

SECTION 21

WATER PROJECT INSTALLATION, TESTING & ACCEPTANCE

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21.1 General

This section describes the minimum requirement and general procedures for the inspection, testing and acceptance of systems dedicated to the City of Monticello.

Connection permits for utility service will not be issued until all the requirements of this section are fulfilled.

21.2 Inspection

Inspection of the construction shall occur for the duration of the project, including the installation of service connections. Inspection fees shall be as set forth in **Section 3**.

A. General Requirements

1. Contractor and/or Owner shall provide notice to the City and his representative of the planned commencement of construction thirty (30) days prior to such commencement.
2. Once the construction starts, the Contractor shall be responsible for informing and/or notifying the inspection representative assigned of the following [NOTE: The City may require as much as five (5) working days' notice to provide inspection services during construction.]:
 - a. Daily work schedule, including any changes in schedule;
 - b. Prior notification if work is to be performed on weekends and/or holidays;
 - c. Date tests are to be performed; and
 - d. Date as-built verification is to be performed.
3. The City, upon request of the Contractor and/or Owner, will schedule the Final Inspection.

All testing required shall be paid for by the Contractor and performed under the observation of the City or City's representative. It shall be the Contractor's responsibility to schedule the testing with the City representative and/or City. Test results obtained in the absence of the presence of the City will not be accepted.

21.3 Water Main Testing and Disinfection

A. General

After the pipe has been laid and backfilled, all newly laid pipe or any valved sections of it shall, unless otherwise expressly specified, be subjected to a hydrostatic pressure test. The duration of each pressure test shall be for a period of not less than two hours and not more than six hours. The basic provisions of AWWA C-600, **Section 4** shall be followed for all pressure testing.

The test pressure shall not exceed pipe and/or thrust resistant design pressures. The test pressure shall not vary by more than plus or minus five (5) psi for the duration of the test.

All newly laid pipe or any valved section thereof shall be subjected to a hydrostatic pressure of at least 1.5 times the working pressure at the point of testing or fifty (50) psig whichever is greater.

B. Pressurization

Each valved section of pipe shall be slowly filled with water and the specified test pressure, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the City/City Engineer. The pump pipe connection and all necessary apparatus, including gauges and meters shall be furnished by the Contractor. Before applying the specified test pressure, air shall be expelled completely from the test section. If permanent air vents are not located at all high points, the Contractor shall install corporation cocks at all points so that the air can be expelled as the section is filled with water. After all the air has been expelled, the corporation cocks shall be closed, and the test pressure applied. At the conclusion of the pressure test the corporation cocks shall be removed and plugged or left in place at the direction of the City/City Engineer.

Any exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the test. Any damaged or defective pipe, fittings, valves, hydrants or joints that are discovered following the pressure test shall be repaired or replaced with sound material approved by the City/City Engineer and the test shall be repeated until it is satisfactory to the City/City Engineer.

C. Leakage Test

After the completion of the pressure test a leakage test shall be conducted to determine the quantity of water lost by leakage under the specified test pressure. 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 pipe has been filled with water and the air has been expelled.

Leakage shall not be measured by a drop-in pressure in a test section over a

period of time.

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

$$L = SD \sqrt{P/133,200}$$

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)

D. Acceptance

Acceptance shall be determined on the basis of allowable leakage. If any test of laid pipe discloses leakage greater than that specified, the Developer/Contractor shall at his own expense, locate and make approved repairs as necessary until the leakage is within the specified allowance.

All visible leaks are to be repaired regardless of the amount of leakage. All flanged pipe shall be "bottle-tight".

If the section under test contains sections of various diameters, the allowable leakage will be the sum of the computed leakage for each size.

E. Chlorination of Water Mains

1. Chlorination of New Water Mains

Before being placed in service, all new water distribution systems, or extensions to existing systems, or any valved section of such shall be chlorinated. Prior to chlorination, all dirt remaining in the pipe after completion shall be removed by a thorough flushing through the hydrants, where available, otherwise through other approved temporary connections to be provided by the Developer/Contractor for the purpose. This shall be done after the pressure test and may be done either before or after the trench has been backfilled. Each valved section of newly laid pipe shall be flushed independently. The flushing velocity shall be not less than 2.5 feet per second through the completed new main.

A chlorine gas-water mixture shall be applied by means of a solution feed chlorinating device or where approved by the City/City Engineer a solution of calcium hypochlorite (H.T.H.) or Perchloron may be injected under low pressure.

The preferable point of application of the chlorinating agent shall be at the beginning of the pipeline extension, or any valved section of pipe, and through a corporation stop inserted in the side of the newly laid pipe. The water injector for delivering the gas-water or calcium hypochlorite mixture

into the pipe shall be supplied from a tap on the upstream side of the valve controlling the flow into the pipeline extensions.

Water from the existing distribution system or any completed extension of the system, entering the newly laid pipeline, shall be controlled to flow very slowly during the application of chlorine. The rate of chlorine gas-water mixture or calcium hypochlorite solution flow shall be in such proportion to the rate of water entering the pipe that the treated water flowing from the far end of the main contains at least forty to fifty (40 - 50) parts per million of chlorine residual. Back pressure, causing a reversal of flow in the pipe being treated shall be prevented. The chlorine solution shall remain in the pipe for at least twenty-four (24) hours. After the chlorine treated water has been retained for the required time, the chlorine residual at pipe extremities and at representative points shall be at least ten (10) parts per million. In the process of chlorinating newly laid water pipe involving more than one (1) valved section, all valves or other appurtenances shall be operated while the pipeline is filled with the chlorinating agent.

