

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 1.4.4
Prepared by: D.J. Satterfield	Disinfecting and Flushing Main Repairs and Connections	Page: 1 of 5
Approved by: Jeff Schovanec		Supersedes: 10-19-11
		Effective: 12-18-18

GENERAL

ALL main failures and intentional openings in mains shall be considered a possible source of contamination. For instance, possible contamination can result from breaks, cracks, holes, leaking joints, fittings that have blown off, service corporations pulled out, air taps left open to suck vault water into main, failing to install water tight night caps on mains, cutting in connections or any other situation where the inside surface of the water main comes in contact with any outside element. This standard outlines the procedure whereby steps shall be taken to insure proper sterilization in such cases.

Only trained personnel shall be in charge of disinfecting main repairs and connections.

RESPONSIBILITIES

The primary responsibility in all cases for the shut off of any part of the water system and for the disinfection of mains in the system both new and old is that of the Water Distribution Division. These responsibilities may sometimes be delegated to other Divisions in the cases of emergency during other than normal working hours. In any case where a main is removed from service, responsibility for various functions shall be as follows:

* The items are coded to indicate the responsibilities of the Construction Division (CD) and the Water Distribution Division (WD). Those responsibilities which are indicated by a plus sign (+) are delegated by Water Distribution to Field Service during non-working hours.

- +WD1. Notification to customers.
- +WD2. Shut down of main.
- * +WD3. Calling hydrants out of service to Dispatch.
- CD4. Excavation.
- CD or WD5. Repair or connection.
- CD6. Install water tight night caps or plugs on mains⁽¹⁾.
- WD7. Provide water for customers on extended shut outs.
- CD8. Calling streets out of service.
- CD9. Notifying Public Information Administrator.
- CD10. Disinfection of new material used which is in contact with potable water.
- +WD11. Flushing of main.
- * WD12. Taking of bacteriological samples.
- WD13. Chlorinating main when necessary.
- +WD14. Reporting hydrants on "limited service."
- +WD15. Placing main back into "limited service."
- WD16. Checking on bacteriological tests.
- WD17. Placing main back into service.
- CD18. Providing information to Construction Office.

Note (1): Night caps or plugs need only be water tight, not pressure resistant.

* Revised Text



METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 1.4.4
Prepared by: D.J. Satterfield	Disinfecting and Flushing Main Repairs and Connections	Page: 2 of 5
Approved by: Jeff Schovanec		<u>Supersedes:</u> 10-19-11
		Effective: 12-18-18

ISOLATION OF AREA

1. In most cases a Water Distribution crew will operate all valves necessary to isolate the main.
- * 2. In ALL cases where a 16" or larger main is removed from service, the Water Distribution Division will operate the valves necessary for the shutdown, or a valve that is not a gate valve.
3. The water is to be left off until the repair or connection is made, unless it is absolutely necessary to turn the water back on to locate a main failure.
- * 4. All valves operated and valves left in a closed position shall be reported to the Water Distribution Office as soon as possible, using Form 1021.
5. All hydrants which are called "out of service until further notice" or are on "limited service" shall be reported to the Dispatcher and relayed to the Fire Operators immediately.
6. Any unusual conditions which might occur during the operating of valves or hydrants shall be reported to the Water Distribution Office as soon as possible.
7. Caution must be used when closing valves and dewatering sections. It has been common practice to install valves with no restrained joints. If couplings are installed around the valves they need to be "Slugged" and pipe joints need to be capable of handling the thrust forces in compression on the dewatered side of the valve. Assuming this is the case, following is a guideline of safe distances for open cutting of pipe for various-sized pipelines (not according to valve size). If the main is exposed or cut within this distance the main needs to be depressurized on the far side of the valve.

Main Size (Not Valve Size)	Bare C.I. or D.I.	Polywrapped D.I.	Coated Steel (Min. wall)
6"	50'	70'	*
8"	60'	90'	*
10"	75'	105'	*
12"	90'	125'	*
14"	100'	140'	*
16"	115'	160'	*

* *Steel is not normally used at this size. Contact Engineering for distances if needed.*

18"	**	**	210'
20"	**	**	230'
24"	**	**	265'
30"	**	**	320'
36"	**	**	365'
42"	**	**	410'
48"	**	**	329'
54"	**	**	363'
60"	**	**	396'

** *The distances listed for steel may be used, however, they exceed the distance needed for ductile iron, concrete and cast iron pipe. Contact Engineering if shorter distances are needed.*

Assumptions are: 180 psi, friction - 0.25, soil density 100 lb./ft.³, Class 50 pipe up through 16". Depth of cover 5'. Steel pipe 18" - 60".

