Water Supply

Chapter 14

Copyright: IFSTA, Essentials of Fire Fighting and Fire Department Operations, 6th Edition

LEARNING OBJECTIVES

Explain the ways water supply system components are used by firefighters.

Describe types of fire hydrants and hydrant markings.

Explain fire hydrant operation and inspection considerations.

Explain alternative water supply sources and methods of access.

LEARNING OBJECTIVES

Describe methods used for rural water supply operations.

Operate a hydrant.

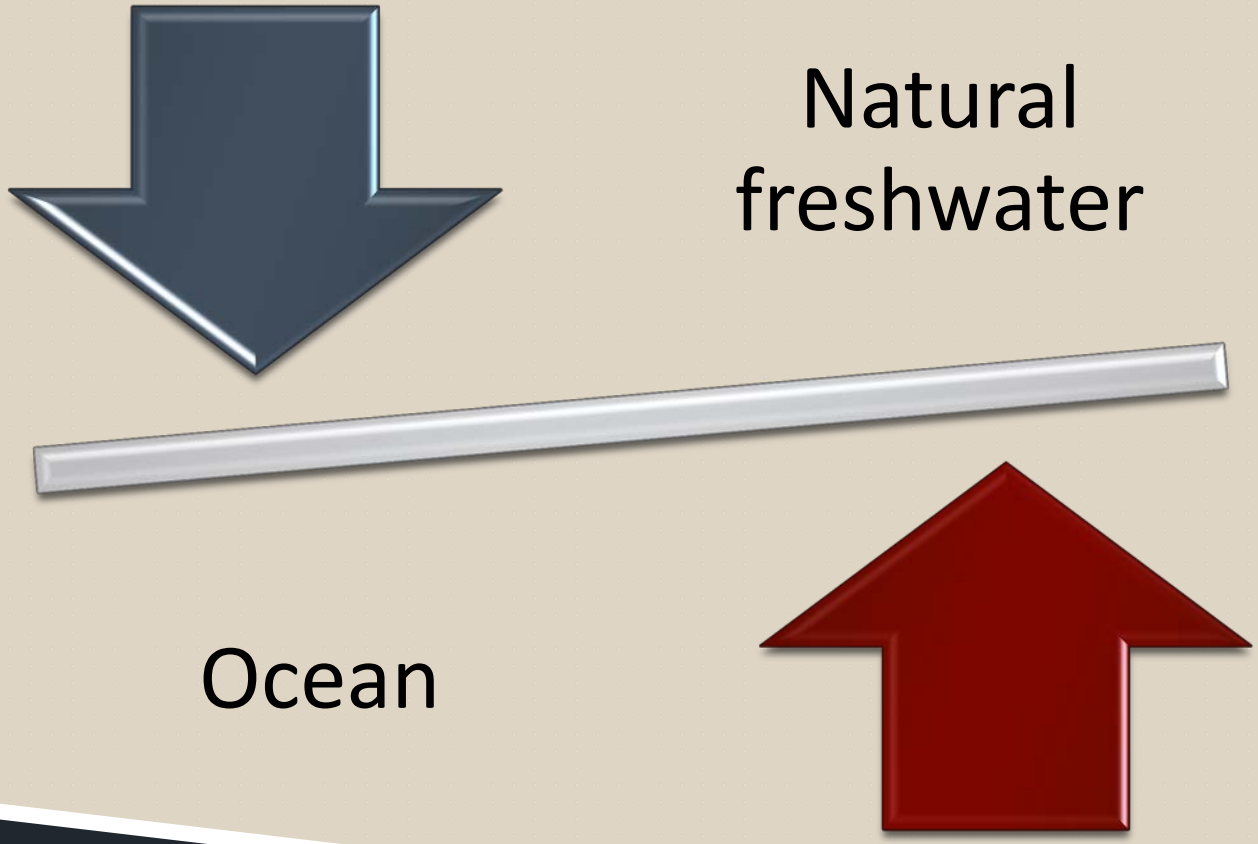
Make soft-sleeve and hard-suction hydrant connections.

Connect and place a hard-suction hose for drafting from a static water source.

Deploy a portable water tank.

THERE ARE TWO TYPES OF WATER SUPPLY SYSTEMS FIREFIGHTERS USE.

