Northeast Water Solutions, Inc.

PASCOAG UTILITY DISTRICT

CLEAN WATER INFRASTRUCTURE REPLACEMENT PLAN

Five (5) Year Update

May 11, 2022

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I. OVERVIEW

This Clean Water Infrastructure Replacement Plan (Plan) has been prepared by Northeast Water Solutions, Inc. on behalf of the Pascoag Utility District (PUD, the District) PWS ID# RI1592020. The Plan was prepared in accordance with the Rules and Regulations for Clean Water Infrastructure Plans per the requirements R46-15.6-INFRA created in October, 1994 and amended in January, 1995 and January, 2002.

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

This Plan utilizes information, in whole or in part, that was provided in previous reports prepared by PARE Corporation, and C&E Engineering Partners, Inc., including the 2010 Clean Water Infrastructure Replacement Plan, and the 2015 PUD Environmental Report for the Water Main Rehabilitation Project. Additional information was derived from the 2012 Pascoag Utility District Facility Improvement Plan, the 2017 CWIRP, and the 2020 Water Supply System Management Plan prepared by NWSI. Pascoag Utility District operating, administrative, and financial information developed subsequent to the prior Plan submittal is also employed in this Plan.

The Infrastructure Replacement Act, Title 46, Chapter 15.6 designates the Rhode Island Department of Health (RIDOH) as the primacy agency to administer the program for Clean Water Infrastructure Plans. This Act requires that all water purveyors that on an annual basis purchase or sell over 50 million gallons of water prepare, maintain and implement a detailed infrastructure plan of the principal components of the water system. Each water system is required to provide a mechanism, for funding to replace and/or rehabilitate identified components at the end of their useful life within the framework of the Regulations.

The intent of the Plan is to provide a planning and funding mechanism to insure this infrastructure replacement program is maintained and executed by the District, and minimize the need for large scale capital improvements.

The District purchases a majority of its water supply on a wholesale basis from neighboring Harrisville Fire District (HFD). The remaining portion of the District's water supply is withdrawn from one (1) active bedrock supply well. The system infrastructure also includes two (2) water storage standpipes, transmission and distribution water mains, two chemical feed stations, administrative and maintenance buildings, and miscellaneous system components.

The wholesale purchase of water from HFD was initiated in 2001/2002 due to a groundwater contamination event which rendered the District's primary supply wells #3 and #3A incapable of supplying a reliable potable water supply. Previous to this contamination event, the District relied solely on their own production supply wells to meet the water system demand requirements. The District installed a bedrock supply well in 2007 with a planned capacity of 105 gallons per minute (GPM). The well facility was placed into service on January 1, 2008 and has been successfully utilized to augment the purchase of wholesale water from HFD. The capacity of this well has declined to a present effective yield of approximately 20 gpm.

II. INTRODUCTION

2.0 Water Supply System Description

The District (PWS ID# RI 1592020), created in 2001 as a successor to the Pascoag Fire District provides water service to 1,122 metered connections with a user population of approximately 2,805, in the Village of Pascoag, within the Town of Burrillville, RI. (Refer to Appendix A - Water Distribution System Plan).

Water is presently provided to the system from one (1), drilled bedrock water supply well (PUD Well #5) and from a connection with the neighboring HFD. Well #5 contributes approximately 10% - 15% of the daily user demand, with the majority of the water supply provided from the HFD system. The water is stored in two (2) standpipes, a 1.5 million gallon tank on Rock Avenue and a 265,000 gallon tank located on South Main Street (opposite Lapham Farm Road). The storage tanks are sized to meet both potable water and fire protection requirements for the District.

The distribution system piping ranges in age up to approximately 100+ years old. However, approximately 50% of the distribution system was cleaned and re-lined in a 3-phase program from 2017 through 2020. The system is configured as a central loop around Pascoag Village, incorporating the 1.5MG Rock Avenue standpipe, with radial branches to outlying areas. The branches are all linear and it is not possible to "loop" these branches. The principle distribution piping is 14" Ø extending from the 1.5 MG standpipe, with the central loop consisting of 10"Ø, 8"Ø and 6"Ø piping. The branch along South Main St. has been upgraded with 12"Ø pipe extending NW-SE from the 265,000-gallon South Main Street standpipe. The system is provided 130 hydrants, some of which have been in service more than 30 years. During the pipe cleaning and relining project, 64 hydrants were replaced with new devices. Thirty-one (31) hydrants are scheduled to be replaced in a phased approach during the next several years. The interconnection with the HFD is via a 10" service connection in Main Street, provided with isolation valves, a double-check valve and flow meter installed into a below-grade reinforced concrete vault.

The District's system originally imported water from the HFD, however following the installation of Well #1, in 1946, the District began providing water from its own source wells. This gravel-packed well was installed in the Silver Lake Avenue well field, within the building that now serves the PUD as the Maintenance Barn, initially providing a capacity of 350 gpm. Well #1 continued in service until April 1972 when it was abandoned due to elevated levels of iron and manganese (0.4 mg/l) in the water creating aesthetic problems, and clogging of the gravel packing around the well screen that reduced the effective well capacity.

Well #2 was installed in the Silver Lake Avenue well field, approximately 600 feet SE of Well #1, in 1947, to augment the system capacity. This gravel-packed well, installed within a small pump house building, had an initial capacity of approximately 150 gpm, however it declined over time, ultimately being redeveloped in 1989 to a capacity of approximately 125 gpm. When this well was abandoned in 2001, due to VOC contamination, it had a capacity of approximately 70 gpm.

In 1970, Well #3 was installed in the Silver Lake Ave well field, approximately 650 feet SE of Well #1 and 220 feet SW of Well #2. This gravel-packed well was installed within a new pump house building, providing a capacity of approximately 440 gpm. The well capacity had declined to approximately 220 gpm at the time it was abandoned in 2001 due to VOC contamination.

Well #3A was installed in 1999, adjacent to Well #3 in the expanded Pump House, in response to declining capacity of Wells #2 and #3. During test programs in 2000/2001 this well demonstrated a capacity of 600 gpm, however the well had to be abandoned in 2001 shortly after start-up, due to VOC contamination of the well field, from an off-site source.

Following the shut-down of the Silver Lake Ave well field due to VOC contamination in 2001, the District has imported water from the HFD via a 10"Ø connection in Harrisville Road, initially depending upon this source to make up 100% of the District's user demand. Well #4 was drilled in 2006 as a potential drinking water source, however the output was only 25 gpm, and the District proceeded with drilling Well #5. Well #5, a drilled bedrock well, constructed in 2007 on the Sugarman Property, went on-line in early 2008, currently is providing a capacity of approximately 20 gpm (28,800 gpd) to lessen reliance upon the HFD. Table 2-1 presents a summary of the water supply wells installed by the PUD since 1946.

Table 2-1:
Pascoag Utility District Water Supply Well Summary

Well ID	**Well #1**	**Well #2**	**Well #3**	**Well #3A**	**Well #5**
Date Installed	1946	1947	1970	1999	2007
Type of Well	Gravel Pack	Gravel Pack	Gravel Pack	Modified Gravel Pack	Bedrock
Total Well Depth	48 ft.	43'-3"	56 ft.	64 ft.	665 ft.
Casing Diameter Ø	12" x 18"	10" x 18"	8"	16"	8"
Casing Length	34 ft.	33 ft.	53 ft.	56.3 ft.	20 ft.
Screen Length	15 ft.	10 ft.	5 ft.	7 ft.	NA
Screen Diameter	12"	10"	8"	14.5"	NA
Screen Slot Size (0.001")[1]	125	125	125	140	NA
Screen Install Depth – BGS	34 – 48 ft.	33.3–43.3 ft.	52-56 ft.	56.3-64 ft.	NA
Est. Capacity	350 gpm	150-70 gpm	440-220 gpm	600 gpm	20 gpm
Water Quality Issues	Fe, Mn	Fe, VOC	VOC	VOC	NA
Service Status	Off-Line	Off-Line	Off-Line	Off-Line	On-Line

Note 1: Screen slot size is measured in thousandths of an inch (125 = 0.125")

2.1 Current and Projected Water Demand

The District provides planning projections based upon the present water demands and average demand per connection, and is basing future demands upon anticipated trends in population and service connections, over a 20-year planning period utilizing information from the Burrillville Comprehensive Plan. Because the demand projections are based upon the existing District water use they include firefighting, unmetered water use, and unaccounted for losses.

Table 2-2 summarizes District usage for 2021, and identifies projected water demands based on a twenty (20) year period from 2021 to 2040 as presented in the 2020 Water Supply System Management Plan.

Table 2-2 Projected Water Demands Water Supply System Management Plan			
Operating Year	**2021**	**2025**	**2040**
Total Service Connections	1,122	1,124	1,114
Average Day Demand[1]	220,000 gpd	220,000 gpd	220,000 gpd
Maximum Day Demand[1]	310,400 gpd	308,000 gpd	308,000 gpd
Peaking Factor	1.41	1.41	1.41
Note 1: ADD Projections are based on the Burrillville Comprehensive Plan and the 2020 WSSMP and are consistent with District operating data. The peaking factor is based on average District operating data for 2020-2022.			

The present sources of supply are Pascoag Well #5 and the connection to the HFD. Pascoag Utility District desires to enhance sustainability and minimize risk by developing additional in-District water sources under the direct control of the District.

2.2 Organization and Legal Structure[1]

The District is a self-supporting, quasi-municipal public utility providing potable water and electricity within its prescribed service territory to service customers. The operation of the water supply portion of the District is financed directly from the sale of metered water to District customers. The District is controlled and operated through a five (5) member part-time, Board of Utility Commissioners ("Board"). This Board is primarily responsible for guidance and policies of the District. This includes but is not limited to defining critical aspects of policy and procedure, approving budgets, system expansion, establishing water rates, enforcing by-laws and establishing general system rules and regulations. The day to day management, operation and function of the water system is dependent upon the General Manager and assigned operation staff.

Note 1: Section reprinted from CWIRP January, 2010, C+E Engineering Partners

A. Organizational Structure

Table 2-3 provides a listing of the organization framework of the water system including job classifications and personnel.

B. Description of Responsibilities

General Manager

The individual tasked with the day to day business function of the water system is the General Manager. This includes managing the District's operations staff, maintaining regulatory compliance, maintaining intergovernmental and customer relations, coordinating activities of the District's professional consultants, advising the Board and implementing policy decisions of the Board.

Assistant General Manager of Operations

The duties of this individual is primarily related to assisting the General Manager in performance of the day to day tasks of managing the water system and serve as the primary backup in periods of absence of the General Manager. This individual is also a liaison to the public in facilitating response to concerns or complaints in regards to the water system. A working relationship with other relationship with other related agencies and utility offices is a part of this individual's function. A responsibility for overseeing all components of the water system on a round the clock basis to ensure the quality and safety of the water system is also under the umbrella of duties for this individual.

Water Department Superintendent

This individual is tasked with the day to day responsibility of ensuring that the water system operates in accordance with the rules and regulations of the Rhode Island Department of Health, Office of Drinking Water Quality. This individual is responsible for possessing a working knowledge of the principals, procedures and techniques of the water distribution system. Knowledge of the materials and techniques required for construction, maintenance and repair of a water system, including facilities and structures is also required.

The individual employs an ability to keep accurate and legible records of the water system and possesses a strong mechanical background to ensure proper maintenance of the water system components. This person is required to demonstrate skill when operating the special equipment and tools related for water system maintenance. The ability to respond tactfully and with discretion to inquiries and complaints is also part of the day to day functioning in this role.

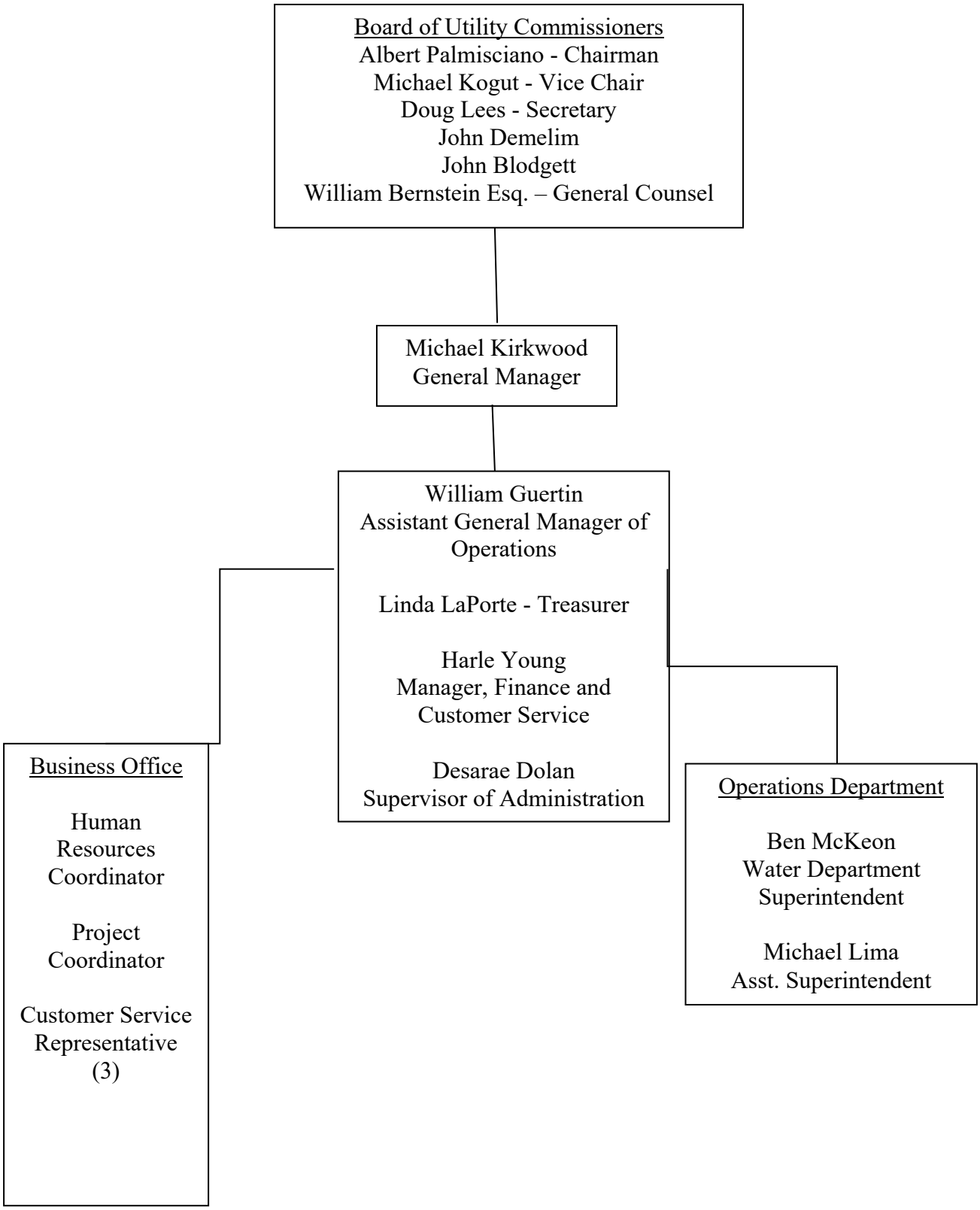
Manager, Finance and Customer Service

This individual is responsible for daily functions of the Business Office including interfacing with the District's customers, providing customer assistance and general information, preparation and mailing of water bills and collection of payments and all accounting and financial functions. The Manager, Finance and Customer Service reports directly to the General Manager.

The District employs a monthly billing system for all customers with all customer distribution meters consisting of an automated reading and billing system. Each service connection has a service, curb stop and meter. The District owns and maintains the tap, curb stop and service pipe up to inside of the curb line at the approximate property line of the customer. The District also furnishes, installs and maintains individual meters.

The Manager, Finance and Customer Service, manages a full-time staff of three individuals within the Business Office with adequate qualification, experience and number in order to effectively and efficiently perform the duties of this area.

TABLE 2-3
Pascoag Utility District
Organizational Chart



Supervisor of Administration

This individual is responsible for administrative functions of the Business Office including the human resources area, IT management including phone and customer service, technical equipment, accounts payable and the District's demand-side management programs. The Supervisor of Administration reports directly to the General Manager. The Supervisor of Administration manages a full-time staff of two individuals with adequate qualifications and experience to effectively and efficiently perform the duties of this area.

Business Office

The employees of the Business Office are responsible for daily functions of the office including interfacing with the District's customers, providing customer assistance and general information, preparation and, ailing of water bills and collection of payments. These personnel report directly to the Supervisor of Administration or the Manager, Finance and Customer Service.

C. Legal Structure

The Pascoag Utility District (District), a quasi-municipal public utility, owns and operates a public water distribution system that serves a portion of the Village of Pascoag in the Town of Burrillville, Rhode Island. The District provides potable water service to its customer base on a "not for profit basis". All operations are financed from water revenues on the form of user fees and the District is managed to be self-supporting. The District seeks funding for capital improvement needs through the most cost effective financing available. Ultimately, however all operations are financed from the revenue generated in the form of customer fees.

In addition to the Districts Water System, the Town is also served by a neighboring water purveyor, the Harrisville Fire District (HFD). The HFD serves as the whole sale supplier of furnished water to the District through one main metered wholesale interconnection located on Main Street and a backup emergency interconnection located on Union Avenue.

The legal and mailing address for the District is:

Pascoag Utility District
253 Pascoag Main Street
P.O. Box 107
Pascoag, Rhode Island 02859

D. Service Territory

Geographic Area

The Village of Pascoag is located in western Rhode Island in the Town of Burrillville. The District's service territory occupies approximately 3 square miles of the 55.6 square miles of land area in the Town of Burrillville. The District's service territory is generally defined by the Village of Pascoag which is bordered by the Village of Harrisville to the east; the Village of Laurel Hill to the north; the Village of Bridgeton to the west, and

extending along the Pascoag Reservoir to the south up to the Town of Glocester. A map of the general service area and major infrastructure components is provided in Appendix A.

Water Services/Customer Accounts

There currently exist 1,122 customer service accounts including residential, commercial, industrial and governmental. The number of residential service accounts equates to 1039 or approximately 93% of the total. The remaining 7% consists of 80 commercial accounts and 3 industrial accounts.

Present Population Served

It is estimated that the current population served via the 1,122 service accounts is 2,805 persons assuming the service connection population formula of 2.5 people per connection. An estimate of the maximum population to potentially be served is 3600 (the difference accounts for those employing private wells within the service territory). Projections of population served for the five and twenty-year planning periods are 2,815 and 2,792, respectively for the District. This represents a modest 0.6% growth in customer accounts for the 5-year planning period, and a 0.9% decrease for the 20-year planning period based on the Burrillville Comprehensive Plan.

Population Demographics

A review of the 2020 U.S. Census information indicates a population of 4,911 in Pascoag, RI. The number of housing units in Town is identified at 1,924, with an occupancy rate of 92%, with 1,776 households with an average of 2.7 persons per household.

2.3 Historical System Summary[1]

The District's water system was developed from an artisan well system thought to have been constructed in the 1800's. The well system consisted of two dug wells, two artesian wells and two shallow trenches acting as infiltration galleries. This well system and pumping facilities were located near the since abandoned Pascoag Railroad Station. System water storage was provided by a 235,000-gallon water storage tank on Rock Avenue which has since been replaced by the 1.5 million-gallon (MG) steel storage standpipe constructed in 1979. Around 1912, the nearby HFD was formed. A new supply well was constructed within Harrisville's service territory which was then considered the main supply of water for both the District and the HFD.

Note 1: Section reprinted from CWIRP January, 2010, C+E Engineering Partners

Formerly under private ownership, the system was purchased by the then-named Pascoag and Harrisville Fire Districts. The District continued to share the water supply well until approximately 1944 when the two systems were separated by a closed valve on Chapel Street. It was at this time that Pascoag elected to install its own drinking supply well termed Well #1 off of Silver Lake Ave. The continued expansion of the water system

promoted Pascoag to build another storage tank on South Main Street with a capacity of 265,000 gallons in 1968.

Subsequently, the District installed Well #2 in 1947 and Well #3 in 1970, also off of Silver Lake Ave., which added to the existing supply capacity of Well No. 1. The District was forced to abandon Well #1 due to the existence of high levels of iron and manganese concentrations and the associated problems it created. Well No. 2. Was also removed from service due to iron levels and reduced production capacity. Well No. 3 continued to stay online and Well #3A was installed in 1999 to serve as the primary supply well with Well No. 3 serving as the backup well supply for the system.

In the summer of 2001, the District detected high levels of methyl-tertiary-butyl ether (MTBE) in both Wells #3 and #3A and subsequently was forced to abandon both supply wells. In response to the elimination of existing supply wells, the District began to purchase wholesale water from neighboring HFD. Since then, the District has maintained a primary metered interconnection with HFD on Main Street and a secondary (non-metered) emergency interconnection on Union Avenue.

The District began to explore alternate water sources, and in 2006 drilled Well #4. The well yielded only 25 gpm, and was abandoned as a water source, which led to the drilling of Well #5. Well #4 was later used as a water level monitoring well for the nearby wetland and vernal pool to confirm that Well #5 was not stressing the local ecosystem. After approximately seven years of monitoring, the State was satisfied that Well #5 did not adversely impact these natural resources. Well #4 remains inactive.

The District installed a bedrock supply well in 2007 with a rated capacity of 105 gpm (Well #5). This well source is located at the far end (dead end) of a radial leg of the distribution system near the intersection of George Eddy Drive and Reservoir Road. This source has been permitted with the Rhode Island Department of Health (RIDOH) and the Rhode Island Department of Environmental Management (RIDEM) Division of Freshwater Wetlands. The RIDEM wetlands permit stipulated pumping restrictions for this source which included an initial maximum withdrawal rate of 75 gpm.

Well #5 was placed into service on January 1, 2008 and has been successfully utilized to augment the purchase of wholesale water from the HFD. Upon activation, the daily production from this source originally averaged 108,000 gallons which provided up to 30 percent of the system average daily demand. This well was redeveloped in 2014 to restore capacity to approximately 40 gpm (57,000 gpd).However the capacity of this well is again declining, and the current rate of withdrawal from the well is approximately 20 gpm. This equates to 28,800 gallons per day (or less) or 12% of the District water supply.

III. System Infrastructure Component Analysis

3.1 General[1]

This section provides an analysis and description of the major infrastructure components of the District's water system. Specifically, this includes a discussion related to component condition, function and original date of construction, future life expectancy and record of latest maintenance and repair. As permitted per the Regulations, small and numerous system components such as water mains, valves, hydrants and service connections shall be evaluated collectively as a group.

Visual inspection and observation, inquiry with District staff, record plans, available engineering and inspection reports and studies were primarily utilized to determine component condition and future life expectancy. The source of the determination for each assessment is so noted. On the basis of specific available information, the life expectancy of a particular component may vary from the guidelines provided in the Regulations. In addition, by employing proper routine maintenance in combination with replacement of critical items and "wear use" components, the useful life expectancy of a particular system component, maybe be extended significantly. Where applicable estimated cost are provided for the rehabilitation and/or replacement of system components. These costs are provided in present day (2022) dollars.

3.2 Wells #3 and #3A and Pump House:

This Pump House was originally constructed in 1970 to house Well #3, ultimately expanded in 2000 to accommodate the addition of Well #3A. The building has a plan area of approximately 550 ft^2, and provided a spread footing and perimeter foundation wall (8" reinforced concrete) extending to approximately 6" above grade. The building floor is 5" thick, cast-in-place concrete with welded wire mesh reinforcing, poured within the foundation wall.

The building superstructure is of concrete masonry units with grout-filled cores, vertical and horizontal reinforcing. The shed roof is a membrane type, with tapered insulation, supported by 2 x 10 joists on 12" centers with batt insulation between the joists. The roof joists are enclosed with 3/8" interior plywood sheathing. The roof is provided two (2) scuttles to facilitate removal of the well pumps, using a crane. The interior clear height is approximately 10'-9". The south wall of the building is provided an overhead door for equipment access, and a personnel door.

The primary 480 VAC, 3 phase electrical service is installed on the east end of the Pump House, including primary disconnect switches, distribution panel, motor starters, and bussing (Photo #5). The building is provided a standby, emergency generator with automatic transfer switch, installed on a foundation pad immediately adjacent to the

Note 1: Section reprinted from CWIRP January, 2010, C+E Engineering Partners

Pump House. The emergency generator also provides standby power service for the

Maintenance Barn. The electrical service, switchgear, distribution service and emergency generator are all in excellent physical condition.

Well #3 was in service from 1970 until shutting down due to VOC contamination in 2001. The capacity of Well #3 had declined over time, which was the impetus to develop Well #3A, in close proximity. A downhole video inspection of Well #3 was performed in 2006, with the following findings:

- The lower 7 feet of the borehole, within the well screen was fouled with grit, sand, gravel and oxidized iron. Only the upper 3 feet of the original well screen was visible.
- The observed portion of the well screen was badly corroded in "*in very poor condition*".
- An oil layer was observed in the upper portion of the water column in the well.