Following chlorination, all treated water shall be thoroughly flushed from the newly laid pipeline at the extremities until the replacement water throughout the length shall, upon test, be proved comparable in quality to the water served the public from the existing water supply system. Samples of the water for tests shall be taken by or under the direction of the City and in accordance with methods of sampling as recommended by the State Board of Health. The bacteriological tests shall be performed by the State Board of Health Laboratory or by a testing laboratory which is approved for bacteriological testing by the State Board of Health. The City's representative will send the samples to the State Laboratory, unless otherwise directed by the City.

At least two (2) sets of successive satisfactory bacteriological samples taken at twenty-four (24) hour intervals shall be obtained from the newly laid pipelines and equipment before water is discharged through them to the existing system. The new piping shall be lightly flushed a second time prior to taking the second sample. Should the test of the second or last taken sample prove ineffective, the chlorination procedure shall be repeated until confirmed tests show that water sampled from the newly laid pipe conforms to the requirement stated above.

When the bacteriological tests of the samples of water taken from the new mains prove to be satisfactory and before the new mains are placed in service, the City shall increase the chlorine dosage of the water being delivered to the entire distribution system as specified herein under the heading of "City's Responsibility for Temporary Step-up of System Chlorination".

2. Reconnection of Services

The reconnection of existing building services from existing water mains to new mains shall not be made until the water in the newly constructed mains has been disinfected and satisfactorily tested as specified herein under the heading of "Chlorination of New Water Mains".

3. Chlorination Procedure When Cutting into Existing Mains

Under ideal trench and installation conditions with full time inspection by the City, the Developer/Contractor may be permitted to make cuts into existing pipe lines for the insertion of valves, fittings, repairs or for other purposes by the following procedure of disinfection: Sprinkle the inside surfaces of the appurtenances to be installed with a dry hypochlorite (or apply a hypochlorite slurry) and place a small quantity of the hypochlorite powder into the ends of the existing pipe on either side of the opening before the new pipe and fittings are installed.

At the discretion of the City Engineer or the City and/or when the trench and installation conditions are not ideal for making the cuts into existing mains, the Developer/Contractor shall introduce the solution of chlorine or the suspension of hypochlorite into the isolated or valved-off sections of mains through a tap in the main to be made for this special purpose or through a fire hydrant when one is available in a suitable location.

In either of the two (2) above procedures, the chlorine introduced should be in sufficient amount to ensure a high concentration, forty to fifty (40 - 50) parts per million, reaching every part of the isolated section of mains. The maximum permissible contact period shall be used after which the water bearing strong chlorine solution shall be flushed out of the isolated section of mains before they are returned to service.

The Developer/Contractor shall schedule the making of all of the project cut-in connections to existing mains as close together, timewise, as is feasible. He shall notify the Water Works Superintendent at least seventy-two (72) hours in advance, so arrangements can be made for inspection of the work and so the City can step up the system chlorination and notify the affected water customers.

All water customers who will be affected by the isolated section of mains for the purpose of making the cut-in connections and disinfection are to be given advance notification by the Water Works Department through the local newspaper or by personal notice to each customer.

4. City's Responsibility for Temporary Step-Up of System Chlorination

At least eight (8) hours prior to the making of cuts into existing pipe lines for the insertion of valves, fittings, repairs and the connection of new mains to existing mains and prior to the placing of newly constructed

water mains into service, the City will increase the chlorine dosage of the water supply to the system to effect a free chlorine residual of at least 0.5 ppm, or a combined available chlorine residual of at least 1.0 ppm. The said chlorine residual shall be maintained by the City for a sufficient period of time to establish a record of satisfactory bacteriological quality of the water throughout the distribution system. After at least two (2) successive sets of satisfactory bacteriological samples of water have been taken from the system at approximate twenty-four (24) hour intervals, the stepped-up chlorination may be cut back to the normal dosage.

21.4 Fire Hydrant Testing

Hydrants shall be flushed, and flow/pressure tested after installation. Contractor shall submit test results to City utilizing City Fire Hydrant Data Sheet.

21.5 Documentation, Dedication and Acceptance Procedures

A. Documentation Requirements

In order for the City Council to accept dedicated facilities, the following items shall be completed and on file:

1. Copies of all testing reports and data;
2. Copies of all O&M Manuals (if applicable);
3. Pump manufacturer's certification letter (if applicable);
4. Final payment for inspection services;
5. Service line location forms;
6. As-built drawings;
7. Performance and/or maintenance bonds (if required);
8. Daily inspection reports;
9. Legal description of the land to be dedicated to the City; and
10. A written statement of facilities present on those lands. The written statement shall include:
 - a. Identification of the type and nature of facilities present
 - b. Dimensions of the facilities present
 - c. Totals for each type of facility present [example: one thousand (1,000) feet of water main, thirty-four (34) service connection, one (1) booster station, etc.]

B. Dedication

The City shall review the above-mentioned requirements and prepare a

document stating that the work has been completed, the requirements have been met, and all items are in proper form. The City shall include in the statement a recommendation on acceptance/denial of the facilities and may also include comments regarding the project. The City shall present to the City Council its findings in a public hearing for their consideration.

C. Acceptance

The City Council shall receive the recommendation from the City representative, and upon review by the City Attorney and Mayor, shall make a determination as to acceptance of the facilities. A majority approval of the Council members present at the meeting is required for acceptance. The City Council shall accept dedicated facilities by resolution.