WATER SUPPLY SOURCES ARE FOUND IN A VARIETY OF LOCATIONS.



THE AMOUNT OF WATER NEEDED FROM A SUPPLY SOURCE CONSIDERS SEVERAL FACTORS.

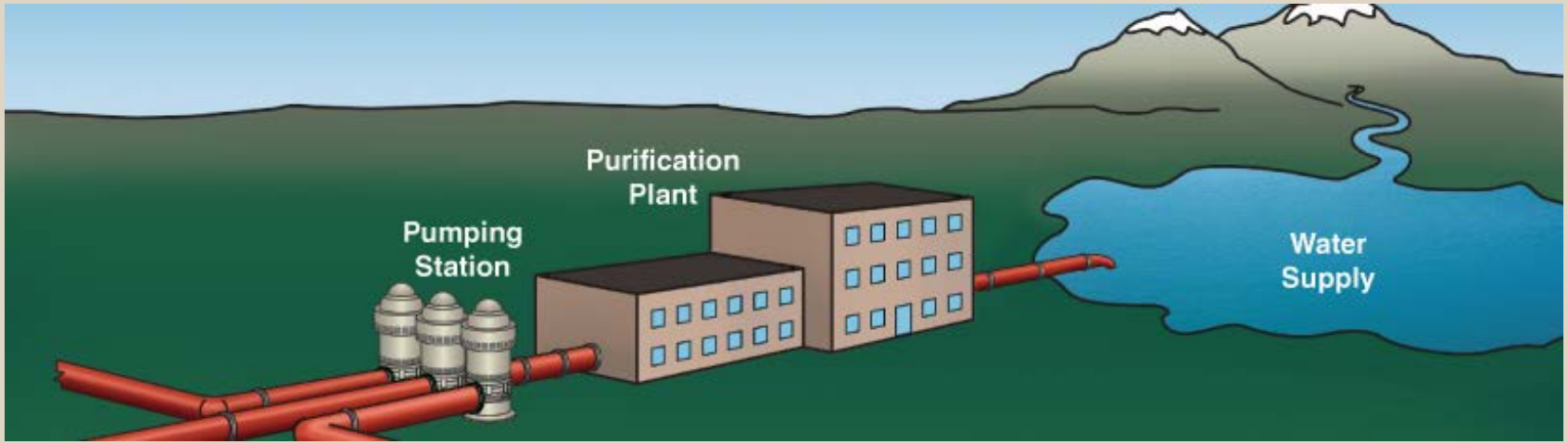
