

PUBLIC HEALTH ENGINEERING GUIDELINE: PROTECTION AND DISINFECTION OF WATERMAINS DURING CONSTRUCTION

Water for flushing, pressure testing, and disinfection testing of new watermains should be provided by a temporary connection (e.g. via existing hydrant or water truck) and not by connection to the existing active watermains, per *AWWA Standard C651-05*.

1. ISOLATION OF ACTIVE DISTRIBUTION SYSTEM

- As standard procedure, the new watermain should be kept isolated from the active distribution system using a physical separation (see **Figure 1**) until satisfactory bacteriological testing has been completed and the disinfectant water flushed out.

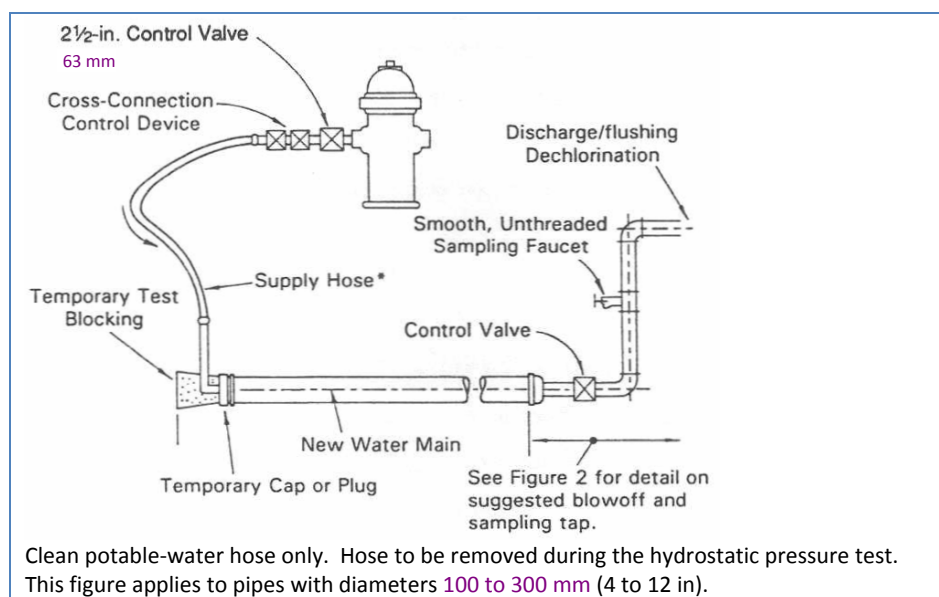


Figure 1. Suggested temporary flushing/testing connection

(after AWWA C651)

- Water required for hydrostatic pressure testing, flushing, and disinfection should be supplied through a temporary connection between the distribution system and the new watermain.
- The temporary connection should include a testable backflow prevention (cross-connection control) device – either a **double check valve assembly** or a **reduced pressure zone assembly** – and should be physically disconnected from the new main during the hydrostatic pressure test.
- Re-establish the temporary connection after completion of the hydrostatic pressure test to flush out the disinfectant water prior to final connection of the new main to the distribution system.

2. FLUSHING

- Before flushing, ensure waterworks are finished except tie-in to existing watermain.
- Flush at maximum velocity (minimum 0.8 m/s) until discharge water is clean and clear.

3. PRESSURE TESTING

- For details on pressure and leakage testing of new watermains, refer to *AWWA C651*, *AWWA C600/M41* (ductile iron), *AWWA C605/M43* (PVC), or equivalent.

4. DISINFECTION

- Do not use granular hypochlorite for disinfection of PVC pipe with solvent welded joints (explosion).
- Allow water from temporary connection (above) to enter new watermain with not less than 25 mg/L free chlorine at a constant, measured rate, as per *AWWA C651*, Continuous Feed Method.
- Measure chlorine concentration at regular time intervals and at a number of points and extremities along main to ensure that this concentration is provided.
- Continue until entire watermain, all service connections, end points and hydrants to be disinfected are treated with 25 mg/L chlorine solution.
- Operate all valves, curb stops and hydrants in section treated to disinfect them thoroughly.
- Retain chlorinated water in watermain for at least 24 h.
- At end of 24 h, measure and record free chlorine at points along new watermain.
- If chlorine content is less than 10 mg/L, repeat disinfection procedure.
- Following disinfection, flush chlorinated water from system until the residual chlorine in the remaining water is approximately 0.2 mg/L.