Well Pump #3 has been partially dismantled (for the inspection in 2006) and remains disassembled. Prior inspection of the pump drive motor indicates it is in fair to good physical condition. Inspection of the 8"Ø discharge piping identified an accumulation of corrosion product, including tubercles, within the discharge pipe (Photo #6). The corrosion product has a nominal thickness of 1/8" with tubercles to 3/8" thickness.

Well Pump #3A remains intact, as installed. Although the borehole has not been inspected since installation, the exposed portion of the pump, drive motor and piping appear to be in good physical condition.

An emergency generator is installed immediately adjacent to the Pump House. This diesel-fired generator is Milton-Cat Model D150P1, rated for 150 KW, providing 277/480 VAC, 60 Hz power. This generator provides standby power for both Pump House #3/#3A and the Maintenance Building.

In 1999, this well station was completely rehabilitated with the existing building structure razed and a new concrete masonry structure constructed to enclose both well heads. Although this pumping facility is inactive, it has been maintained and is in good condition, with a projected effective life of > 30 years.

The future use of Pump House #3/#3A and Wells #3/#3A is dependent upon remediation of the VOC contamination in the wellfield. There is presently no active remediation effort underway, however natural attenuation and dissipation of the contamination indicate the groundwater quality may be restored and acceptable for use in approximately five to fifteen years.

A pump test of Well #3A is planned for 2023 to determine production viability and to assess water quality.

Component General Condition	Life Expectancy
Pump and Wellhead No. 3: Fair per visual inspection	10 years
Pump and Wellhead No. 3A: Good, new in 2000	15 years +
Well Station Structure: Very Good, new in 2000	40 years +
Mechanical Systems: Good, new in 2000	25 years +
Electrical: Excellent, Very Good new in 2000	25 years +
Corrosion Control System: Good, new in 2000	10 years +
Instrumentation and Control: Upgraded in 2000	10 years +

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2023	Well #3A pump test	$30,000
10 year/2032	--	--
15 year/2037	--	--
20 year/2042	--	--

3.3 Maintenance Building & Well #1:

The Maintenance Building was initially constructed off of Silver Lake Avenue in 1946 to house Well #1, with two (2) additions later constructed to provide storage and a maintenance garage. As noted above, Well #1 was shut down in 1972 due to elevated iron and manganese content in the water. No design or construction as-built drawings or documentation for this building were available for review. The total building structure has an outside length of 84 feet. The original building structure had an outside width of 19'-2", with the sequential additions having widths of 22'-0" and 30'-0". Well #1 remains installed within the original portion of the building that has been converted to a field/maintenance office.

This rectangular, single-story building is constructed with a cast-in-place concrete foundation wall, concrete masonry unit (CMU) walls and a truss-supported roof. The floor of the original structure is supported by wood joists, while the floor of the two (2) additions is cast-in-place concrete. The building appears to be constructed over a very-fine compacted sand material that readily flows when disturbed. Additionally, a portion of the foundation wall under the original structure is partially unsupported, due to the erosion of sand from underneath. The roof is finished with asphaltic tiles and appears to be in good condition, reported to be approximately 17 years old. The window frames demonstrate some weathering and separation from the wall opening.

Electrical service into this building is 480 VAC, 3 phase, 60 Hz. The service is provided a primary disconnect switch, distribution panel and step-down transformer providing 120 VAC, 1 phase service for lighting, receptacles, etc. The power supply and distribution system is in good physical condition. Standby electric power is provided from the emergency generator installed at the Well #3/#3A Pump House. Building heat is provided by a gas-fired heating system, estimated to be in service approximately 15 years.

While this building underwent repair in 2015, ongoing deterioration prompted construction of a new maintenance 5-bay garage and office area in 2021 adjacent to the existing building. The original building is now utilized for storage.

The new facility is a 30'x 90' steel building with a 4' cement foundation that supports an 8" cement slab for the floor. Within the building, 20'x30' is dedicated for the office area, with one access door. The office area will be heated by a Haier dual zone mini split heating and cooling system. The interior of the office area is constructed with 2"x6"x8'stud framework for the walls and 2"x12'x16' ceiling joists. Upon completion, the office area will house Dell laptops that will be linked directly to through a fiber optic connection in the main office. The remaining 70'x30' will be used for the maintenance garage and vehicle storage. The garage has five (5) 12'x12' roll up garage doors and two access doors. The 70'x30' garage area has an open layout, with no dimensions for individual bays. The 70'x30' garage area is heated by two (2) Modine 130,000 BTU propane heaters. Electricity for the building is supplied through the PUD on a standard 200 amp breaker panel.

3.4 Well #5 and Pump House:

This pre-cast, rectangular concrete building (approx. 16'-0" x 14'-0") was installed in 2008 to house Well #5 and the associated power supply, instrumentation and controls. The pre-cast building structure is provided an integrally cast floor, is installed over a compacted gravel foundation, and is in excellent physical condition. The building is installed within a perimeter security fence that also contains the power supply transformer.

Access into the building is provided by a 2-leaf door. The wellhead is within the building with the discharge piping installed above the floor. The 6"Ø ductile iron discharge piping includes isolation valves, a surge suppressor, flowmeter and a chemical feed injector, all appearing to be in excellent condition. The primary power service is 208Y/120 VAC, 3 phase, 60 Hz (4-wire). The interior electrical power, distribution and control components are in excellent physical condition including; (1) primary disconnect switch, (2) distribution panel, (3) well pump drive panel, and (4) chemical feed system control panel. The chemical feed system uses sodium hypochlorite for microbiological control.
An emergency generator is installed immediately adjacent to the Pump House. This propane-fired generator is Milton-Cat Outdoor Olympian Model, rated for 60 KW, providing 120/208 VAC, 3-Phase, 60 Hz power. This generator provides standby power for both Well #5 and the Pump House.

Latest Maintenance/Repairs: This drilled, bedrock well source was installed in 2007 and activated January 1, 2008 with an effective yield of 105 gpm, and an approved maximum pumping rate of 75 gpm. The well underwent cleaning, flushing and redevelopment in 2014, due to loss of effective yield. The pump house overall is rated in very good condition, although the effective well yield has been reduced to approximately 20 gpm, and the well is providing approximately 12% of the District water demand. Therefore, Well #5 is scheduled to be redeveloped in 2022 with the goal of improving performance.

The chemical feed system was upgraded recently with a new backup chemical feed pump and new Teflon 3/8" tubing for the chlorine feed line. A new pH probe, linked to the SCADA system was also installed. A new chlorine analyzer is scheduled to be installed in 2022.

Component General Condition	Life Expectancy
Well Casing: Excellent, new in 2004	25 years +
Well Pump: Excellent, new in 2008	10 years +
Well Station Structure: Excellent, new in 2008	40 years +
Mechanical Systems: Excellent, new in 2008	25 years +
Electrical: Excellent, new in 2008	25 years +
Chemical Feed System: Excellent, new in 2019	10 years +
Instrumentation and Control: New in 2020	10 years +
Emergency Generator: New in 2013	25 years +

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
5 year/2022	Well Re-Development	$28,000
5 year/2022	Instrumentation & Controls	$3,000
5 year/2027	New Well Pump Assembly	$10,000

3.5 Rock Avenue Standpipe (1.5M Gallons):

This water storage standpipe tank was constructed in 1978 to replace a smaller tank (235,000 gallon) installed in the same location. Table 3-1 presents a summary of the tank design and fabrication.

Prior to 2001 this storage tank was operated with a total water depth of approximately 98 feet (el. 588 ft.), resulting in an effective depth (above El. 550 ft.) of 38 feet and effective volume of 558,000 gallons. Since 2001 the system has required up to 100% of the demand to be supplied from the Harrisville Fire District system, necessitating a reduction of the water level to 85 feet and the effective volume to 367,000 gallons, a reduction of 187,280 gallons (33.8%).

This tank has undergone periodic inspections in accordance with good engineering practice in 1994, 2000, 2007, 2012 and 2017. The next tank inspection and associated cleaning is scheduled for 2022.

The Rock Avenue Standpipe was removed from service on November 28, 2012 and returned to service on June 3, 2013. The repairs included complete rehabilitation of the internal and external coatings of the tank, and all code updates were implemented. Equipment replacements include the 12" valve at the bottom of the tank, the 12" line from Rock Avenue to the analyzer shed and the line from the meter to the sample port. In addition, due to a lightning strike, a new tank level gauge was installed, and the output

is transmitted to the SCADA system on a continuous basis. Trend charts can also be accessed through the SCADA software. A sample collection manifold was installed to allow the Operator to obtain a discrete sample of the tank contents from three (3) separate elevations in the tank.

Table 3-1: Rock Avenue Water Storage Standpipe Design	
Tank Configuration	Vertical, Cylindrical
Tank Materials	Welded Carbon Steel
Tank Volume - Gross	1.5M gallons
Tank Dimensions	50' Ø x 104' S/S Ht.
Tank Bottom	Flat
Grade Elev. @ Tank	490 ft.
Overflow Elevation	590 ft.
Water Level/Depth	85 ft.
Effective Water Depth[1]	25 ft.
Effective Volume[1]	367,000 gallons
Tank Coatings - Exterior	Epoxy Paint
Roof Hatches	2 @ 24" Ø, 1 @ 30" Ø
Side Manways	2 @ 24" Ø
Top Vent	18" Ø w/cap & screen
Overflow	12" Ø
Fill/Discharge Connection	12" Ø
Access Ladder	Yes
Sample piping	3 @ ¾" PVC
Ladder Safety Restraint System	Yes
Ladder Access Security	Yes
Note 1: The effective depth is based upon a minimum water elevation of 550 ft. required to maintain distribution system pressure. Based upon the reported water depth of 85 feet the effective liquid depth above El. 550 ft. is 25 feet, equivalent to 367,000 gallons.	

The 2017 inspection by Underwater Solutions, Inc. (USI) resulted in the following excerpts of the findings with regard to the physical condition of the standpipe tank. The complete report can be found in Appendix D.

- The exterior steel wall panels and associated welds were observed to be sound and free of obvious fatigue or failures of the steel at this time. The protective coating applied to the exterior walls was observed to have good adhesion value, providing adequate protection for the steel surfaces. However, 2 of the 13 rows of bolts exhibited a dry film thickness that was slightly less than the required thickness. A mild to moderate non-uniform accumulation of mildew throughout the exterior walls has declined the overall esthetics. USI recommends pressure washing the exterior wall, roof, and exterior components to preserve the adhesion value of the protective coating, while improving the overall aesthetics.

- The steel roof panels and associated wells appeared sound and remain free of obvious fatigue or failures of the steel. The protective coating applied to the surfaces meets the

AWWA dry film thickness recommendation and appeared to have been applied uniformly, having good adhesion value, providing adequate protection for the steel.

- The sidewall manways were determined to be securely installed and free of obvious leakage.

- The 36, 2-1/2"Ø tank anchor bolts were inspected and each anchor bolt nut was securely installed, and the protective coating applied to this steel support hardware was found to have good adhesion.

- The tank foundation is uncoated yet appeared mostly sound. Tight cracks were observed throughout less than 5% of the exposed surfaces. The cracks were sounded and appeared to be limited to the surface of the concrete and free of voids or spalls at this time. USI advised that these cracks should be monitored to ensure that concrete spall does not occur.

- The exterior access ladder is secure, the coating system in good condition and the fall restraint system is place.

- The interior walls, coating and floor of the tank appeared sound and free of fatigue or failures of the steel. The protective coatings applied to all surfaces appeared to have been applied uniformly, with good adhesion thereby achieving adequate protection.

- A uniform layer of accumulated precipitate averaging 1.5" in depth, was found throughout the floor. All precipitate was vacuumed up during the cleaning process. A mild to moderate stain remained throughout the floor which was attributed to the precipitate. Mild staining was observed throughout the interior walls as well.

In addition to routine tank inspections occurring on 5-year intervals, a mixing system is scheduled to be installed during 2022 to assist in blending the contents of the tank to reduce stratification.

Component General Condition	Life Expectancy
Structure: Very Good	50 years +
Protective Coatings: Very Good	20 years
Concrete Foundation: Very Good	40 years +
Piping/Vault: Good per visual inspection	25 years +

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
2022	Mixing System	$25,000
2022	Inspect Tank*	$4,000
5 year/2027	Inspect Tank*	$5,000

10 year/2032	Inspect Tank*	$6,000
15 year/2037	Inspect Tank*	$7,000

*Included in general operating budget

3.6 South Main Street Standpipe (265,000 Gallons):

This water storage standpipe tank was constructed in 1968 to replace a smaller tank (235,000 gallon) installed in the same location. Table 3-2 presents a summary of the tank design and fabrication. The tank is presently operating with a maximum effective operating depth of 40 feet, equivalent to an effective volume of 184,000 gallons.

This tank has undergone periodic inspections in accordance with good engineering practice in 1995, 2000, 2007, 2012, and 2017. The next tank inspection is scheduled for 2022.

The South Main Street Standpipe was removed from service on July 19, 2012 and returned to service on November 27, 2012. During this time the internal and external coatings of the tank were reapplied, and all code updates were implemented. A sample collection manifold was also installed to allow the Operator to obtain a discrete sample of the tank contents from three (3) separate elevations in the tank.

Table 3-2:
South Main Street Water
Storage Standpipe Design

Tank Configuration	Vertical, Cylindrical
Tank Materials	Welded Carbon Steel
Tank Volume - Gross	265,000 gallons
Tank Dimensions	28’ Ø x 58’ S/S Ht.
Tank Bottom	Flat
Grade Elev. @ Tank	542 ft.
Overflow Elevation	590 ft.
Water Level/Depth	48 ft.
Effective Water Depth[1]	40 ft.
Effective Volume[1]	184,140 gallons
Tank Coatings - Exterior	Epoxy Paint
Roof Hatches	1 @ 24”x 24” 1 @ 30” x 30”
Side Manways	1 @ 24” Ø 1 @ 30” Ø
Top Vent	24” Ø w/screen
Overflow	8” Ø
Fill/Discharge Connection	12” Ø
Access Ladder	Yes (2)
Sample piping	3 @ ¾” PVC
Ladder Safety Restraint System	Yes
Ladder Access Security	Yes

Note 1: The effective depth is based upon a minimum water elevation of 550 ft. required to maintain distribution system pressure. Based upon the reported water depth of 48 feet the effective liquid depth above El. 550 ft. is 40 feet, equivalent to 184,000 gallons.

The 2017 inspection by USI resulted in the following excerpts of the findings with regard to the physical condition of the standpipe tank. The complete report can be found in Appendix D.

- The exterior steel wall panels and associated welds were observed to be sound and free of obvious fatigue or failures of the steel at this time. The protective coating applied to the exterior walls was observed to have good adhesion value, providing adequate protection for the steel surfaces. A mild to moderate non-uniform accumulation of mildew throughout the exterior walls has declined the overall esthetics. USI recommends pressure washing the exterior wall, roof, and exterior components to preserve the adhesion value of the protective coating, while improving the overall aesthetics.

- The tank foundation is uncoated yet appeared mostly sound. Tight cracks were observed throughout less than 5% of the exposed surfaces. The cracks were sounded and appeared to be limited to the surface of the concrete and free of voids or spalls at this time. USI advised that these cracks should be monitored to ensure that concrete spall does not occur.

- The steel roof panels and associated wells appeared sound and remain free of obvious fatigue or failures of the steel. The protective coating applied to the surfaces meets the AWWA dry film thickness recommendation and appeared to have been applied uniformly, having good adhesion value, providing adequate protection for the steel.

- The sidewall manways were determined to be securely installed and the protective coating exhibited good adhesion value.

- The six (6) 1.75”Ø anchor bolts were inspected and each anchor bolt nut was securely installed, and the protective coating applied to this steel support hardware was found to have good adhesion.

- The exterior access ladders are secure, and the coating system in good condition with a fall restraint system is place.

- A uniform layer of accumulated precipitate averaging 1” in depth, was found throughout the floor. All precipitate was vacuumed up during the cleaning process. A mild stain remained throughout the floor which was attributed to the precipitate. Mild staining was observed throughout the interior walls as well.

- The interior walls, coating and floor of the tank appeared sound and free of fatigue or failures of the steel. The protective coatings applied to all surfaces appeared to have been applied uniformly, with good adhesion thereby achieving adequate protection.

- The top 10’ segment of the PVC sample piping support has failed, resulting in exposure of the steel surfaces at the site of the failed weld, with mild corrosion evident on the

exposed steel surface. No fatigue of the steel was evident. A primer coating was applied in this location and exhibited good adhesion.

In addition to routine tank inspections occurring on 5-year intervals, a mixing system is scheduled to be installed during 2022 to assist in blending the contents of the tank to reduce stratification. Construction of a new chlorine analyzer shed with ATI chlorine analyzer is also planned within the next five years.

Component General Condition	Life Expectancy
Structure: Very Good	50 years +
Protective Coatings: Very Good	20 years
Concrete Foundation: Very Good	40 years +
Piping/Vault: Good per visual inspection	25 years +

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
2022	Mixing System	$25,000
2022	Inspect Tank*	$4,000
5 year/2027	Inspect Tank*	$5,000
10 year/2032	Inspect Tank*	$6,000
15 year/2037	Inspect Tank*	$7,000

*Included in general operating budget

3.7 Wholesale Supply Interconnection

The District currently obtains the majority (88%) of its water on a wholesale basis from an interconnection with neighboring Harrisville Fire District located off Main Street. A secondary emergency interconnection also exists on Union Avenue which consists of a 6-inch closed gate valve. The main interconnection is owned and operated by the District, and consists of an underground concrete vault with master meter and normally closed bypass on the water main in Main Street. The District submits to a court order for the wholesale purchase of water from the HFD. The agreement permits reasonable access to both parties to the vault for the purpose of reading, calibrating and maintain the meter assembly. The District also performs periodic upgrade and upkeep of the vault for functional purposes.

A. Main Street Master Meter Vault

Construction Date/ Age: 2002/ 20 years

Description: The vault is located immediately off the shoulder of Main Street, at the location of the division between the two Districts. The vault consists of a reinforced concrete structure with the top of the vault set at approximately 6” above finished

grade. Access is via a two (2) leaf hatch. The vault houses a 10-inch turbine meter with strainer, isolation valves, and a check valve to prevent backflow to HFD. The flowmeter is provided a remote, digital output to allow the Operator to read the meter without entering the vault. The meter is linked directly to the SCADA system which allows PUD to access real time flow in gallons per minute and it also provides daily readings in gallons. The District also has chemical feed systems for chlorine and corrosion control located in a separate location called the "Hot Box" whereby the incoming water supply from the HFD can be adjusted to increase the residual chlorine and minimize corrosion.

Recent Rehabilitation/Repairs: The vault was installed in 2002 and is in very good condition. Recent improvements in 2020 include a new pressure data logger to monitor the line pressure, and Harrisville provided a new flowmeter and a new check valve.

Component General Condition	Life Expectancy
Structure: Excellent	65 years +
Meter/Interconnections: Very Good	15 years +
Mechanical Piping and Components: Very Good	30 years +
Instrumentation: Very Good	10 years +

B. Hot Box

The Hot Box is located at the Pascoag Main Street office complex and was constructed in 2002 as part of the connection with Harrisville Fire District. It is a 6'x6'x 7.5' height building that houses the chlorination system. The Hot Box chlorination treatment consists of a 55-gallon day tank, chemical feed pump for chlorine, backup chlorine feed pump, and 3/8" tubing for the chlorine feed line.

An orthophosphate chemical feed system for corrosion control was added in 2020 in response to copper and lead exceedances. The orthophosphate system includes a 50-gallon day tank, mixer, chemical feed pump and 3/8" polyethylene tubing. The two chemical tanks are located within a containment pallet for spill control. The chlorine feed line was upgraded to 3/8" Teflon tubing in 2020, and a new backup chemical feed pump for chlorine was also provided. The planned improvement in 2022 includes upgrading the orthophosphate chemical feed line to 3/8" Teflon tubing. Future planned projects include replacing and upgrading the 55-gallon day tank for the chlorine feed system and possibly replacing the chemical feed pump.

The North Main Street Analyzer Shed is a concrete shed set up specifically for monitoring residual chlorine from the system at the Hot Box, and is a remote location around the corner from the Hot Box. Chlorine residual monitoring is tied into the SCADA system. PUD recently installed a new ATI chlorine analyzer and 3/8" Teflon tubing for the analyzer.

Required or Scheduled Rehabilitation/Replacement

Time Interval/Year	Description	Estimated Cost
2022	Orthophosphate Teflon feed line	$ 250
5 year / 2024	Chlorine day tank and feed pump location)	$ 2,500
15 year/2037	Chlorine Metering Pump & Chlorine Analyzer (remote location)	$ 10,000
20 year/2042	--	--

3.8 Water Distribution System Piping, Valves, Hydrants, Meters and Curb Stops:

Table 3-3 presents a summary inventory of the approximately 17.6 miles of distribution system piping. The water distribution piping is all original construction, excepting certain pipeline repairs therefore, the substantial majority has been in service more than 50 years and certain segments for over 100 years. The Water Main Cleaning and Re-Lining Program to rehabilitate the oldest segments is described in detail in Section 3.9. District personnel identified the approximate age of certain portions of the distribution system, as noted below:

- All of the 14"Ø cast iron piping (approx. 2,500 lf) installed at the center of the system (High Street, Main Street, Rock Ave., and Eagle Peak Rd.) has been in service approximately 100 years;

- The 12" Ø cast iron piping installed in South Main Street (approx. 7,600 lf) was installed in 1968 in conjunction with the South Main Street Water Storage Standpipe tie-in (300 lf), and therefore has been in service 54 years;

- Additional 12" Ø cast iron piping is installed along Main Street, Harrisville Road, Elm Street, and the Rock Ave Standpipe Tie-in (approx. 2,760 lf) has been in service approximately 100 years;

- The 10"Ø cast iron piping installed in Pascoag Main Street has been in service more than 100 years, and the South Main Street section was installed in 1968 (approx. 3,360 lf);

- The 8"Ø cast iron piping installed in North Main Street, Grove Street, Sayles Avenue, and Laurel Hill Avenue has been in service from 42 to 65 years, and the access roads for Well #1 (80 years), Well #2 (60 years) and Well #3 (50 years) for a total of approximately 10,400 lf. It should be noted that during Phase 2 of the cleaning and relining project in 2018, approximately 160 LF of the pipe along Sayles Avenue experienced a leak and was repaired by inserting a 6" HDPE segment through it, with expansion connections on each end back to the 8" cast iron cast-iron main ;

- The 8” Ø cast iron piping installed in South Main Street (approx. 1,600 lf) is an extension from the 12” Ø piping installed in 1988-1990 and therefore has been in service approximately 34 to 36 years;

- The 6”Ø cast iron piping installed in South Main Street and Reservoir Road (approx. 11,600 lf) has been in service approximately 60 years;

- The 6”Ø cast iron piping (approx. 8,880 lf) installed in the center of the system (Howard Ave., Church Street, Pine Street, Broad Street, Charles Street, and Irving Rd.) has been in service for more than 60 years;

- The northwest branch of the distribution system consists of 6” Ø piping (approx.. 5,680 lf) including East Wallum Lake Rd., Old Wallum Lake Rd., Wallum Lake Rd., Ross Rd., Laurel Ridge Rd., and North Hill Road and has been in service approximately 60 years;

Table 3-3:
Water Distribution System Inventory

Pipeline Ø	Pipe Length (ft.)	Distribution Valves
Distribution Main		
2”Ø	2,260 lf	5
3”Ø	3,580 lf	8
4” Ø	200	1
6”Ø	54,520 lf	89
8”Ø	14,100 lf	27
10”Ø	3,360 lf	5
12”Ø	12,560 lf	22
14”Ø	2,500 lf	7

- The southwest branch of the distribution system consists of 6” Ø piping (approx.. 10,080 lf) including Eagle Peak Rd., Lake Shore Dr., Shady Lane, Beach Road, Lake View Drive, Moss Lane, Camp Dixie Road, and Rock Avenue and has been in service approximately 60 years;

- Northeastern branches of the system consist of 6” Ø piping (approx. 11,520 lf) including the Well #1, #2, and #3 access road, Centennial Street, Union Avenue, Grove Lane (in service 60 years), Hill Road (in service 30-60 years), Ledgewood Lane (in service 17 years), Hamlet Street (in service 40 years), Fairbanks Avenue (in service 40 years), and North Hill Road (in service 100 years);

- Eastern branches of the system consist of 6” Ø piping (approx. 6,760 lf) including Griffin Street (in service 100 years), the Well#4 and #5 access road (in service 17 years), George Eddy Road (in service 17 years), Lapham Farm Road (in service

60 years), Arthur's Way (in service 30 years), Park Place and Spring Street (in service 100 years);

- The 4" Ø cast iron piping (approx. 200 lf) off the southern end of Sayles Ave. has been in service 15 years;

- The 3" Ø cast iron piping (approx. 3,580 lf) is installed in areas in the perimeter of the system, including Erin Lane, Marion Ave., Pleasant Street, and Roosevelt Ave. These lines have been in service for 60 years;

- The 2" Ø pipe is constructed of copper piping (approx. 2260 lf) and is located at Lodge Road, Maple Terrace, Shore Drive, Nahant Place, and Albee Lane, and off the southern end of Sayles Ave. These lines have been in service for 60 years.