History of consumption, estimated needs

Averages, maximum daily consumption tracked

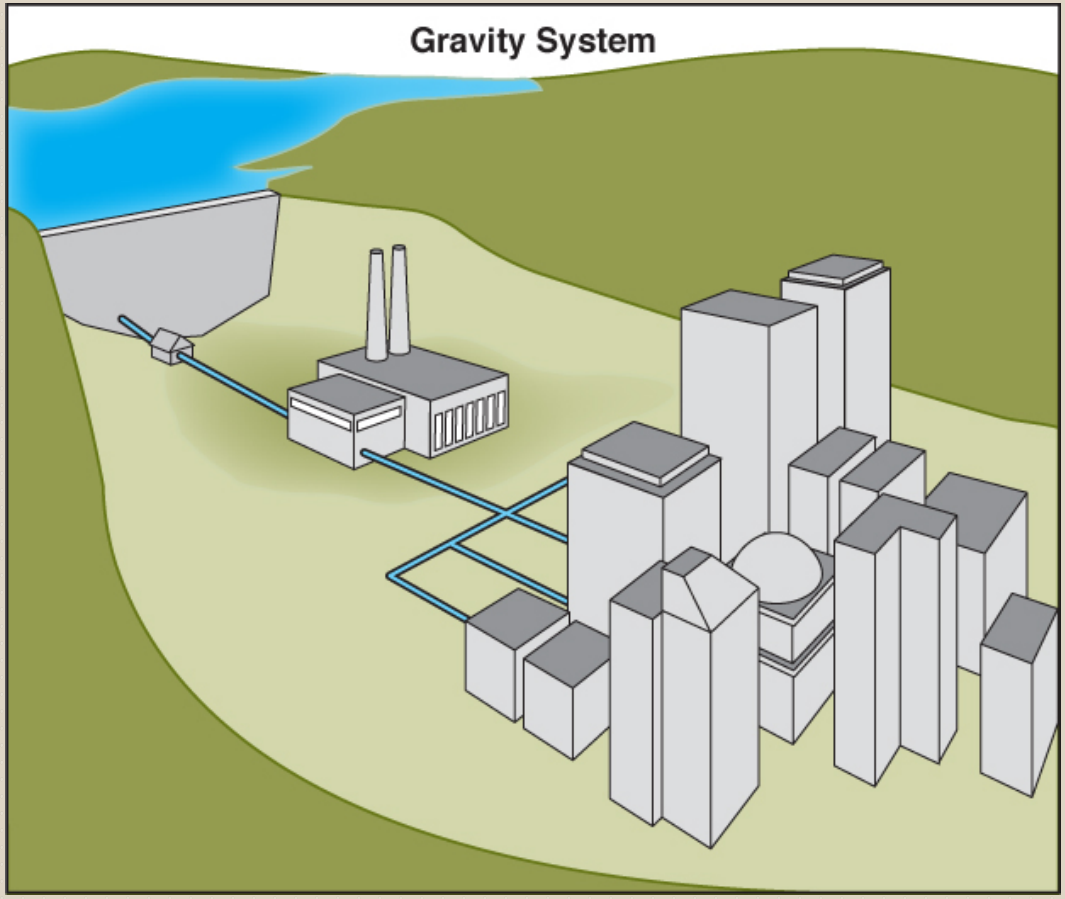
Domestic needs added to flow requirements for fire protection

