STATE OF NEW HAMPSHIRE
BEFORE THE
NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

RE: PENNICHUCK WATER WORKS, INC.
DW 19-___

2019 QUALIFIED CAPITAL PROJECT ADJUSTMENT CHARGE FILING

DIRECT TESTIMONY
OF
John J. Boisvert

February 11, 2019

Professional and Educational Background

Q. What is your name and what is your position with Pennichuck Water Works, Inc.?

A. My name is John J. Boisvert. I am the Chief Engineer of Pennichuck Water Works, Inc. (the "Company" or "PWW"). I have worked for the Company since February 1, 2006. I am a licensed professional engineer in New Hampshire and Maine.

Q. Please describe your educational background.

A. I have a Bachelor of Science degree and a Master of Science degree in Civil Engineering from the University of New Hampshire in Durham, New Hampshire. I also have a Master's degree in Environmental Law and Policy from Vermont Law School in South Royalton, Vermont.

Q. Please describe your professional background.

A. Prior to joining the Company, I served as a Team Leader for Weston & Sampson Engineers of Portsmouth, New Hampshire in their Water Practices Group from 2000 to 2006. Prior to Weston & Sampson I was employed by the Layne Christensen Company of Shawnee Mission, Kansas as Regional Manager for their Geosciences Division in Dracut, Massachusetts from 1994 to 2000. I completed graduate school in 1992 and was employed by Hoyle, Tanner, & Associates of Manchester, New Hampshire as a Project Engineer from 1992 to

1994. Prior to entering full time graduate programs at the University of New Hampshire and Vermont Law School I was employed by Civil Consultants of South Berwick, Maine as a Project Engineer from 1986 to 1989 and by Underwood Engineers of Portsmouth, New Hampshire as a project Engineer from 1985 to 1986.

Q. What are your responsibilities as Chief Engineer of the Company?

A. As Chief Engineer, I manage and oversee the Company's Engineering Department. I lead the Company's Asset Management program. I, as head of the Engineering Department, am responsible for the planning, design, permitting, construction, and startup of major capital projects, including pipelines, reservoirs/dams, building structures, pumping facilities, treatment facilities, and groundwater supplies. The Engineering Department staff provides regular technical assistance to the Company's Water Supply Department, Distribution Department, Customer Service Department, and Senior Management.

Q. What is the purpose of your testimony?

A. I will be providing details of the major capital projects planned and budgeted for 2019-2021 as part of the Company's 2019 Qualified Capital Project Adjustment Charge ("QCPAC") filing. This testimony will present the major QCPAC projects initiated and completed in 2018 as well as proposed projects for 2019, 2020 and 2021. My testimony supports, and is in addition to, testimony being provided by the Company's Chief Operating Officer Donald L. Ware for this docket. Detailed

project listings mentioned in this testimony are detailed in Mr. Ware's testimony (Exhibit 2 Pages 1 – 5).

Q. What types of projects can be described as "major capital projects"?

A. Major capital projects require significant capital investment and are approved annually in the Company's capital budget by the Company's Board of Directors. Projects are associated with dams, treatment facilities, pumping facilities, storage tanks, water main replacements, valve and hydrant replacements, building facility improvements and refurbishments, as well as non-structural efforts to improve Company performance, such as Asset Management. These generally include:

- The replacement of infrastructure that has reached the end of its useful life, does not achieve the level of service required of it (water quality, capacity, and efficiency), or the Company's ability to properly maintain it (outdated/lack of repair parts, etc.) is either impractical or more costly than replacing it.
- Infrastructure upgrades to improve system performance.
- Investments to ensure compliance with the primary and secondary Safe Drinking Water Act standards.
- Engineering studies and evaluations to assess infrastructure and system performance to aid in planning future capital investment needs.
- The implementation of processes and systems such as Asset Management, which incorporates/integrates Geographical Information Systems (GIS), Computerized Management and Maintenance System

(CMMS- Oracle WAM), electronic time and record keeping, as well as inventory management, allowing the Company to have access to the data and information needed to make cost effective, immediate and long term operations and planning decisions.

