WARWICK
WATER DIVISION

MEMO

To: Members of the Warwick City Council

From: Daniel O'Rourke, Chief of Water Division

Date: April 5, 2018

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1. The Water Division recently posted the locations of all known remaining lead service locations on one of the city's web pages. The intent is for any resident to verify if they have a lead service concern with a link to our office.

2. Pre-bid meeting will be held for prospective companies interested in submitting proposals for the inspection of critical water mains. I have alluded to this in past presentations to the full Council.

3. Project meetings have been held with the engineering consulting firm and general contractor relative to the Governor Francis sewer project. As you are aware, the Water Division has begun the process of replacing and upgrading fire protection. Replacement of undersized water lines will take place in conjunction with the project over the duration of the contract.

4. The Water Division will begin the process of flushing specific areas as recommended in the "unidirectional water system flushing program" developed by our engineering consulting firm. This process has become more important since overall usage with all water systems continues a

downward trend resulting in higher retention times of water in water storage tanks and distribution lines (see attached).

5. Stantec Consulting Services will be retained to conduct a study of increased levels of disinfection by products (TTHM'S) throughout designated areas in the distribution system. This is a relatively new issue under the federal UNREGULATED CONTAMINANTS MONITORING RULE. They will evaluate different means and/or methods to lessen retention time and increase water turnover time in storage tanks without adversely effecting system pressure and emergency storage capacity.

If you have any questions or need additional information, please contact me at your earliest convenience.

Cc: Rick Crenca- DPW
Ray Studley- Chief of Staff
Janine Burke- Warwick Sewer Authority

CITY OF WARWICK WATER DIVISION

Unidirectional Water System Flushing Program

Warwick, Rhode Island

July 2014

FST
100 YEARS

FAY, SPOFFORD & THORNDIKE

General

The City of Warwick, Rhode Island supplies over 75,000 customers with approximately 9.5 million gallons per day (MGD) of potable water. Water is delivered to these customers through the City's water distribution system which consists of approximately 18 miles of transmission mains (mains greater than or equal to 16-inch diameter) and 375 miles of distribution mains (mains less than 16-inch diameter). In order to remove sand and sediment that can collect in the invert of pipes over time, a distribution system unidirectional flushing program has been developed.

Rather than flushing the system using conventional techniques, by opening hydrants without directing the flow by closing valves, this program uses a process known as unidirectional flushing. Unidirectional flushing requires that certain valves be closed and hydrants be flowed in order to direct the water and reach high enough velocities to scour the pipe clean. It is a more organized and more effective method of flushing the system.

In addition to the City's aggressive water quality sampling program, the practice of flushing water mains will further reduce the likelihood of contamination in the distribution system and remove sediment and particles that can cause discolored water and result in an increase in customer complaints. Flushing can also help to boost system residuals by moving fresher quantities of water through dead end stagnant areas.

Water System

The City of Warwick water system is supplied 100% from the Providence Water Supply Board (PWSB) through two metered connections off of PWSB transmission mains at Natick Avenue and Pettaconsett Avenue. The Kent County Water Authority (KCWA) also purchases water wholesale from the Warwick System through the Quaker Lane meter station. Based on an agreement with Warwick, the KCWA can withdraw water at a rate up to 4.6 MGD through the meter. The Warwick system hydraulic grade line elevation is maintained by three storage facilities. Table 1 presents information about these facilities:

TABLE 1
City of Warwick Storage Facilities

Storage Tank Facility	Volume (MG)	Diameter (ft)	Over Flow Elevation (ft)
Bald Hill Reservoir 1	6.5	185	231
Bald Hill Reservoir 2	5.5	185	231
Warwick Neck Elevated	0.5	Spheroidal	231

The two Bald Hill tanks provide storage for most of the system. The Warwick Neck Elevated tank is used to maintain a hydraulic gradeline in the Warwick Neck Peninsula which is located at the southeast end of the system. The system is designed to supply Warwick Neck by gravity when the hydraulics permit. This is accomplished using two check valves located in Warwick Neck Ave and Palmer Ave. When the level in the Warwick Neck Elevated tank drops below the needed hydraulic gradeline for the system to feed Warwick Neck via gravity, the State Street Pump Station is used. Characteristics of pumps in the State Street Pump Station are shown in Table 2:

