



CITY OF MARLBOROUGH
Department of Public Works
Engineering Division
 135 Neil Street
 Marlborough, Massachusetts 01752
 (508) 624-6910 Ext. 7200
 Facsimile (508) 624-7699 TDD (508) 460-3610

April 25, 2014

ADDENDUM NO. 1

To: All Bidders of Record
 Date Issued: April 25, 2014

RE: City of Marlborough, Massachusetts
Cleaning and Lining of Water Main on a Portion of Broad Street and the Abandonment of Water Main on Northboro Road West
Contract ED 2014-12
Bid Date: Thursday, May 1, 2014

ADDENDUM No. 1:

This addendum shall become part of the Contract Documents as described within the Instructions to Bidders section for the above referenced project.

This addendum is being issued per the Contract Documents "City of Marlborough Bidding and Contract Requirements" section "Instructions to Bidders" Article 3 "Requests for Interpretations". This addendum will provide all potential bidders with any interpretations that were provided to other potential bidders.

- Page 23 2.2 Bypass - Pressure Testing of the water lines by "approved" party. Why are you pressure testing the bypass and who would be more qualified to do the pressure test than the contractor? Why a third party?
 - Please disregard the requirement of pressure testing the temporary by-pass.
- Sheet 7 Testing - The contractor shall hire an independent testing firm to pressure test the old main @ 200 lbs. Why would you need a third party to pressure test the main if an inspector is on site and how can the contractor be responsible for the existing main? If the main leaks who pays for the repairs? Cost Plus?
 - Please disregard the requirement for pressure testing the old main/lined main.
- The spec makes several references to PRVs. What is the current main pressure and what are we reducing the pressure to?
 - The reference to the PRV's is standard language within our contracts. The current main pressure is approximately 60-70 psi. This pressure is not to be reduced.
- On page 42 3.4 it states the method of cutting must be approved by the engineer. What methods are acceptable?

- If authorized, cutting of the pipe shall be done so that the cut is square and clean, without causing damage to the pipe lining. Unless otherwise authorized by the Engineer, all pipe cutting shall be done by means of an approved type of power cutter. The use of hammer and chisel, or any other method which results in rough edges, chips and damaged pipe, is prohibited. All cut edges shall be field beveled by use of a power grinder, as required, prior to installation.
- On page 45 you mention a slump test. Are you requiring slump testing for 12" lining? It's not typical for small diameter lining.
 - Yes.
- On sheet 4 @ #26 "Church" there is a gate box in the sidewalk @ sta. 9+10. Is this the service for the church and if so what diameter is it?
 - This service is for the old rectory and is 1-1/2" Diameter. Please see the revised sheet 3.
- What is the gate valve on sheet 4 @ #24 which shows it running onto the property there?
 - This is a 6" CI Fire Service for Academy Knoll. Please see the revised sheet 4.
- Please explain what the "normal" water pressure is on the 12" & 10" mains there.
 - As mentioned above, approximately 60 to 70 psi.
- On page 38 4.2 payment it says include a 6" & 12" hydrant extension in the price. Why is this required? How deep is the main?
 - We assume the main is a minimum 5' deep. The extensions are required in case the main is deeper than anticipated.
- Please explain the TV inspection requirements. Why would you TV after cleaning and before lining? What happens in between then. It is extremely difficult to TV the same day as lining. Is that a requirement?
 - We would like to have the main video-taped after the cleaning and before the lining in case there is any lag time between the two operations. It will also be required after the lining process is completed.
- On page 46 3.7 "curing" It says water blow backs only. Please explain this requirement. The industry standard is air blowbacks because they do less damage to the lining.
 - Air flush backs will be allowed.
- On sheet 3 at Versailles St it says remove and replace concrete wheel chair ramp. How many ramps are being replaced?
 - The 2 wheel chair ramps at Versailles Street need to be replaced. Note that the detectable warning panels are to be included in the contract unit price Item 701.2 Concrete Sidewalk at Wheel Chair Ramps.
- Can both mains be taken out of service at the same time?
 - Yes
- Does the work on Northboro Road West at RT 20 for the 16x6 tapping sleeve and valve require state police?
 - No
- Please provide the number on sheet 4 under note No. 8 which indicates they are to be scheduled at off peak hours. No. 90 and No. ?
 - #85 Broad Street and #90 Broad Street
- Can you please clarify the abbreviation of CA on Northboro Road West?
 - Cement Asbestos
- Will pressure testing be required on the cleaning and lining mains?
 - No. Please disregard the requirement noted within specification.