Q. **What is the process that the Company employs and what are the factors the Company considers when developing the capital budget for water main replacements?**

A. The Company considers a number of factors in developing a capital budget for water main rehabilitation, replacement, and/or new construction. The Company is transitioning to an Asset Management based approach which considerations risk of asset failure, consequence of asset failure, the criticality of an asset, and required level of service for all assets including:

- Water main break/failure history;
- Water quality problems;
- Fire protection flows;
- The proximity of and support provided to key critical customers (public safety, government, hospitals, etc.;
- Coordination with gas company replacement projects;
- Geographic grouping of streets where mains to be replaced/rehabilitated for improved efficiency by keeping work in close proximity;
- The opportunity to take advantage of efficiencies gained from coordinating with the City of Nashua ("City") and Town of Amherst's ("Town") paving,

storm water and sewer projects, to replace water main where aging unlined cast iron, steel, and A-C water pipes are present.

- Industry guidelines of the American Water Works Association for the replacement of water main using an average life expectancy for water main of 100 years absent specific information on a particular asset. The Company considers this rate to be reasonable until the Asset Management System allows for a more system/asset specific assessment to be performed. It will remain important when the City or Town is working on a street where the Company has an unlined cast iron, steel, or A-C water main for the Company to replace the water main. There are cost savings in pavement repair and traffic control associated with completing projects while the municipality or gas company is working on a street.

Furthermore, it is rare that the City can replace older sewers or storm drains and not undercut existing water mains. Often, the water mains are located in the same trench as the sewer main, with the sewer main being installed first and the water main laid higher in the same trench. This generally makes it impossible to replace the sewer main without adversely affecting the integrity of the water main. Unlined cast iron, steel, and A-C water main usually cannot survive loss of soil support or the vibration from heavy construction equipment without experiencing high levels of breakage. Municipal infrastructure replacement will continue to be a major driver of our water main replacement for the foreseeable future.

Q. Please describe the pipeline composition of the Company's core water distribution system.

A. As of the end of 2018, the Company had approximately 2,260,000 linear feet ("LF") of water main in its core water system. The water main targeted for replacement includes unlined cast iron water mains, steel and galvanized steel water mains, and Asbestos-Cement (A-C) water mains. The Company has approximately 265,000 LF of unlined cast iron water main, approximately 5,110 LF of steel water main, approximately 21,000 LF of unknown material (likely cast iron), and approximately 208,000 LF of A-C water mains in its core distribution system.

Q. What are the major projects the Company started in 2018 that the Company will be completing as part of the 2019 Capital Budget?

A. The Company planned to complete water main replacement in 2018 on four streets in Nashua prior to winter. Construction delays and the onset of winter weather required shifting the work to 2019. These streets include:

Elm Street:	Replacement of 875 LF of 6 inch unlined cast iron (CI) with 12 inch ductile iron cement lined (DIPCL).
Monroe Street:	Replacement of 310 LF of 4 inch CI with 8 inch DIPCL.
West Pearl Street:	Replacement of 260 LF of 8 inch CI with 8 inch DIPCL.
Gilman Street:	Replace 1470 LF of 8 inch CI with 12 inch DIPCL

These "carry-over" projects total approximately $1,369,000.

Q. What were the major water main projects completed in 2018?

A.	Ritter Street:	Replaced 500 LF of 6 inch CI with 12 inch DIPCL
	Woodward Street:	Replaced 300 LF of 6 inch CI with 12 inch DIPCL
	Factory Street:	Replaced 625 LF of 8 inch and 950 LF CI 950 LF of 16 inch DIPCL
	Pennichuck Street:	Replaced 100 LF of 12 inch CI with 12 inch DIPCL
	Early Street:	Replaced 385 LF of 6" CI with 8" DIPCL
	Fossa Avenue:	Replaced 310 LF of 6 inch CI and 2 PVC with 6 inch and 4 inch DIPCL
	Russell Avenue:	Replaced 775 LF of 8 inch and 275 LF of 6 inch CI with 775 LF of 8 inch and 225 LF of 4 inch DIPCL
	Taylor Street:	Replaced 2084 LF of 6 inch CI with 8 inch DIPCL
	Burnett Street:	Replaced 535 LF of 6 inch CI with 12 inch DIPCL
	Field Street:	Replaced 325 LF of 6 inch CI with 6 inch DIPCL
	Fernwood Street:	Replaced 450 LF of 6 inch CI with 6 inch DIPCL
	Revere Street:	Replaced 760 LF of 6 inch CI with 8 inch DIPCL
	Stevens Street:	Replaced 760 LF of 8 inch CI and 160 LF of 6 inch CI with 760 LF of 8 inch and 160 LF of 4 inch DIPCL
	Evergreen Street:	Replaced 310 LF of 1.5 and 1.25 inch CI with 4 inch DIPCL
	Morton Street:	Replaced 290 LF of 1.5 inch CI with 550 LF of 4 inch DIPCL
	Park Avenue:	Replaced 300 LF of 8 inch CI and 160 LF of 2 inch CI with 300 LF of DIPCL and 160 LF of 4 inch DIPCL
	Kinsley Street:	Replaced 275 LF of 12" CI and 1020 LF of 6" CI with 12" DIPCL