The substantial majority of the distribution piping is cast iron pipe, with limited amounts of ductile iron and PVC in more recently constructed pipelines. Also, approximately 2,100 lf of 8"Ø pipeline installed in Davis Drive (serving the industrial park) is of asbestos cement materials, and has been in service 50 years. The Rolling Meadows development off South Main Street, including Finn Road and Julia Road, is provided a service loop of 12" PVC (approximately 1900 lf) and has been in service approximately 20 years.

The District conducted a service area leak detection survey completed by Hydra-Tech in 2015. In 2019, Conservation Technologies performed a leak detection survey of all the District's system map. Six (6) leaks were detected including three (3) main leaks, two (2) additional service line leaks and one hydrant valve leak, totaling 15 gpm. Repairs were conducted. PUD is committed to conducting a system-wide leak detection survey annually, and has done so since 2019, in order to identify leaks and reduce water loss. All identified leaks have been repaired. It should be noted that since the completion of the Water Main Cleaning and Re-Lining project water main breaks have diminished extensively, with limited service leaks in the last few years. The installation of the orthophosphate system also minimizes corrosion impacts which can compromise water quality and lead to water main leaks.

The existing Summer Street water main feeds three to four homes and is scheduled for a complete replacement of the main with new services in the next five to ten years.

<u>Distribution Valves</u>: The distribution system includes 164 valves, 150 of which are 6" or larger. Valves are typically exercised once per year however, there is no formal valve inventory or maintenance program. It is recommended that the District implement a formal valve management and maintenance program to assure the long-term effective service of the valves and to minimize unscheduled failures and disruption of service.

The valves in the District's system were installed within the pipe section or hydrant assembly on which they are located, and consist of buried, double disk and resilient seated, wedge style gate valves. In general, they are of similar age of the pipe section or hydrant assembly on which they were installed. It is estimated that over 90% of the

valves were approaching 100 years in age, which corresponds to the CI pipe sections on which they are installed. However, 78 were replaced during the Water Main Cleaning and Re-Lining Program.

Excepting specific cases of valve degradation or failure, the useful life of each valve is nominally equivalent to the pipe section or hydrant assembly upon which it is installed. The valve would be typically upgraded with the pipe or hydrant, as required. The cost for valve replacement/upgrade is included in the cost of the pipe or hydrant assembly. The anticipated effective valve life is typically 75 to 100 years.

Hydrants: The distribution system is provided with 130 hydrants, including one (1) hydrant located at the Rock Avenue Water Storage Standpipe, one (1) at Pump House #3/#3A and one (1) hydrant at the Well #5 Pump House. Each hydrant is typically provided a 6" service valve and they are a mix of manufacturers (Ludlow, A. Darling, Kennedy, Mueller, U.S. Pipe, Clow, and Eddy). The hydrants are replaced on an as-needed basis and District personnel report that they have been in service from 1 to >60 years. A formal, unidirectional flushing program was implemented in 2014, and was conducted initially on an annual basis, and is now conducted bi-annually. Hydrant maintenance records are maintained, including pressure data logging around the system, as well as a hydrant inventory list. PUD recently measured hydrant flows around the system and marked devices with color-code tape to identify hydrants accordance to fire codes.

Hydrants are typically repaired or replaced when they are determined to be leaking, non-draining, or wholly/partially inoperable, or otherwise malfunctioning. Sixty-two (62) hydrants were replaced in conjunction with the line cleaning and re-lining project. PUD has plans to replace the remaining 31 aging Ludlow and Eddy models in the 2022-2026 time frame. The effective life of a hydrant is 50 to 75 years.

Service Meters: The District has executed a comprehensive replacement of all service meters during 2010/2012. The replacement meters are equipped with a radio read transmitter system suitable for "drive by" monitoring. Additionally, the meter program also includes an automatic and reading billing system. All meters are now AMR type to facilitate data collection for water use monitoring, billing and system management. During 2020-2021, PUD replaced all meter register heads for radio reading. It is anticipated that the water meters will have a service life of 15-20 years.

Curb Stops[1]: The District owns and maintains that portion of the customer service that lies within the public right-of-way, generally from the corporation stop at the supply main to a curb stop valve located in the vicinity to the property line of the customer. This portion of the service is referred to as the curb stop. From the point of the curb stop valve to the internal plumbing system, the customer is responsible for ownership and maintenance of the line. This portion of the service is referred to as the customer service line or service line. There are approximately 1,118 customer service lines within the District's service territory.

Curb stops were generally installed to the customer's property line at the time of distribution main installation throughout a particular area and as development in an area occupied. The standard material for all curb stops and service lines is type "K" copper tubing. Copper pipe (tubing) is a widely-utilized material for customer service connections in the water services industry. PUD recently identified seventeen (17) lead service line connections, and replaced all of these during 2020-2021.

Currently, there is no program to upgrade or replace any customer service lines or curb stops. The useful life of these components is in the range of 75 years, or better. Any replacement deemed necessary through the failure of these system components is considered general system maintenance and is included in the annual operations budget.

3.9 Water Main Relining Program:

A. Project Description

A Water Main Cleaning and Re-Lining Program to rehabilitate the District's existing distribution system piping with pipeline cleaning and lining was initiated in 2017 and completed in 2020. The Distribution System Re-Lining Program cleaned and re-lined the aging cast iron pipe in the oldest, core portion of the distribution system. The cleaning process included grinding and flushing accumulated iron and tuberculation deposits from the pipeline interior. A continuous, cementitious lining was then installed on the prepared interior pipeline surface, creating a clean finish that enhanced hydraulic characteristics and provided a non-corrosive wetted interface with the flowing water. The project also provided new valves and hydrants.

- Phase 1 (2017) included 3,900 linear feet of 8", 10" 12" and 14" pipe and replacement of 11 valves.
- Phase 2, (2018) included 15,195 linear feet of 6" to 14" cast iron pipe and replacement of 28 valves.
- Phase 3, (2020) included an additional 19,310 linear feet of pipe and replacement of 39 valves, plus 2,330 LF along Centennial Street.

The figure provided in Appendix B identifies the location of the piping that was included in the cleaning and re-lining. The total length of the re-lined pipe is approximately 38,400 linear feet, representing approximately 50% of the aging cast iron pipe.

Note 1: Section reprinted from CWIRP January, 2010, C+E Engineering Partners

B. Project Details

The District water mains in the following locations were cleaned/lined during Phase 1 in 2017:

- Pascoag Main Street 7 valves replaced
- High Street 4 valves replaced

The District water mains in the following locations were cleaned/lined during Phase 2 in 2018:

- North Main Street 3 valves replaced
- Grove Street 2 valves replaced
- Laurel Hill Avenue 5 valves replaced
- Church Street 6 valves replaced
- Sayles Avenue 8 valves replaced
- Irving Avenue 2 valves replaced
- Pine Street 2 valves replaced

The District water mains in the following locations were cleaned/lined during Phase 3 in 2020:

- Pine Street 2 valves replaced
- Howard Avenue 4 valves replaced
- Charles Street 2 valves replaced
- Sayles Avenue 2 valves replaced
- Eagle Peak 1 valve replaced
- Broad Street 2 valves replaced
- High Street 2 valves replaced
- South Main Street 14 valves replaced
- Centennial Street 10 valves replaced

3.10 Instrumentation & Controls:

The District maintains the following local system monitoring and control instrumentation:

A. Water Storage Tank Level Monitoring: Both standpipe tanks are provided liquid level monitoring that display and/or record, and are also transmitted on the SCADA system. District personnel have the ability to manually read the meters or recorders and transfer the data:

- The Rock Avenue tank (1.5 MG) level monitoring is provided a monitor readout local to the tank in the Maintenance Building. Local high and low water level alarm indication is provided.

- The S. Main Street tank (265,000 gallons) is provided a monitor readout local to the tank. Local high and low level alarm indication is provided.

B. Flow Meters: The system is provided two (2) flowmeters for monitoring water makeup:

- The connection with HFD is provided a 10" turbine meter. The flowmeter is provided a remote, digital output to allow the Operator to read the meter without entering the vault. The meter is linked directly to the SCADA system which allows PUD to access real time flow in gallons per minute and it also provides daily readings in gallons. Isolation valves are also transmitted by SCADA.
- Well #5 is provided a 4" paddlewheel type insertion flowmeter with an output to a local indicator/data logger and a chart recorder installed in the Pump House. The system Operator has the ability to transfer the data to flash drive on a monthly basis, ultimately transferring the data into a master electronic data base. Local low flow alarm indication is provided, with an auto-dialer output (text message) to the system operator.

C. Chlorine Residual Monitoring: The district has two (2) points of injection for sodium hypochlorite; one located at the "Hot Box" chemical metering enclosure on the grounds of the District Administrative Offices, and the 2nd at the Well #5 Pump House. A chlorine residual monitor is provided at the Well #5 Pump House, one at the Rock Street Avenue Standpipe, and one at the North Main Street Maintenance Building. The system operator has the ability to read this monitoring data locally. Local alarming is provided for high and low chlorine residual with an auto-dialer output (text message) to the system operator. A fourth chlorine residual monitor is planned at the South Main Street Storage Tank within the next 5 years. This project will include construction of a new shed and ATI chlorine analyzer with communication to the SCADA system.

D. Well #5 Level Monitoring: Well #5 is provided an electronic pressure transducer providing continuous monitoring of the water level in the well. The output signal is sent to a data logger in the Pump House, providing the Operator the ability to transfer data to a flash drive.

3.11 SCADA System:

In 2013 the District purchased and installed a Supervisory Control and Data Acquisition (SCADA) system to remotely monitor, record operating data, provide trending screen charts, and allow off-site Operator access to the following information from the these system locations:

A. The Rock Avenue Tank:

- Remote Tank Level Monitoring
- Chlorine Residual Monitoring
- Distribution System Pressure Monitoring.

B. The South Main Street Tank:

- Remote Tank Level Monitoring

- Distribution System Pressure Monitoring.

C. The HFD Wholesale Meter Vault:

- Flow Rate (GPM)
- Flow Totalization (Gallons)

D. The Hot Box:

- Chemical Day Tank Level Monitoring

E. Well 5 Pump House:

- pH Monitoring
- Chlorine Residual Monitoring
- Well Level Monitoring
- Flow Rate (GPM)
- Flow Totalization (Gallons)
- System Pressure (psi)

F. The North Main Street Maintenance Building:

- Chlorine Residual Monitoring

3.12 Standby Power Supply Systems:

The emergency generator serving Pump House #3/#3A and the Maintenance Building is in excellent condition and of sufficient capacity to meet projected needs. See Section 3.2 for details.

An emergency generator is installed immediately adjacent to the Well#5 Pump House. This propane-fired generator is Milton-Cat Outdoor Olympian Model, rated for 60 KW, providing 120/208 VAC, 3-Phase, 60 Hz power. This generator provides standby power for both Well #5 and the Pump House.

IV. System Administrative Component Analysis (Note[1], with updates)

4.1 Buildings

The District conducts operations for its water system from two (2) locations; the Business Office at 253 Pascoag Main Street which houses the offices for administration, billing and customer service; and an Operations and Maintenance Office, which is located at the site of the former Well #1Pump Station off Silver Lake Avenue which had been retrofitted with a four-bay garage and storage area. Storage of spare system components (i.e. pipe, valves, hydrants, etc.) is provided at the Operations and Maintenance Office.

A new facility has been constructed on the property where Well #1 and the Operation and Maintenance are located. The building will house a dedicated office area with the remaining space designated for the maintenance garage and vehicle storage. The garage has five (5) roll up garage doors.

The Business Office is in excellent condition having been completely renovated. Similarly, the Operations and Maintenance Office is in good condition, and will be transitioned to the new building. There are no additional required improvements, significant maintenance or rehabilitation that is anticipated to be required at either facility for the next 20 years. The Business Office is fully ADA compliant.

4.2 Vehicles

The District owns four (4) service vehicle which consist of a 2008 Ford E350 general utility cutaway van, a 2019 Chevy Silverado pick-up truck, a 1992 Ford rubber tired backhoe which is shared with the Electric Division branch of the District, and a 2017 John Deere backhoe. An air compressor trailer is also shared with the Electric Utility. The utility truck is replaced out at approximate ten year intervals. District vehicle(s) are maintained and serviced by District employees and serviced through a local auto mechanic for major repairs. The 2017 John Deere 310 backhoe is relatively new and is expected to have a remaining life of appropriately 10-15 years. Overall, the condition of the District vehicles is good.

Should the need arise for a larger scale repair or emergency, the Water Superintendent utilizes the resources of the District's Electric Department personnel, or neighboring Harrisville Fire District whereas both District's manually assist each other in emergencies or the services of an outside water works contractor. These costs are appropriated in the general operating budget.

4.3 Computer Equipment/Billing Software

The District maintains an in-house NISC iVue customer service billing software system which was upgraded following replacement of the District water meters. This software is in very good condition. An annual appropriation is set aside for upgrades/maintenance of components and purchase of software and the associated costs are budgeted within the annual operation budget. In addition, several personal computers are maintained by the

Administrative Staff that are upgraded on an as needed basis. Funds for the next Water Department laptop and computer update are designated in the 2024-2026 time frame with an anticipated cost of $5,000.

Note 1: Section reprinted from CWIRP January, 2010, C+E Engineering Partners

The District has the hardware/software for communication and operating systems/methods to relay information to District personnel. The network expedites both the ordering of necessary parts and the completion of the respective tasks. This program also inventories all repair parts/equipment, and creates purchase orders. The same software package generates work orders for repairs when equipment arrives allowing for the timely completion of tasks.

As discussed in Section 3.11, the SCADA system enables PUD staff to remotely monitor, record operating data, provide trending screen charts, and allow off-site Operator access to the information from the PUD system locations. A SCADA desktop system update is planned in 2023 with an anticipated cost of $3,500.

4.4 Cross Connection Control Program

In accordance with the Rhode Island Rules and Regulations to Public Drinking Water (regulations), Section 9.4, the District developed and implemented a cross connection control program. This program includes the following provisions.

- Pascoag Utility District conducts surveys of new and existing service connections, determine levels of hazard and select appropriate backflow preventers.
- Pascoag Utility District requires the owner of the backflow prevention device to make necessary corrections, or removal of actual or potential cross-connections.
- Pascoag Utility District agrees to develop suitable timetables for the inspection and/or testing of back preventers and insure that this work is completed by a certified backflow preventer inspector/tester.

A certified cross connection control survey is planned for 2023, which will entail completing all industrial and commercial service connections. In 2024, a certified cross connection control survey will address completing all residential service connections. Funding for implementation of the program will be from the general operations budget.

4.5 Water Exploration Activities

A. Clear River Pilot Infiltration Gallery

In 2015 the Clear River pilot, riverbank infiltration gallery was designed, constructed and subjected to a pumping test program to assess the viability of developing a new public drinking water source along the Clear River in an area northeast of wellfield of Wells #1, #2, and #3 . The infiltration gallery was installed in conjunction with an extensive system of monitoring/observation wells

to assess the ambient pre-test groundwater conditions, in addition to the conditions occurring during the active pumping program and the subsequent recovery phase. The groundwater monitoring and pumping test program determined the following:

- The pilot infiltration pre-test ambient groundwater elevation monitoring demonstrated that groundwater elevations were nominally stable prior to the initiation of the infiltration gallery construction, and again during the period between completion of construction and the initiation of pumping. The groundwater elevations demonstrated reasonable stability with minimal variability, particularly considering the absence of any precipitation occurring recently prior to or during this monitoring period. Additionally, the river gage monitoring indicated an extremely stable water surface elevation.

- The construction dewatering operated continuously for 174.50 hours until shutting down on September 14, 2015. During the dewatering, when pumping at approximately 200 gpm, it was noted that groundwater stabilization (in the excavation) occurred approximately 11 feet below grade. It was necessary to increase the dewatering pumping rate by the addition of a submersible pump into the excavation to approximately 250 gpm, to lower the water elevation sufficiently to permit excavation to the full depth of the gallery. Drawdown recovery initiated immediately upon shutdown of the pumping, with the open cut excavation recovering to an elevation slightly above the pre-construction groundwater elevation within 3 hours. This rapid recovery is indicative of the groundwater recharge capacity substantially exceeding the groundwater withdrawal rate.

- During the seven (7) days of ambient monitoring from September 23rd through 28th when **no precipitation occurred**, the water elevation in the Clear River was the principal factor controlling groundwater elevations along the riverbank and in the immediately adjacent gallery area. Subsequent significant precipitation events demonstrated relatively rapid response from the aquifer as water coursed from immediately adjacent upland areas into the Clear River.

- The pumping test programs demonstrated nominal stabilization occurring rapidly, with no apparent impact to the Clear River and only a slight drawdown in the upstream and downstream riverbank piezometers. The riverbed piezometers further indicated the zone of capture extended under the Clear River, but did NOT extend beyond the north bank of the river. Additionally, the slight decline in groundwater elevations in the far-field piezometers and observation wells was consistent with ambient pre-test trends, and response to precipitation events.

- The rapid water level recovery of the production well, observation wells and nearby piezometers after both the step-pumping test program and the constant rate pump test further demonstrates that the aquifer underlying the Clear River

infiltration gallery site has sufficient yield capacity to support the recommended capacity of the production well.

- A subsequent groundwater supply model was executed to evaluate the contributing aquifer area, recharge, aquifer drawdown and potential contaminant threats. The model demonstrated the existing aquifer was viable for supply, with minimal impact from a threat of contaminant intrusion from the former wellfield. This model determined viability of this aquifer to supply up to 400 gpm.

Implementation of this potential water source is on hold pending resolution of land acquisition and viability of other sources.

B. Steere Farm Water Supply Well

The proposed target well site is located in the northeast section of the Steere Farm property in Chepachet, RI (41.927752 Lat, -71.657184 Long), within the Chepachet River Sub-basin of the Branch River and Lower Blackstone Watershed.

The groundwater withdrawn from the Chepachet River sub-basin will be transferred to homes and industries located in the Clear River sub-basin, located just northwest of and within the same Branch River Basin, thereby increasing the amount of water emanating from this sub-basin locally. Based upon surface water estimations, a maximum amount of 22% of available surface water will be extracted from the Chepachet Sub-basin during 7Q10 low flow conditions under a groundwater extraction rate of 400 gpm. However, it is very likely that this amount will be much lower than estimated as the evaluation criteria are very conservative, assuming that all groundwater stored within the basin is being directly withdrawn from the Chepachet River at the time of its extraction. Due to aquifer storage effects and the lag time between the pumping of groundwater from the production well, the potential impacts of that withdrawal on any surface water decline of the Chepachet River will be reduced.

The impacts of the transfer of groundwater withdrawn from the Chepachet River basin and its redistribution to the adjacent Clear River sub-basin will include an increase in the flow rate of the Clear River at or below the Burrillville Water Treatment Plant, which is near the terminus of the Clear River Sub-basin. The overall impact to the Branch River Basin is minimized as most of the water extracted from the Chepachet River will be redistributed again into the Branch River south of the Burrillville Treatment Plant.

The initial pumping test program was completed in 2015 and the implementation of this potential water source is on hold pending resolution of land acquisition and viability of other sources.

C. Roosevelt Avenue / Knights of Columbus "Columbus Club" Property

The subject property is located at 98 Roosevelt Avenue in Pascoag, RI. The site was determined to be a favorable area for development based on geophysical exploration and test drilling, and lies within the Clear River sub-basin of the Blackstone River Watershed basin.

The initial step in the process of exploration consists of an initial field survey and contaminant threats evaluation, and a preliminary hydrogeologic assessment, followed by site specific logistical and technical surveys, test well siting and test drilling. The work would be performed in a staged fashion with further work contingent upon receiving positive indications that groundwater is available and logistics are not an impediment to successful well targeting.

Development of an exploratory well of this magnitude as a public water supply will require the approval of both RIDOH and RIDEM, including the following scope of recommended tasks:

- Pre-Test Surface Water and Groundwater Monitoring Program: Transducers would be installed into the exploratory well, possibly in nearby observation or private wells and piezometers would be installed into nearby wetlands and water courses to monitor the ambient upper aquifer groundwater and surface water elevations. This program would be conducted for a minimum of 10 days, potentially longer, depending upon field and weather conditions.
- Pump Test Program – Phase 1 – Step Test: The initial phase of the pump test program to assess the effective well capacity using incremental flowrates. Each step phase of the test is conducted for 1- hour or until log stabilization of the water level in the well is attained. During this phase of the test, a transducer installed in the well provides continuous monitoring and logging the water column pressure, temperature and level readings.
- Pump Test Program – Phase 2 – Constant Rate Test: This test would be conducted over a 240-hour (10-day) period at the discharge flowrate determined from the Step Pumping Test. Upon shutdown of the pumping phase the recovery would be monitored for a minimum 10-day period. A well level transducer would provide continuous monitoring of the water level during the pumping and recovery phases. Additionally, monitoring data would be obtained from observation wells and piezometers to assess potential impacts from the pumping. Additionally, field monitoring of certain water quality parameters would be conducted (pH, TDS, conductivity, temperature, odor, color).
- Safe Yield Assessment: The data generated by the well pumping test would be used to develop a safe yield projection for the well. This would include a projection of the well water drawdown using a 180-day, no recharge extrapolation scenario, to assess whether the well would be able to continue to produce water at a specific rate under conditions of long-term aquifer stress.

- Water Quality Monitoring: During the constant rate pump test water samples would be obtained to execute a comprehensive water quality evaluation including; physical and inorganic parameters, VOC's, SOC's, radionuclides, and pH titrations.
- Because the well(s) would have a capacity >10,000 gpd the pump test program, impact assessment and final report would be prepared in accordance with the requirements of the RIDEM Groundwater Withdrawal Program (>10,000 gpd) and submitted to RIDEM for review.

The initial phases of the project scope could begin in 2022. The PUD plans to utilize settlement funds from the Exxon/Mobile litigation to fund the project as opposed to the District's capital fund. The project cost is expected to range from $139,800 to $217,500. Not included in this budget is the cost for full infrastructure implementation including a Pump House and utility infrastructure, access road, transmission force main, design and construction engineering, permits, etc.

V. SDWA Regulations/Planning Document Compliance (Note[1], with updates)

5.1 Water Quality Regulations

The District is cognizant of the requirements of the Safe Drinking Water Act (SDWA) and maintains a continued effort to ensure compliance. To a large extent, the District replies upon its wholesale supplier, the Harrisville Fire District, to meet specific compliance requirements of the SDWA and to ensure that water quality standards are being maintained. The District periodically performs analytical testing of the wholesale source water and requires analytical test results from the wholesale supplier. These test results allow the District to determine compliance with standards and consequently potential changes in operations. Since the activation of Well No. 5 in January 2008, the District has performed analytical testing of this supply well water.

The Rhode Island Department of Health (RIDOH) is the primary agency enforcing SDWA Regulations. The District is designated by the RIDOH as a community water supply system. As such, the District is required to sample water from the distribution system that is representative of that which consumers drink to assure conformance with these Regulations. For the District, this notably includes the "Total Coliform Rule" (TCR) whereby the District is required to collect samples from the distribution system to verify the presence/absence of the total coliform bacteria. The District also preforms sampling for lead and copper at select individual consumer taps in accordance with requirements of the Lead and Copper Rule (LCR). The District is in current compliance with the TCR and LCR. In addition to routine TCR compliance monitoring, the District performs distribution system chlorine residual monitoring. Refer to Appendix C for a copy of the Coliform Sampling Plan and the LCR Sampling Plan.

5.2 Compliance with Planning Documents

This Clean Water Infrastructure Replacement Plan is intended to be consistent with the goals and polices outlined in the "Water Supply System Management Plan for the Pascoag Utility District" and the Town of Burrillville Comprehensive Community Plan. Consequently, it shall be incumbent upon the District to promote consistency between the contents of this Clean Water Infrastructure Replacement Plan and the policies of the Water Supply Management Plan and, as appropriate, the Town's Comprehensive Community Plan.

Future land uses, zoning requirements, growth projections and other areas of mutual interest, with regard to service area expansion, shall be consistent with the ability of the water supply system to accommodate the expected potable water requirements of the system.

Note 1: Section reprinted from CWIRP January, 2010, C+E Engineering Partners

VI. Infrastructure Replacement Plan (Note[1], with updates)

6.1 General

The purpose of this Clean Water Infrastructure Replacement Plan is to identify water system infrastructure components within the District's system which require rehabilitation and replacement in accordance with the requirements of the Rules and Regulations for Clean Water Infrastructure Replacement Plans. It is the obligation of the District that in combination with these infrastructure improvements and general system maintenance, operation and upkeep that the water system operate and provide a safe and reliable water supply for indefinite periods of time. Table 6-1 summarizes the five (5)-year infrastructure improvement costs, and Table 6-2 summarizes the 6 to 20-year infrastructure improvement costs. All costs have been presented in present day (2022) dollars.

6.2 Operation/Organization

The District operates as a self-supporting, quasi-municipal public utility that provides potable water service to the Village of Pascoag within the limits of the existing service territory. A five (5) member part-time, elected Board of Utility Commissioners is responsible for the overall management and polices of the District. The Rhode Island Public Utilities Commission (RIPUC) does not regulate the Water Division branch of the District.