Please be sure to substitute and/or add the attached sheets in the proper location within the contract documents as follows:

- Construction Drawings revised sheets 3 & 4 (Broad Street Proposed Plan). This revised sheet includes revision 1 (Additional by-pass and water service modifications).
- Form for General Bid Pages 4A of 10 (Broad Street Proposed Plan Revision).
- Construction Drawings revised sheet 5 (Northboro Road West Plan). This revised sheet includes revision 1 (Installation of hydrant).
- Form for General Bid Pages 4G & 4H of 10 (Northboro Road West Plan Revision).
- Construction Drawing Details: Tee-Intersection Wheel Chair Ramp, Wheel Chair Ramp Grade Requirements and Detectable Warning Panel (Broad Street @ Versailles Street).
- Contract Documents Specification pages 18, 20, 21, 22, 25, 27, 35, 43, 46 of 54 eliminating the requirement for pressure and leakage testing on the temporary by-pass water main, cleaned and lined water mains and hydrants.

ADDENDUM No. 1:

ACKNOWLEDGEMENT: **City of Marlborough, Massachusetts**
Cleaning and Lining of Water Main on a Portion of Broad Street and the Abandonment of
Water Main on Northboro Road West
Contract ED 2014-12
Bid Date: Thursday, May 1, 2014

MEMO TO ALL BIDDERS OF RECORD – Dated April 25, 2014

CORPORATE NAME

TELEPHONE NO.

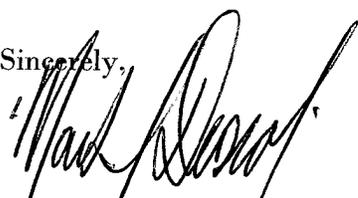
AUTHORIZATION REPRESENTATIVE SIGNATURE

DATE

**THIS FAX/EMAIL NOTICE IS THE ONLY NOTIFICATION YOU WILL RECEIVE.
PLEASE SIGN, FAX/EMAIL AND RETURN AS SOON AS YOU RECEIVE THIS TO:**

Fax: (508) 624-7699 or Email: mdascoli@marlborough-ma.gov

ATT: Mark J. Dascoli

Sincerely,

 Mark J. Dascoli
 Assistant Civil Engineer

**FORM FOR GENERAL BID
CITY OF MARLBOROUGH, MASSACHUSETTS**

**CLEANING AND LINING OF WATER MAIN ON A PORTION OF BROAD STREET
AND THE ABANDONMENT OF WATER MAIN ON NORTHBORO ROAD WEST
CONTRACT ED 2014-12**

(BROAD STREET)

Item No.	Quantity	Item with Unit Bid Price Written in Words	Unit Price		Amount	
			Dollars	Cents	Dollars	Cents
120.1	124	UNCLASSIFIED EXCAVATON _____ DOLLARS AND _____ CENTS PER CUBIC YARD				
127.	15	CONCRETE EXCAVATION _____ DOLLARS AND _____ CENTS PER CUBIC YARD				
151.01	124	GRAVEL BORROW TYPE-C _____ DOLLARS AND _____ CENTS PER CUBIC YARD				
170.	600	FINE GRADING AND COMPACTING - SUBGRADE AREAS _____ DOLLARS AND _____ CENTS PER SQUARE YARD				
345.02	975	2 IN. TEMPORARY BY-PASS WATER MAIN _____ DOLLARS AND _____ CENTS PER FOOT				
345.04	1925	4 IN. TEMPORARY BY-PASS WATER MAIN _____ DOLLARS AND _____ CENTS PER FOOT				

SUBTOTAL PAGE 1

**FORM FOR GENERAL BID
CITY OF MARLBOROUGH, MASSACHUSETTS**

**CLEANING AND LINING OF WATER MAIN ON A PORTION OF BROAD STREET
AND THE ABANDONMENT OF WATER MAIN ON NORTHBORO ROAD WEST
CONTRACT ED 2014-12**