TABLE 2
State Street Booster Pump Characteristics

Pump No.	Capacity (GPM)	Rating (HP)	Function
1	1200	50	Emergency conditions and periods of heavy demand
2	1200	50	Emergency conditions and periods of heavy demand
3	320	10	Booster pump for normal demands
4	320	10	Booster pump for normal demands

The system is made up of approximately 393 miles of water mains. The breakdown of system pipes by material for both transmission (≥ 16-inch diameter) and distribution (< 16-inch diameter) pipes are shown in Table 3 below:

TABLE 3
Distribution System Breakdown by Material

Material	Length (feet)	Percent of Total Length
Asbestos Cement	976,999	55.45%
Cast Iron	616,926	35.02%
Copper	74,113	4.21%
Plastic	61,681	3.50%
Pre-Cast Concrete Pipe	17,100	0.97%
Ductile Iron	15,025	0.85%

The system is comprised of approximately 1,750 hydrants and approximately 5,000 valves. The City also maintains multiple emergency interconnections with surrounding communities.

The Warwick Water Division also purchases water from the KCWA through the Forge Road Meter Station to serve a small independent section of the system located in the Potowomut Neck area of Warwick. There are no pump stations or storage facilities in the Potowomut system. The hydraulic grade line elevation in the Potowomut system is entirely maintained by the Forge Road meter station. Average day demand in this system is approximately 0.22 MGD

Flushing Program Development

The flushing program for the City of Warwick was developed with the assistance of the City's hydraulic model using average day demand conditions (approximately 9.5 MGD). For all tests, computer simulations were conducted where valves were closed and various hydrants were simultaneously flowed in an attempt to obtain a velocity between 4-8 feet per second (ft/s) in the majority of the pipes in the test area.

The program was designed to start at the system source(s) and flush out away from the source(s) or to move water from mainline pipes out into pipe branches and through dead end areas. This will allow fresh water from previously flushed areas to be used in subsequent tests.

The flushing program should be conducted sequentially, following the flushing test numbers included in the attached maps and tables. This approach will allow fresh water from previously flushed areas to be used in subsequent tests. Using the hydraulic model, optimum valve closure patterns and hydrant flow rates were determined for each test. This allowed pipe velocities to increase into the target range producing the scouring velocity required to adequately flush the mains. Also, where possible, the program attempts to flush short lengths of pipe to minimize flushing times and reduce water quality complaints. During each test, the computer model was used to verify that a system wide pressure of no less than 20 psi was maintained.

The system was divided into six (6) areas and a total of 137 tests were developed. Due to the system configuration, required valve closures could be minimized while still providing adequate velocities to maintain scour velocities. The six areas can be flushed every year, or the six areas can be worked at a rate of one area per year. If a six year rotating cycle is used, the areas should be done sequentially over the six year period.

Operating Procedure

A systematic plan of flushing has been developed showing, for each test, the identifying label for each hydrant and valve required to be operated as well as a target flow rate for each hydrant. All tests require no more than two hydrants to be simultaneously flushed. It is assumed that crews of

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April 5, 2018

Kathleen Martin
20 White Av
Warwick, RI 02889

White Av 20
711 02578200

Dear Water Customer,

We have been trying unsuccessfully to contact you to inspect the corrections to the plumbing for your water meter. Please call this office immediately to arrange an appointment with our meter service department.

*****Service to this address will be discontinued on April 16, 2018, if necessary repairs have not been made.******

Account Number: 711 02578200
Customer Name: Kathleen Martin
Property Address: White Av 20

Restoration Charge: $ 100.00 to be charged after shutoff

Please be advised that Section 26-142 through Section 26-144 of the Warwick Housing Code states every dwelling unit shall be properly connected with both hot and cold water lines. Therefore, unless this bill is paid in full, this information will be forwarded to the Department of the Building Inspector, Minimum Housing Division for further action.