5. BACTERIOLOGICAL SAMPLING AND VERIFICATION

- After final flushing and before the new watermain is connected to the distribution system, at least one set of acceptable samples should be collected from the new main every 300 m (1,000 ft) of the new watermain, plus one sample from each end of the line and each branch.
- If requested by the water system owner or Northern Health, a second set of samples should be collected 24 h after the first set.
- Samples should be tested for bacteriological quality and show the absence of coliform organisms.
 - Turbidity, pH, and a heterotrophic plate count (HPC) test may be required at the option of the water system owner or Northern Health.
- If trench water, dirt or debris may have entered the new watermain during construction, bacteriological samples should be taken at closer intervals: every 60 m (200 ft).
- A suggested combination blowoff and sampling tap used for watermains up to and including 200 mm (8 in) diameter is shown in **Figure 2**.
 - Alternatively, a corporation stop may be installed in the watermain with a removable copper-tube gooseneck assembly.
 - No hose or fire hydrant should be used in the collection of samples.

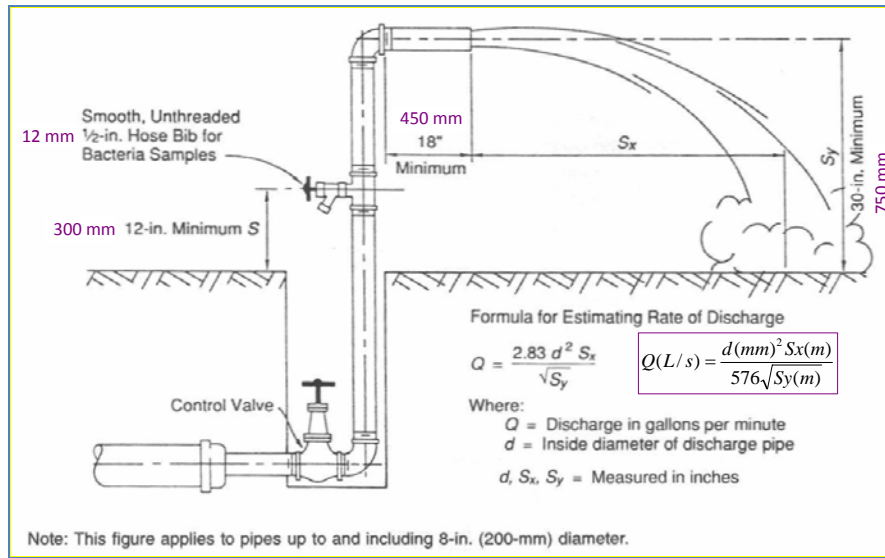


Figure 2. Suggested combination blowoff and sampling cap (after AWWA C651)

- Bacteriological samples from new watermain construction must be taken to an **accredited private lab**, not the **Health Unit**.
- If the initial lab test is **not satisfactory**, the new watermain should be refushed and resampled.
 - If these next samples also fail to produce acceptable results, the watermain should be rechlorinated until satisfactory results are obtained.
- **Do not connect to the active distribution system until laboratory tests confirm no detectible coliform bacteria anywhere in the new watermain.**

6. FINAL CONNECTIONS TO EXISTING WATERMAINS

- Watermains and appurtenances must be completely installed, flushed, disinfected, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system.
- Sanitary construction practices must be followed during installation of the final connection so that there is no contamination of the new or existing watermain with foreign material or groundwater.
- Final connections are to be no more than one pipe length, **5.5 m (18 ft)**.
- The new pipe, fittings, and valve(s) required for the connection may be spray-disinfected or swabbed with a minimum 1 to 5% solution of chlorine just prior to being installed.
- For final connections greater than one pipe length, refer to *AWWA C651*.