ATTACHMENT D

CITY OF EVANSTON
WATER & SEWER DIVISION
PRESSURE/LEAK AND CHLORINATION TEST PROCEDURES

This procedure is for new water main, fire services and/or domestic services 4 inches or larger in diameter. The contractor shall submit to the Water & Sewer Division an outline or drawing indicating the sequence of water main/service installation. This outline or drawing shall include information as to where and how the flushing, pressure/leak testing, and disinfection of the new water main/service will be carried out. This procedure shall indicate that the installation will be done in a manner that will cause the least amount of water service interruption to the water customers. The Water & Sewer Division must approve the installation procedure prior to starting the work. If water service to other customers will be affected, the contractor must prepare a notice similar to the example in Attachment C. This notice must be submitted to the Water & Sewer Division for approval prior to the contractor distributing it to the affected customers.

All pipes shall be kept clean during installation. Suitable watertight bulkheads shall close the exposed ends of the pipe in the trench at all times when pipe laying is not actually in progress. The Contractor must install all water mains/services on a dry flat bottom, which conforms to the grade to which the pipe is to be laid. When conditions are wet or muddy, the Contractor must dewater the trench, remove the muddy trench bottom and provide proper bedding. Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing such organisms. It is therefore essential that these procedures be observed to assure that a water main/service and their appurtenances are thoroughly clean before the final disinfection by chlorination.

The interior of all pipe, fittings and valves which are likely to come in contact with potable water after their installation and prior to the final disinfection shall be swabbed or sprayed with a 1 percent (1%) hypochlorite solution before they are installed. Six ounces of HTH granules in a five-gallon bucket of water will provide an adequate solution.

The Contractor is responsible to contact the Water & Sewer Division a minimum of 48 hours in advance of scheduling pressure/leak test or disinfection at 1-847-866-2942.

PRESSURE/LEAK TEST

Only one connection of the new water main, as approved by the Water & Sewer Division, shall be made to the present system prior to testing the new water main/service. The Contractor shall provide all temporary bulkheads/plugs required for testing.

A representative of the City of Evanston shall be present at all times during the pressure test, leak test, and for the chlorination and sampling of the new water main/service. The Contractor shall test the water main in sections as approved by the Water & Sewer Division. The test shall be made by closing valves and filling the lines slowly with water. Care shall be used to see that all air is released during the filling of the water main/service. After the line or section has been completely filled, it shall be allowed to stand
under slight pressure for sufficient time to allow the escape of air from any air pockets. During this period the hydrants, valves and other connections shall be examined for leaks. If any are found, they shall be repaired prior to the start of the pressure/leak test.

The test shall consist of holding a pressure on the water main / service of 150 pounds per square inch (psi) for a period of at least two (2) hours. The pressure during the two hour test can not vary by more than ± 5 psi for the duration of the test.

Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof to maintain pressure within 5 psi of the specified test pressure after the water main / service has been filled with water and the air has been expelled. This leakage will be calculated after the 2-hour test has been completed. The water necessary to bring the pressure up to 150 psi from a measured container shall be the amount of leakage. Leakage will equal the amount of water used from the container.

No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

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L = \frac{SD \sqrt{P}}{133,200}
\]

Where:
- \( L \) = Allowable leakage, in gallons per hour
- \( S \) = Length of pipe tested, in feet
- \( D \) = Nominal Diameter of the pipe, in inches
- \( P \) = Average test pressure during the leakage test, in pounds per square inch (gauge)

Where it is not practical to pressure test the final connections to an existing water main, a visual inspection shall be carried out under normal working pressure before backfilling the trench.

**DISINFECTION OF WATER MAIN / SERVICE**
The basic disinfection procedure consists of:

1) Prevent contaminating materials from entering the water main pipe during storage, construction, or repair.

2) Removing, by flushing or other means, those materials that may have entered the water main / service.
3) Chlorinating any residual contamination that may remain, and flushing the chlorinated water from the main / service.

4) Protecting the existing distribution system from backflow due to hydrostatic pressure test and disinfection procedures.

5) Determining the bacteriological quality by laboratory test after disinfection.

6) Final connection of the approved new water main to the active distribution system.

