

Confidence Testing for Fire Hydrants

**A Guide to the Maintenance, Testing, and
Marking of Private Fire Hydrants**



Fire Prevention Bureau

February 2010

Scope

This document is intended to aid informed, and registered individuals with information for proper maintenance, testing, and marking of private fire hydrants for private developments and businesses in the city. In no way will this document replace proper training and experience, therefore it should not be viewed as a training manual but as a guide to the equipment and expertise required for the proper execution of these functions.

Introduction

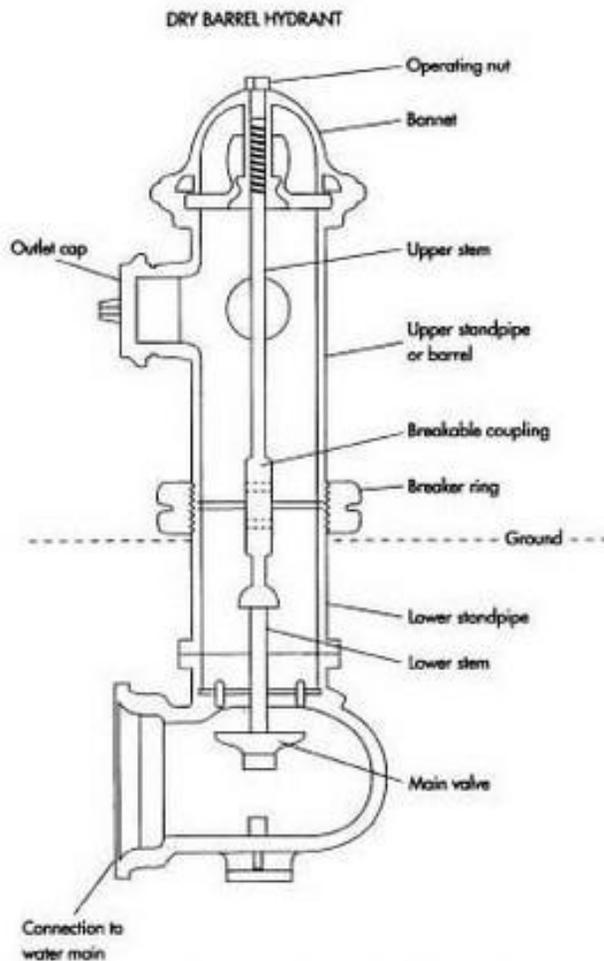
Fire hydrants spend most of their time unused and ignored, yet they are called upon in a moment's notice to provide fire flow for the protection of a business or home. They are an indispensable facet of the overall fire protection features of a building. There are a significant number of private fire hydrants within the Bellevue Fire Department's service area that are necessary for the fire protection of a building, but they are useless unless regularly maintained.

There are nearly 6,000 fire hydrants within Bellevue Fire Department's service area. How can you tell a private hydrant from a public one? Public hydrants are primarily located in the public right-of-way, on the side of public streets, or other public property.

Hydrants located in the middle of commercial parking lots are more than likely private hydrants. The testing, maintenance, and marking of hydrants is the responsibility of the property owner. The maintenance, testing, and inspection of private hydrants must be performed only by a contractor registered with the Bellevue Fire Department. Please note that in any case, the property owner assumes all liability not otherwise contractually dictated for the proper operation, maintenance, and marking of the hydrant system(s).

A guide for the fire flow testing and marking of hydrants can be found in the National Fire Protection Association (NFPA) Standard 291: *"Recommended Practice for Fire Flow Testing and Marking of Hydrants."* The maintenance and periodic testing of hydrants is covered in NFPA Standard 25: *"Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protecting Systems."* Specifically, Chapter 4 of this standard addresses private water mains and their appurtenances. Additionally, an outstanding reference guide on this is the American Water Works Association (AWWA) Manual M-17 "Installation, Field Testing and Maintenance of Fire Hydrants."