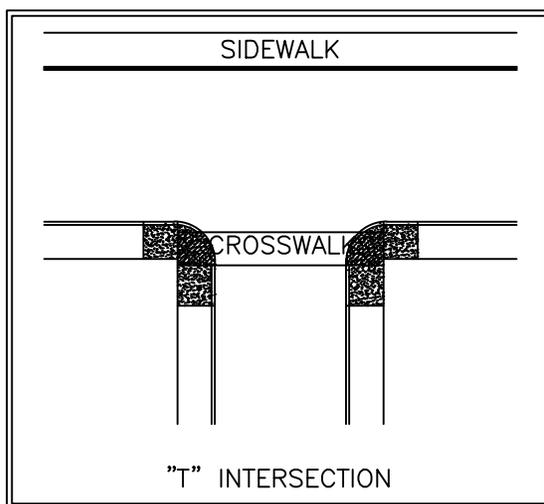
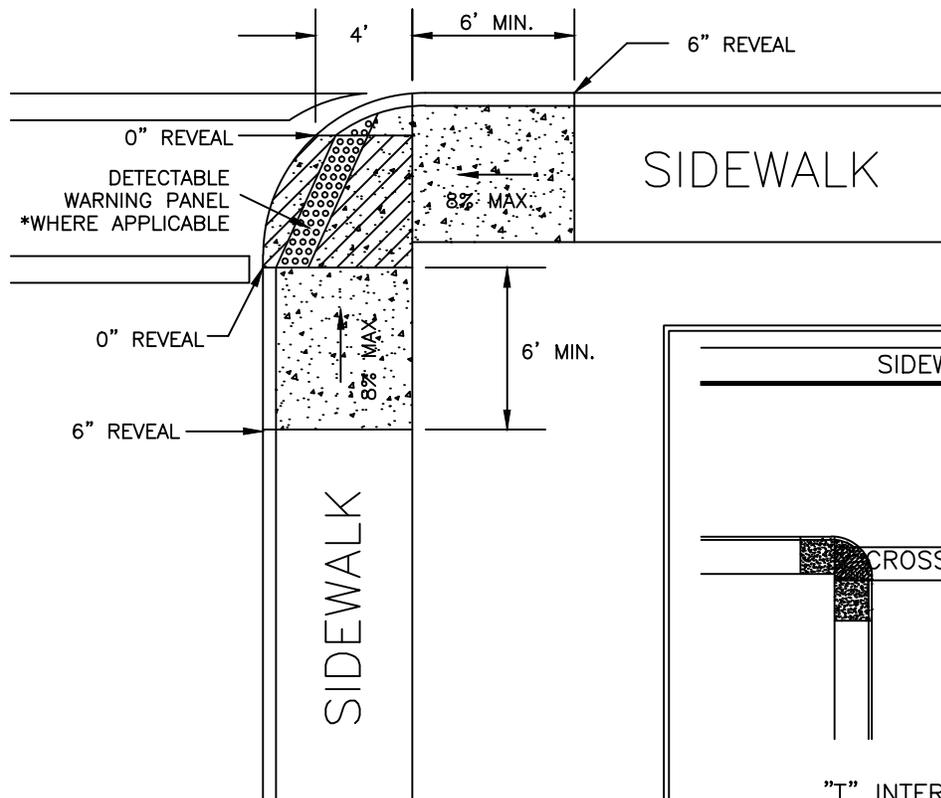
(NORTHBORO ROAD WEST)

Item No.	Quantity	Item with Unit Bid Price Written in Words	Unit Price		Amount	
			Dollars	Cents	Dollars	Cents
120.1	85	UNCLASSIFIED EXCAVATON _____ DOLLARS AND _____ CENTS PER CUBIC YARD				
127.	12	CONCRETE EXCAVATION _____ DOLLARS AND _____ CENTS PER CUBIC YARD				
151.01	85	GRAVEL BORROW TYPE-C AND _____ CENTS PER CUBIC YARD				
170.	60	FINE GRADING AND COMPACTING - SUBGRADE AREAS _____ DOLLARS AND _____ CENTS PER SQUARE YARD				
302.06	16	6 IN. DUCTILE IRON WATER PIPE CEM. LINED (RUBBER GASKET) _____ DOLLARS AND _____ CENTS PER FOOT				
347.1	95	1 IN. COPPER TUBING-TYPE K _____ DOLLARS AND _____ CENTS PER FOOT				
369.16	2	16 IN.X 6 IN. TAPPING SLEEVE, VALVE AND BOX _____ DOLLARS AND _____ CENTS EACH				

SUBTOTAL PAGE 1

Item No.	Quantity	Item with Unit Bid Price Written in Words	Unit Price		Amount	
			Dollars	Cents	Dollars	Cents
376.	1	HYDRANT _____ DOLLARS AND _____ CENTS EACH				
432.	25	CONTROLLED DENSITY FILL TYPE 2E _____ DOLLARS AND _____ CENTS PER CUBIC YARD				
440.	50	CALCIUM CHLORIDE FOR ROADWAY DUST CONTROL _____ DOLLARS AND _____ CENTS PER POUND				
464.	15	BITUMEN FOR TACK COAT _____ DOLLARS AND _____ CENTS PER GALLON				
472.	17	HMA (TEMP. BINDER, TOP DRIVEWAYS/SIDEWALKS) _____ DOLLARS AND _____ CENTS PER TON				
482.01	130	HOT APPLIED ASPHALT CRACK FILLER _____ DOLLARS AND _____ CENTS PER FOOT				
482.3	130	SAWING BITUMINOUS CONCRETE _____ DOLLARS AND _____ CENTS PER FOOT				
701.	18	CONCRETE SIDEWALK _____ DOLLARS AND _____ CENTS PER SQUARE YARD				

SUBTOTAL PAGE 2



LEGEND

-  CEMENT CONCRETE WALK SURFACE
-  LANDING AREA - 1.6% CROSS SLOPE (MAX)