The District operates on the cash method of accounting such that all operations are financed through user fees in the form of water service charges. Charges are adjusted by the Board to reflect cost of customer service and to ensure adequate revenue stream to fund operations, debt services and capital improvements. The District requires an annual financial audit through external auditors. The District will conduct a Cost of Service Study in 2022 to re-evaluate water rates and associated charges.

6.3 Funding[2]

The District has available and utilizes a variety of sources for funding of water system improvements including those costs associated with infrastructure improvements. In general, the District seeks to secure funding through the most cost effective financing alternatives available. The District does not necessarily utilize each of the available funding sources detailed herein, but rather these are options that are currently available for consideration. The following are the major available sources of revenue/financing for the District.

Note 1: Section reprinted from CWIRP January, 2010, C+E Engineering Partners
Note 2: Excerpts based on the Pascoag Utility District Financial Statement for the Year Ending December 31, 2021 compiled by the District and audited by Marcum LLP.

Table 6-1
Infrastructure Fund Improvements
Five-Year Infrastructure Replacement Plan

PROJECT	ESTIMATED VALUE	YEAR START	YEAR END	COMMENTS
Rock Avenue Storage Tank	$25,000	2022	2023	Mixing System
South Main Street Storage Tank	$25,000	2022	2023	Mixing System
Rock Avenue Storage Tank*	$4,000	2022	2022	Tank Cleaning and Inspection
South Main Street Storage Tank*	$4,000	2022	2022	Tank Cleaning and Inspection
So. Main St. Storage Tank	$25,000			New Cl2 Analyzer Shed & Instrumentation
Well Pump Station #3/#3A**	$30,000	2023	2023	Well #3A Pump Test
Well #5 Pump House	$ 28,000	2022	2022	Well Re-Development & new Cl_2 Analyzer
Hydrant Replacement	$2,500/year	2022	2026	Ongoing Replacement of Aging Hydrants
SCADA desktop replacement	$3,500	2023	2023	Desktop Update
Computer System	$5,000	2022	2022	Water Dept. Laptop/ Computer Update
Roosevelt Ave./Columbus Club***	$139,800 - $217,500	TBD	TBD	Development of New Water Source
Orthophosphate Addition System	Complete	2020	2020	LCR Corrosion Control at Hot Box
Water Main Rehabilitation	Complete	2016	2020	Water Main Cleaning/Relining Program
District Vehicle	Complete	2020	2020	New Utility Truck
Chemical Feed/Monitoring System	Complete	2022	2022	Replace Chlorine Pump & Chlorine feedline
Main Street Meter Vault	Complete	2020	2020	Replaced flow monitoring instrumentation
New Maintenance Garage & Office Space	Complete	2021	2021	Replaced aging Maintenance Garage
TOTAL	$296,800-$374,500			

* Maintenance and rehabilitation including five-year inspections included in general operations.

**Redevelopment of Well 3A contingent upon satisfactory remediation efforts in aquifer.

*** Funding for the new water source development is expected from settlement funds associated with litigation from Exxon/Mobile related to contamination of Well #3/#3A.

Table 6-2
Infrastructure Fund Improvements
Year Six through Year Twenty Infrastructure Replacement Plan

PROJECT	ESTIMATED VALUE	YEAR START	YEAR END	COMMENTS
Rock Avenue Storage Tank*	$5,000 $6,000 $7,000	2027 2032 2037	2027 2032 2037	Tank Inspection and Cleaning
S. Main Street Storage Tank*	$5,000 $6,000 $7,000	2027 2032 2037	2027 2032 2037	Tank Inspection and Cleaning
Summer Street Water Main Replacement	$60,000	2027	2027	Replace main and Service connections
Hot Box Chlorine System	$2,500	2024	2024	Replace & Upgrade the 55-gallon Cl2 Day Tank & Feed pump
Clear River Infiltration Gallery		On Hold	On Hold	Development of New Water Source
Steere Farm Well		TBD	TBD	Development of New Water Source
TOTAL	$98,500			

*Maintenance and rehabilitation including five-year inspections included in general operations budget.
**Cost of Backhoe Shared with Electric Utility

A. Customer Charges

The District raises revenue through water use charges and service charges. This revenue is used to fund general operations, capital improvements and to pay debt service on outstanding notes. The Board adjusts these charges as necessary when the annual budget is established to ensure an adequate source of revenue for the budgeted expenses. The District maintains a Restricted Account, or capital reserve fund, for capital purchases that they seed with $50,000 each year. The District collects for debt services through a combination of separate line item customer charges on their bills, supplemented by some of the debt being paid by funds received from a contamination settlement years ago.

B. Rhode Island Infrastructure Bank General Obligation Drinking Water Bonds

The District can obtain financing through bonding based on a majority vote of the Board of Utility Commissioners or ratepayer vote. This option is typically used when financing large capital improvements and is in the form of tax-exempt general

obligation bonds backed by the District's taxing authority. The Administrative Board must evaluate on a case by case basis the need to use General Obligation debt for future water projects. This funding resource was utilized for the AMR Meter Project. The bond was issued in 2009 for $179,000, and with forgiveness from the American Recovery and Reinvestment Act, the net cost to the District will be $137,480. The outstanding balance is $93,000.

C. Commercial Loans

The District has the ability to secure through private lending institutions, commercial loans for immediate and short-term projects. This is generally considered the least attractive method of financing options for the District.

D. Cash Reserves

The District maintains cash reserves for special projects, improvements and emergencies for which an immediacy of need is required. These reserves are accumulated through budgeted accounts.

E. Rhode Island Water Resources Board

The Rhode Island Water Resources Board (RIWRB) is under the authority of the RI Department of Administration's (DOA) Division of Statewide Planning. The mission of the RIWRB is to manage the proper development, utilization and conservation of water resources. Under the Water Facilities Assistance Program, the RIWRB a grant program to finance up to 50% of design and construction costs for new public water facilities. To date, the District has not utilized funding through this program, but is aware of its availability.

F. US Department of Agriculture (UDSA) - Rural Development

The USDA Rural Development (RD) loan program was previously referred to as Rural Utilities Services (RUS), an agency created in 1994 under the auspices of the US Department of Agriculture (USDA). RUS replaced the Rural Development Administration and the Farmers Home Administrations, under the 1994 reorganization. USDA-RD administers a water and wastewater loan and grant program to various eligible rural communities and other eligible participants.

The District has utilized funding and grants for water system improvements through this program and considers this a viable and economic option for financing of future projects. The District secured $2.4 million from USDA-RD in 2017 for Phases 1 and 2 of the water main cleaning and re-lining project. This funding represented a loan of $1,920,000 and $480,000 in grant money. The balance on this loan is currently $1,785,640. In 2019, the District received funding for Phase 3 of the water main cleaning and re-lining project for a total of $2.1 million, including over $900,000 in grant money. The balance on this loan is currently $1,175,092. New valves and hydrants were also installed as part of these projects.

G. Rhode Island Infrastructure Bank (RIIB)

The State of Rhode Island passed legislation in 1993 creating the Safe Drinking Water Revolving Fund under the auspices of the RI Clean Water Finance Agency and the Department of Health. This program, now the RIIB, established a subsidized loan program for eligible publicly and privately organized drinking water supplies in the State of Rhode Island. In order to determine which projects are to be funded, the RIDOH annually prepares a Priority Project Listing. This listing is the basis for appropriation of funds including the issuance of bonds, originating loans and making grants. In 2012, the District obtained $1 million from the RIIB to rehabilitate the system's two water storage facilities. The balance on this loan is $635,000. The District also utilized $195,000 from RIIB in 2021 for the lead service line replacement project. The balance of this loan is currently $156,000. The District will pursue this option of financing for the Standpipe mixing systems in 2022.

H. Infrastructure Replacement Fund (IRF)

The Infrastructure Replacement Fund (IRF) is intended to be funded through the collection of user fees from water bills to the District's customers. The IRF is a direct result of the requirements of the Rules and Regulations for Clean Water Infrastructure Plans. The fees to fund this account would necessarily be an increase to the Districts' current water rate fee structure. The RIDOH / RIIB has set no specific guidelines as to how the IRF fee must be calculated, however requirements per RIGL 46-16.6 are that the IRF must meet the following criteria:

- Any monies collected must be deposited into a dedicated fund and;
- That the charge to the user be proportional to actual usage and;
- The funds collected are identified as a separate line item in the annual audit and;
- The IRF financing be reviewed, and adjusted if necessary on a bi-annual basis.

The District must apply to use the funds, which they have done once or twice in the past.

I. U.S. Environmental Protection Agency Grant Programs

The U.S. Environmental Protection Agency's Office of Enforcement and Compliance Assurance (OECA) makes grant funds available through various State agencies in order to strengthen their ability to address environmental issues and for the betterment of public health. Funding for the grant program has been provided through annual congressional appropriations for the U.S. Environmental Protection Agency (EPA). The District has in the past received such appropriations and specifically related to projects for construction of Well Station No. 5 and the meter replacement program.

J. Exxon Settlement Agreement

In August 2012, the District received $2,714,654 from the Exxon Settlement Agreement. This settlement represented compensation for the MTBE contamination to the District's well field in 2001. The District utilized settlement funds for new water source exploration as described in Section 4.5, as well as for debt service

payments and system improvements such as the SCADA control system. At the end of 2021, $765,635 remained in the settlement accounts. These funds will be utilized for the ongoing water exploration initiatives at the Roosevelt Avenue / Columbus Club property.

6.4 Funding and Cash Flow Analysis

In order to meet the Rules and Regulations for preparation of the Clean Water Infrastructure Replacement Plan, a detailed analysis of the existing infrastructure of the District's water system was completed. The previous sections have provided a review of the system infrastructure components related to condition, remaining useful life and anticipated replacement and/or rehabilitative costs. This specifically included those components for which a remaining useful life of 20 years or less was identified. In general, the infrastructure rehabilitation or replacement of any particular component has been prioritized by the time interval based on its expected useful life.

A discussion was also provided for these improvements categorized as general operations and maintenance expense of the water system. These, by definition of the Regulations, do not qualify for funding under the IRF, but rather must be funded through the general operations budget. This is consistent with current practices of the District.

In addition, there are several infrastructure components discussed in the body of this report which could by definition be categorized as eligible IRF cost. This predominantly includes the development of a new water source, such as the Roosevelt Avenue/Columbus Club. The redevelopment of Well #5 in 2022, and the pump test of Well #3A planned for 2023 may also be eligible.

6.5 Financial Analysis

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

Table 6-1 provides a detailed breakdown for the five-year period that totals $296,800-$374,500 or a $59,360 - $74,900 annualized cost. This dollar value is largely attributed to development of a new water source, the mixing systems for the two water storage tanks, redevelopment of well #5, and the pump test at well #3A. Table 6-2 provides a summary breakdown for the twenty (20) year period (year 6 through year 20) that totals $98,500, or a $ 6,600 annualized cost.

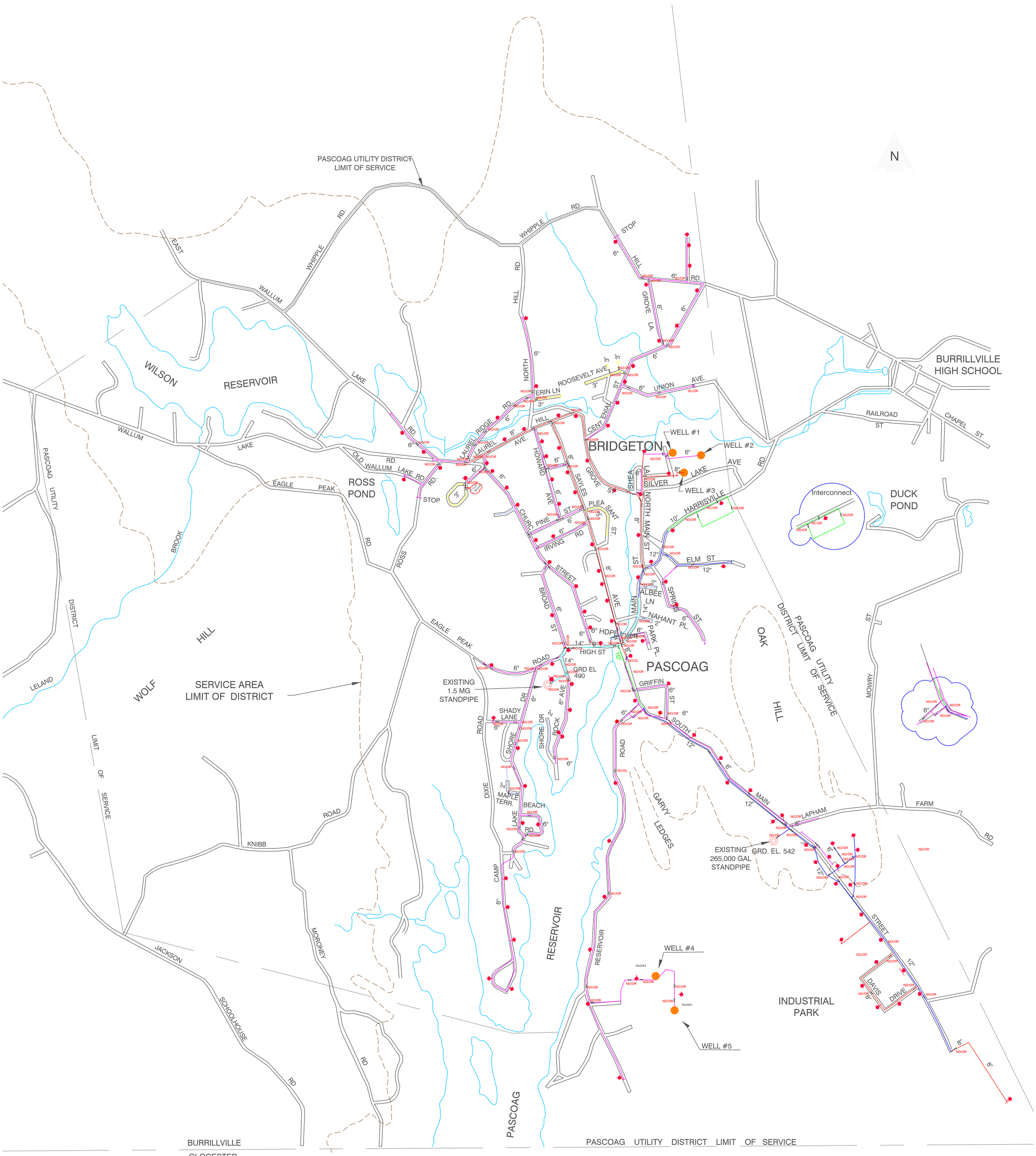
Currently, the District maintains a method of customer rate charges based on full cost of service allocation accounting. In other words, the District seeks to recover all the costs associated with administration, operation, and maintenance of the water system

through customer rate charges. This type of system establishes uniform rates for customers and maintains individual customer bills based on the actual volume of water utilized. In addition, all customers pay an annual service charge based on meter size to cover the cost of meter maintenance, administration and billing. Therefore, the final customer bill is comprised of two components, a minimum charge, which includes the service charge, and an overage charge for water use in excess of the minimum. The District will conduct a Cost of Service Study in 2022 to re-evaluate water rates and associated charges.

The District employs proper planning and fiscal management for pending water system improvements. Many of these improvements have been previously identified and anticipated by the District and considered in terms of both short and long term fiscal planning. The District shall seek to provide funding through the various funding source alternatives currently available as discussed above, and will determine on a case by case basis the most cost-effective method available.

Appendix A

Water System Map



LEGEND

- Existing Hydrant
- Existing Valve
- 2" Existing Pipe
- 3" Existing Pipe
- 4" Existing Pipe
- 6" Existing Pipe
- 8" Existing Pipe
- 10" Existing Pipe
- 12" Existing Pipe
- 14" Existing Pipe

GRAPHIC SCALE

800 0 400 800 1600 2400

(IN FEET)
1 inch = 800 ft.

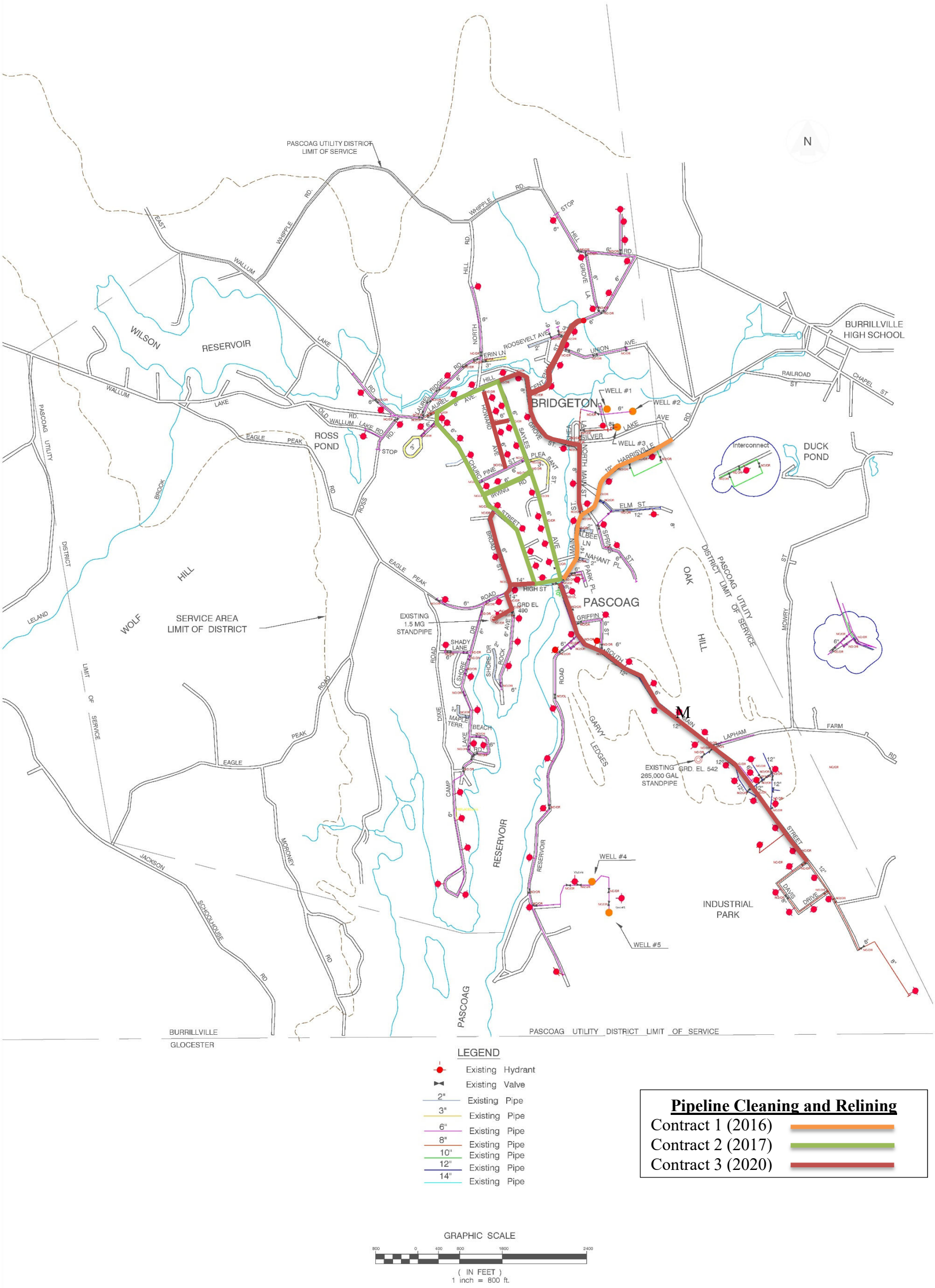
PASCOAG UTILITY DISTRICT
PASCOAG, RHODE ISLAND

WATER DISTRIBUTION SYSTEM PLAN

Gary Kimation, Engineer at Large 1-7-2014

Appendix B

Water Main Rehabilitation Map


PASCOAG UTILITY DISTRICT LIMIT OF SERVICE
N
WILSON RESERVOIR
ROSS POND
BRIDGETON
PASCOAG
WOLF HILL
OAK HILL
DUCK POND
BURRILLVILLE HIGH SCHOOL
INDUSTRIAL PARK
SERVICE AREA LIMIT OF DISTRICT
EXISTING 1.5 MG STANDPIPE
EXISTING 265,000 GAL STANDPIPE
WELL #1
WELL #2
WELL #3
WELL #4
WELL #5
Interconnect
BURRILLVILLE
GLOCESTER
PASCOAG UTILITY DISTRICT LIMIT OF SERVICE
LEGEND
Existing Hydrant
Existing Valve
2" Existing Pipe
3" Existing Pipe
6" Existing Pipe
8" Existing Pipe
10" Existing Pipe
12" Existing Pipe
14" Existing Pipe
GRAPHIC SCALE
(IN FEET)
1 inch = 800 ft.
Pipeline Cleaning and Relining
Contract 1 (2016)
Contract 2 (2017)
Contract 3 (2020)

Appendix C

Sampling Plans

Department of Health
Center for Drinking Water Quality
Room 209, 3 Capitol Hill
Providence RI 0208-5097
TTY: 711
www.health.ri.gov
Phone: (401) 222-6867

Lead and Copper Rule Sample Site Selection Form

THE NUMBER OF LEAD/COPPER SAMPLE SITES REQUIRED IS BASED ON THE POPULATION OF THE PWS AS SUMMARIZED BELOW:

PWS ID: 159-2020 **Year:** Aug. 2021 **SYSTEM TYPE:** ☒ **CWS** ☐ **NTNC**

SYSTEM NAME: Pascoag Utility District

ADDRESS: PO Box 107 (253 Pascoag Main St.

CONTACT PERSON: Michael Kirkwood

PHONE NUMBER: 401-568-6222, ext 1266

EMAIL ADDRESS: mkirkwood@pud-ri.org

POPULATION:
- ☐ >100,000
- ☐ 10,001 to 100,000
- ☐ 3,301 to 10,000
- ☒ 501 to 3,300
- ☐ 101 to 500
- ☐ ≤ 100

Minimum Number of Tap Sample Sites Required for the Lead and Copper Rule

System Population	Minimum Number of Tap Sample Sites	
	Standard Monitoring	Reduced Monitoring
Greater than 100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5
Less than 101	**5**	**5**

The purpose of this form is to identify your Lead and Copper Rule (LCR) sampling sites for approval by RIDOH. RIDOH recommends that you identify (50% - 100%) more sampling sites than the minimum number of required sample sites in case volunteers drop out or the plumbing is changed in the building. Example: If you are required to sample 10 sample sites for standard monitoring, identify 15 sample sites.

If your system contains lead service lines, either owned by the system or privately owned, they must be selected as sampling sites. If the number of lead service lines in your system exceeds half of the number of required samples, at least half of the lead service lines must be selected as sampling sites. If the number of lead service lines in your system is half or less than the number required samples, all of your lead service lines must be selected as sampling sites. You will need to conduct some site surveys to be sure you have identified potential sites with lead. Example: You are required to collect 20 lead and copper samples and 9 of your service connections are lead service lines. All 9 lead service lines must be selected as sampling sites.

LEAD AND COPPER TAP SAMPLE SITES

STANDARD MONITORING SITES: Include enough tap sample sites for Standard Monitoring as required in the table above. The sampling pool shall be comprised of Tier 1 sites, if there are not enough Tier 1 sites in your system, Tier 2 sites shall be included. If not enough Tier 2 sites are available, Tier 3 shall be included, and so on. If your system has lead service lines, 50% of your sampling sites shall be sites with lead service lines. Add rows to this form as needed. Please refer to the EPA Tier Schedule as guidance included with this document. Add rows to this form as needed.

No	Site Name & Address	Tier 1, 2, 3, Other	Plumbing Material	Date of Construction/Notes
1	131 LAKE SHORE DRIVE	Tier 1	Copper	1984
2	38 SHEA LANE	Tier 1	Copper	1986
3	74 GROVE STREET	Tier 1	Copper	1987
4	411 SAYLES AVENUE	Tier 1	Copper	1985
5	360 CHURCH STREET	Tier 1	Copper	1985
6	183 UNION AVENUE	Tier 1	Copper	1985
7	636 CAMP DIXIE RD	Tier 1	Copper - lead solder	1987
8	195 UNION AVENUE	Tier 1	Copper	1983
9	95 LAKE SHORE DRIVE	Tier 1	Copper	1985
10	167 CENTENNIAL STREET	Tier 1	Copper	1985
11	3 SHADY LANE	Tier 1	Copper	1987
12	124 LAUREL HILL AVENUE	Tier 3	Copper	1900
13	90 EAST WALLUM LAKE ROAD	Tier 3	Copper	1930
14	60 PARK PLACE	Tier 3	Copper	1900
15	840 SOUTH MAIN ST	Tier 3	Copper	1938
16	233 SAYLES AVE	Tier 1	Copper	1987
17	128 HOWARD AVE	Tier 3	Copper	1939
18	280 SOUTH MAIN ST	Tier 3	Copper	1850
19	100 NORTH MAIN ST	Tier 3	Copper	1949
20	68 NORTH RD	Tier 3	Copper	1972

ALTERNATE MONITORING SITES: Sites should be the same Tier(s) as sites listed above. These sites should be used if site(s) above are unavailable at time of sampling. Please note the use of "alternate" sites that are identified on a RIDOH approved Sampling Site Selection Form still require additional written approval from RIDOH prior to sampling. All requests to substitute "standard" or "reduced" monitoring sites with "alternate" monitoring sites should be submitted in writing to Colin.Millar@health.ri.gov Add rows to this form as needed.