System must be capable of supplying both

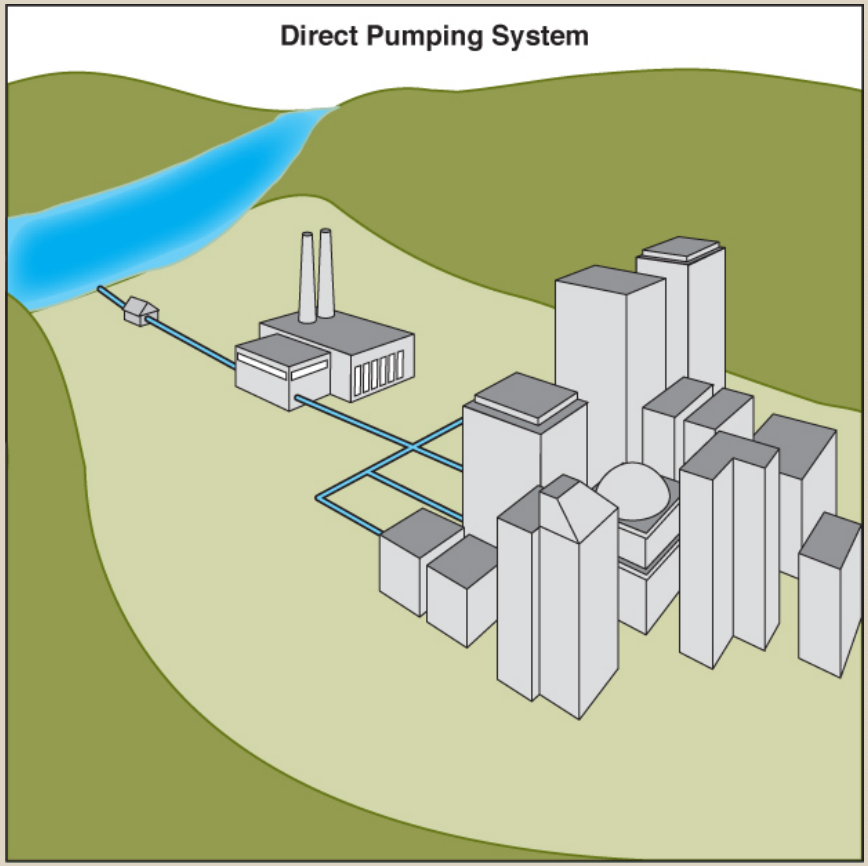
WATER TREATMENT OR PROCESSING FACILITIES REMOVE IMPURITIES IN WATER.