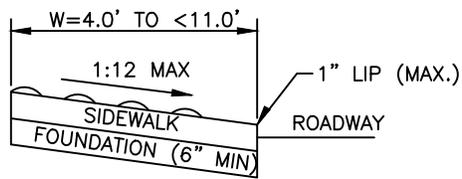
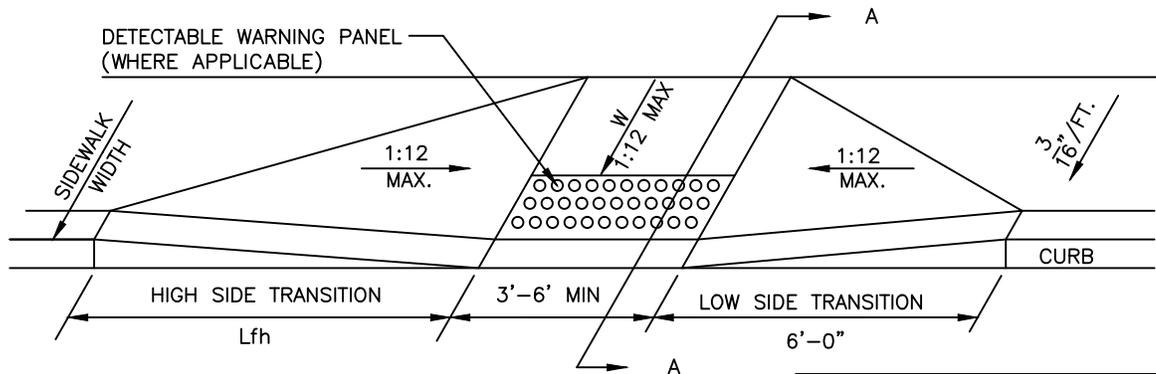
City of Marlborough
 Department of Public Works
 Engineering Division
 135 Neil Street
 Marlborough, MA 01752

TEE-INTERSECTION
 WHEEL CHAIR RAMP

CONTRACT ED 2014-12

WCR-1

SCALE: N.T.S. DATE: 4/24/14



SECTION A-A

EXISTING PROFILE GRADE		Lfh (Ft.) TRANSITION LENGTH
%	G	
0	0	6.0
1	.01	7.0
2	.02	8.0
3	.03	9.5
4	.04	11.5
5	.05	15.0

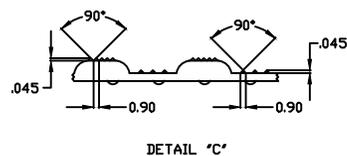
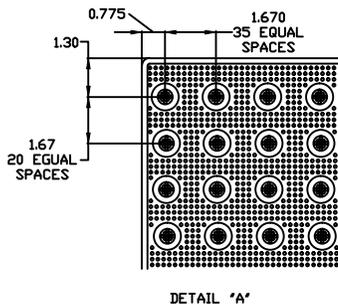
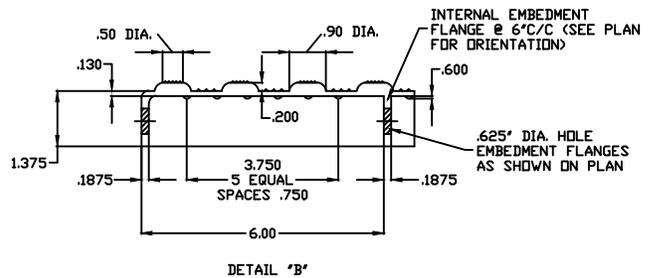
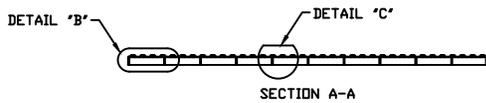
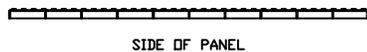
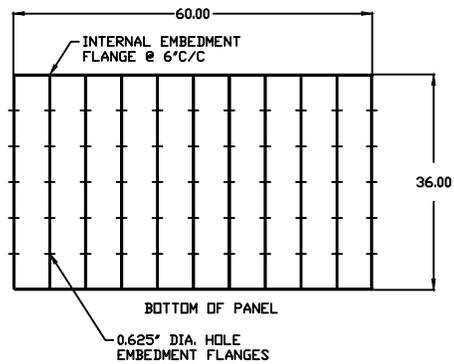
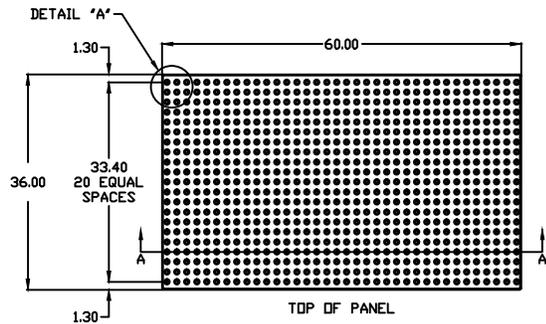
City of Marlborough
 Department of Public Works
 Engineering Division
 135 Neil Street
 Marlborough, MA 01752

WHEEL CHAIR RAMP
 GRADE REQUIREMENTS

CONTRACT ED 2014-12

WCR-2

SCALE: N.T.S. DATE: 4/24/14



NOTE:
1. COLOR TO BE "SAFETY YELLOW" OR APPROVED EQUAL.