No	Site Name & Address	Tier 1, 2, 3, Other	Plumbing Material	Date of Construction/Notes
1	333 SAYLES AVE	Tier 3	Copper	1952
2	675 RESERVOIR RD	Tier 3	Copper	1965
3	278 UNION AVE	Tier 3	Copper	1956
4	82 ROCK AVE	Tier 3	Copper	1895
5	120 EAST WALLUM LAKE RD	Tier 3	Copper	1940
6	75 EASTERN AVE	Tier 3	Copper	1900
7	11 EAGLE PEAK RD	Tier 3	Copper	1800
8	210 CENTENNIAL ST	Tier 3	Copper	1938
9	835 SOUTH MAIN ST	Tier 3	Copper	1970
10	80 PINE ST	Tier 3	Copper	1900

REDUCED MONITORING SITES: Fill this out <u>after</u> Standard Monitoring has been completed and resubmit this form to our office. Sites should be representative of the distribution system and should include the sites with the highest lead and/or copper results from the Standard Monitoring sampling pool. Add rows to this form as needed.

No	Site Name & Address	Tier 1, 2, 3, Other	Plumbing Material	Date of Construction/Notes
1	131 LAKE SHORE DRIVE	Tier 1	Copper	1984
2	38 SHEA LANE	Tier 1	Copper	1986
3	74 GROVE STREET	Tier 1	Copper	1987
4	411 SAYLES AVENUE	Tier 1	Copper	1985
5	360 CHURCH STREET	Tier 1	Copper	1985
6	183 UNION AVENUE	Tier 1	Copper	1985
7	636 CAMP DIXIE RD	Tier 1	Copper - lead solder	1987
8	195 UNION AVENUE	Tier 1	Copper	1983
9	95 LAKE SHORE DRIVE	Tier 1	Copper	1985
10	167 CENTENNIAL STREET	Tier 1	Copper	1985

I have verified and certify that all sites for collecting lead and copper tap samples were selected from a pool of targeted Tier 1, 2, 3, or "other" sample sites in the distribution system. The entire distribution system was evaluated and the selected sample sites specifically represent areas in the distribution system that are most vulnerable to the corrosion of lead and copper, which can contribute to the contamination of the finished water. This sampling plan shall be maintained, followed, and made available upon inspection.

Signature: _____	**Date:** _____
Printed Name: Michael Lima	**Title: Superintendent - Water**

Return this form to:

Center for Drinking Water Quality
Rhode Island Department of Health
3 Capitol Hill, Rm 209
Providence, RI 02908-5097

If you have any questions, please contact our office and ask for the Lead and Copper Rule Manager.
Phone: 401-222-7762
Email: DOH.RIDWQ@health.ri.gov
Fax: 401-222-6953

APPROVED

Center for Drinking Water Quality

Coliform Sampling Plan

For public water systems (PWSs) serving 1,001-4,900 persons

1. **Public Water System ID#:** 1592020 **Public Water System Name:** Pascoag Utility District

Select type of PWS:

- [x] Community
- [ ] Transient Non-Community (TNC) Year-Round
- [ ] Non-Transient, Non-Community (NTNC)
- [ ] TNC Fully Seasonal
- [ ] TNC Partial Seasonal

Check the box that describes the PWS:

- [ ] Groundwater with no treatment
- [ ] Groundwater with ultraviolet treatment
- [ ] Groundwater treating for secondary concerns such as taste and odor or iron removal
- [x] Groundwater with 4-log viral disinfection
- [x] Groundwater practicing chlorine residual maintenance
- [ ] Purchasing surface water
- [x] Purchasing groundwater

2. **System Contact Name:** Michael Kirkwood

Phone: 401-568-6222 **Email address:** MKirkwood@PUD-RI.org

3. **Total population # served by PWS:** 2795 **Number of service connections:** 1118

PWS collects 5 **samples per:** [x] Month [ ] Quarter

4. **Laboratory ID#:** LA100033 **Laboratory Name:** RI Analytical

5. **Primary and alternate sampling site information:**

RTOR = Routine original *RPOR = Repeat original* *RPOT = Repeat other*

a.

Sampling Locations	Repeat Sampling Sites	Location
Primary Sampling Site (RTOR)	RPOR	*Same site as primary at left*
Sampling site description: 222 Davis Drive (Blake)	RPOT (upstream)	244 Davis Drive
	RPOT (downstream)	181 Davis Drive
Alternate Sampling Site (RTOR)	RPOR	*Same site as alternate at left*
Sampling site description: 59 Davis Drive	RPOT (upstream)	181 Davis Drive
	RPOT (downstream)	885 South Main St

b.

Sampling Locations	Repeat Sampling Sites	Location
Primary Sampling Site (RTOR)	RPOR	*Same site as primary at left*
Sampling site description: Rock Ave Storage Tank	RPOT (upstream)	4 Broad St
	RPOT (downstream)	82 Rock Ave
Alternate Sampling Site (RTOR)	RPOR	*Same site as alternate at left*
Sampling site description: 14 Rock Ave	RPOT (upstream)	4 Broad St
	RPOT (downstream)	82 Rock Ave

c.

Sampling Locations	Repeat Sampling Sites	Location
Primary Sampling Site (RTOR)	RPOR	*Same site as primary at left*
Sampling site description: Harrisville Interconnection	RPOT (upstream)	Harrisville Interconnection
	RPOT (downstream)	400 Main St
Alternate Sampling Site (RTOR)	RPOR	*Same site as alternate at left*
Sampling site description: 400 Main St	RPOT (upstream)	Harrisville Interconnection
	RPOT (downstream)	370 Main St

d.

Sampling Locations	Repeat Sampling Sites	Location
Primary Sampling Site (RTOR)	RPOR	*Same site as primary at left*
Sampling site description: 105 Main St (Hose 1)	RPOT (upstream)	99 Main St
	RPOT (downstream)	125 Main St
Alternate Sampling Site (RTOR)	RPOR	*Same site as alternate at left*
Sampling site description: 96 Main St	RPOT (upstream)	92 Main St
	RPOT (downstream)	98 Main St

e.

Sampling Locations	Repeat Sampling Sites	Location
Primary Sampling Site (RTOR)	RPOR	*Same site as primary at left*
Sampling site description: 124 Laurel Hill Ave	RPOT (upstream)	116 Laurel Hill Ave
	RPOT (downstream)	140 Laurel Hill Ave
Alternate Sampling Site (RTOR)	RPOR	*Same site as alternate at left*
Sampling site description: 105/107 Laurel Hill Ave	RPOT (upstream)	101/103 Laurel Hill Ave
	RPOT (downstream)	125 Laurel Hill Ave

6. **Entry point sampling site information:**

Entry Point State Facility ID (ex., EP001)	Entry Point Location
EP001	Hose 1- Bathroom Faucet
EP002	Well 5- Smooth nose sample faucet

Center for Drinking Water Quality

Coliform Sampling Plan

For public water systems (PWSs) serving 1,001-4,900 persons

7. **Raw water sampling site information:**

Raw Water Sampling Site State Facility ID (ex., WL001)	**Well Name (e.g., Well #1)**	**Smooth nosed tap?**
WL007	Well #5	☑ Yes ☐ No
		☐ Yes ☐ No
		☐ Yes ☐ No
		☐ Yes ☐ No
		☐ Yes ☐ No
		☐ Yes ☐ No

8. **Attach floor plan/map showing the primary, upstream, downstream, and raw water (well) sampling sites.**

9. The information on this completed *Coliform Sampling Plan* pertains to the coliform samples collected under the *Revised Total Coliform Rule* and the *Ground Water Rule*. If any of this information changes between now and the next scheduled sanitary survey, it is the responsibility of the PWS to provide the Center for Drinking Water Quality with an updated *Coliform Sampling Plan.*

PWS Official's Name: Mike Lima

PWS Official's Role: Superintendent

PWS Official's Signature: _____ **Date:** 7-20-21

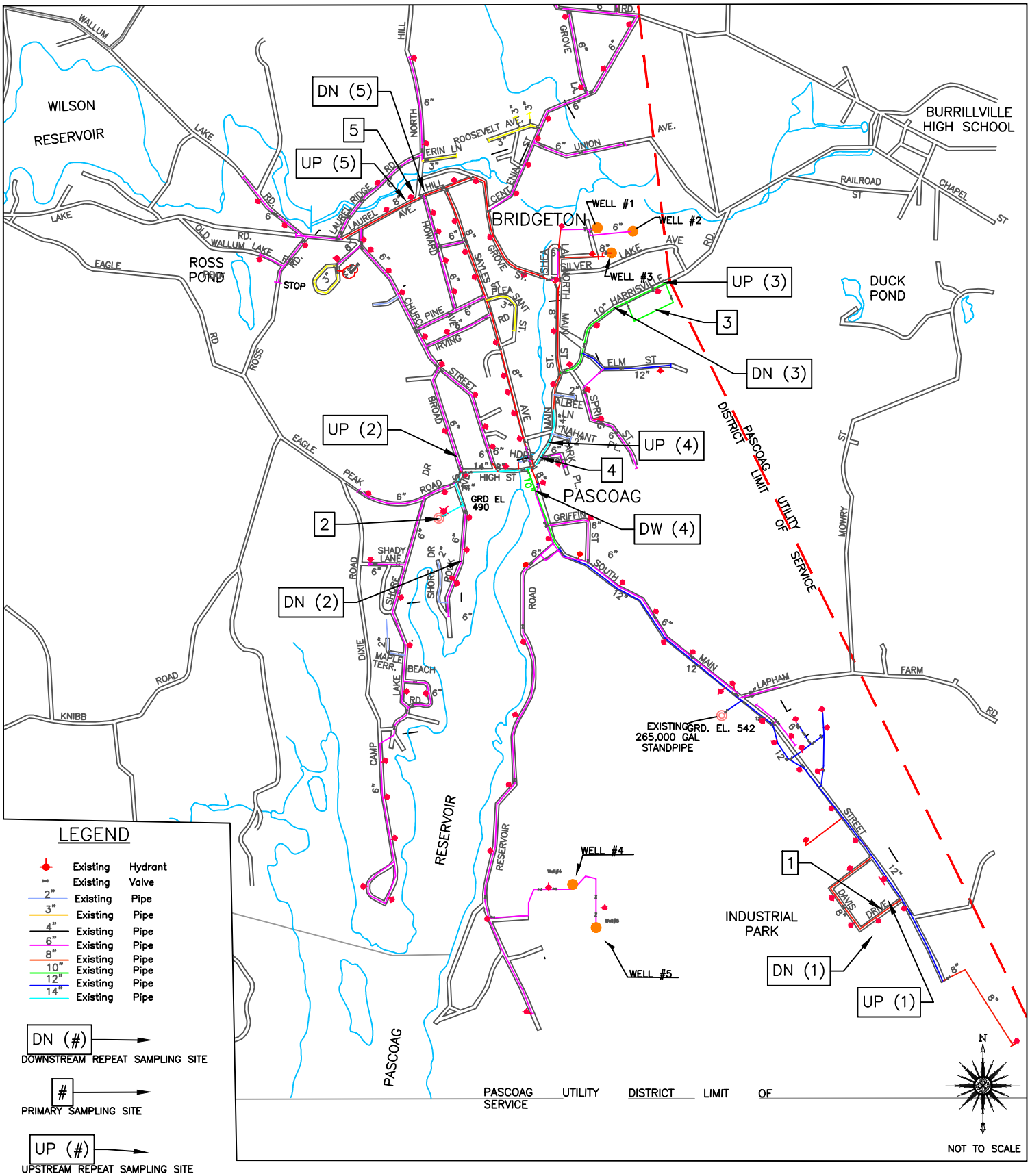
Complete this form and submit it along with all supporting documents to the Rhode Island Department of Health Center for Drinking Water Quality, 3 Capitol Hill, Room 209, Providence, RI 02908 or to DOH.RIDWQ@health.ri.gov with PWS identification number in the subject line.

RIDOH OFFICIAL USE ONLY BELOW THIS LINE

Field Inspector: _____ **Date:** _____

Sample Plan Reviewer: _____ **Date:** 7/23/2021

PASCOAG UTILITY DISTRICT SAMPLING PLAN



LEGEND

- Existing Hydrant
- Existing Valve
- 2" Existing Pipe
- 3" Existing Pipe
- 4" Existing Pipe
- 6" Existing Pipe
- 8" Existing Pipe
- 10" Existing Pipe
- 12" Existing Pipe
- 14" Existing Pipe

DN (#) → DOWNSTREAM REPEAT SAMPLING SITE

→ PRIMARY SAMPLING SITE

UP (#) → UPSTREAM REPEAT SAMPLING SITE

NWSI NORTHEAST Water Solutions INC.

7/19/2021

Sampling Site	Sample Site	Up Stream Site	Down Stream Site
1	222 Davis Drive	244 Davis Drive	181 Davis Drive
2	Rock Ave Storage Tanks	4 Broad Street	82 Rock Ave
3	Harrisville Wholesale Interconnections Harrisville FD/PUD System Boundary	Harrisville Wholesale Interconnections	400 Pascoag Main Street
4	Fire Dept. Hose 1 - 105 Main Street	99 Main Street	125 Main Street
5	124 Laurel Hill Ave	116 Laurel Hill Ave	140 Laurel Hill Ave

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Appendix D

2017 Standpipe Inspection Reports

UNDERWATER SOLUTIONS INC.

INSPECTION AND INTERIOR CLEANING (SEDIMENT REMOVAL) OF THE ROCK AVENUE 1.5-MILLION GALLON WELDED STEEL WATER STORAGE TANK

PASCOAG UTILITY DISTRICT
PASCOAG, RHODE ISLAND

NOVEMBER 2 & 3, 2017

INSPECTION AND INTERIOR CLEANING (SEDIMENT REMOVAL) OF THE ROCK AVENUE 1.5-MILLION GALLON WELDED STEEL WATER STORAGE TANK

PASCOAG UTILITY DISTRICT
PASCOAG, RHODE ISLAND

NOVEMBER 2 & 3, 2017

SCOPE:

On November 2 & 3, 2017, Underwater Solutions Inc. inspected the Rock Avenue 1.5-million gallon welded steel potable water storage tank to provide information regarding the overall condition and integrity of this structure and removed (vacuumed) the accumulated precipitate from the floor.

EXTERIOR INSPECTION:

The entire exterior of this water storage tank was inspected, to include walls and coating, manways, anchor bolts, foundation, ladder, overflow, roof, vent and hatches.

The exterior wall and roof dome, to include all components affixed to the exterior of this tank, have been re-coated since a previous inspection completed by Underwater Solutions Inc. on September 24, 2012.

Walls And Coating

The exterior steel wall panels and associated welds were inspected and were found appearing sound and remain free of obvious fatigue or failures of the steel at this time.

The average dry film thickness of the protective coating system applied to the exterior welded steel wall panels were measured during this inspection. The dry film thickness of the coating system applied to the exterior wall surfaces was found as follows:

Row	***Mil Thickness***	***Row***	***Mil Thickness***	***Row***	***Mil Thickness***
1.	6.9 mils	6.	11.6 mils	11.	10.6 mils
2.	7.1 mils	7.	8.9 mils	12.	10.9 mils
3.	10.4 mils	8.	7.7 mils	13.	6.5 mils
4.	13.0 mils	9.	10.3 mils		
5.	10.6 mils	10.	10.3 mils		

The American Water Works Association (AWWA) recommends a dry film thickness of 7.0 to 10.0 mils of coating film thickness be applied to the exterior surfaces of welded steel potable water storage tanks to provide adequate protection for welded steel structures.

The protective coating applied to the exterior walls appeared to have been applied uniformly, while the average dry film thickness of the coating applied to the second through twelfth rows of wall panels above the tank base meets the specifications set by the AWWA. Although the average dry film thickness of the coating applied to the first and thirteenth rows of wall panels above the tank base is below the AWWA's recommendation, the protective coating applied to these exterior walls surfaces was found having good adhesion value, providing adequate protection for these welded steel surfaces.

A steel box welded to the lowest wall panel on the westernmost side of the tank provides a housing for the sample pipes. This steel box was found secured with a lock, preventing unwanted access.

A mild to moderate non-uniform accumulation of mildew throughout the exterior walls has declined the overall aesthetics.

Manways

Two, 24" inside diameter manways penetrate the lowest row of wall panels on the easternmost and westernmost sides of the tank, located approximately 26" above the tank base and are securely installed and free of obvious leakage.

The protective coating applied to the steel surfaces of each manway lid and trunk was found having good adhesion value, while the galvanized steel nuts and bolts that secure each manway are not coated at this time.

Anchor Bolts

Thirty-six, 2-1/2" diameter steel anchor bolts extend up from the concrete foundation through steel support chairs welded to the lowest row of wall panels.

Each anchor bolt has a nut securely installed, while the protective coating applied to this steel support hardware was found having good adhesion value at this time.

Foundation

The exposed surfaces of the 10" wide concrete foundation averages 5" in height and was found to be un-coated, yet appeared mostly sound. Tight cracks were observed throughout less than 5% of these exposed surfaces. These cracks were sounded and appeared to be limited to the surface of the concrete and free of voids or spalls at this time.

The sealant applied throughout the circumference of the tank at the junction of where the foundation and tank base meet was found having good adhesion value, preventing moisture from penetrating and accumulating beneath the tank.

Ladder

A steel ladder extends from approximately 35' above the ground up to a steel platform welded to the tank wall at roof level and is supported to the tank wall with seven sets of welded standoffs. A galvanized steel fall prevention device is installed throughout the length of this ladder, providing safe access to the roof.

The protective coating applied to this steel ladder and platform was found having good adhesion value, while the galvanized steel fall prevention device is not coated at this time.

An aluminum ladder guard installed on the base of the ladder was found secured with a nylon cable tie (zip-tie) at this time.

A communications cable extends up from the ground below the ladder and extends up to and is secured to the ladder with nylon cable ties and terminates at an antenna installed on the roof safety railings. This cable was found with extra slack and is loosely installed and is in contact with the tank wall surfaces at this time.

Overflow

A 12" inside diameter steel overflow pipe exits the base of a welded steel weir box, extends down and is supported to the wall with nine welded standoffs and terminates at an air gap, located approximately 48-1/2" above the ground. The outlet for this pipe was free of obvious obstructions, while a stainless steel 24-mesh primary screen and a stainless steel 1/4" by 1/4" mesh secondary screen installed at the end of this pipe remains secure, preventing access to the interior of the tank.

Approximately 5" below this pipe, a 12" inside diameter pipe extends down and penetrates the ground. The inlet for this pipe was free of obvious obstructions and was found without a screen at this time.

Approximately 30' west of the tank, this pipe exits a concrete wall and extends 6" and terminates 9" above a rip-rap splash pad. The outlet for this pipe was free of obvious obstructions and has a flap-valve installed at its end.

Roof

The steel roof panels and associated welds appeared sound and remain free of obvious fatigue or failures of the steel at this time. The protective coating applied to these surfaces was found having an average dry film thickness of 16.6 mils and appeared to have been applied uniformly, meets the AWWA's recommendation and was found having good adhesion value, providing adequate protection for the steel.

The 43" tall angle iron safety railings welded to the roof on the southernmost side of the tank that continue up to the vent in the center of the roof were found securely installed. The 43" tall angle iron safety railings welded to the edge of the roof on the easternmost side of the tank at the 30" by 30" interior access hatch was also found securely installed, providing safe access.

The protective coating applied to these welded steel safety railings was found having good adhesion value at this time.

Vent

A frost proof vent is located in the center of the roof, having an 18" inside diameter and standing 36" tall.

A 44" outside diameter aluminum cap and associated screen were found securely installed over the vent penetration in the roof, preventing access to the interior of the tank. The P.V.C. vacuum release plate located on the underside of the vent was free of obvious obstructions and was found to move freely at the time of this inspection.

Hatches

Three hatches provide access to the interior of the tank through the roof.

One, 24" inside diameter hatch is located on the southernmost side of the tank and was found secured with a lock, preventing unwanted access to the interior of the tank. This hatch was utilized to access the tank interior and was found in good working condition at this time.

A second, 24" inside diameter hatch is located within the center of the roof and was found secured with nuts and bolts, preventing unwanted access to the interior of the tank. This hatch was not opened or utilized for this inspection.

A third, 30" by 30" hatch is located on the easternmost side of the roof and was found secured with a lock, preventing unwanted access. This hatch was not opened or utilized for this inspection.

INTERIOR INSPECTION:

The entire interior of this water storage tank and components was inspected, to include sediment accumulations, floor, manways, piping, walls and coating, overhead, overflow and aesthetic water quality.

Sediment Accumulations

A uniform layer of accumulated precipitate was found throughout the floor, averaging 1-1/2" in depth.

Upon completing this inspection, all precipitate was vacuumed from the floor.

Floor

After removing the accumulated precipitate, the steel for panels and associated welds were inspected and were found appearing sound and free of obvious fatigue or failures of the steel at this time.

The protective coating applied to the floor appeared to have been applied uniformly and was found having good adhesion value, providing adequate protection for these welded steel surfaces.

A mild to moderate stain remains throughout the floor due to the accumulation of precipitate.

Manways

Two, 24" diameter manways penetrate the lowest row of wall panels on the easternmost and westernmost sides of the tank, located approximately 26" above the floor and are securely installed and free of leakage.

A rubber gasket covers and seals all surfaces of each manway lid, while the protective coating applied to the steel trunk surfaces of each manway was found having good adhesion value, providing adequate protection for the steel.

Piping

The influent/effluent mixing system pipe penetrates the floor approximately 20” in-form the wall on the easternmost side of the tank, having a 12” inside diameter.

A 12” inside diameter P.V.C. pipe extends up from this penetration and is supported to the wall with six welded steel standoffs and terminates approximately 80’ above the floor of the tank, having a 12” inside diameter rubber check valve installed at its end. Two additional 6” inside diameter rubber check valves extend off the main 12” inside diameter pipe, located approximately 40’ above the floor of the tank.

Two, stainless steel effluent grates, each having a 12” inside diameter, extend off the main 12” inside diameter pipe, located approximately 10” and 20” above the floor of the tank.

Each of the three rubber influent check valves, to include each stainless steel effluent grate, was free of obvious obstructions and without flow at this time.

The protective coating applied to each metal support standoff was found having good adhesion value at this time.

The stainless steel flanges and hardware that secure the effluent grates and influent check valves to the pipe are not coated. Mild corrosion was observed on these surfaces, yet these stainless steel flanges and associated hardware remain securely installed and free of obvious metal fatigue at this time.

Three, 3/4" inside diameter sample pipes penetrate the lowest wall panel on the westernmost side of the tank, located approximately 24” above the floor and are spaced approximately 8” apart.

Each P.V.C. pipe extends into the tank 2-1/2” and turn 90° and extend up and were found in sound condition, while being securely supported to the wall with welded and bolted steel standoffs. The sample pipes within the steel box welded to the exterior of the tank are not labeled, and the northernmost sample pipe terminates 7’ above the floor of the tank. The southernmost sample pipe terminates 45’ above the floor and the center pipe terminates 80’ above the floor of the tank. Each of these three sample pipes were free of obvious obstructions at the time of this inspection.

Walls And Coating

The interior walls were inspected beginning at the floor and by spiraling the circumference of the tank up to the water surface.

These steel wall panels and associated welds appeared sound and remain free of obvious fatigue or failures of the steel at this time.

The average dry film thickness of the protective coating system applied to the upper eight rows of interior welded steel wall panels were measured during this inspection. The dry film thickness of the coating system applied to these wall surfaces was found as follows:

Row	***Mil Thickness***	***Row***	***Mil Thickness***
6.	20.1 mils	10.	22.2 mils
7.	23.4 mils	11.	18.7 mils
8.	24.9 mils	12.	20.7 mils
9.	23.1 mils	13.	27.0 mils

The American Water Works Association (AWWA) recommends a dry film thickness of 10.5 to 15.5 mils of coating film thickness be applied to the interior surfaces of welded steel potable water storage tanks to provide adequate protection for welded steel structures.

The protective coating applied to the interior welded steel wall surfaces appeared to have been applied uniformly. The average dry film thickness of the coating applied to the upper eight rows of wall panels meets the specifications set by the AWWA, while the protective coating applied to all interior wall surfaces was found having good adhesion value, providing adequate protection for the steel.

Mild staining exists throughout the interior walls, beginning approximately 20’ below overflow level and extends down to the floor.

Overhead

The entire overhead was inspected from the water surface.

These steel panels and associated welds appeared sound and free of obvious fatigue or failures of the steel at this time.

The protective coating applied to these welded steel surfaces was found having an average dry film thickness of 50.2 mils and appeared to have been applied uniformly, meets the specifications set by the AWWA and has good adhesion value. Mild rust staining was observed throughout the edges of less than 5% the steel panels, yet no obvious exposure of the underlying steel was evident at the time of inspection.