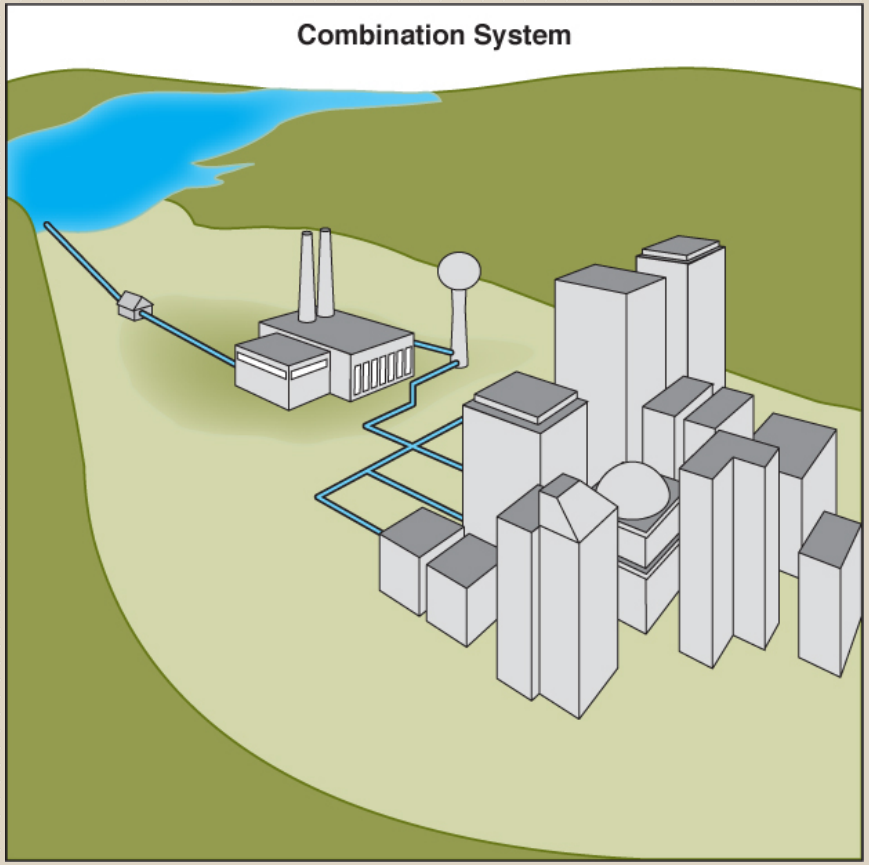
THE MEANS OF MOVING WATER DEPENDS ON THE ORIGINAL SOURCE FOR THE WATER.



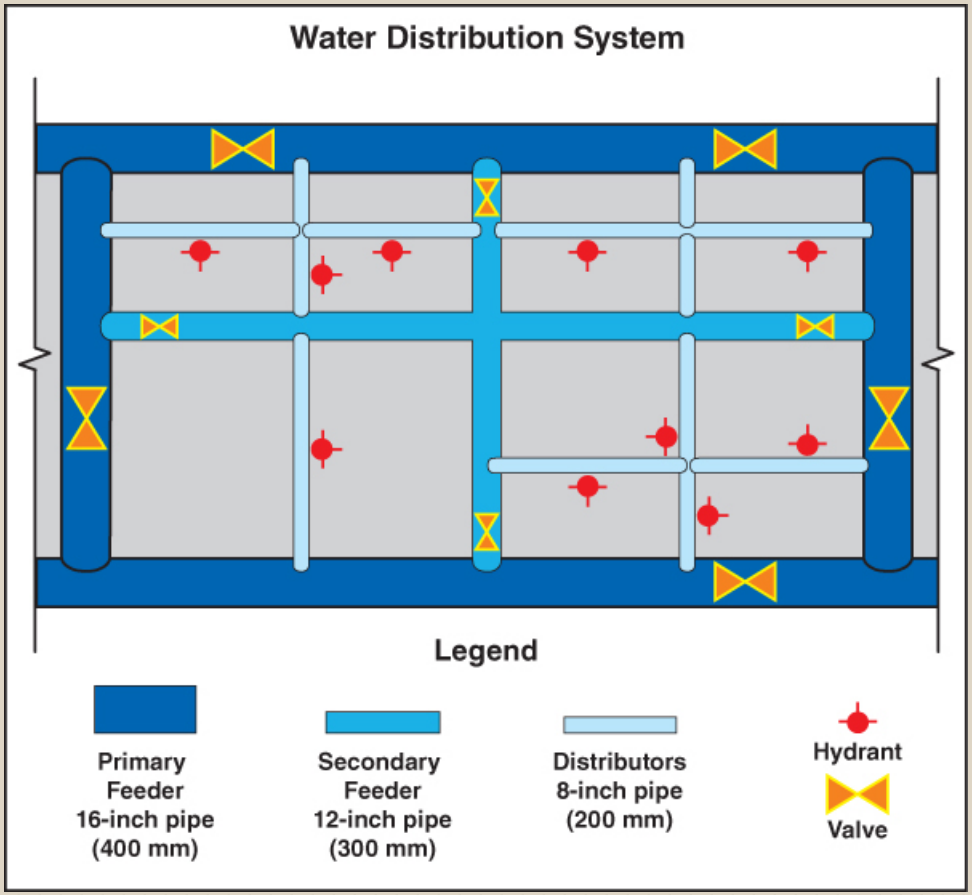
THE MEANS OF MOVING WATER DEPENDS ON THE ORIGINAL SOURCE FOR THE WATER.