Mast Road:	Replaced 700 LF of 8" AC with 700 LF of 12" DIPCL (Merrimack)
Marshall Street:	Replaced 1074 LF of 8" CI with 1074 LF of 8" DIPCL
Ferryalls Court:	Replaced 116 LF of 1.25" steel pipe with 4" PVC
Salvail Court:	Replaced 100 LF of 1.25" steel pipe with 4 inch PVC
Lovewell Street:	Replaced 400 LF of 1.25" steel pipe with 8" DIPCL
Cheshire Street:	Replaced 394 LF of 8" AC with 394 LF of 12" DIPCL
Shakespeare High Pressure System:	Expanded the existing high pressure system to address pressure issues to 4 streets with the addition of gate valves and check valves

These projects represent an investment of $4,816,000 in aging infrastructure.

In 2018, the Company successfully negotiated a pavement restoration agreement with the City of Nashua over streets where water mains were replaced from 2015 through 2018. The Company was able to issue payment to the City in an amount just over $1,568,000 for the City to accept restoration responsibility at an amount less than the Company would have had to pay its contractor's. As part of this agreement, the City assumes management of street/pavement restoration relieving the Company from this responsibility.

Q. Please identify and describe water main projects planned for 2019, 2020, and 2021.

A. Proposed water main construction and corresponding water main trench restoration is presented, by year, below. The vast majority of the water main being replaced is in Nashua and is near or greater than 100 years old. The pipe is generally 2 inch through 8 inch diameter unlined cast iron pipe (CI). Most of this pipe suffers from internal corrosion (tuberculation) resulting in substandard fire flows. This internal corrosion also increases the risk of the delivery of substandard quality water to our customers, including bacteria (from the potential loss of chlorine residual) and colored water from flow fluctuation or pipe disturbance. Some of the work in 2019 will be done in conjunction with sewer improvements by the City of Nashua. The City schedules and completes their work annually based upon a July 1st – June 30th fiscal year and does not finalize and provide the Company with their capital project plans until March or April each year. Finally, there will be some projects undertaken, which relate to certain water main additions needed to enhance system reliability and limit system vulnerabilities.

Planned 2019 Water Main Replacements/Additions

The Company plans to replace approximately 7,020 LF and add approximately 10,500 LF of new water in 2019. The majority of the added water main will be in the Company's Northwest High Pressure system that serves the northwest area of Nashua and Amherst as well providing interconnections to serve the Town of Milford and the Merrimack Village District. The new main will close some "dead ends" and provide a redundant pipeline to a large commercial and industrial area along Route 101A. In addition, the installation of new 24-inch water main along

Manchester Street will eliminate a pipeline restriction "bottle neck" that restricts to the Northwest High Pressure System from the Company's Snow Pumping Station. This work is a critical lead on project ahead of the Company's planned replacement of the Kessler Farm Storage Tank in 2020 (discussed below). This work will allow more water to be delivered from the Snow Station and allow sufficient back feed from the Company's Bon Terrain Tank in Amherst during emergency (fire) flow conditions. The work within the Northwest High Pressure System is being funded by a low interest loan from the NH Drinking Water and Groundwater Trust Fund (DWGTF).

A significant amount of water main replacement work is anticipated within the City as part of ongoing replacement of aging infrastructure. Much of this effort will be associated/coordinated with other utility work and road reconstruction. Specific Projects are as follows:

Gilman Street: Replace 1470 LF of 8 inch CI with 12 inch DIPCL

Elm Street: Replace 875 LF of 6 inch CI with 12 inch DIPCL

Monroe Street: Replace 310 LF of 4 inch CI with 8 inch DIPCL

W.Pearl Street: Replace 260 LF of 8 inch CI with 8 inch DIPCL

Harvard Street: Replace 800 LF of 8 inch CI with 8 inch DIPCL

<u>Northwest High Pressure System</u>

Manchester Street: Add 2700 LF of 24 inch DIPCL on Manchester St.