Overflow

The overflow consists of a 24” long by 6” wide cutout in the top wall panel, located approximately 6” below the junction of where the roof and walls meet.

This overflow cutout was free of obstructions at the time of this inspection.

Aesthetic Water Quality

The aesthetic water was found to be good throughout this tank, allowing unlimited visibility for this inspection.

RECOMMENDATIONS:

It is the opinion of Underwater Solutions Inc. that this welded steel potable water storage tank appeared sound and free of obvious leakage at the time of inspection.

EXTERIOR:

The exterior steel wall panels and associated welds appeared sound and free of obvious fatigue or failures of the steel.

The protective coating applied to the exterior walls appeared to have been applied uniformly, while the average dry film thickness of the coating applied to the second through the twelfth rows of wall panels above the tank base meets the specifications set by the AWWA. Although the average dry film thickness of the coating applied to the first and thirteenth rows of wall panels above the tank base is below the AWWA's recommendation, the protective coating applied to these exterior wall surfaces was found having good adhesion value, providing adequate protection for these welded steel surfaces.

The steel roof panels and associated welds appeared sound and free of obvious fatigue or failures of the steel.

The protective coating applied to these welded steel surfaces appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value.

A mild to moderate non-uniform accumulation of mildew throughout the exterior walls and roof has declined the overall aesthetics.

It is our recommendation to pressure-wash the exterior wall, roof and associated exterior component surfaces at 3,000 P.S.I. and at 3.0 G.P.M. to remove the accumulated mildew from these surfaces in an effort to preserve the adhesion value of the protective coating, while improving the overall aesthetics.

It is also our recommendation to monitor the protective coating applied to the first and thirteenth rows of wall panels above the ground through future scheduled inspections to ensure that a decline in the coating film thickness and adhesion loss of the coating does not occur, which could result in exposure of the underlying steel.

The exposed surfaces of the concrete foundation appeared mostly sound, while tight cracks were observed throughout less than 5% of these exposed surfaces. These cracks were sounded and appeared to be limited to the surface of the concrete and free of voids or spalls at this time.
It is our recommendation to monitor the cracks found throughout the exposed surfaces of the concrete foundation through future scheduled inspections to ensure that concrete spall does not occur, which could result in exposure of the reinforcement steel.

All components affixed to this tank were found properly installed at this time. A primary and secondary screen installed at the end of the overflow pipe remains secure, preventing access to the interior of the pipe/tank.

The pipe located below the overflow pipe for the tank was found without a screen, while a flap-valve remains securely installed over the end of this pipe. It is our recommendation to install a screen over the end of this pipe to prevent objects from entering this pipe and causing obstructions.

A cap and screen installed over the vent penetration in the roof remains secure, preventing access to the interior of the tank.

The two interior access hatches located on the easternmost and southernmost sides of the roof were found secured with locks. The hatch located within the center of the roof is secured with nuts and bolts, preventing unwanted access to the interior of the tank.

The steel sample box welded to the lowest row of wall panels was found secured with a lock, preventing unwanted access.

The ladder guard installed at the base of the roof access ladder was found secured with a nylon cable tie (tie wrap).

It is our recommendation to install a lock on the ladder guard in an effort to prevent unwanted access to the ladder/roof.

A communications cable that extends up from the ground below the ladder and extends up to and is secured to the ladder with nylon cable ties and terminates at an antenna installed on the roof safety railings was found with extra slack and is loosely installed and is in contact with the tank walls at this time.

It is our recommendation to remove all slack from this cable and to install additional cables ties throughout the length of the ladder/cable in an effort to prevent the cable from contacting the tank and causing damage to the cable and the coating system applied to the exterior walls.

INTERIOR:

The interior steel for panels and associated welds appeared sound and free of obvious fatigue or failures of the steel at this time.

The protective coating applied to the floor appeared to have been applied uniformly and was found having good adhesion value, providing adequate protection for these welded steel surfaces and therefore requires no remedial action at this time.

The interior steel wall panels and associated welds appeared sound and free of obvious fatigue or failures of the steel at this time.

The protective coating applied to the interior welded steel wall surfaces appeared to have been applied uniformly, while the average dry film thickness of the coating applied to the upper eight rows of wall panels meets the specifications set by the AWWA. The protective coating applied to all interior wall surfaces was found having good adhesion value, providing adequate protection for the steel and therefore requires no remedial action at this time.

The influent/effluent mixing system pipe within this tank was found securely installed. The rubber influent check valves and effluent grates were free of obvious obstructions at this time. The three P.V.C. sample pipes within this tank were found securely installed and free of obvious obstructions, allowing water samples to be taken at a level of 7’, 45’ and 80’ above the floor.

The steel overhead panels and associated welds appeared sound and free of obvious fatigue or failures of the steel at this time. The protective coating applied to these welded steel surfaces appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value. Mild rust staining was observed throughout the edges or several of the steel panels, yet no obvious exposure of the underlying steel was evident at this time.

It is our recommendation to monitor these overhead surfaces through future scheduled inspections to ensure that adhesion loss of the protective coating does not occur, which could result in exposure of the underlying steel.

As always, we recommend re-inspection and cleaning of all water storage facilities in accordance with state and federal mandates, A.W.W.A. standards, and be completed by an experienced and authorized inspection corporation.

_____
UNDERWATER SOLUTIONS INC.
Christopher A. Cole, Project Manager

This report, the conclusions, recommendations and comments prepared by Underwater Solutions Inc. are based upon spot examination from readily accessible parts of the tank. Should latent defects or conditions which vary significantly from those described in the report be discovered at a later date, these should be brought to the attention of a qualified individual at that time. These comments and recommendations should be viewed as information to be used by the Owner in determining the proper course of action and not to replace a complete set of specifications. All repairs should be done in accordance with A.W.W.A. and/or other applicable standards.

1 ***Exterior Wall With Mild To Moderate Mildew***

2 ***Exterior Wall With Mild To Moderate Mildew***

3 ***Exterior Wall With Mild To Moderate Mildew***

4 ***Exterior Wall With Mild To Moderate Mildew***

5 ***Exterior Wall With Mild To Moderate Mildew***

6 ***Exterior Wall With Mild To Moderate Mildew***

7 ***Exterior Wall With Mild To Moderate Mildew***

8 ***Exterior Wall With Mild To Moderate Mildew***

9 ***Exterior Wall With Mild To Moderate Mildew***

10 ***Exterior Wall With Mild To Moderate Mildew***

11 ***Exterior Wall With Mild To Moderate Mildew***

12 ***Exterior Wall With Mild To Moderate Mildew***

13 ***Secure Easternmost Manway***

14 ***Secure Westernmost Manway***

15 ***Secure Anchor Bolt***

16 ***Secure Anchor Bolt***

17 ***Secure Anchor Bolt***

18 ***Concrete Foundation With Tight Cracks***

19 ***Concrete Foundation With Tight Cracks***

20 ***Concrete Foundation With Tight Cracks***

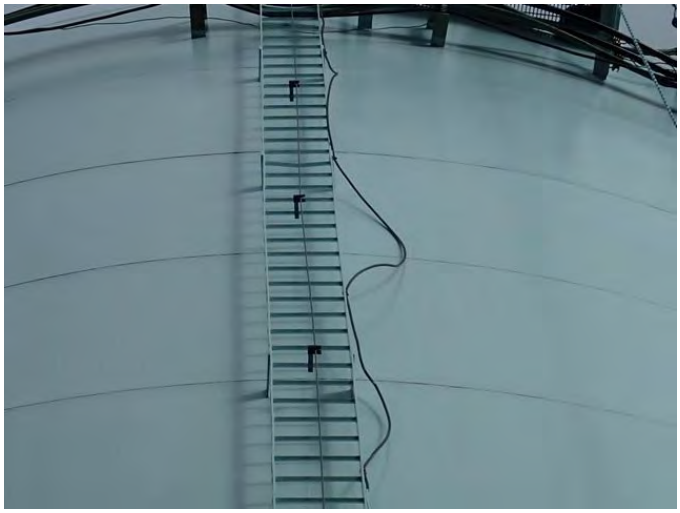
21 ***Concrete Foundation With Sealant Applied At The Junction Of The Concrete Foundation And Tank Base***

22 ***Concrete Foundation With Sealant Applied At The Junction Of The Concrete Foundation And Tank Base***

23 ***Concrete Foundation With Sealant Applied At The Junction Of The Concrete Foundation And Tank Base***

24 ***Ladder With A Fall Prevention Device And Platform***

25 ***Ladder With A Fall Prevention Device And Platform***



26 ***Communication Cable Installed On The Ladder Having Slack***

27 ***Secure Ladder Guard***

28 ***Overflow Weir Box And Overflow Pipe***

29 ***Overflow Pipe With An Air Gap***

30 ***Secure Overflow Pipe Screen***

31 ***Pipe Below The Overflow Pipe Without A Screen***

32 ***Overflow Pipe With A Flap-Valve***

33 ***Roof Panels***

34 ***Roof Panels***

35 ***Roof Panels***

36 ***Roof Panels***

37 ***Roof Panels***

38 ***Roof Panels***

39 ***Secure Safety Railings***

40 ***Secure Safety Railings***

41 ***Secure Safety Railings***

42 ***Secure Frost Proof Vent***

43 ***Secure Vent Screen***

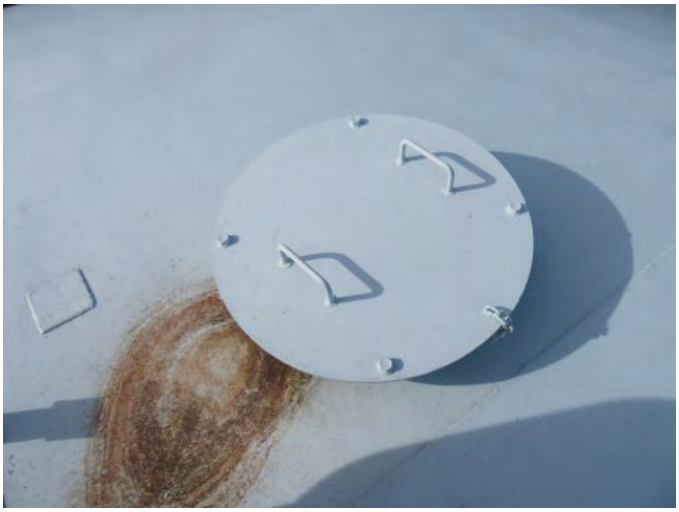
44 ***Secure Vent Screen***

45 ***Secure Vacuum Release Plate***

46 ***Secure Vacuum Release Plate***

47 ***Closed Easternmost Access Hatch***

48 ***Secure Easternmost Access Hatch***

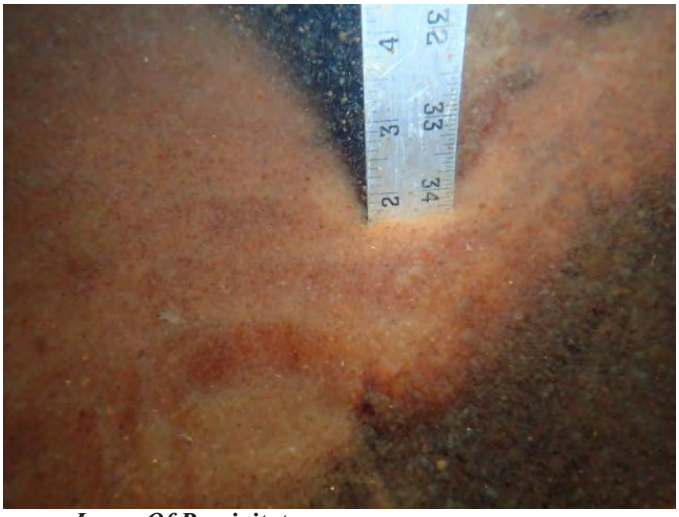


49 ***Secure Access Hatch***

50 ***Southernmost Open Access Hatch***

51 ***Southernmost Closed Access Hatch***

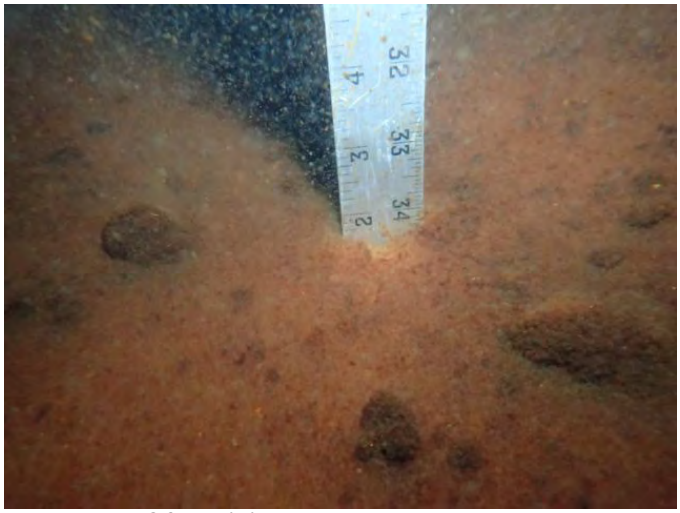
52 ***Southernmost Secure Access Hatch***



53 ***Layer Of Precipitate***

54 ***Layer Of Precipitate***

55 *Layer Of Precipitate*

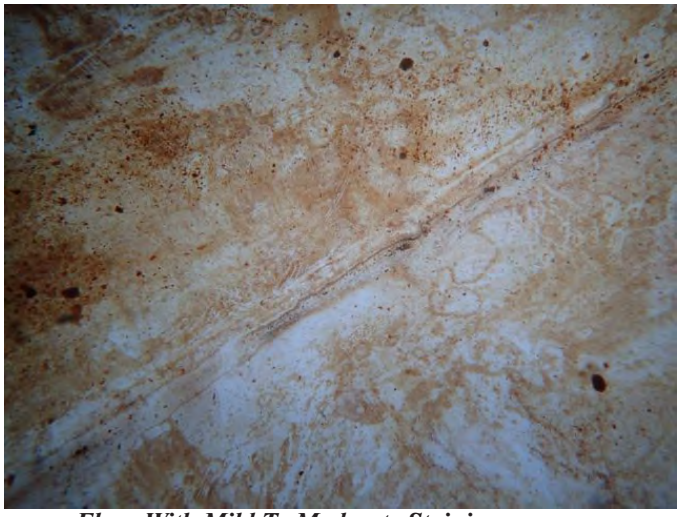


56 *Layer Of Precipitate*

57 *Floor With Mild To Moderate Staining*

58 *Floor With Mild To Moderate Staining*

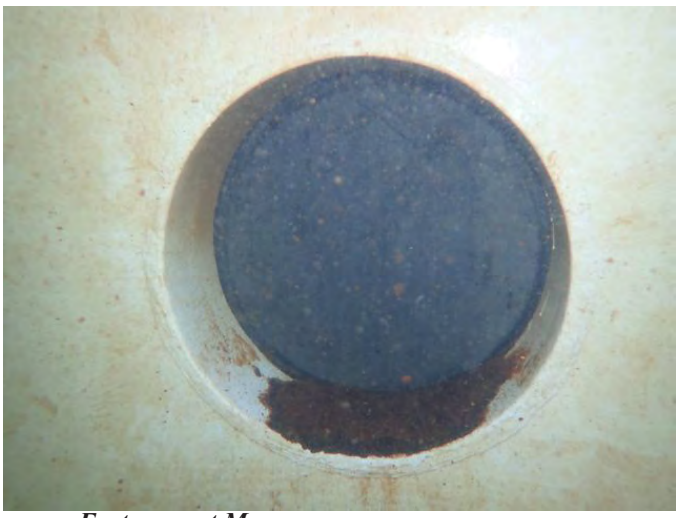
59 *Floor With Mild To Moderate Staining*



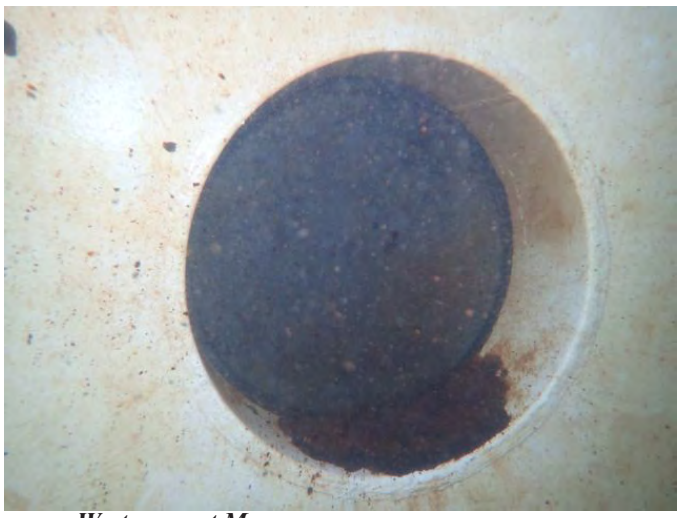
60 *Floor With Mild To Moderate Staining*

61 ***Floor With Mild To Moderate Staining***

62 ***Floor With Mild To Moderate Staining***

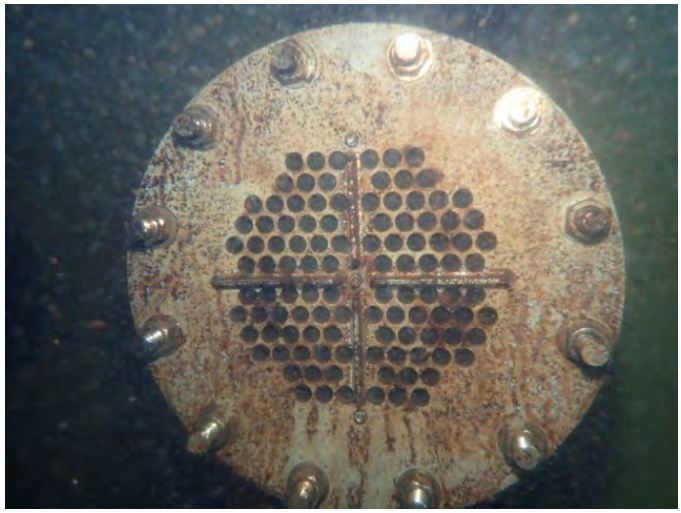


63 ***Easternmost Manway***

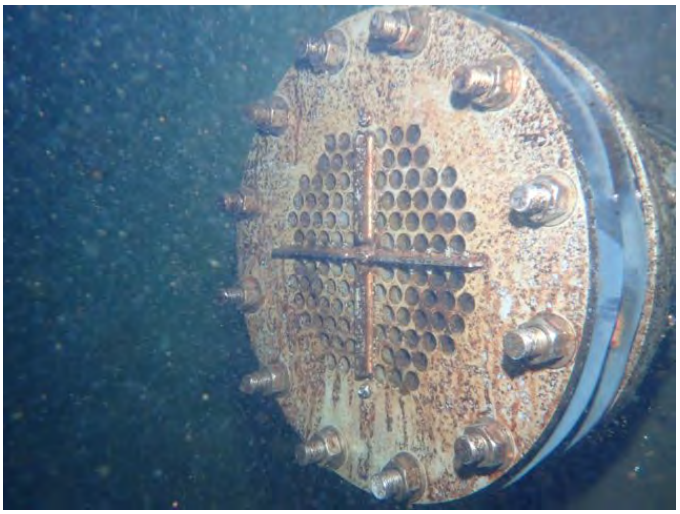


64 ***Westernmost Manway***

65 ***Influent/Effluent Mixing System Piping Penetrating The Tank Floor***



66 ***Effluent Steel Grate***

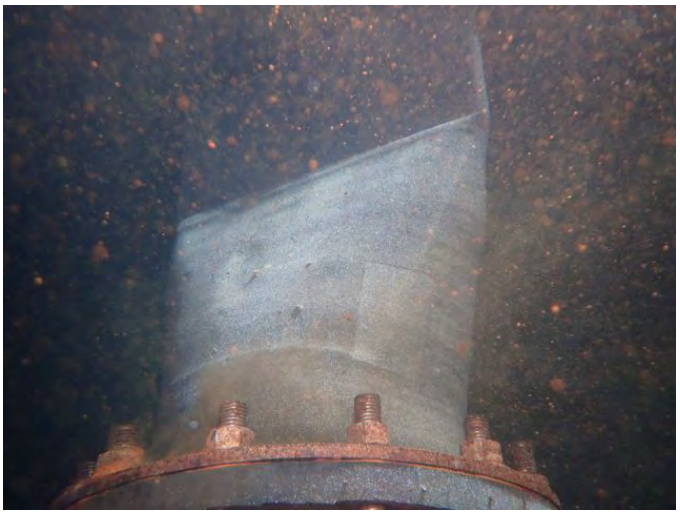


67 *Effluent Steel Grate*

68 *Influent/Effluent Mixing System Pipe Supported To The Wall*

69 *Rubber Influent Check Valve*

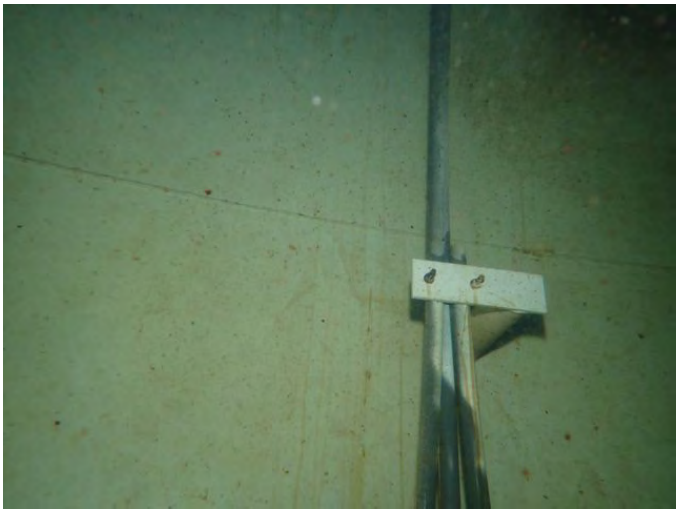
70 *Rubber Influent Check Valve*



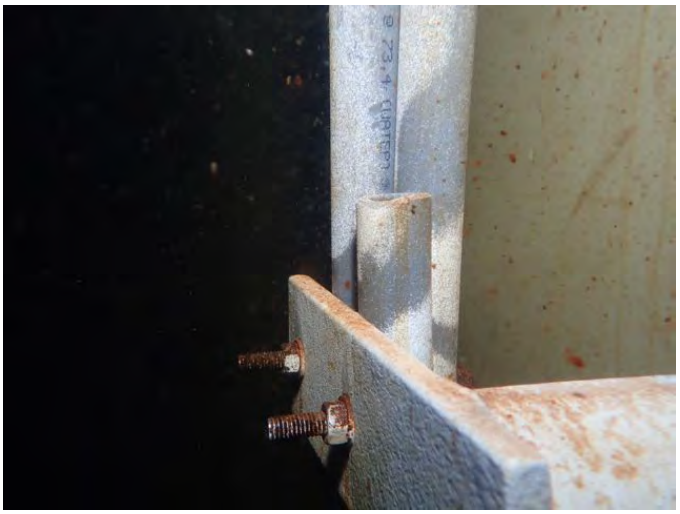
71 *Rubber Influent Check Valve*

72 *Sample Pipes Penetrating The Wall (Interior Of The Tank)*

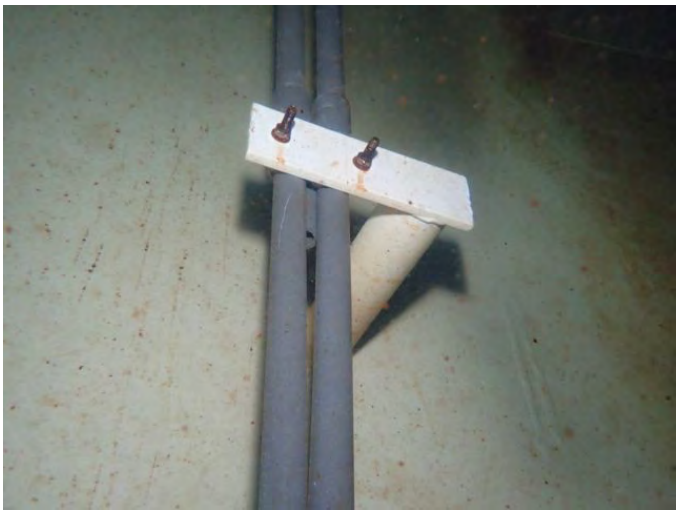
73 ***Sample Pipe Box On The Exterior Of The Tank***



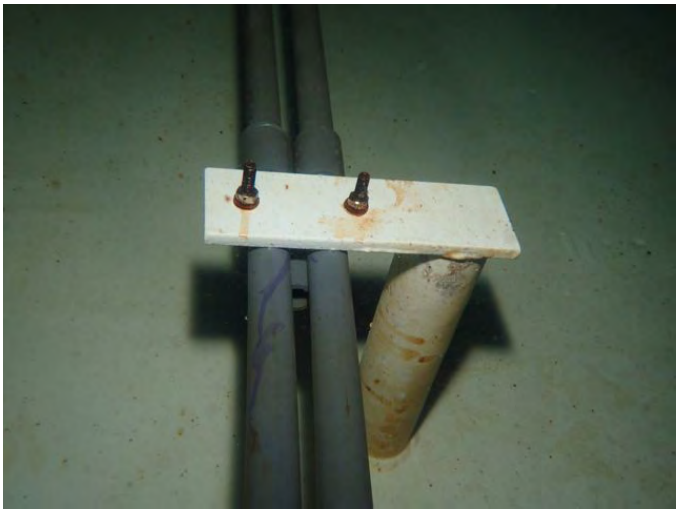
74 ***Sample Pipes Supported To The Wall***