THE MEANS OF MOVING WATER DEPENDS ON THE ORIGINAL SOURCE FOR THE WATER.



PIPING IS AN IMPORTANT ASPECT OF THE WATER DISTRIBUTION AND STORAGE SYSTEM.



STORAGE TANKS ARE ALSO ANOTHER COMPONENT IN THE SYSTEM.

ISOLATION AND CONTROL VALVES USE SEVERAL METHODS TO INTERRUPT WATER FLOW.

ISOLATION VALVES ARE USED TO ISOLATE SECTIONS OF THE WATER SUPPLY SYSTEM.

- Location intended for minimum disruption
- Maximum spacing lengths
- Tested at least once a year
- Located on easement, below ground
- Usually marked
- Directions for use
- Usually indicating-type for private systems

CONTROL VALVES ARE LOCATED BETWEEN PUBLIC AND PRIVATE SYSTEMS.

- Typical types
- Water flowmeter, backflow preventer also installed

FIRE HYDRANT LOCATIONS VARY DEPENDING ON THE WATER SYSTEM.

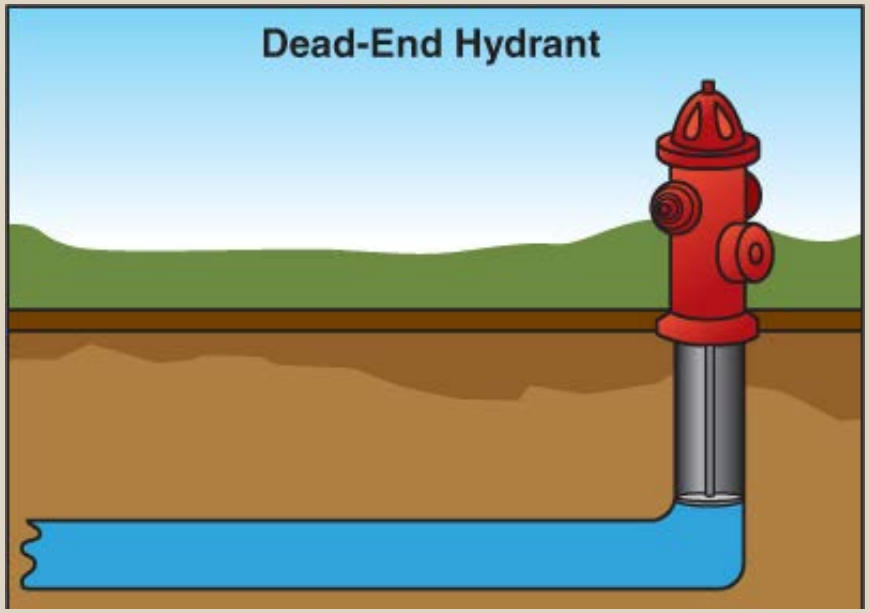
Located along system

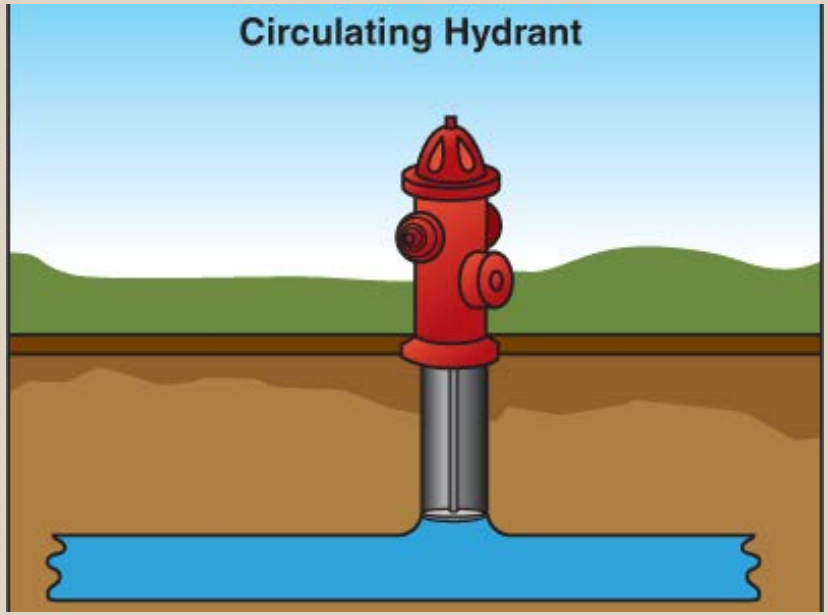
- Connected at specified intervals
- Not more than 300 feet (100 m) apart in high-value districts
- Every building within one block
- May require intermediate hydrants

Factors impacting location, spacing

- Building constructions
- Occupancy
- Building density
- Size of water main
- Required fire flows in area

FRICTION LOSS AND LOCATIONS CAN AFFECT VOLUME AND PRESSURE.





FIRE HYDRANTS, WHILE A DEPENDABLE WATER SOURCE, CAN FAIL.