Routes 101A/Route 121 (Amherst): Add 2200 LF of 12 inch DIPCL to close dead end water mains

Tinker Road: Replace 825 LF of 16 inch AC with 825 LF of 24 inch DIPCL

Deerwood Drive:	Replace 1300 LF of 12 inch AC with 1300 LF of 24 inch DIPCL
NW Blvd Loop:	Add 3400 LF of 20 inch HDPE including RR pipe jacking
Route 101A Loop:	Add 2200 LF of 12 inch DIPCL to close two loop major dead ends

City of Nashua Sewer Coordination

Chase Street:	Replace 470 LF of 6 inch CIP with 470 LF of 6 inch DIPCL
Ash Street:	Replace 710 LF of 6 inch CIP with 710 LF of 12 inch DIPCL
Lake Street:	Replace 2950 LF of 6 inch CI with 12 inch DIPCL

Planned 2020 Water Main Replacements/Additions

Approximately 9100 LF of water main replacement is anticipated in 2020. Roughly 2000 LF will be associated/coordinated with City sewer projects with the remainder of the work consisting of aging infrastructure replacement. The specific locations include:

Hamilton Street:	Replace 410 LF of 6 inch CI with 4 inch DIPCL
Brook Street:	Replace 225 LF of 4 inch and 915 LF of 6 inch CI with 1140 LF of 8 inch DIPCL
Ash Street:	Replace 510 LF of 6 inch CI with 8 inch DIPCL
Burritt Street:	Replace 425 LF of 4 inch CI with 8 inch DIPCL
Burritt Street:	Replace 125 LF of 4 inch CI with 4 inch DIPCL
Verona Street:	Replace 675 LF of 6 inch CI with 8 inch DIPCL
Sarasota Avenue:	Replace 250 LF of 6 inch CI with 8 inch DIPCL

Alld Street:	Replace 1860 LF of 6 & 8 inch CI with 12 inch DIPCL
Lawndale Avenue:	Replace 1085 LF of 6 inch CI with 12 inch DIPCL
Taylor Road:	Replace 725 LF of 8 inch CI with 12 inch DIPCL
Temple Street:	Replace 900 LF of 8 inch CI with 12 inch DIPCL
School Street:	Replace 400 LF of 4 inch CI with 8 inch DIPCL
City Sewer:	Replace 2000LF various sections of CI pipe

Planned 2021 Water Main Replacements/Additions

Water main replacements total approximately 21000 LF for 2020 and include the following locations:

Benson Avenue:	Replace 550 LF of 4 inch CI with 8 inch DIPCL
Spaulding Street:	Replace 950 LF of 6 inch CI with 8 inch DIPCL
Alstead Avenue:	Replace 240 LF of 4 inch CI with 4 inch DIPCL
Spaulding Avenue:	Replace 430 LF of 6, 2, & 1.25 inch CI with 4 inch DIPCL
St. Lazare Street:	Replace 415 LF of 2 inch CI with 4 inch DIPCL
Ingalls Street:	Replace 200 LF of 1.5 inch CI with 4 inch DIPCL
Nye Avenue:	Replace 400 LF of 2 & 1.5 inch CI with 4 inch DIPCL
Copp Street:	Replace 350 LF of 6 inch CI with 8 inch DIPCL
Gray Avenue:	Replace 360 LF of 6 inch CI with 6 inch DIPCL
Coburn Woods:	Replace 4400 LF of 2 inch PVC with 4 inch DIPCL
City Sewer:	Replace CI with DICLP on the streets noted below:
Sawyer Street:	Replace 1600 LF of 6 inch CI with 12 inch DIPCL
Woodward Street:	Replace 360 LF 8 inch CI with 470 LF 8 inch DIPCL

Blosson Street:	Replace 2400 LF of 6 inch CI and 8 inch CI with 2400 LF of 8 inch DIPCL
Linwood Street:	Replace 960 LF of 6 inch CI with 8 inch DIPCL
Balcom Street:	Replace 1240 LF 6 inch CI with 1240 LF 8 inch DIPCL
Euclid Avenue:	Replace 425 LF 6 inch CI with 425LF 8 inch DIPCL
Fairview Street:	Replace 800 LF 6 inch CI with 800 LF 8 inch DIPCL
Sargent Street:	Replace 1900 LF 6 inch CI with 1900 LF 16 inch DIPCL
Courtland Street:	Replace 1170 LF 4 inch CI with 1170 LF 16 inch DIPCL

Q. Your testimony states that water main replacement varies each year (2019-2021) due to balancing the investment in water main replacements with other major capital projects. What are those projects?

