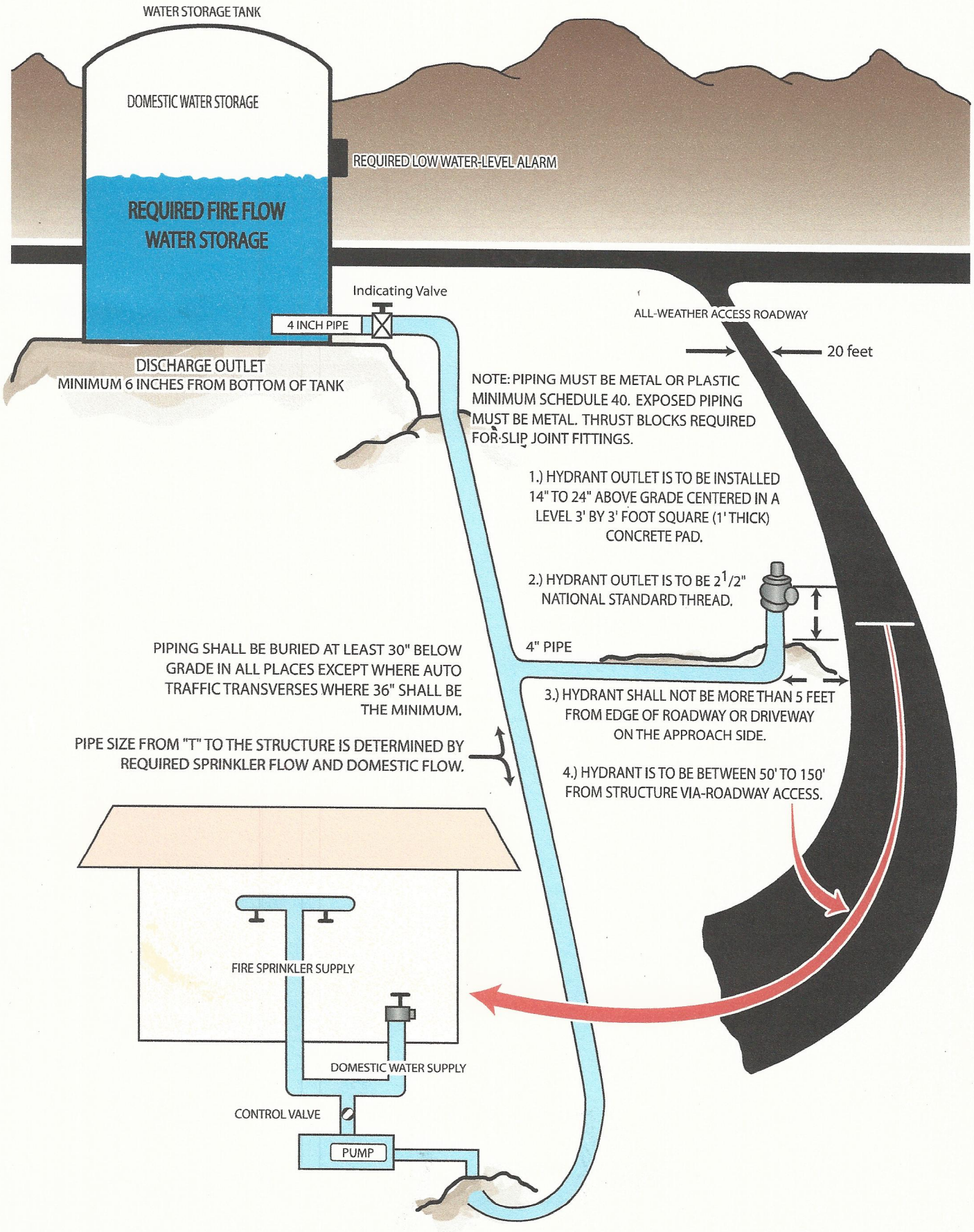
COUNTY OF LOS ANGELES FIRE DEPARTMENT
FIRE PREVENTION DIVISION

REV. 10/05

WATER TANK INSTALLATION STANDARD



I. INTRODUCTION

A. Purpose: The purpose of this standard is to provide installation requirements for a fire sprinkler system that will aid in the detection and control of residential fires, and thus, provide improved protection against injury, life loss, and property damage. A fire sprinkler system, installed in accordance with this standard, is expected to prevent flashover (total involvement) in the room of fire origin and to improve the chance for occupants to escape or be evacuated.