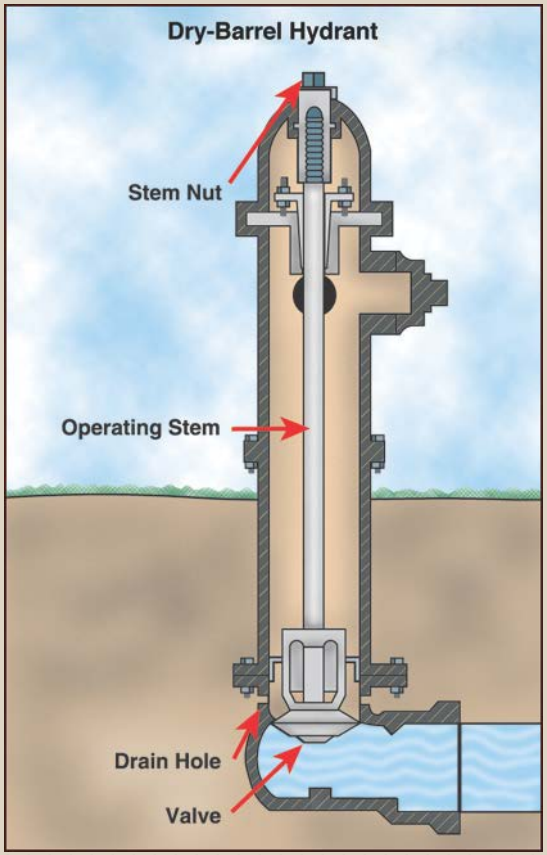
May result from

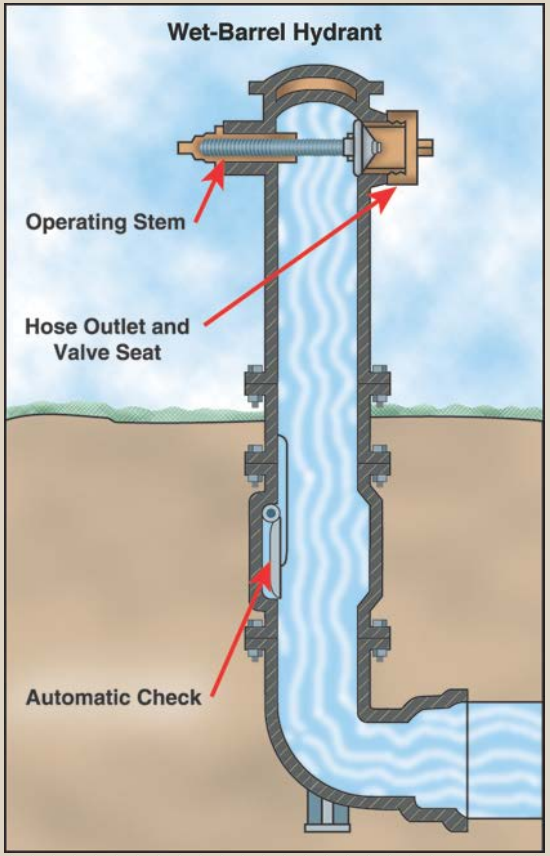
Damaged hydrant valves and connections	Broken water mains	Greater demand than the system can provide	Hydrants located on dead end water mains	Closed isolation valves	Restricted mains caused by sediment and mineral deposits	Pipes or hydrants that are frozen

THERE ARE SEVERAL COMMONALITIES IN HYDRANTS A FIREFIGHTER MAY ENCOUNTER.

Construction materials	
Two components to be standard	• At least one large (4 or 4½ inches [100 mm or 115 mm]) outlet • Two hose outlet nozzles for 2½-inch (65 mm) couplings
Specifications	• Valve opening and water main connection requirements • Male threads conform with local use • NFPA® 1963 regulations

DRY- AND WET-BARREL HYDRANTS ARE DESIGNED FOR DIFFERENT CLIMATES.





FIRE HYDRANT MARKINGS CAN BE USED TO DESIGNATE FLOW CAPACITY.

Table 14.1
Classifications and Markings of Municipal Fire Hydrants

Classification	Fire Flow	Barrel Color	Top and Nozzle Cap Colors	Pressure
Class AA	1,500 gpm (5 680 L/min) or greater	Chrome Yellow	Light Blue	20 psi (140 kPa)
Class A	1,000–1,499 gpm (3 785–5 675 L/min)	Chrome Yellow	Green	20 psi (140 kPa)
Class B	500–999 gpm (1 900–3 780 L/min)	Chrome Yellow	Orange	20 psi (140 kPa)
Class C	500 gpm (1 900 L/min) or less	Chrome Yellow	Red	20 psi (140 kPa)

Based on information given in NFPA® 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants, 2007.

HYDRANT OPERATION AND INSPECTION REQUIRES SPECIFIC KNOWLEDGE.

- Inspection frequency
- Wet-barrel operation
- Dry-barrel operation
- Precautions for opening, closing all hydrants

SOME POTENTIAL PROBLEMS MAY BE PRESENT DURING HYDRANT INSPECTIONS.

ALTERNATIVE WATER SUPPLY SOURCES CAN BE FOUND IN A VARIETY OF PLACES.