Anatomy of a Typical Dry Hydrant



All hydrants in this part of the country are *dry hydrants* because of the freezing weather conditions we experience. This means that the barrel of the hydrant stays dry until the hydrant is opened at the Operating nut. This drives the stem to open the valve at the bottom of the barrel. Notice in the *detail to the left* that the stem is split into two parts with a safety coupling which acts as a breakaway valve in case the hydrant is run over. As can be seen, a hydrant is an intricate water delivery mechanism with many moving parts. In addition to the stem and valve that bring water into the barrel, other important moving parts are the 2½ and 4½ inch nozzle caps (identified as hose and pumper nozzle respectively) which keep the nozzles protected from dirt and the elements. The caps can easily lock up due to corrosion, neglect, and sloppy painting.

Regularly Scheduled Maintenance

It really doesn't take much to keep a hydrant operating in peak condition if regular (and proper) maintenance is followed. NFPA 25 "Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems" is the standard used for the periodic maintenance and testing of hydrants.

NFPA 25, Chapter 4 indicates that hydrants must be inspected, lubricated, and flushed on an annual basis.

Inspection

This should be done annually or after each use in conjunction with the maintenance and the flow test. Where possible, check the fire hydrant manufacturer's maintenance manual.

- Check the hydrant's appearance. Remove obstructions within a 3 foot radius.
- Check to see whether the hydrant needs to be raised because of a change in the ground surface grade. If adjustments are needed, schedule the work.
- Inspect the hydrant for leaks, either from the operating nut, nozzle caps, or the drain.
- Locate the foot valve and completely close and open the valve.
- Making sure the hydrant is off, remove the port caps and check for standing water by use of plumb bob or other suitable means. (Indicates a faulty drain)
- Remove all nozzle caps and check threads and operating nuts for damage.
- Make repairs as necessary.

Maintenance

In conjunction with regular inspections, the following maintenance should be performed annually.

- Loosen one outlet-nozzle cap to allow air to escape.
- Open the hydrant only a few turns. Allow air to vent from the outlet-nozzle cap.
- Tighten the outlet-nozzle cap. Never use excessive force.
- Completely open and close the operating nut, verifying the drain valve closed and open properly - Check for ease of operation.
- Check for leakage at flanges, around outlet nozzles, at packing or seals, and around the operating stem - Repair as needed.
- Partially close the hydrant so the drains open and water flows through under pressure for about 10 seconds, flushing the drain outlets.
- Close the hydrant completely. Remove an outlet-nozzle cap and check the operation of the drain valve by placing the palm of one hand over the outlet nozzle. Drainage should be sufficiently rapid to create noticeable suction.
- Remove all outlet nozzle caps, clean the threads, check the condition of the gaskets, and lubricate the threads with a manufacturer approved lubricant. There are several never-seize compounds available. Check the ease of operation of each cap.
- Check outlet-nozzle-cap chains or cables for free action on each cap. If the chains or cables bind, open the loop around the cap until they move

- freely. This will keep the chains or cables from kinking when the cap is removed during an emergency.
- Replace the caps. Tighten them, and then back off slightly so they will not be excessively tight. Leave them tight enough to prevent their removal by hand.
 - Check the lubrication of operating-nut threads. Lubricate per the manufacturer's recommendations.
 - Locate and exercise the auxiliary valve. Leave it in the open position.
 - Check the breakaway device for damage.
 - If the hydrant is inoperable, bag it with a brightly colored, weather-resistant cover that bears the stenciled warning: "HYDRANT OUT OF SERVICE". Notify the Bellevue Fire Department and schedule the hydrant for repair.
 - Check the fire hydrant for signs of rust or paint chipping/damage. Remove rust or other foreign materials and touch up the paint (including the hydrant number) following the standards indicated in the hydrant painting section of this manual.

Flushing a Hydrant

Flushing a hydrant removes any accumulated sediment in the barrel and on the valve. Flushing must be performed annually along with the regular inspection and maintenance items described above. Circumstances will sometimes not permit flushing; at a minimum, perform the regular inspection and maintenance.