City of Marlborough
Department of Public Works
Engineering Division
135 Neil Street
Marlborough, MA 01752

DETECTABLE WARNING PANEL

CONTRACT ED 2014-12

WCR-3

SCALE: N.T.S. DATE: 4/24/14

The Contractor shall furnish slings, straps, and/or approved devices to provide satisfactory support of the pipe when it is lifted. Transportation from delivery areas to the trench shall be restricted to operations which can cause no damage to the pipe units.

Pipe shall not be dropped from trucks onto the ground or into the trench. The Contractor shall have on the job site, with each laying crew, all the proper tools to handle and cut the pipe.

Damaged pipe coating and/or lining shall be restored before installation only as approved or directed by the Engineer.

Ductile Iron Pipes shall be laid in accordance with AWWA C600 and with manufacturer's instructions.

All testing of the water mains (pressure, disinfection) shall be performed by an independent third party company approved by the City Engineer. In no case shall the contractor perform the testing work.

3.2 CONTROL OF ALIGNMENT AND GRADE:

The Engineer has shown easement and property and other control lines necessary for locating the work as well as elevations and benchmarks used in the design of the work on the Drawings.

The Contractor shall use this information to set line and use a surveyor's level or transit to set grade as required.

The use of string levels, hand levels, carpenter's levels or other curved devices for transferring grade or setting pipe are not permitted.

During construction, the Contractor shall provide the Engineer, at his request, all reasonable and necessary materials, opportunities, assistance for setting stakes and making measurements, and chain men, as needed, at intermittent times. He shall not proceed until he has made timely request of the Engineer for, and has received from him, such controls and instructions as may be necessary for the work to progress. The work shall then be done in strict conformity with such controls and instructions.

The Contractor shall carefully preserve benchmarks, reference points and stakes, and in case of willful or careless destruction by his own employees, he will be charged with the resulting expense and shall be responsible for any mistakes or delay that may be caused by their unnecessary loss or disturbance.

3.3 PREPARATION OF BED:

As soon as excavation has been completed to required depth, the Contractor shall place and compact bedding material to the elevation necessary to bring the pipe to grade as specified herein.

The compacted bed shall be rounded so that at least the bottom quadrant of the pipe shall rest firmly for the full length of the barrel.

Mechanical joints at valves, fittings and where designated shall be in accordance with the "Notes on Method of Installation" under ANSI Specification A21.11 and the instruction of manufacturer. To assemble the joints in the field, the Contractor shall thoroughly clean the joint surfaces and rubber gasket with soapy water before tightening the bolts. Bolts shall be tight to the specified torque. Under no conditions shall extension wrenches, pipe over handle or ordinary ratchet wrench be used to secure greater leverage.

******Note the following testing procedures apply for the cleaned and lined portion of water main as well with the exception of pressure and leakage testing******

3.4 TESTING:

The Contractor shall hire an independent testing firm that specializes in water line testing and disinfections of water distribution systems. The contractor may be required by the City to hire a consultant for testing for compaction. The testing firm shall furnish all labor, pumps, taps, chemicals, and other necessary equipment to conduct hydrostatic pressure tests, measured leakage test, and laboratory bacteriological analysis on the mains laid under this contract in accordance with Section 4 AWWA C600-82 Installation of Ductile Iron Water Main and Part 3.7 of this Specification Section. The cost associated with the independent testing firm shall be included in the contract unit price for the items to be tested and/or those items, which may affect the testing of existing utilities.

The tests shall be conducted at a time specified by and under the supervision and success or failure of the work to meet the required standards.

In the event that the work fails to meet the required standards as stated herein, the Contractor shall perform such excavation, repair, re-laying of pipe, re-chlorinating (third party), and all other work necessary to correct the work; and shall repeat the tests as often as may be necessary and until such time as the required standards are met.

3.5 PRESSURE TESTS:

~~Before applying the specified test pressure, all air shall be expelled from the pipe. If suitable means of expelling air are not available at high places, the Contractor shall make all the necessary taps as shown on plans or as the Engineer may direct. After the tests have been completed, the corporation stops shall be left in place or removed and plugs inserted, as directed by the Engineer or Owner.~~

~~The newly laid pipe shall be tested in valved or plugged sections as determined by the Engineer in the field. Water shall be slowly introduced into the section being tested by means of an approved power driven high pressure test pump.~~

~~The newly laid pipeline shall be tested to a pressure equal to 150% of the maximum static pressure for the section being tested, measured at the lowest point of the section being tested, corrected to the elevation of the test gauge. If the static pressure of any newly laid section of pipeline being tested is less than 100 psig measured at the lowest point of the pipeline section, then the minimum test pressure shall be 150 psig.~~

~~The pressure shall be raised to the test pressure required for each section being tested as determined by the Engineer. When the test pressure is reached, the time shall be recorded and the test shall begin. The duration of each pressure test shall be a minimum of two hours. During the test, pressure shall be maintained in the section of pipeline being tested by means of a re-circulating, by-pass type test pump. Water shall be added in measured amounts from a container of known volume if required to maintain pressure. The addition of excessive amount of water shall constitute immediate test failure. The Engineer will approve all gauges and test equipment.~~