B. Scope: This regulation deals with the design and installation of automatic sprinkler systems for Group R-3 occupancies (i.e., guest houses, one and two family dwellings, and their garages). This regulation shall be used in conjunction with NFPA (National Fire Protection Association) #13D.

C. Author: The Deputy Chief of the Prevention Services Bureau, through the Assistant Fire Chief (Fire Marshal) of the Fire Prevention Division, is responsible for the content, revision, and periodic review of this regulation.

D. Authority: Los Angeles County Fire Code, Title 32, Sections 101.4, 1001.9 & 1003.2.11.

II. RESPONSIBILITY

A. All individuals and companies who propose to engage in the design, installation, or alteration of fire sprinkler systems are subject to the requirements of this regulation.

III. POLICY

A. This regulation outlines the procedures to be followed when submitting residential fire sprinkler plans and defines the Department's requirements for residential fire sprinkler system installations that may be more restrictive or not found in existing codes. This regulation is based on the installation of smoke detectors in the residences as required in the California Building and Fire Codes.

IV. PROCEDURES

A. Plan submittal

1. Sprinkler plans shall be submitted to the appropriate Fire Prevention Office.

ANTELOPE VALLEY
Fire Prevention Office
335-A E. Avenue K-6
Lancaster, CA 93535
(661) 949-6319

SANTA CLARITA VALLEY
Fire Prevention Office
23757 Valencia Blvd.
Valencia, CA 91355
(661) 286-8821

COMMERCE OFFICE
Fire Prevention Division
Sprinkler Plan Check
5823 Rickenbacker Road
Commerce, CA 90040
(323) 890-4125

2. A minimum of two sets of plans and calculations shall be submitted for the initial plan review and a minimum of four sets for final approval. Two sets shall be retained by the Department.

3. All plans shall include a completed Fire Flow (Form 195) obtained within one year of the submittal date and verified by a signature of an official of the water company or a Los Angeles County Fire Department representative. Information shall include: location of the hydrants flowed and gauged; static pressure; residual pressure; size of orifice; pitot reading; observed flow, date, and time of test; and backflow prevention requirements.

4. All notes and details shall be incorporated onto the original drawings and blueprinted.

5. Sprinkler plans shall be legible and drawn neatly, and be at a scale not smaller than 1/8" = 1'-0".

6. Sprinkler plans will not be approved until building plans are approved.

7. Installation shall not begin until plans have been approved. A complete set of approved plans shall be kept at the building site at all times. Contractors installing piping without approved plans may be cited.

B. Design and installation of systems

1. The installation of fire protection systems shall be performed by C-16 license holders or an owner/builder.

2. The underground water supply line between the detector check/water meter and the base of the fire sprinkler riser may be installed by one of the following:

   a. General engineering contractor (A)

   b. Fire protection contractor (C-16)

   c. Plumbing contractor (C-36)

   d. Pipeline contractor (C-34)

   e. Owner/builder (limit two per calendar year)

3. Designers of the overhead and underground fire protection systems shall meet the requirements set forth by the State Board of Registration and as follows:

   a. C-16 (only if also the installing contractor)

   b. Registered professional engineer (civil, mechanical)

   c. Registered fire protection engineer

   d. Owner/builder (limit two per calendar year)

C. Minimum requirements

1. The following verbatim notes are required to be on the blueprints:

   a. This residential sprinkler system shall be designed and installed in accordance with NFPA 13D, and Los Angeles County Fire Department Regulation #19.

