WATER T&D Construction Standard

FLUSHING, PRESSURE TESTING, AND DISINFECTION OF NEW WATER MAINS/LARGE SERVICES

APPLICATION: This procedure applies to properly pressure testing, correctly flushing, and disinfecting of new water mains and large services

GENERAL INSTALLATION NOTES:

See Water T&D Construction Standard W-03-0002 for General Installation Requirements For Water Service Lines. See W-03-0004 for Water Service Disconnects and Reconnects, and W-03-0005 for Documentation of Installed Water Services. Reference W-03-6000 if existing service cannot be removed and must be abandoned.

SAFETY NOTES

Full use of the Board of Water & Light Safety Rules is required, giving special attention to the use of all personal protective equipment, i.e. hard hats, safety glasses, vests, traffic control and vehicle safety.

DEFINITIONS

Pigged (also Pigging) – The act of driving a low density bare swab (pig) through a pipe to mechanically clean the interior of the pipe.

RELATED SAFETY RULES/ PROCEDURES

LBWL Safety Manual Rule 116: Excavating, boring, and tunneling.
LBWL Safety Manual Rule 200: PPE's
LBWL Safety Manual Rule 612: Tools
LBWL Safety Manual Rule 613: Disinfecting watermain
LBWL Safety Manual Rule 800: Lockout - Tag out
LBWL Safety Manual Rule 1001: Chemical and Biological materials

PRESSURE TESTING, FLUSHING AND DISINFECTING

Article I. Pigging

- New water mains and large services longer than 20 feet shall be "pigged" using a low density bare swab of the appropriate size in place of high velocity flushing.

Article II. High Velocity Flushing

- If required by the Engineer, prior to pressure testing and disinfecting, the main shall be flushed at an appropriate velocity. Flushing velocity to be obtained for pipes 12 inches and smaller in diameter shall not be less than 3.0 ft. /sec.

Pipe Diameter	Flow Rate to Obtain 3ft/s
4-inch	118 gpm
6-inch	265 gpm
8-inch	470 gpm
12-inch	1058 gpm

- Flow velocity for pipes with a diameter over 12 inches shall be determined by the Engineer.

Article III. Pressure Testing

Manager, Water and Steam Distribution: DocuSigned by: Todd Russell BADA8CA6678D459... Date: 2/9/2022

Exec. Director, Water Operations and Special Projects: DocuSigned by: Sanjeev Mungarwadi E1B176FA599F49A... Date: 2/10/2022

WATER T&D Construction Standard

FLUSHING, PRESSURE TESTING, AND DISINFECTION OF NEW WATER MAINS/LARGE SERVICES

APPLICATION: This procedure applies to properly pressure testing, correctly flushing, and disinfecting of new water mains and large services

- The new water pipe shall be pressure tested in accordance with ANSI/AWWA C600 section 5.2.
- The water pipe shall be tested for a minimum of 2 hours. The pressure shall not vary by more than + or - 5 psi for the duration of the test. Test pressure shall be maintained within this tolerance by adding makeup water through the pressure test pump into the pipeline. The amount of makeup water added shall be accurately measured (in gallons per hour) by suitable methods and shall not exceed the applicable testing allowance per the BWL Pressure Testing Standard.
- No pipe installation will be accepted if the quantity of makeup water is greater than that determined by the following formula:

In inch-pounds units, $L = \frac{SD\sqrt{P}}{148{,}000}$ (ANSI/AWWA C600-10)

- For larger transmission mains, lacking tie-ins to other mains or appurtenances, up to 3,000 lineal feet may be pressure tested at one time.
- For typical distribution mains, with tie-ins and service line taps, up to 1,200 lineal feet may be pressure tested at one time.
- In the event that leakage exceeds the specified amount, the joints in the line shall be inspected for leaks and repaired as necessary.
- After all the failed pipe has been repaired, the test shall be repeated. Final acceptance of the line will not be made until a satisfactory test has been completed.

Article IV. Disinfecting General

- All new water pipes shall be disinfected in accordance with the most current AWWA C651 standard.
- The method of disinfecting shall be "continuous feed". The tablet or other disinfection methods will not be allowed, unless otherwise approved by the engineer.
- Disinfecting must follow pressure testing.
- Connections to the existing water pipe, such as sleeves, valves, etc. are required to be disinfected before installation. Swabbing only is acceptable on connections < 20' in length.