75 ***Sample Pipes Supported To The Wall***



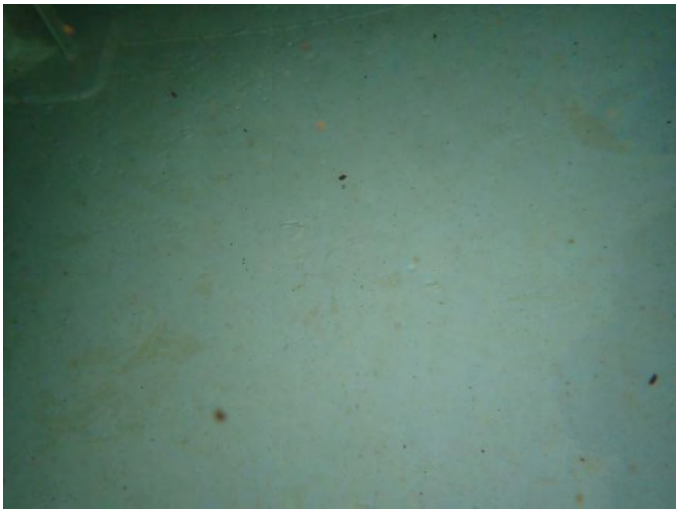
76 ***Sample Pipes Supported To The Wall***



77 ***Sample Pipes Supported To The Wall***

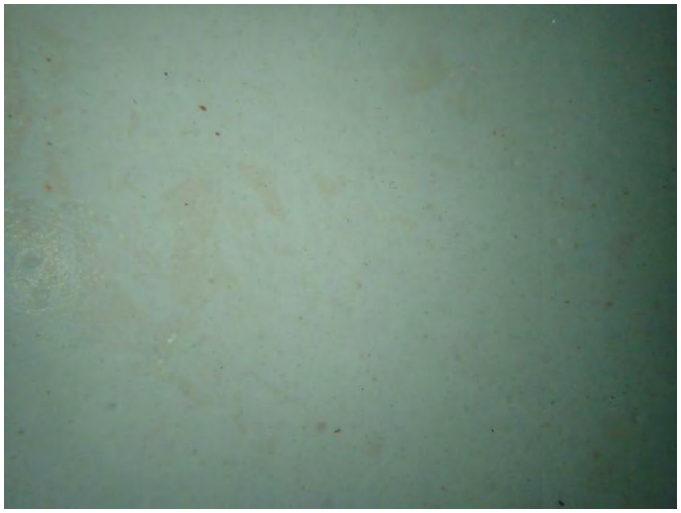
78 ***Interior Wall With Mild Staining***

79 ***Interior Wall With Mild Staining***

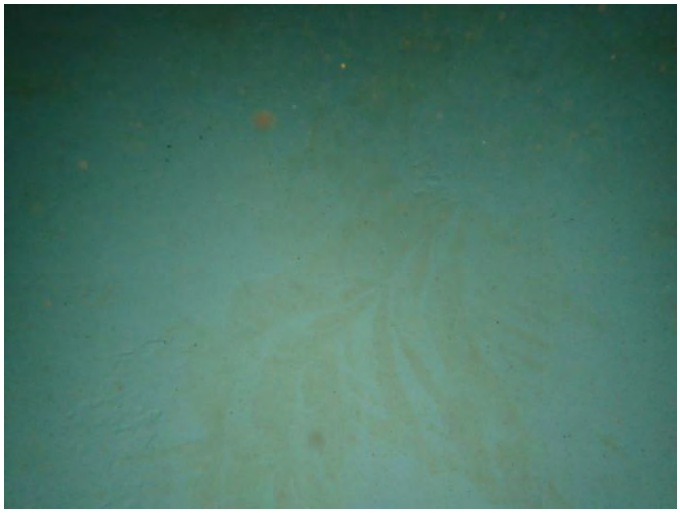


80 ***Interior Wall With Mild Staining***

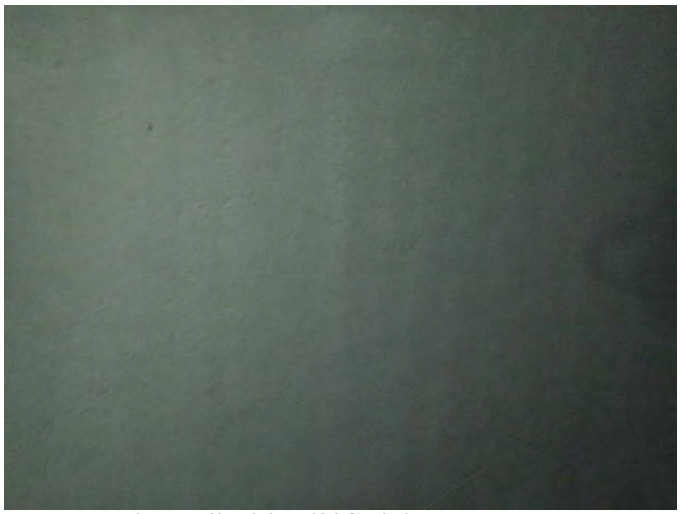
81 ***Interior Wall With Mild Staining***



82 ***Interior Wall With Mild Staining***



83 ***Interior Wall With Mild Staining***



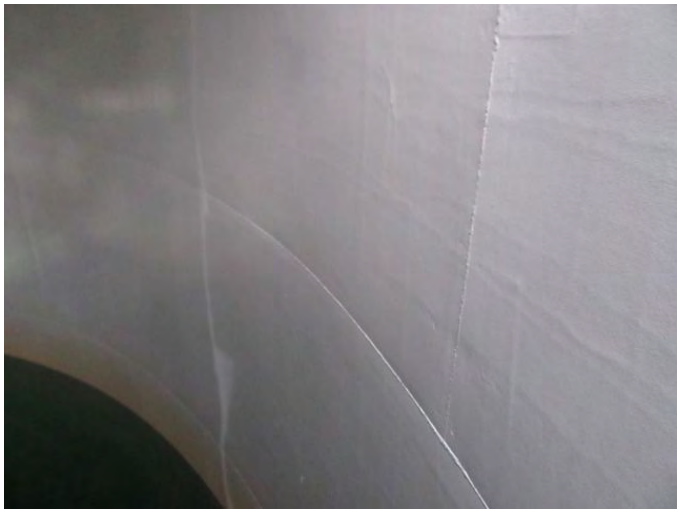
84 ***Interior Wall With Mild Staining***

85 ***Interior Wall With Mild Staining***

86 ***Interior Wall With Mild Staining***

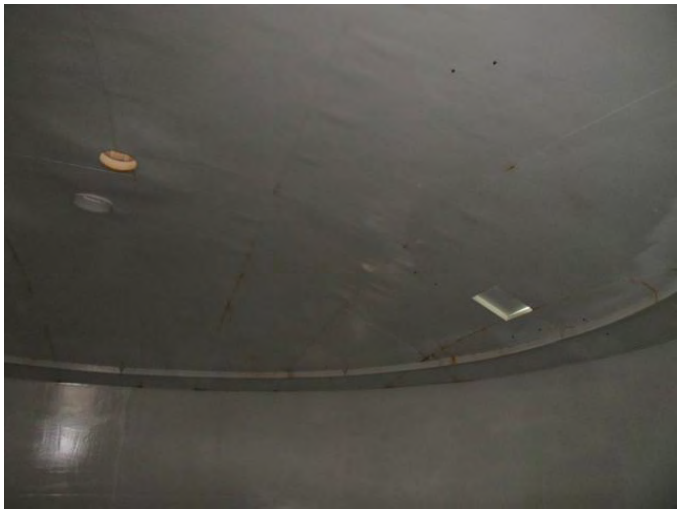
87 ***Interior Wall With Mild Staining***

88 ***Interior Wall With Mild Staining***



89 ***Interior Wall With Mild Staining***

90 ***Interior Wall With Mild Staining***



91 ***Overhead With Mild Rust Staining***

92 ***Overhead With Mild Rust Staining***

93 ***Overhead With Mild Rust Staining***

94 ***Overhead With Mild Rust Staining***

95 ***Overflow Cutout***

96 ***Discharge During Cleaning***

UNDERWATER SOLUTIONS INC.

INSPECTION AND CLEANING (SEDIMENT REMOVAL) OF THE SOUTH MAIN STREET 265,000-GALLON WELDED STEEL WATER STORAGE TANK

PASCOAG UTILITY DISTRICT
PASCOAG, RHODE ISLAND

NOVEMBER 1, 2017

INSPECTION AND INTERIOR CLEANING (SEDIMENT REMOVAL) OF THE SOUTH MAIN STREET 265,000-GALLON WELDED STEEL WATER STORAGE TANK

PASCOAG UTILITY DISTRICT
PASCOAG, RHODE ISLAND

NOVEMBER 1, 2017

SCOPE:

On November 1, 2017, Underwater Solutions Inc. conducted an inspection of the South Main Street 265,000-gallon welded steel potable water storage tank to provide information regarding the overall condition and integrity of this structure and removed (vacuumed) the accumulated precipitate from the floor.

EXTERIOR INSPECTION:

The entire exterior of this water storage tank and components was inspected, to include walls and coating, foundation, anchor bolts, manways, ladder, overflow, roof, vent and hatches.

The exterior wall and roof dome, to include all components affixed to the exterior of this tank, have been re-coated since a previous inspection completed by Underwater Solutions Inc. on December 12, 2007.

Walls And Coating

The exterior steel wall panels and associated welds were inspected and were found appearing sound and free of obvious fatigue or failures of the steel at this time.

The average dry film thickness of the protective coating system applied to the exterior welded steel wall panels were measured during this inspection. The dry film thickness of the coating system applied to the exterior wall surfaces was found as follows:

Row	***Mil Thickness***	***Row***	***Mil Thickness***
1.	11.6 mils	5.	10.3 mils
2.	10.7 mils	6.	12.9 mils
3.	11.2 mils	7.	13.8 mils
4.	10.2 mils	8.	10.0 mils

The American Water Works Association (AWWA) recommends a dry film thickness of 7.0 to 10.0 mils of coating film thickness be applied to the exterior surfaces of welded steel potable water storage tanks to provide adequate protection for welded steel structures.

The protective coating applied to the exterior walls appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value, providing adequate protection for these welded steel surfaces.

A steel box welded to the lowest wall panel on the westernmost side of the tank provides a housing for the sample pipes. This steel box was found secured with a lock, preventing unwanted access.

A mild to moderate non-uniform accumulation of mildew throughout the exterior walls has declined the overall aesthetics.

Foundation

The exposed surfaces of the 10” wide concrete foundation averages 7” in height and was found to be un-coated, yet appeared mostly sound. Tight cracks were observed throughout less than 5% of these exposed surfaces. These cracks were sounded and appeared to be limited to the surface of the concrete and free of voids or spalls at this time.

The sealant applied throughout the circumference of the tank at the junction of where the foundation and tank base meet was found having good adhesion value, preventing moisture from penetrating and accumulating beneath the tank.

Anchor Bolts

Six, 1-3/4" diameter anchor bolts extend up from the foundation into steel support chairs welded to the lowest row of wall panels. Each anchor bolt has a nut securely installed, while the protective coating applied to this steel support hardware was found having good adhesion value at this time.

Manways

One 24" inside diameter manway penetrates the lowest wall panel on the westernmost side of the tank, located approximately 17" above the tank base and is securely installed and free of obvious leakage. The protective coating applied to the steel manway lid, trunk and securing hardware was found having good adhesion value at this time.

One, 30" inside diameter manway penetrates the lowest wall panel on the easternmost side of the tank, located approximately 25" above the tank base and is securely installed and free of obvious leakage. The protective coating applied to the steel manway lid and trunk was found having good adhesion value, while the galvanized steel nuts and bolts that secures this manway are not coated at this time.

Ladder

A welded steel ladder extends from 20' above the ground up to the roof and is supported to the tank wall with five sets of welded standoffs, having a galvanized steel fall prevention device installed throughout its length and providing safe access to the roof. The protective coating applied to this steel ladder and support standoffs was found having good adhesion value, while the galvanized steel fall prevention device is not coated at this time.

An aluminum ladder guard installed on the base of the ladder was found secured with nut and bolt at this time.

A second welded steel ladder extends from the edge of the roof on the northernmost side of the tank up to the vent within the center of the roof and is supported to the roof with two sets of welded standoffs, providing safe access to the vent. The protective coating applied to this steel ladder and support standoffs was found having good adhesion value at this time.

Overflow

An 8" inside diameter steel overflow pipe penetrates the base of a welded steel weir box, extends down and is supported to the tank wall with three sets of welded standoffs and terminates approximately 14" above a rip-rap splash pad.

This pipe was free of obvious obstructions and a flap-valve and screen installed at the end of this pipe remains secure, preventing access to the interior of the pipe/tank.

The protective coating applied to this steel pipe was found having good adhesion value at this time.

The inspection hatch located on the top of the overflow weir box was found secured with a series of nuts and bolts, preventing access.

Roof

The steel roof panels and associated welds appeared sound and free of obvious fatigue or failures of the steel at this time. The protective coating applied to these welded steel surfaces appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value, providing adequate protection for the steel.

The 43” tall angle iron safety railings welded to the roof on the northernmost side of the tank were found securely installed and free of obvious fatigue at this time. The protective coating applied to these safety railings was found having good adhesion value at this time.

An accumulation of mildew throughout the roof has declined the overall aesthetics.

Vent

A frost proof vent is located in the center of the roof, having a 24” inside diameter and stands 36” tall.

A 36” outside diameter aluminum cap and associated screen were found securely installed over the vent penetration in the roof, preventing access to the interior of the tank. The P.V.C. vacuum release plate located on the underside of the vent was free of obvious obstructions and was found to move freely at the time of this inspection.

Hatches

One, 24” by 24” hatch, and one 30” by 30” hatch provide access to the tank interior through the roof dome on the northernmost side of the tank. Each hatch was found secured with a lock, preventing unwanted access to the interior of the tank.

Each hatch was opened during this inspection and were found in good working condition.

INTERIOR INSPECTION:

The entire interior of this water storage tank and components was inspected, to include sediment accumulations, floor, manways, piping, walls and coating, overhead, overflow and aesthetic water quality.

Sediment Accumulations

A uniform layer of accumulated precipitate was found throughout the floor, averaging 1" in depth.

Upon completing this inspection, all precipitate was vacuumed from the floor.

Floor

After removing the accumulated precipitate, the steel for panels and associated welds were inspected and were found appearing sound and remain free of obvious fatigue or failures of the steel at this time.

The protective coating applied to the floor appears to have been applied uniformly and has an average dry film thickness of 28.0 mils and meets the specifications set by the AWWA and was found having good adhesion value, providing adequate protection for these welded steel surfaces.

A mild stain remains throughout the floor due to the accumulation of precipitate.

Manways

One, 24" inside diameter manway penetrates the lowest wall panel on the westernmost side of the tank, located approximately 17" above the floor and is securely installed and free of obvious leakage.

This manway was found properly installed and without leakage, yet with mild surface corrosion throughout it's outside circumference due to coating failure. The protective coating applied to these steel surfaces was found having good adhesion value and with an average dry film thickness of 28.7 mils, providing adequate protection for the steel.

One, 30" inside diameter manway penetrates the lowest wall panel on the easternmost side of the tank, located approximately 25" above the floor and is securely installed and free of obvious leakage. A rubber gasket covers and seals all surfaces of the manway lid, while the protective coating applied to the steel maway trunk was found having good adhesion value and with an average dry film thickness of 18.6 mils, providing adequate protection for the steel.

Piping

The influent/effluent mixing system pipe penetrates the floor approximately 72” inform the wall on the north-easternmost side of the tank, having a 12” inside diameter. This metal pipe extends up approximately 10” to a metal T-fitting. One side of the T-fitting has a stainless steel grate that is securely installed and free of obvious obstructions at this time. On the opposite side of the T-fitting, is a second 12” inside diameter metal T-fitting. One side of this T-fitting has a stainless steel grate that is securely installed and free of obvious obstructions at this time.

A 12” inside diameter metal 90° elbow directed up extends from the opposite side of this T-fitting. A 12” inside diameter P.V.C. pipe extends up from this elbow and is supported to the tank wall with four welded steel standoffs and reduces to 8” inside diameter and terminates approximately 17’ below the junction of where the roof and walls meet, having an 8” inside diameter rubber check valve installed at its end. Three additional 8” inside diameter rubber check valves extend off the main 12” inside diameter pipe and are evenly spaced throughout its length.

Each of the four rubber influent check valves, to include each stainless steel effluent grate, was free of obvious obstructions and without flow at this time.

The protective coating applied to the metal section of this mixing pipe and each metal support standoff was found having good adhesion value at this time.

Three, 3/4" inside diameter sample pipes penetrate the lowest wall panel on the westernmost side of the tank, located approximately 12” above the floor and are spaced approximately 6” apart.

The sample pipe labeled at 40’ within the steel box welded to the tank wall on the exterior of the tank has snapped at the penetration, located approximately 12” above the floor. Although this pipe has failed at the wall penetration, this 3/4" inside diameter penetration was free of obvious obstructions at this time. The P.V.C. pipe that once extended up from this penetration was followed upward throughout its length. This pipe remains supported to the wall with four welded standoffs, while the top 10’ of this pipe has snapped and failed. The upper most standoff for this pipe above the area of failure and located approximately 40’ above the floor has somewhat failed from its weld to the wall, yet this standoff remains in-place at this time.

The two remaining 3/4" inside diameter P.V.C. pipes that provide sampling at the 5’ and 25’ elevations above the floor were found securely supported within welded steel standoffs and were found free of obvious obstructions at this time.

Walls And Coating

The interior walls were inspected beginning at the floor and by spiraling the circumference of the tank up to the water surface.

These steel wall panels and associated welds appeared sound and remain free of obvious fatigue or failures of the steel at this time.

The average dry film thickness of the protective coating system applied to the interior welded steel wall panels were measured during this inspection. The dry film thickness of the coating system applied to the interior wall surfaces was found as follows:

Row	***Mil Thickness***	***Row***	***Mil Thickness***
1.	21.2 mils	5.	30.2 mils
2.	23.9 mils	6.	32.2 mils
3.	32.5 mils	7.	24.5 mils
4.	31.7 mils	8.	27.9 mils

The American Water Works Association (AWWA) recommends a dry film thickness of 10.5 to 15.5 mils of coating film thickness be applied to the interior surfaces of welded steel potable water storage tanks to provide adequate protection for welded steel structures.

The protective coating applied to the interior welded steel wall surfaces appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value, providing adequate protection for the steel.

At the location of the failed standoff for the sample pipe, located 40’ above the floor on the westernmost side of the tank are the exposed steel surfaces of the failed weld. Mild corrosion was found throughout the exposed steel surfaces of the weld, while no steel fatigue was evident.

Behind this failed standoff is an exposed section of the wall panel measuring approximately 1” in diameter and a primer coating was observed applied to the wall, while appearing to have good adhesion value at this time.

Mild staining exists throughout the interior walls, beginning approximately 17’ below overflow level and extends down to the floor.

Overhead

The entire overhead was inspected from the water surface.

These steel panels and associated welds appeared sound and remain free of obvious fatigue or failures of the steel at this time. The protective coating applied to these welded steel surfaces was found having an average dry film thickness of 21.9 mils and appeared to have been applied uniformly, meets the specifications set by the AWWA and has good adhesion value. Mild rust staining was observed throughout the edges of the steel panels, yet no obvious exposure of the underlying steel was evident at this time.

Overflow

The overflow consists of a 48" long by 3" wide cutout within the top wall panel, located approximately 4" below the junction of where the roof and walls meet.

This overflow cutout was free of obvious obstructions at the time of this inspection.

Aesthetic Water Quality

The aesthetic water quality was found to be good throughout this tank, allowing unlimited visibility for this inspection.

RECOMMENDATIONS:

It is the opinion of Underwater Solutions Inc. that this welded steel potable water storage tank appeared sound and free of obvious leakage at this time.

EXTERIOR:

The exterior steel wall panels and associated welds appeared sound and free of obvious fatigue or failures of the steel.

The protective coating applied to the exterior walls appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value at this time.

The steel roof panels and associated welds appeared sound and free of obvious fatigue or failures of the steel.

The protective coating applied to these welded steel surfaces appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value at this time.

A mild to moderate non-uniform accumulation of mildew throughout the exterior walls and roof has declined the overall aesthetics.

It is our recommendation to pressure-wash the exterior wall, roof and associated exterior component surfaces at 3,000 P.S.I. and at 3.0 G.P.M. to remove the accumulated mildew from these surfaces in an effort to preserve the adhesion value of the protective coating, while improving the overall aesthetics.

The exposed surfaces of the concrete foundation appeared mostly sound, while tight cracks were observed throughout less than 5% of these exposed surfaces. These cracks were sounded and appeared to be limited to the surface of the concrete and free of voids or spalls at this time.

It is our recommendation to monitor the cracks found throughout the exposed surfaces of the concrete foundation through future scheduled inspections to ensure that concrete spall does not occur, which could result in exposure of the reinforcement steel.

All components affixed to this tank were found properly installed at this time. A screen and flap-valve installed at the end of the overflow pipe remains secure, preventing access to the interior of the pipe/tank.

A cap and screen installed over the vent penetration in the roof remains secure, preventing access to the interior of the tank.

The two interior access hatches located on the roof were found secured with locks, preventing unwanted access to the interior of the tank.

The steel sample box welded to the lowest row of wall panels was found secured with a lock, preventing unwanted access.

The ladder guard installed at the base of the roof access ladder was found secured with a nut and bolt.

It is our recommendation to install a lock on the ladder guard in an effort to prevent unwanted access to the ladder/roof.

INTERIOR:

The interior steel for panels and associated welds appeared sound and free of obvious fatigue or failures of the steel at this time.

The protective coating applied to the floor appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value and therefore requires no remedial action at this time.

The sample pipe labeled 40’ within the steel box on the exterior of the tank has failed at its wall penetration within the tank, therefore a sample from this location. A sample taken from this location has an actual level of 12” above the tank floor.

The 3/4" inside diameter P.V.C. pipe that extends from the 40’ sample location within the tank has snapped at the penetration located approximately 12” above the floor.

The P.V.C. pipe that once extended up from this penetration was followed upward throughout its length. This pipe remains supported to the wall with four welded standoffs, while the top 10’ of this pipe has snapped and failed. The upper most standoff for this pipe above the area of failure, located approximately 40’ above the floor has somewhat failed from its weld to the wall, yet this standoff remains in-place at this time.

Failure of this support standoff has resulted in exposure of the steel surfaces of the failed weld and mild corrosion was found throughout the exposed steel surfaces of the weld, while no obvious fatigue steel fatigue was evident.

Behind this failed standoff is an exposed section of the wall panel measuring approximately 1” in diameter. A primer coating was observed applied to the wall in this location that appeared to have good adhesion value at this time.

The two remaining 3/4" inside diameter P.V.C. pipes that provide sampling at the 5’ and 25’ elevations above the floor were found securely supported within welded steel standoffs and free of obvious obstructions at this time.

The interior steel wall panels and associated welds appeared sound and free of obvious fatigue or failures of the steel at this time.

The protective coating applied to the interior welded steel wall surfaces appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value, providing adequate protection for the steel.

It is our recommendation that the next time this tank is removed from service and de-watered, that the failed sample pipe be repaired/replaced to allow for sampling at the proper elevations. We recommend then re-securing the failed support standoff located approximately 40' above the floor and to re-coat the repaired standoff using an A.N.S.I./N.S.F.61 approved coating for use in structures containing potable water in an effort to halt corrosion, prevent steel fatigue and to provide good protection for this steel support and to provide good protection for the wall panel that this support is welded to.

The steel overhead panels and associated welds appeared sound and free of obvious fatigue or failures of the steel at this time. The protective coating applied to these welded steel surfaces appeared to have been applied uniformly, meets the specifications set by the AWWA and was found having good adhesion value. Mild rust staining was observed throughout the edges of the steel panels, yet no obvious exposure of the underlying steel was evident at this time.

It is our recommendation to monitor these overhead surfaces through future scheduled inspections to ensure that adhesion loss of the protective coating does not occur, which could result in exposure of the underlying steel.

As always, we recommend re-inspection and cleaning of all water storage facilities in accordance with state and federal mandates, A.W.W.A. standards, and be completed by an experienced and authorized inspection corporation.