~~During the test, the line will be examined by the Engineer for visible leaks and breaks. Any defects in the works shall be repaired, and any defective materials shall be removed and replaced by the Contractor as and where directed by the Engineer.~~

3.6 LEAKAGE TEST:

~~The leakage test shall be conducted concurrently with the pressure 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 five psi of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. 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:~~

$$\frac{\text{—————}}{\text{—————}} L = \frac{SD}{133,200 P}$$

~~In which L is the allowable leakage, in gallons per hour; S is the length of pipe tested, in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge.~~

~~When testing against closed metal seated valves, an additional leakage per closed valve of 0.0078 gal/h/in. of nominal valve size shall be allowed.~~

~~When hydrants are in the test section, the test shall be made against the closed hydrant.~~

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

~~All visible leaks are to be repaired regardless of the amount of leakage. At the end of the test period, if the amount of water added to the main from the calibrated vessel is less than the allowable leakage, and if the line shows no visible leaks or other failures, that portion of the main tested will be approved by the Engineer.~~

3.7 DISINFECTION:

~~After satisfactory pressure and leakage tests have been made by a third party independent testing company approved by the Engineer, before placing the newly laid~~

~~mains in service, and when directed by the Engineer, the independent testing firm shall clean mains and disinfect by chlorination.~~ Disinfection of water mains shall be in accordance with AWWA C651 and related chemical standards such as ANSI/AWWA B300 - Hypochlorites, or ANSI/AWWA B301 - Liquid Chlorine.

Prior to chlorination, the mains shall be flushed to remove dirt and other foreign substances.

The mains shall be disinfected by the third party independent firm under the supervision of the Engineer. Disinfection shall be achieved using one of the following chlorination chemicals: liquid chlorine, sodium hypochlorite, or calcium hypochlorite appropriately mixed with water to form a solution. The independent testing firm hired by the contractor shall use a manually controlled, vacuum type solution feed chlorinator or electrically powered chemical feed pump suitable for feeding high concentrations of chlorine solutions. The chlorine shall be introduced into the main through a 3/4-inch corporation stop installed approximately one foot up-stream from the valve at the beginning of the job and testing for residual chlorine shall be at a 3/4-inch corporation stop installed approximately one foot from the down-stream valve at the end of the project.

Water from an approved source shall be introduced slowly into the main during the application of chlorine. The rate of chlorine solution flow shall be in proportion to the rate of water entering the pipe such that the chlorine dose entering the mains shall be at least 25 milligrams per Liter (mg/L) measured as free chlorine. The Contractor shall measure the chlorine concentration at regular intervals and as directed by the Engineer to ensure a dosage of greater than 25 mg/L. When the pipe line has been completely filled with treated water, the main shall be sealed off. Treated water shall be retained in the main for a period of at least twenty-four (24) hours. At the end of the retention period, the chlorinated water at the extremities of the pipe and at other representative points shall have a residual of at least ten (10) mg/L free chlorine.

Should the first treatment fail to meet the above requirements, the procedure shall be repeated until tests show that, in the opinion of the Engineer, effective disinfection has been accomplished.

Following acceptance of the disinfection process, the chlorinated water shall be flushed from the newly-laid main into the sewer line (or dechlorinate) until such time as the replacement water throughout its entire length shall be equal in quality to that elsewhere in the system.

After the main has been flushed of chlorinated water a representative water sample shall be taken by the Independent testing contractor under the supervision of the Engineer. This sample shall be taken to a Massachusetts DEQE certified laboratory for a bacteria analysis. The cost associated with the collection and analysis of the sample(s) shall be paid for by the Contractor. A minimum of one (1) sample shall be taken per 3000 linear feet. When satisfactory bacteriological test results indicating zero coliform and background levels, a second set of samples shall be taken at least 24 hours after the first sample and delivered to a certified laboratory for analysis. If both sets of samples are found to be free of coliform and are of equal or better bacteriologic quality than that of the distribution system quality, the new mains may be connected to the existing system and placed into service.

SECTION 300 TEMPORARY BY PASS WATER MAIN

1.0 GENERAL:

1.1 DESCRIPTION OF WORK:

The work to be performed under this section shall include furnishing all equipment, materials, labor and other items required to install and maintain temporary water service for all sections of the water system, which may be temporarily out of service due to construction.

1.2 RELATED SECTIONS:

Attention is directed to the General Conditions, Special Conditions, and Contract Drawings all of which are hereby made a part of this section.

2.0 MATERIALS:

2.1 GENERAL:

The temporary service pipe, temporary hydrants and all other connecting materials shall be of the best quality materials and shall be capable of withstanding the required pressures and all other conditions of use.

All testing of the water mains (pressure, disinfection) shall be performed by an independent third party approved by the City Engineer. In no case shall the contractor perform the testing work.