Article V. Design

- The water pipe should be fitted with appurtenances that facilitate sampling and flushing.
- New work shall not be directly connected to existing piping or water mains, unless approved by the Engineer, or until the main has satisfactorily passed the required bacteriological tests.
- Refer to Appendix A for details regarding temporary connections required for chlorine injection.
- Larger transmission main lacking tie-ins to other mains or appurtenances, and sections of up to 3,000 feet may be disinfected at one time.
- Typical distribution mains with tie-ins and service line taps must be limited to no more than 1,200 feet.

Article VI. Chlorine Injection

- Copper tubing extending 4 feet to 5 feet above the grade followed by an isolation valve shall be installed. The chlorine solution will be injected into this tubing.
- The chlorine shall be injected into the main through a temporary connection supplied with a backflow prevention device (see chlorine injection details in Appendix A).
- Chlorine shall be applied continuously.
- Chlorine must be applied such that a uniform concentration of at least 25 mg/L of free chlorine is present.

WATER T&D Construction Standard

FLUSHING, PRESSURE TESTING, AND DISINFECTION OF NEW WATER MAINS/LARGE SERVICES

APPLICATION: This procedure applies to properly pressure testing, correctly flushing, and disinfecting of new water mains and large services

- After a 24-hour holding period in the main there shall be a free chlorine residual of not less than 10 mg/L
- All new valves shall be operated to ensure that the discs seats are fully open to chlorinated water.

Article VII. Final Flushing

- Heavily chlorinated water shall be flushed from the pipe to a location where damage to the environment is minimized. The preferred location is to a sanitary sewer main, once the local sewer authority has approved the disposal. Where approved by the engineer, heavily chlorinated water may be disposed to land surfaces that will absorb, and/or minimize the impact of chlorination.
- Flush 3 volumes of the line at a minimum.
- If necessary, a neutralizing chemical shall be applied to the chlorinated discharge to remove the chlorine residual from the water prior to discharge.
- Federal, State, or Local jurisdiction may be contacted to determine special provisions for disposal of chlorinated water.

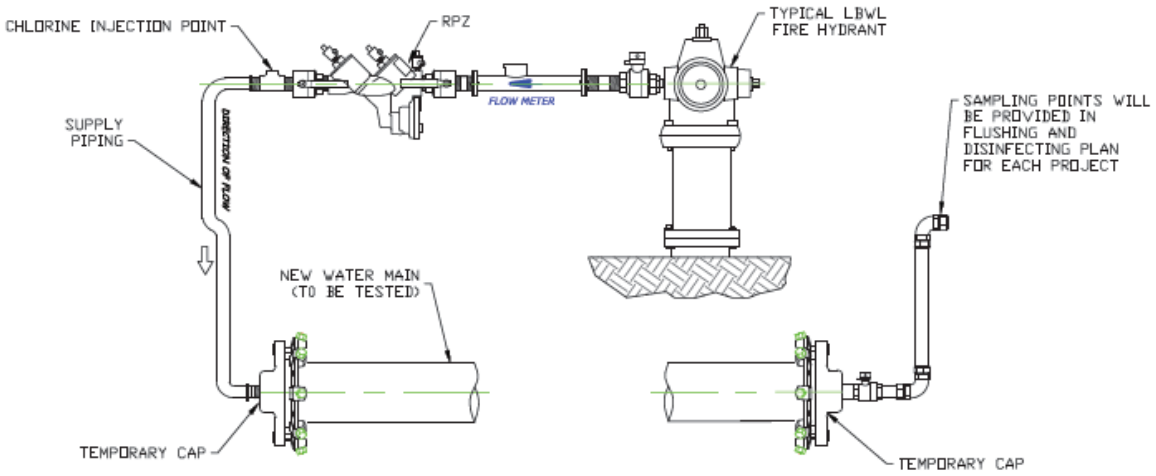
Article VIII. Bacteriological Testing

- After final flushing of heavily chlorinated water, take an initial set of samples. If the first sample passes wait 16 hours and take a second sample without additional flushing. Both sets of samples must pass for the main to be approved for release.
- If the initial disinfection fails the bacteriological testing, the pipe may be reflushed and resampled. If the second set of samples fail, the pipe must be rechlorinated until acceptable bacteriological samples are obtained.
- Disinfect sampling device at the pipe with bleach or heat.
- Samples shall be collected every 1,200 ft. of new pipe, plus one set from the end of the line and at least one from each branch greater than one pipe length.
- If trench water has entered the new pipe during construction or if excessive quantities of dirt and debris have entered the new pipe, bacteriological samples shall be taken at intervals of approximately 200 ft. and the sampling location shall be identified. Samples shall be taken of water that has stood in the new pipe for at least 16 hours after the final flush has been completed.
- Perform total chlorine analysis on the tap water using the DPD colorimetric method and record information on the bottle.