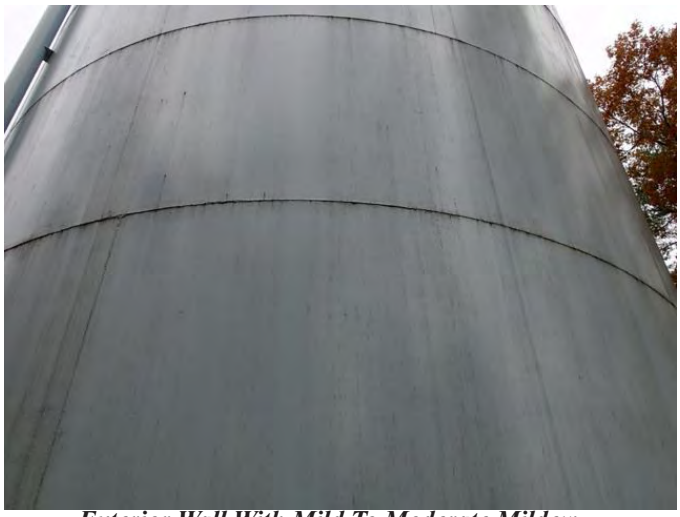
UNDERWATER SOLUTIONS INC.
Christopher A. Cole, Project Manager

This report, the conclusions, recommendations and comments prepared by Underwater Solutions Inc. are based upon spot examination from readily accessible parts of the tank. Should latent defects or conditions which vary significantly from those described in the report be discovered at a later date, these should be brought to the attention of a qualified individual at that time. These comments and recommendations should be viewed as information to be used by the Owner in determining the proper course of action and not to replace a complete set of specifications. All repairs should be done in accordance with A.W.W.A. and/or other applicable standards.

1 ***Exterior Wall With Mild To Moderate Mildew***

2 ***Exterior Wall With Mild To Moderate Mildew***

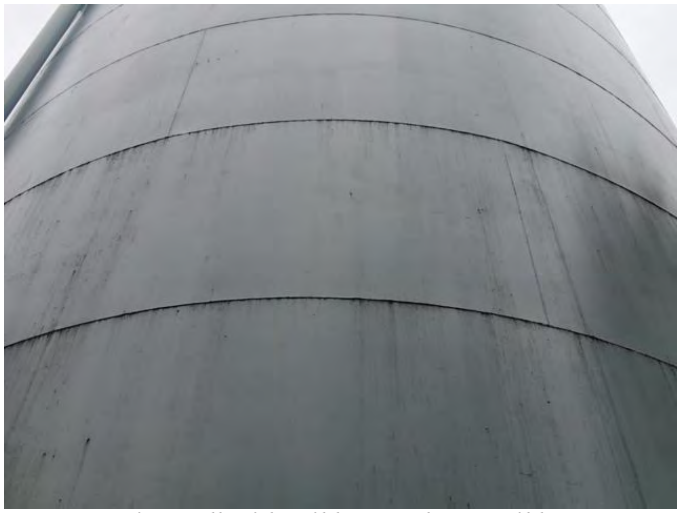
3 ***Exterior Wall With Mild To Moderate Mildew***



4 ***Exterior Wall With Mild To Moderate Mildew***

5 ***Exterior Wall With Mild To Moderate Mildew***

6 ***Exterior Wall With Mild To Moderate Mildew***



7 ***Exterior Wall With Mild To Moderate Mildew***

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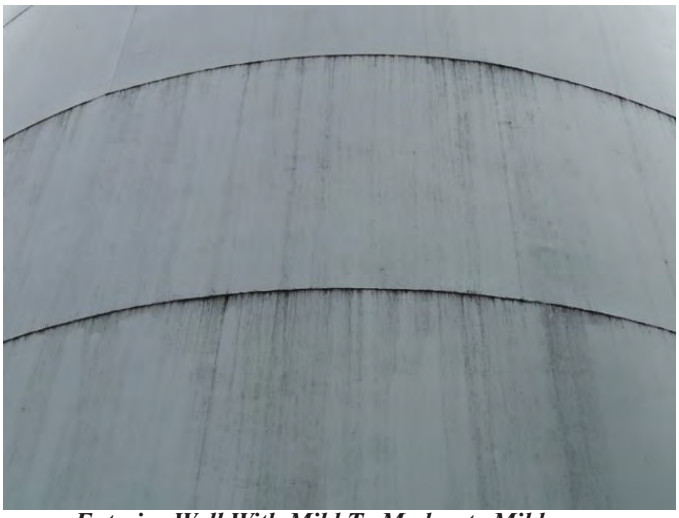
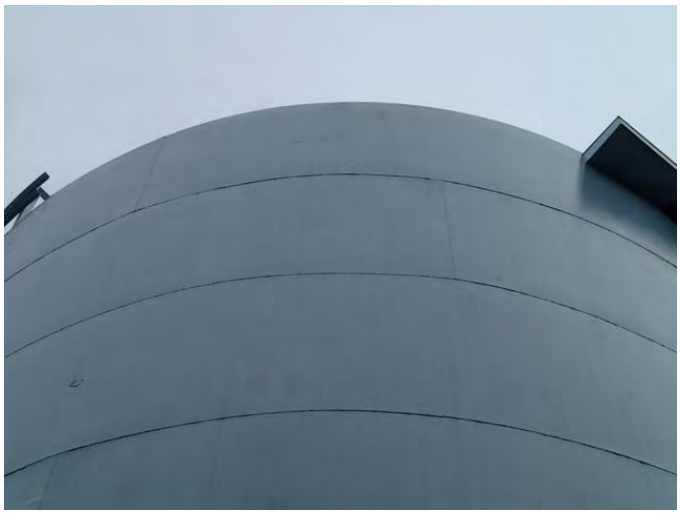


9 ***Exterior Wall With Mild To Moderate Mildew***

10 ***Exterior Wall With Mild To Moderate Mildew***

11 ***Exterior Wall With Mild To Moderate Mildew***



12 ***Exterior Wall With Mild To Moderate Mildew***

13 ***Concrete Foundation With Tight Surface Cracks***

14 ***Concrete Foundation With Tight Surface Cracks***

15 ***Concrete Foundation With Tight Surface Cracks***

16 ***Concrete Foundation With Sealant Applied At The Junction Of The Concrete Foundation And Tank Base***

17 ***Concrete Foundation With Sealant Applied At The Junction Of The Concrete Foundation And Tank Base***

18 ***Concrete Foundation With Sealant Applied At The Junction Of The Concrete Foundation And Tank Base***

19 ***Secure Anchor Bolt***

20 ***Secure Anchor Bolt***

21 ***Secure Anchor Bolt***

22 ***Secure Westernmost Manway***

23 ***Secure Easternmost Manway***

24 ***Ladder And Safety Cage With A Fall Prevention Device***

25 ***Secure Ladder Guard***

26 ***Vent Access Ladder***

27 ***Overflow Weir Box And Overflow Pipe***

28 ***Overflow Pipe With A Flap-Valve***

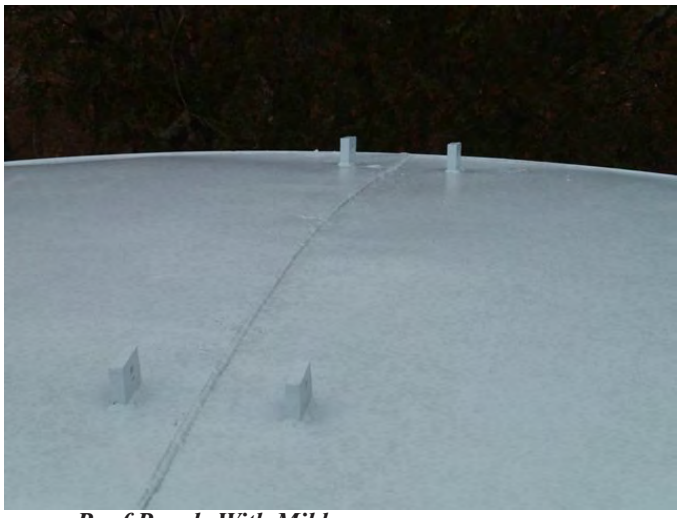
29 ***Secure Overflow Pipe Screen***

30 ***Roof Panels With Mildew***

31 ***Roof Panels With Mildew***

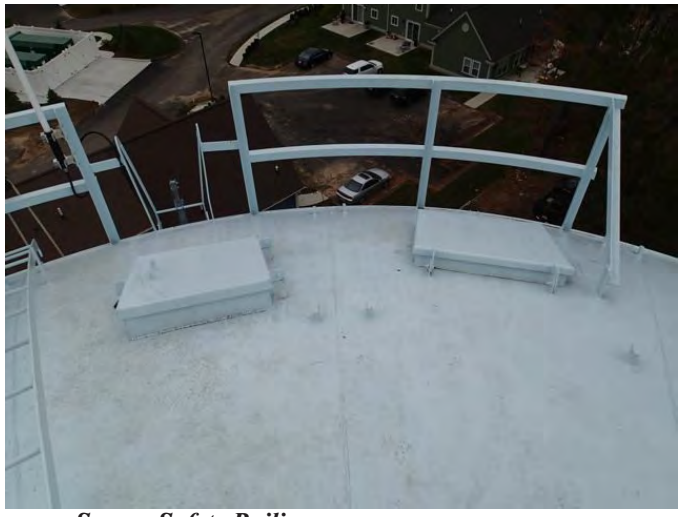
32 ***Roof Panels With Mildew***

33 ***Roof Panels With Mildew***



34 ***Roof Panels With Mildew***

35 ***Secure Safety Railings***



36 ***Secure Safety Railings***

37 ***Secure Frost Proof Vent***

38 ***Secure Vent Screen***

39 ***Secure Vent Screen***

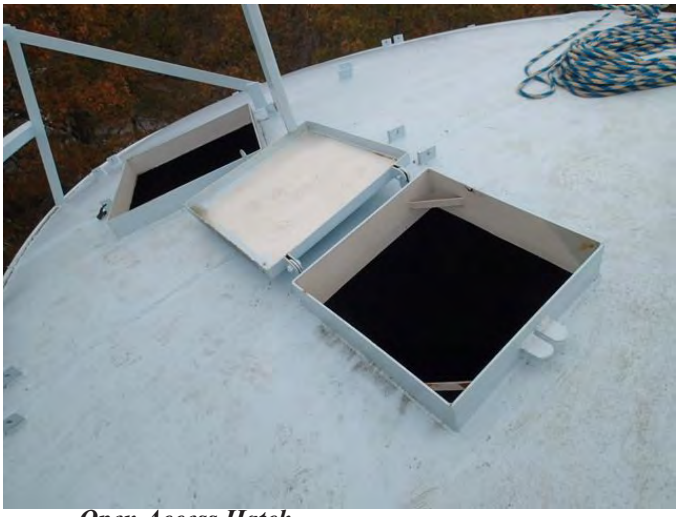
40 ***Secure Vacuum Release Plate***

41 ***Secure Vacuum Release Plate***

42 ***Open Access Hatch***

43 ***Closed Access Hatch***

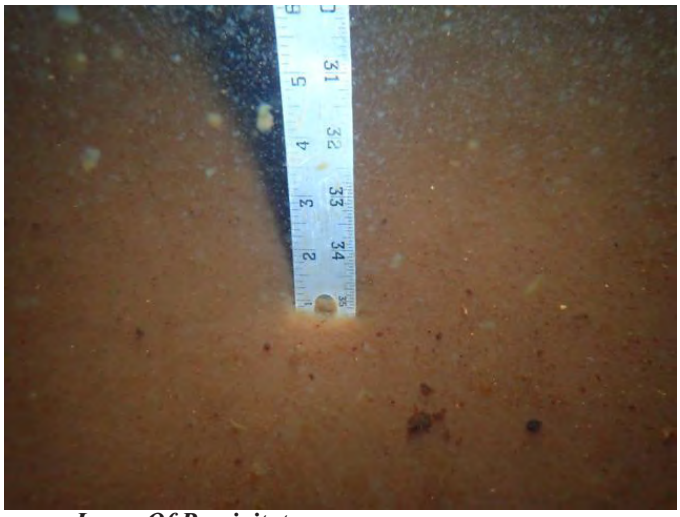
44 ***Secure Access Hatch***



45 ***Open Access Hatch***

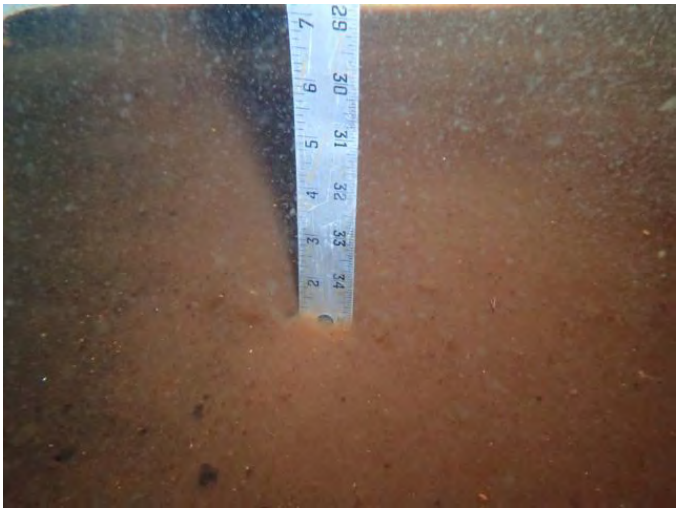
46 ***Closed Access Hatch***

47 ***Secure Access Hatch***



48 ***Layer Of Precipitate***

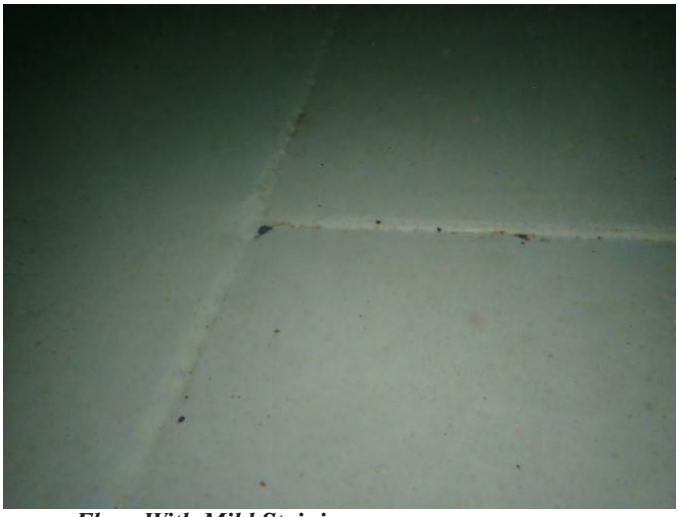
49 ***Layer Of Precipitate***



50 ***Layer Of Precipitate***

51 ***Floor With Mild Staining***

52 ***Floor With Mild Staining***



53 ***Floor With Mild Staining***

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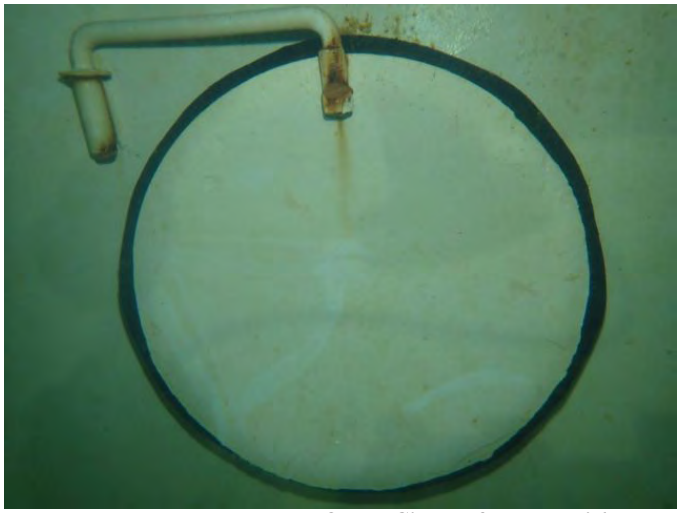
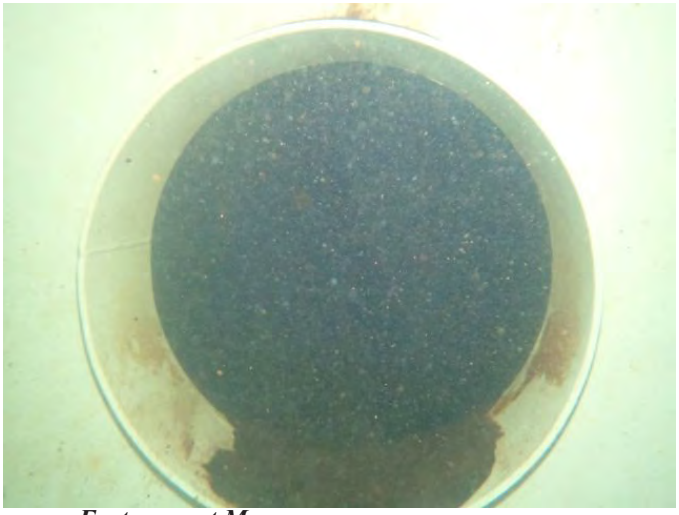
55 ***Floor With Mild Staining***



56 ***Westernmost Manway Outer Circumference With Coating Loss And Mild Surface Corrosion***



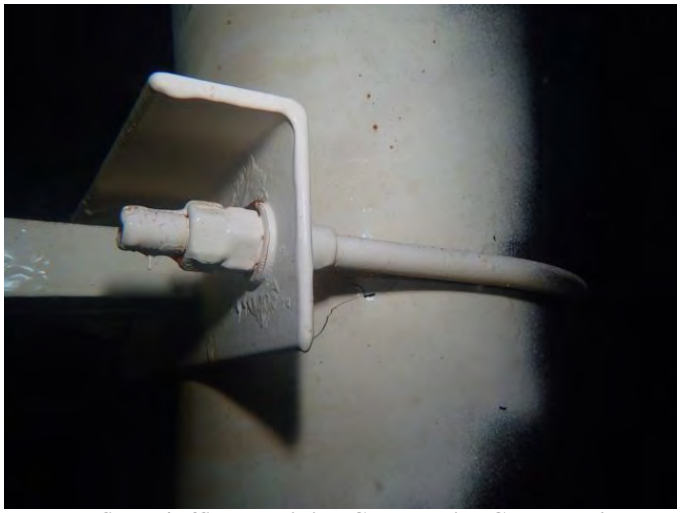
57 ***Easternmost Manway***

58 ***Influent/Effluent Mixing System Piping Penetrating The Tank Floor***

59 ***Effluent Steel Grate***

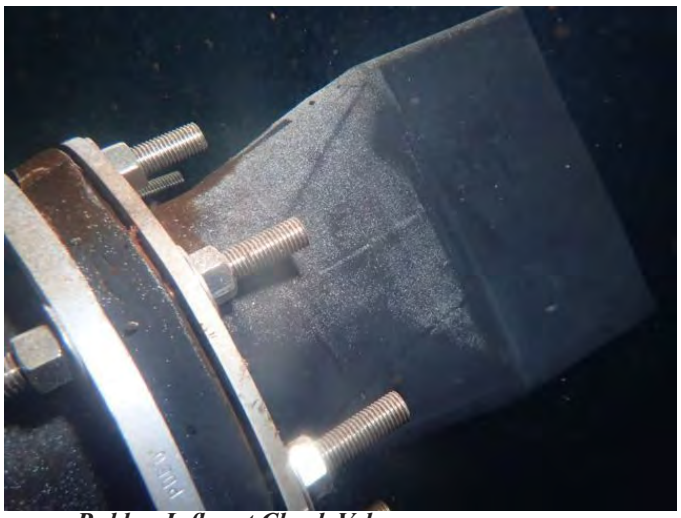
60 ***Effluent Steel Grate***

61 ***Influent/Effluent Mixing System Extending Upward Into The Tank***



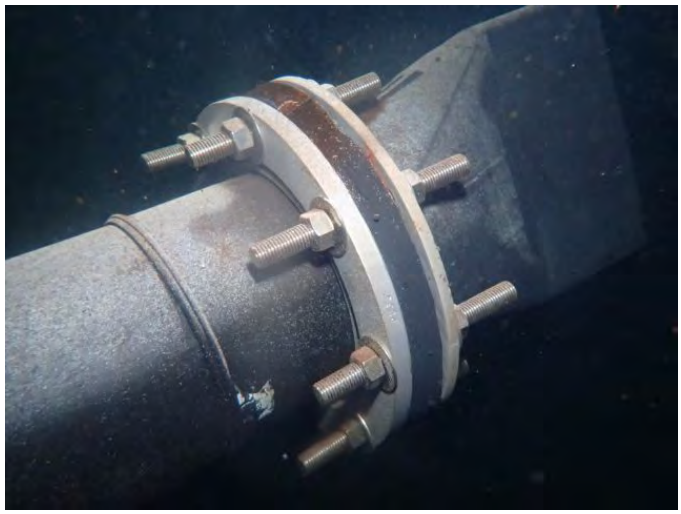
62 ***Influent/Effluent Mixing System Pipe Supported To The Wall***

63 ***Influent/Effluent Mixing System Pipe Supported To The Wall***



64 ***Rubber Influent Check Valve***

65 ***Rubber Influent Check Valve***



66 ***Rubber Influent Check Valve***

67 ***Rubber Influent Check Valve***

68 ***Sample Pipes Penetrating The Wall (Interior Of The Tank)***

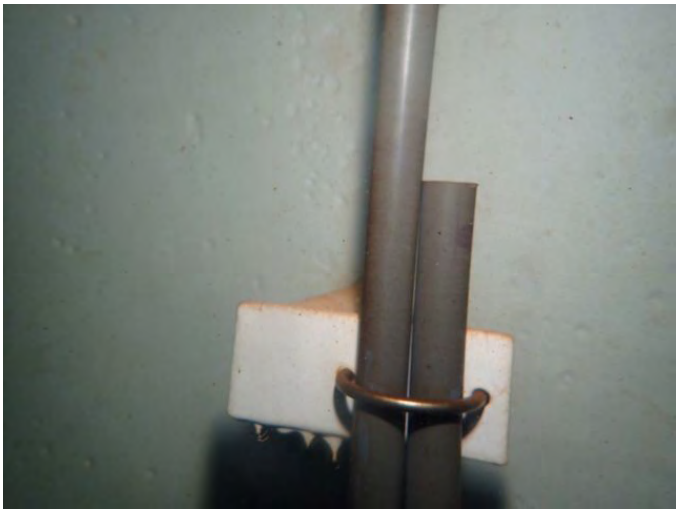
69 ***Sample Pipe Box On The Exterior Of The Tank***

70 ***Sample Pipes Penetrating The Wall (Exterior Of The Tank)***

71 ***Sample Pipe Snapped At The Wall Penetration***

72 ***Sample Pipe Securely Installed***

73 ***Sample Pipes Supported To The Wall***



74 ***Sample Pipes Supported To The Wall***

75 ***Sample Pipes Supported To The Wall***

76 ***Failed Sample Pipe***

77 ***Failed Sample Standoff Located 40' Above The Floor***

78 ***Failed Sample Pipe Standoff Weld With Exposed Steel And Surface Corrosion***

79 ***Failed Sample Pipe Standoff Weld With Exposed Steel And Surface Corrosion***

80 ***Interior Wall With Mild Staining***

81 ***Interior Wall With Mild Staining***

82 ***Interior Wall With Mild Staining***

83 ***Interior Wall With Mild Staining***

84 ***Interior Wall With Mild Staining***

85 ***Interior Wall With Mild Staining***

86 ***Interior Wall With Mild Staining***

87 ***Interior Wall With Mild Staining***

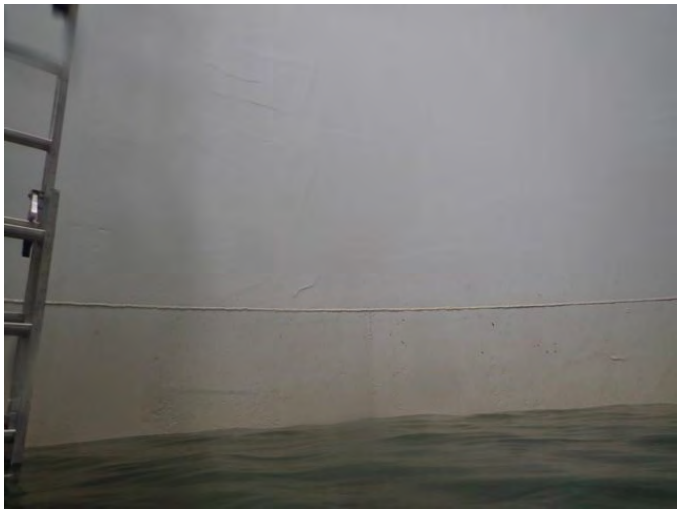
88 ***Interior Wall With Mild Staining***

89 ***Interior Wall With Mild Staining***

90 ***Interior Wall With Mild Staining***

91 ***Interior Wall With Mild Staining***

92 ***Interior Wall With Mild Staining***



93 ***Interior Wall With Mild Staining***

94 ***Overhead With Mild Rust Staining***

95 ***Overhead With Mild Rust Staining***

96 ***Overhead With Mild Rust Staining***

97 ***Overhead With Mild Rust Staining***

98 ***Overhead With Mild Rust Staining***

99 ***Overhead With Mild Rust Staining***

100 ***Vent Penetration***

101 ***Overflow Cutout***

102 ***Discharge During Cleaning***