Sincerely,
Warwick Water Division
401-738-2008 Option 4
8:00AM – 3:45 PM Monday through Friday

two to four people will be required to perform each test. This allows for an adequate number of people to operate valves and hydrants and document each test.

The program has been broken up into six areas and a total of 137 tests. Each area map includes the directions for flowing the specified hydrants, and operating valves. Hydrants should be opened to be flushed, and once flushing velocities have been reached and the water runs clean, the hydrant should be closed before moving onto the next step listed.

Valves to be operated to isolate areas should be done slowly to prevent water hammer. Fire hydrants should also be opened slowly until the desired flow is established. Once the water is clear, the hydrant should be closed slowly. Flushing should be directed away from traffic, pedestrians and private land. Where practical a flow diffuser or bend should be used to reduce impact from the test. Precautions should be taken when flushing mains to minimize flooding by directing water to an appropriate drain inlet.

Operators should record date, time, location, test ID and an estimate of the flushing flow rate and amount of time for discolored water flowing from hydrant to clear. This time, along with an estimate of the hydrant flow rate can be used to determine the quantity of water flowed. It should also be documented if any odor, discoloration, turbidity or presence of any visible objects was observed during the test.

These procedures should be carried out for all sections to be flushed:

1. Notify customers in the area that the tests will take place at least two weeks prior to conducting the tests.

2. Prior to conducting the test, crews should go into the field and locate and mark hydrants and valves to be operated, clean valve boxes and generally prepare for the actual flushing program. If valves or hydrants cannot be found, are inaccessible or are broken this information should be documented and a contingency plan should be put in place (see below).

3. Take the necessary safety precautions (cones, signs, police/flagger details) in the test area.

4. Close the appropriate valves for the test.

5. Slowly open the test hydrants simultaneously until the desired flow rate(s) is achieved.

6. Flow the hydrant(s) until the discharge is determined to be clear.

7. Slowly close the hydrant(s).

8. Record the results of the test.

9. Slowly open any valves that were closed.

Below is the minimum equipment that will be required to conduct the flushing program:

- Hydrant wrench, gate valve wrench, assorted tools
- Flow diffuser or director
- Flow measuring device
- Portable radios
- Documenting equipment
- Cones and safety vests
- Police Details/Flaggers (as necessary)
- Signage - to be erected and relocated at each work location

Contingency Planning

As with most field work there will be times when the flushing program will have to be adapted to accommodate changes or problems that arise. Cars parked over valves and broken or unusable hydrants are two situations that would require the flushing program to be adapted based on unforeseen and unavoidable circumstances. Under such circumstances there are two alternatives that can be taken:

1. Change the flushing program in the field to best accommodate the situation.

2. Delay the test until the circumstance allows for the test to be conducted.

Since each situation that arises will be unique, a determination will need to be made by City of Warwick field personnel as to the extent and the effect of altering or delaying the test(s).

Public Relations

Due to the broad range of potential customers that can be affected it is extremely important to provide timely notice to consumers regarding the tests.

Prior to starting the flushing program the City of Warwick should notify the following customers:

- Warwick Police and Fire Departments

- Warwick Housing Authority
- All private utility companies
- Customers should be made aware of the potential for reduced pressure and dirty water particularly:
  - Food service establishments
  - Hospitals, nursing homes and other health facilities
  - Customers with special needs, such as home dialysis
  - Laundry facilities

It is recommended that notices be run in local newspapers, on cable television, the City website, on radio and within the area of work to alert customers of the work area and of potential for reduced pressure and/or dirty water. It is important that consumers be aware of the program and that the temporary inconvenience will provide an improved water supply system. It also would be beneficial to maintain on hand an anti-oxidant such as "Red B Gone" that can be provided to customers in the event that customers need to do laundry and live in an area that is being flushed. Telephone operators should be trained with appropriate responses to complaints of colored water. Appendix A and B include examples of what might be used to inform the public.