2.2 TEMPORARY BY-PASS WATER MAINS:

The temporary by-pass water main, herein referred to as temporary service pipe, shall be 2-inch and 4-inch water pipe with couplings and all other necessary appurtenances as shown on the Drawings. Prior to installation the pipe type shall be approved by the Engineer.

Pressure reducing valves shall be used in all areas as required.

2.3 TEMPORARY HOUSE SERVICE CONNECTIONS:

Temporary house service hose connections shall be standard industry 3/4-inch hard rubber hose capable of withstanding the usual water system pressures. No plastic or soft rubber hose shall be allowed. Polyvinyl chloride (PVC) pipe is not acceptable for temporary house service pipe.

2.4 EMERGENCY FIRE CONNECTIONS:

Valves for emergency fire connections shall be installed and maintained on the 4-inch temporary water main. At each existing hydrants location that will be out of service, a 4-inch temporary fire hydrant shall be provided which has standard fire connection set in a horizontal position.

3.3 VALVES:

All service pipes shall be suitably valved at designated places which meets with the approval of the Engineer. Individual shutoff valves shall be provided at each temporary house service or building connection. Line valves shall be located no further than one block apart, or 1,000 feet; whichever is less. Suitable valved emergency fire connections shall be installed and maintained on the four-inch temporary water main adjacent to each existing fire hydrant, which is scheduled to be out of service.

3.4 PROTECTION:

The pipe and all other connections shall provide adequate water tightness and be free from excessive leaks. Care shall be exercised during the installation of the temporary pipe and especially during the connection to all house services such that pollution of all water mains and house services is prevented and contamination of the by-pass pipe itself is avoided.

~~3.5 PRESSURE TESTS:~~

~~Before applying the specified test pressure, all air shall be expelled from the pipe. If suitable means of expelling air are not available at high places, the Contractor shall make all the necessary taps as shown on plans or as the Engineer may direct.~~

~~The pipe shall be tested in valved or plugged sections as determined by the Engineer in the field. Water shall be slowly introduced into the section being tested by means of an approved power driven high pressure test pump.~~

~~The pipeline shall be tested to a pressure equal to 150% of the maximum static pressure for the section being tested, measured at the lowest point of the section being tested, corrected to the elevation of the test gauge. If the static pressure of any newly laid section of pipeline being tested is less than 100 psig measured at the lowest point of the pipeline section, then the minimum test pressure shall be 150 psig.~~

~~The pressure shall be raised to the test pressure required for each section being tested as determined by the Engineer. When the test pressure is reached, the time shall be recorded and the test shall begin. The duration of each pressure test shall be a minimum of two hours. During the test, pressure shall be maintained in the section of pipeline being tested by means of a re-circulating, by-pass type test pump. Water shall be added in measured amounts from a container of known volume if required to maintain pressure. The addition of excessive amount of water shall constitute immediate test failure. The Engineer will approve all gauges and test equipment.~~

~~During the test, the line will be examined by the Engineer for visible leaks and breaks. Any defects in the works shall be repaired, and any defective materials shall be removed and replaced by the Contractor as and where directed by the Engineer.~~

3.6 DISINFECTION:

After the by-pass pipe has been laid and fastened together, but before any connections are made to the public water supply system or any consumers, the Independent testing firm approved by the Engineer shall chlorinate all by-pass pipe using a chlorinated

Installation of chlorination taps shall be by direct tap, after which corporation shall be removed, the top shall be plugged with a brass plug as directed by City engineers.

The exact location of the manual air releases will be determined in the field.

3.3 TESTING OF VALVES AND HYDRANTS:

~~All valves and hydrants shall be pressure tested during the main pipeline test. Hydrant gate valves shall remain open during the main pressure test. After the pipeline has been pressure tested and accepted, the hydrant gate valve shall be closed and the hydrant valve cracked open to release some pressure on the hydrant side of the gate valve. An acceptable test for each hydrant gate valve shall be no loss of pressure in the main line test pressure as each valve is closed.~~

All main line butterfly or gate valves and control valves on any intersecting side streets shall also be tested by the same procedures outlined above as far as practical. The Engineer shall decide if it is impractical to test any one particular valve location. ~~No pressure test shall be considered acceptable until all possible control valves have been tested to insure proper closing and water tightness.~~

The Contractor shall make any taps and furnish all necessary caps, plugs, etc., as required in conjunction with testing. He shall also furnish a test pump, gauges and any other equipment required in conjunction with carrying on the hydrostatic tests. He shall at all times protect the new water mains and the existing water mains against the entrance of polluting material.

4.0 MEASUREMENT AND PAYMENT:

4.1 MEASUREMENT:

Valves shall be measured per unit installed, complete and in place, including boxes, if required and all appurtenant work including but not limited to excavating, backfilling, testing, disinfecting, nipples and couplings.

4.2 PAYMENT:

Payment shall be made at the contract unit price per valve for work completed and accepted. The contract unit price shall include removal and disposal of existing valves and boxes, new valves and gate boxes, threaded rods, mega lugs, retainer glands, nipples, couplings, support blocks, poured in place concrete thrust blocks, fittings if required, sawcutting of pavement and cement concrete, bedding, brought to finish grade, per these Specifications and Drawings, all hardware, excavation and backfilling, testing, cleaning, compaction and other work required to fully and completely install valves in place.