To flush a hydrant:

- Contact the appropriate Water Department (see Appendix A) to inform them that a hydrant flush is about to take place. Often, when a large volume of water is moved through an orifice such as a hydrant, sediment in the line will be stirred up and the Water Department may receive complaints about brown water.
- Prepare to flow water from the hydrant. Following are acceptable discharge locations for the water:
 - Sanitary Sewer
 - Storm Sewer if water has been de-chlorinated
 - Other locations must receive prior approval
- Open the hydrant **very slowly** until it is fully open;
- Let water flow for a minimum of 3 minutes or until water is clear. Do not open more than one hydrant at a time - this will minimize the amount of flow created in the main;
- Shut the hydrant down, again very slowly, until the valve is completely shut;
- Remove hardware and replace cap.

Dynamics of Water

When performing any sort of flow test or exercising of hydrants, there are several important concepts that must be understood to avoid causing damage to the hydrants and to the water system in general.

Water Hammer

Water hammer is caused by an abrupt change in the velocity of flowing water. It is most often the result of shutting down a valve too quickly. Imagine driving into a brick wall at 60 mph. The energy of your momentum has to be transferred somewhere. In this case it is shared, though unequally, by you, the car, and the brick wall.

Water is incompressible. It will not absorb ANY of the energy it gives off by being forced to suddenly decelerate. Therefore, the system, pipes, hydrants, ground have to absorb all of the energy. If a valve is shut down too quickly, the weak link in the system will go first. The weak links are almost always at the flanges.

Brown Water

Brown water is the basic complaint the Water Resources Department receives when people turn on their faucet and see less than clear water coming out. This may be caused by several things. One thing that will almost always cause brown water is a large amount of flow in a water main.

During normal conditions only the center portion of a water main actually flows water. That's because of the friction that the wall of the pipe is exerting on the water. It's less trouble for the center portion to flow than the outer portion. As the average velocity increases, so will the velocity of the fluid close to the wall of the pipe. As this water moves faster, it begins to kick up all the sediment that usually stays at the bottom of the pipe. This sediment gets stirred up and does not settle back down until the velocity slows down. However, once the sediment has been kicked up into the center portion of the pipe, it is now in the *main stream* of flow.

Protection from Vehicular Damage

Please refer to the International Fire Code Section 312 for required vehicle protection such as bollards for fire hydrants or other devices such as PIVs or fuel tanks.

Equipment

To work on a hydrant system, you may need the following equipment and materials:

Equipment	Quantity
50 ft section of 3" and/or 5" hose*	2 - 4
De-chlorination supplies	-
Hydrant wrench	2
Paint supplies (spray paint & masking tape)	-
Steel brush	1
Thread grease (lubricant)(Check manufacturer for specs)	-
Valve key	1
Water distribution map	1

Record Keeping

Refer to Appendix A for forms to use to keep records of these flow tests. Copies of these tests are required to be sent to the Bellevue Fire Department Prevention Bureau and the original kept by the owner of the private property. It is also a good idea to keep copies on site at an appropriate address.

Frequency

It is a requirement of NFPA 25 that inspection, maintenance, and flushing as be performed ***annually***.

Hydrant Colors - Painting Requirements

Private fire hydrants are required to be painted solid red.

Appendix A

References

The following phone numbers will be of valuable use to you in acquiring additional information or in performing the duties outlined in this document.

Water Departments:

Beaux Arts (Water District 22)	(425) 454-8580/(425) 454-5720
Bellevue Water Department	(425) 452-7840
Coal Creek	(425) 235-9200
Hill Top (Water District 117):	(425) 747-4970/(425) 746-2707/ (425) 373-5237
Trails End (NE 42 nd & 137 th Ave NE)	(425) 881-0853/(253) 851-4060

Bibliography

Installation, Field Testing, and Maintenance of Fire Hydrants, AWWA Manual M17, Third Edition, American Water Works Association, 666 West Quincy Avenue, Denver, CO 80235 (www.awwa.org)

NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems, 1995 Edition, National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101. (www.nfpa.org)

NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants, 1995 Edition, National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101.

The Fire Protection Handbook, 18th Edition, National Fire Protection Association, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101.

Bellevue Fire Department Fire Hydrant Test Form - Please contact the Fire Department to obtain a current copy of this form or download it at http://www.bellevuewa.gov/word/Fire/Private_Hydrant_Confidence_Testing_Form.docx