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 1.4.4
Prepared by: D.J. Satterfield	Disinfecting and Flushing Main Repairs and Connections	Page: 3 of 5
Approved by: Jeff Schovanec		Supersedes: 10-19-11
		Effective: 12-18-18

EXCAVATION

1. The excavation for repair or connection is generally wet and poses a risk of contaminating the main. To prevent contamination of the main the following steps shall be taken:
2. When exposing broken or cracked mains, excavate 16" to 18" below the pipe and use a pump of sufficient capacity to keep outside water from entering the pipe. Every precaution shall be taken to avoid mud or debris of any kind entering into the existing pipe.
3. Edges around main break excavations shall be diked with dirt or other materials to prevent run-off water from streets or surrounding areas from entering the excavation during any type of wet weather.
4. Any storm sewers, sanitary sewers, disposal drains for septic tanks, cesspools, or any waste disposal systems which are broken while excavating or which are over, under, or around broken water main shall be reported to the Water Distribution Office. Extreme care shall be taken to prevent any waste disposal systems from emptying into an excavation for a broken or cracked water main. Any circumstances which may provide contamination, the result of which will require extraordinary care in chlorinating shall be reported to the Water Distribution Office as soon as possible, so that extreme care and caution may be taken in sterilizing the main.
5. All "open ended" mains that will be left over night shall be capped or plugged.

MATERIALS USED FOR REPAIR

1. Existing ends of pipe to be repaired or connected shall be cleaned inside and outside before a new section of pipe is installed.
2. Existing ends of pipe to be repaired or connected shall be sprayed with a 1% hypochlorite solution (See #4 below) outside and as far back inside the main as possible.
3. All inside surfaces of any new material used in repair or on connections to mains shall be cleaned and sprayed with a 1% hypochlorite solution (See #4 below). This includes middle rings of couplings, gaskets, slip joints, mechanical joints, split sleeves and any other item which comes in contact with the potable water on the inside of the main.
4. A 1% hypochlorite solution in a container marked "1% Hypochlorite Solution" shall be furnished by the Construction Storeroom. The interior surface of the pipe is to be washed clean of dirt and debris, then sprayed with the 1% hypochlorite solution. This solution shall be emptied from the tank sprayer as soon as possible after using to prevent corrosion of the inside of the tank.

FLUSHING

- * 1. Only ONE valve at a time shall be opened to provide the flow necessary to flush the main. After the flushing is completed, the break will be isolated so water cannot migrate from the location of the break.

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 1.4.4
Prepared by: D.J. Satterfield	Disinfecting and Flushing Main Repairs and Connections	Page: 4 of 5
Approved by: Jeff Schovanec		<u>Supersedes:</u> 10-19-11
		Effective: 12-18-18

2. Refer to Table 1 for minimum flows required when flushing out mains. Flushing shall be performed so water flows quickly through the repaired section of pipe.
3. The required openings to flush pipe lines as specified are shown in the table on the following page.
- * 4. If dirt or other foreign matter enters the main during the repair or connection, flush until clear and then notify the Water Distribution Foreman via email or text.
5. If there are no hydrants in the isolated section of water main, the nearest hydrant to the isolated section shall be used for flushing. This requires opening or closing such valves as necessary to give a direct route to the hydrant and avoid contamination of adjacent mains.
6. The additional valves that are required to be closed in #5 above, are to be left closed and the supervisor in charge is to notify the Dispatcher of this type of shut off.

BACTERIOLOGICAL TESTING

1. All mains that have had the interior surface exposed to any outside elements shall have two (2) sets of negative samples taken approximately 24 hours apart.
- * 2. All water samples taken shall be from taps in the main or from a water service line. Under unusual circumstances water samples may be taken from hydrants with the approval of the Director or Foreman of Water Distribution.
3. If water samples are taken from a house service tap, a sufficient amount of water shall be flowed through the service line to insure fresh water being supplied from the main is being tested.
4. Water samples shall be taken from downstream sources as close to the main repair or connection as possible.
- * 5. Samples shall be taken in sterile sealed bottles provided specifically for obtaining bacti samples, as specified by the Water Quality division.
6. All water sample bottles shall be properly and clearly labeled with the location of where the sample was obtained, the time, the date, and by whom the sample was made.
- * 7. All water samples shall be taken to the Chemical Building at Florence Pumping Station within one business day after the repair of the break.

Positive Samples

1. Should the initial or second set of samples test positive, the main shall be re-flushed and re-sampled.
2. The Water Distribution Division may put the main into service After two (2) consecutive negative samples have been taken and the main is cleared by the Chemical Laboratory.

METROPOLITAN UTILITIES DISTRICT	Construction Standard	No: 1.4.4
	Disinfecting and Flushing Main Repairs and Connections	Page: 5 of 5 Supersedes: 10-19-11 Effective: 12-18-18
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Table 1
Required Openings to Flush Pipelines at 3 ft/s
(40 psi pressure)*

Nominal Pipe Dia. (in.)	Flow Req. for 3/fts GPM	Min. Number of Hydrant Outlets ^a	
		2 ½ in.	4 ½ in.
4	120	1	-
6	260	1	-
8	470	1	-
10	730	1	-
12	1060	2	or 1
14	1440	2	or 1
16	1880	2	or 1
18	2380	3	or 1
20	2940	1	and 1
24	4230	-	2
30	6610	2	and 2

a. With 40 psi pressure in the main with the hydrant flowing to atmosphere, a 2 ½ in. hydrant outlet will discharge approximately 1000 gpm and a 4 ½ in. outlet will discharge approximately 2500 gpm.

* The Table was adapted from AWWA C651-14 Table 3.

HISTORICAL RECORDS

1. The supervisor in charge shall fill out all necessary forms to provide an accurate record of the work performed.
2. These forms shall be turned in to the Construction Office as soon as possible, so that they can be used by other departments who may have related work to perform.

** Revised Table



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