Locations chosen for openings shall be in the least offensive places possible and shall be approved by the Engineer.

Where the Contractor requires additional openings into the water lines for the admission of material or equipment, the entire expense of making these openings, including excavation, cutting an opening into the water line, properly closing the opening, and backfilling shall be included in the bid price for cleaning and lining the lines.

Before any pipe cuts are made, temporary bypass pipe must be disinfected, pressure tested by an independent testing firm and approved for use by the Water and Sewer Division General Foreman and temporary water service connections completed.

All valves, blow-offs, air valves and hydrants shall be operated by the City.

After dewatering, the remaining water from the low spots, dips and depressions in the pipe line shall be removed.

The Contractor shall dewater all water main excavations required for the cleaning and lining procedure and shall maintain the water level in the excavation at least 1 foot below the invert of the water main. As an additional precaution, bulkheads or other means are to be used at the terminals of dewatering sections to prevent dirt, mud, water and debris from entering the water main.

The City shall exercise the side line valves prior to beginning the cleaning operation. This work shall be performed by the City and shall consist of locating and operating valves for appropriate mainline subsections and identifying potential leaking or inoperative valves. This work must be performed in such a manner as to minimize customer disturbance and/or interference. Work may have to be performed nights or other off-hours as required.

Equipment (pigs, scrappers, cameras, etc.) shall be disinfected by brushing with a 5 percent hypochlorite solution prior to insertion into the water main.

All rust, tubercles, deposits, loose or deteriorated remains of original coatings and other foreign materials shall be removed from the inside of the pipe by hydraulic cleaning, and hand cleaning, or other approved methods shall be included in the bid price for cleaning and lining the lines. The cleaned surface shall be treated as necessary to insure a successful application of a durable lining. Oil and grease shall be removed. Cleaning water shall be discharged to a sanitary sewer and not to a storm drain or the ground surface. Accumulations of water on the bottom of the interior of the pipe shall be removed.

The water main cleaning debris that is pushed inside the side street water mains/laterals must be removed via scouring by manipulating the respective side street water main/lateral gate valve.

The open water main ends that are left unattended shall be capped to prevent contamination.

The Contractor shall use flushing or other appropriate methods of removing rust deposits and leave the street in a condition satisfactory to the Engineer.

12-20	¼	-1/16,+1/8
24-36	5/16	-1/16,+1/8
>36	5/16	-1/16,+1/8

3.6 WATER:

The City will furnish water at normal operating pressure for the hydraulic cleaning, flushing, disinfection, ~~pressure testing~~ and temporary bypass lines. The City does not guarantee the pressure and volume of water provided. The Contractor may need to supply a booster pump so that the pressure is adequate to perform hydraulic cleaning.

3.7 CURING:

Curing operations shall begin immediately after completion of the mortar lining and hand finishing of a section of the pipe line. This pipe shall be closed, and a moist atmosphere shall be maintained in this section of the pipe line to keep the lining damp and to prevent evaporation of water from the mortar lining.

After a section of pipe has been cement-lined, all 2-inch and smaller services shall be flushed back with water. A minimum of three hours shall elapse after completion of the lining before these flush backs are begun. All flush backs shall be performed by the Contractor using water. Air flush backs ~~will not~~ be permitted.

Sections of the cement-mortar-lined pipe shall be filled with water, in such a manner as not to damage the lining, as soon as possible after lining operations have been completed and the pipe has been televised or otherwise inspected by the Engineer. There shall be no pressure on any section until the mortar lining has been in place for at least 24 hours, except for pressure induced by variations in the grade of the pipe-line. The Contractor shall be responsible for careful curing of the mortar lining of completed sections of the pipe lines until the lining work has been accepted by the Engineer.

The exterior surfaces of pipe exposed to sunlight shall be sprinkled with water in the daytime during the lining, finishing, and curing period.

3.8 SURFACE FINISH:

The mortar lining of all pipe shall be mechanically troweled, except where otherwise noted in these specifications or otherwise approved by the Engineer. The finished surface shall be smooth and shall not have a sand finish. ~~For pipe sizes 24-inch diameter and larger, 10 places shall be selected in straight sections of the pipe lined and troweled in each day's run. In each of the 10 places, a 12-inch straightedge shall be laid parallel to the axis of the pipe. In 9 of the 10 places, the space between the lined surface and the straightedge shall at no point be greater than 1/16-inch for smoothbore pipe in good condition and 1/8-inch for pipe with a rough or irregular interior~~

For locations where machine applied, untroweled linings are placed, with prior approval by the Engineer, the finished surface shall be smooth and regular, except that it may exhibit a slightly dimpled appearance similar to the surface of an orange. Ridges or uneven buildup caused by irregularity in the travel rate of the machine shall not be allowed.