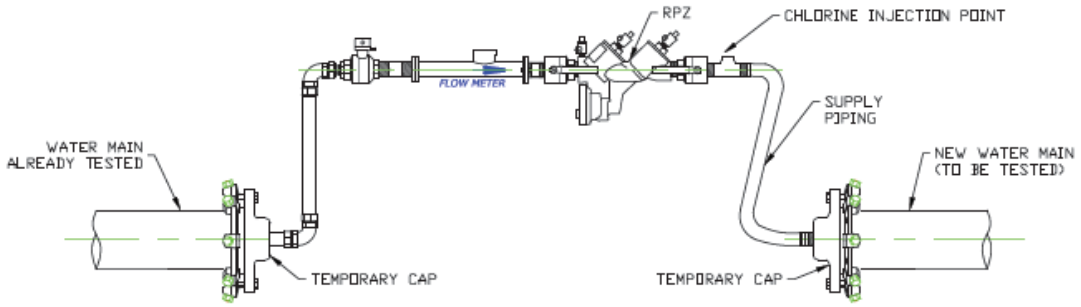
Article IX. Sampling Procedure

- Run only enough water through the sample port to ensure that the sample line has been flushed.
- Use only sterile bottles, indicated by shrink wrapped seal, containing chlorine neutralizing agent. Do not rinse, overflow or overfill the bottle. Remove plastic shrink-wrap from bottle, unscrew the sample bottle cap, and hold the cap with the inner surface facing down, taking care not to contaminate the inside of the cap or the bottle itself.
- Place the sample bottle underneath the water stream, fill the bottle to the line, replace the cap and screw on finger tight.
- Ensure that the bottle has proper labeling information. Place the sample in a cooler with ice or ice packs and a thermometer (if possible).
- Return sample(s) to the laboratory for processing.

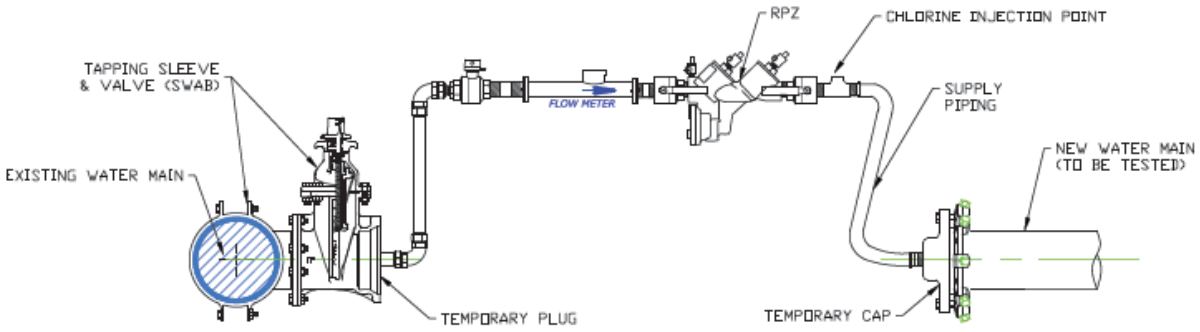
(ANSI/AWWA C651-14)



OPTION A - FILLING FROM HYDRANT



OPTION B - FILLING FROM EXISTING MAIN



OPTION C - FILLING FROM MJ X MJ GATE VALVE OR TAPPING SLEEVE & VALVE

LANSING BWL
Hometown People. Hometown Power.

Lansing Board of Water and Light
Water and Steam Distribution
1232 Haco Drive
Lansing, MI 48912

LANSING BOARD OF WATER AND LIGHT
STANDARD DETAIL FOR
TEMPORARY CONNECTIONS FOR PRESSURE TESTING / DISINFECTION

DRAWN BY: MHR	DRAWN DATE: 1-31-17	CHECKED BY: DRA	SCALE: NTS	SHEET 1 OF 1