A. The Company has typically targeted overall capital investment (reinvestment) between $8 million-$12 million per year. Most of the investments are associated with horizontal assets such as water main or vertical assets, including storage tanks, pumping stations, treatment facilities, dams, and process related improvements (SCADA, Asset Management, etc.). In some years there may be more need for horizontal asset investment rather than vertical assets. In other years the opposite may be true.

<u>2019 Vertical Projects</u>

In 2019 the Company will complete the replacement of the existing Merrimack River Intake with the construction of a new deep-water Merrimack River Intake. The new intake will replace the current "in bank" intake, with a new intake at the

bottom of the river, which will draw water from the river further out from the banks of the Merrimack River, and have access to water at a depth below the surface. Compared to the existing river bank channel, the new intake will be able to function 365 days per year. The existing intake cannot function in winter when ice conditions are present. The new intake project is currently out to public bid, with actual construction of the intake to incur in the summer and fall of 2019. Funding of the project will be from a $5,500,000 low interest loan from the DWGTF, for which a financing petition was filed with the Commission on February 7, 2019.

2019 will also be the first year of a three-year process to change out the activated carbon filter media at the Company's main treatment facility in Nashua. The carbon being replaced has been in service for over 6 years and based on recent testing the carbon's ability to adsorb taste and odor compounds as well as volatile and synthetic organic compounds is almost fully exhausted. Two filters (Filter #1 and Filter #2) will be changed out at a cost of approximately $1,000,000

2020 Vertical Projects

The 2020 budget includes improvements to the Bowers Dam Spillway (estimated cost - $900,000). Improvements are needed to the Bowers Dam Spillway to ensure passage of 2.5 times the 100-year flood and to improve the operation of the current stop log and flashboard. The final budget may vary as an evaluation and design of the improvements are being performed in 2019. This project will address deficiencies in spillway capacity identified by the NHDES earlier this year.

2020 will also be the second year in a three-year process to change out the activated carbon filter media at the Company's main treatment facility in Nashua. Two filters (Filter #3 and Filter #4) will be changed out at a cost of approximately $1,000,000.

The Kessler Farm Tank Replacement Project (estimated cost $3,338,000) will replace an existing 4.5 million gallon welded steel tank with a new 4.5 million gallon precast pre-stressed concrete tank. The interior and exterior coatings of the existing steel tank, which were repainted in 2002, have reached the end of their useful lives. The estimated cost to recoat the interior and exterior of the existing tank would be in excess of $1,000,000, and would need to done again in another fifteen years, based on past experience. Replacing the existing tank with a new concrete tank, which does not require significant annual or regular maintenance other than periodic inspection and cleaning over an 80-year design life, brings significant long term economic advantages to bear over the restoration of the existing tank. The steel tank was painted slightly more than 15 years ago and would need to be painted 5 or more times (once every 15 years), at a cost of $1,000,000 or more each time, over the next 80 years. Replacement of the steel tank with a concrete will result in a net savings of more than $2,000,000 in maintenance cost (painting) over the 80-year design life.

2021 Vertical Projects

2021 will be the final year in the three-year process to change out the activated carbon filter media at the Company's main treatment facility in Nashua. Two filters (Filter #5 and Filter #6) will be changed out at a cost of approximately $1,000,000.

The replacement of the Milford Booster Station is also anticipated in 2021. The replacement will eliminate an over 30-year old below ground (confined space entry) station and include pumping equipment upgrades to ensure the Company can meet its contractual obligations to the Town of Milford for water purchase. Replacement of the Milford Booster station is estimated at $660,000.

The 2021 budget also includes funds to upgrade or replace the Company's Computerized Management and Maintenance System (CMMS). The Company has been put on notice by Oracle that our version of OracleWAM (formerly Synergen) will become unsupported by the end of 2021. The Company is presently evaluating the financial impact the upgrade may have (potentially upwards of $1,000,000) to the Company as well evaluating alternate CMMS systems that may be functional as an asset management and work management tool at a more cost-effective investment. The Company plans to complete this evaluation with internal resources by the end of 2019. The 2020 and 2021 budgets may be adjusted to reflect the results of the evaluation.

Q. Does this conclude your testimony?

A. Yes.