The Contractor shall provide all corporation cocks necessary for disinfection of the new water main / service. These corporation cocks shall be placed as necessary to facilitate testing and disinfection of the new water main / service, including chlorine application points and sample collecting points. These corporation cocks shall be located in valve vaults only, unless approved by the Water & Sewer Division.

The new pipe shall be thoroughly flushed clean before disinfection is attempted. All disinfecting work shall be done by the Contractor with the approval of the Water & Sewer Division. Heavy particulates generally contain bacteria and prevent even very high chlorine concentrations from contacting and killing such organisms. It is, therefore, essential that the water main / service be thoroughly flushed before the final disinfection by chlorination is performed.

The preferred method to be used for disinfecting the water main / service is referred to as the Continuous-Feed Method using Chlorine Gas. The City will allow alternative methods as long as they are approved by AWWA Standard C651-99. At a point no more than 10 inches downstream from the beginning of the new water main / service, water entering the new main / service shall receive a dose of chlorine fed at a constant rate such that the water will have not less than 50 milligrams per liter (mg/L) free chlorine at the discharge end. The chlorine solution must be distributed uniformly throughout the length of the water main / service being disinfected.

The chlorine gas will be fed using a solution-feed, vacuum-operated chlorinator and a booster pump. The vacuum-operated chlorinator mixes the chlorine gas in solution water; the booster pump injects the chlorine-gas solution into the pipe to be disinfected.

The chlorinated water shall be retained in the water main / service for at least 24 hours, during which time all new valves (except the valve connected to the source water) and hydrants in the treated section shall be operated to ensure disinfection of the appurtenances. At the end of the 24 hour period, before flushing, the treated water in all portions of the main / service shall have a residual of not less than 10 milligrams per liter (mg/L) free chlorine.

After the contact period of not less than 24 hours, the water main / service shall be flushed until chlorine concentration of the water leaving the new water main / service is no higher than that generally prevailing in the distribution system (under one milligram\(^1\) per liter (mg/L)).
If the Water & Sewer Division decides there is any possibility that the chlorinated discharge will cause damage to the environment, then a neutralizing chemical shall be applied to the water to be wasted to neutralize thoroughly the chlorine residual remaining in the water. This neutralizing chemical must be approved for that purpose.

After final flushing and before the new water main is connected to the City’s water distribution system, two consecutive sets of acceptable samples (no bacteria growth), taken at least 24 hours apart, will be collected from the new water main / service by the Water & Sewer Division. **The second days’ sample will be collected using only the pressure in the new water main / service, no water main or service valves will be open for this sample and no flushing will be permitted.** At least one set of samples shall be collected from every 1,200 feet of the new water main, plus one set from the end of the line, and at least one set from each branch or as required by the Water & Sewer Division. On a new Fire Service or Domestic Service a sample from a point just after the tapping valve and at the end of the line will be needed.

The Water & Sewer Division will collect samples for bacteriological analysis in sterile bottles treated with sodium thiosulfate as required by Standard Methods for the Examination of Water and Wastewater. No hose or fire hydrant shall be used to collect samples. Corporation cocks shall be installed in the water main with a copper-tube gooseneck assembly to obtain samples. After samples have been collected, the gooseneck assemblies must be removed.

The City will perform the bacteriological analysis of the samples in their certified laboratory to verify that the new water main / service is properly disinfected.

If the initial disinfection fails to produce satisfactory bacteriological results, the new water main / service may be re-flushed and shall be re-sampled. If these samples also fail to produce acceptable results, the water main / service shall be re-chlorinated by the continuous-feed method until satisfactory results are obtained. Upon satisfactory results of the samples, the new water main / service shall be placed into service within 24 hours.

Failure to follow this procedure during pressure and chlorination testing may result in unacceptable results and may require the Contractor to incur additional cost in re-testing and cause project completion delays.

**REF:** AWWA STANDARD FOR INSTALLATION OF DUCTILE-IRON WATER MAINS AND THEIR APPURtenances (ANSI/AWWA C600-99)

AWWA STANDARD FOR DISINFECTING WATER MAINS (ANSI/AWWA C651-99)

CL2procedureswdd July 13, 2012