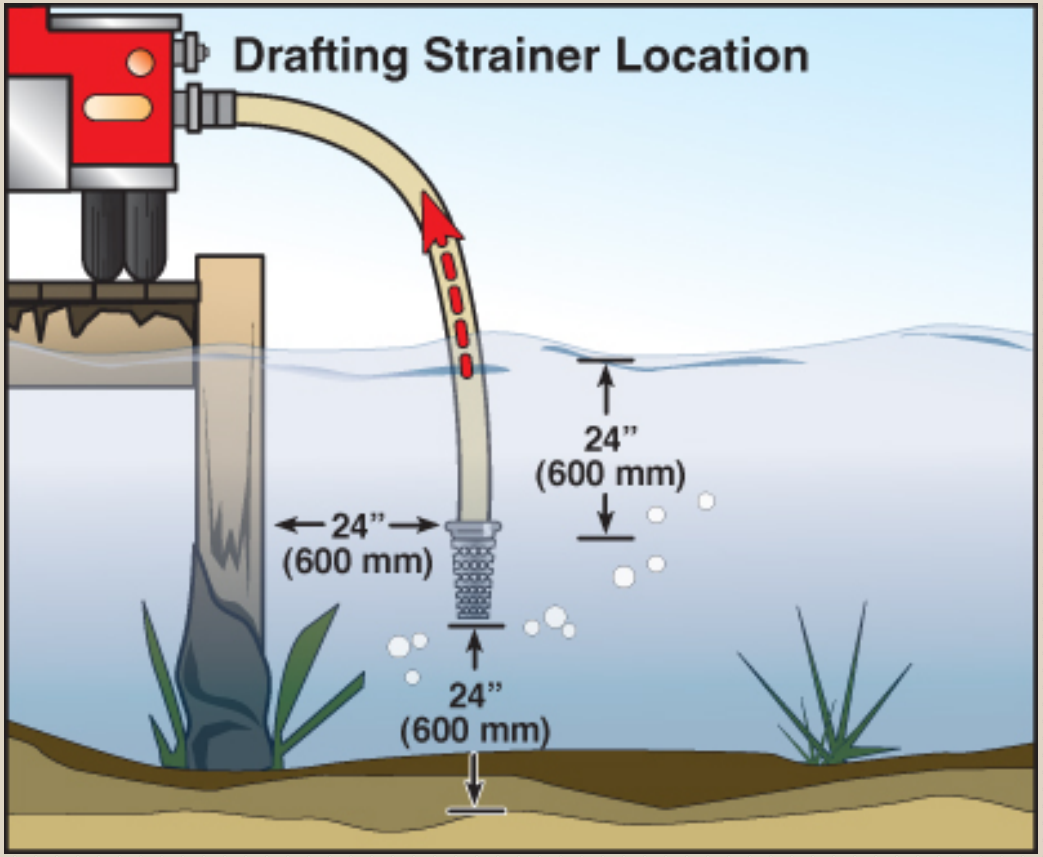
Examples

- Private water systems
- Lakes, ponds, rivers, ocean
- Swimming pools
- Farm stock tanks
- Rainwater collection

Static source can be used if

- Sufficient quantity
- Not contaminated health hazard
- Depth is considered

DRAFTING OPERATIONS MAY BE REQUIRED TO ACCESS ALTERNATIVE WATER SUPPLIES.



RURAL WATER SUPPLY OPERATIONS REQUIRE PLANNING AND PRACTICE.

Needed when

- Areas lack public water distribution system
- System has inadequate volume, pressure

THE WATER SHUTTLE METHOD TRANSFERS WATER TO TANKS FOR USE.

THERE ARE SEVERAL KEY COMPONENTS IN A WATER SHUTTLE OPERATION.

Dump site	• Located near incident • One or more portable tanks
Fill site	• At water source
Mobile water supply apparatus	• Hauls water from fill to dump

PORTABLE TANK TYPES REQUIRE SPECIFIC SET UP GUIDELINES.

- Salvage cover or tarp
- As level as possible
- Allow easy access
- Several set up at once

WATER SUPPLY VOLUME IS CALCULATED ON SEVERAL VARIABLES.

Total gallons (liters) in apparatus

+

Round trip

- Fill time
- Travel time
- Dump time

=

Gallons per minute (L/min)

YOU MUST KNOW WAYS TO USE AND REGULATIONS FOR WATER SUPPLY APPARATUS.

Unloading methods	• Gravity dumping • Jet-assist dumps • Apparatus-mounted pumps • Combination of methods
NFPA® 1901	• Requires dumping or filling rates when on level ground
Use to fill quickly	• Best fill site or hydrant • Large, multiple hoselines • Pumper if necessary

USE OF SELF-FILLING VACUUM MOBILE APPARATUS HAS INCREASED.

RELAY PUMPING IS USED WHEN THE WATER SOURCE IS CLOSE ENOUGH TO THE FIRE SCENE.

Establishment factors	• Maintain volume for duration needed • Must be quick enough to be worthwhile
Set up factors	• Volume of water • Distance between water source, fire scene • Supply hose size, amount available • Pumper capacity
Other considerations	• Apparatus with greatest pumping capacity located at water source • Causes of friction loss • Plan in advance, practice often

SUMMARY

Because water is the primary fire extinguishing agent used by firefighters, and because fires often occur considerable distances from major water sources, fire departments must develop ways to transport the available water from its source to the place it is needed.

Firefighters must be familiar with the water supply systems in their response areas.

They must know about water sources, pumping systems, gravity systems, and the system of underground water mains used to distribute the water.

They must also know how to inspect, maintain, and operate the fire hydrants in their jurisdictions.