   b. Only listed and approved devices or materials shall be installed in the system (except hangers, tanks, and pumps).

   c. Only new UL 1626 listed residential sprinklers shall be installed within the dwelling area.

d. Every residential sprinkler system shall be field tested and inspected at both the rough plumbing and final inspection, prior to occupancy being granted. The jurisdictional Fire Prevention Office shall be notified a minimum of two working days in advance of the requested inspection.

e. All systems shall be tested for leakage at normal system operating water pressure (i.e., 200 psi when equipped with a Fire Department Connection) for a period of not less than two hours.

f. All systems shall have an underground flush completed at the time of the hydrostatic test. Flushing shall be completed prior to connecting the underground piping to the overhead piping.

g. At least three spare sprinklers of each type, temperature rating and orifice size used in the system shall be located at the main riser. A sprinkler wrench shall also be located at the main riser.

h. All valves shall have a permanently affixed sign indicating its function.

i. Piping shall be supported from structural members using support methods comparable to those required by local plumbing codes.

   Exception: Listed piping shall be supported in accordance with any listing limitations.

j. The spacing and location of sprinklers shall conform with the manufacturer's requirements and those contained in NFPA #13D.

k. Alarms shall be of sufficient intensity to be clearly audible in all bedrooms over background noise levels "minimum 15dBA" with all intervening doors closed.

l. Any portion of the sprinkler system that is subject to freezing shall be protected against this exposure.

2. The following information shall be shown on all residential fire sprinkler plans:

   a. Name of owner and/or occupant.

b. Location of project, including street, number, and city.

c. Name of sprinkler designer and installer, address, telephone number, type of license, and number.

d. Square footage of the residence and attached garage.

e. Points of compass.

f. Scale of drawings.

g. Plot plan showing tank, pump, structures, underground pipe-size and type, point of supply connection, depth of bury, type, and size of any valves or meters.

h. Elevations of the tank, water supply, pump, and structures as they relate to each other.

i. Full height cross section showing building construction type, vaulted and beamed ceiling locations (several cross sections may be required).

j. Riser detail showing system split, water flow indicator, alarm location, pressure gauges, rubber faced check valve, main control valve, main drain, and relief valve (where applicable).

k. Water tank details including size, elevation, and type of construction.

l. The manufacturer, model, and type of pump (a pump performance curve shall also be provided).

m. All non-sprinklered areas clearly shown and an indication of specifically why no protection is being provided.

n. Manufacturer, style, model, orifice size, temperature and "K" factor of each style of sprinkler used, and the total number of each style sprinkler used.

o. Make, model, location, and setting of any pressure reducing valves.

p. Main control valve shall be an indicating type located so that it is readily accessible from exterior and above grade.

q. Make, model, and location of the backflow prevention device.

r. Type of pipe and fittings used.

s. Pipe make, size, class, type, internal diameter, and C-factor.

t. Nominal pipe size and cutting length of pipe (or center to center).

u. Use of each room labeled.

v. Location of heat sources.

w. Manufacturer's data for hangers indicating the spacing requirements.

x. Hanger detail, including type and size of fasteners.

y. Inspector's test valve location (it shall be located as remote as possible and easily accessible).

z. Maximum sprinkler head spacing (16' x 16', 18' x 18', etc.). (Also, the flow and pressure requirements must be clearly stated, per the manufacturer's listing requirements).

3. The following information shall be contained in the hydraulic calculations:

a. Calculations must conform to manufacturer's specifications or NFPA #13D.

b. Calculation showing a single sprinkler flowing if the sprinkler is the most hydraulically demanding.

c. Calculations showing a minimum of two sprinklers flowing with the sprinklers contained in the same compartment. [Additional calculations for the garage, or non-standard conditions (i.e., sloped, beamed, or pitched ceilings, etc.) may be required.]

d. "K" factors for all sprinklers.

e. "C" values for the type of pipe used.

f. Five gallons per minute for the residence for domestic use and an additional five gallons per minute for each unit added at each domestic point of connection.

g. A city supply curve or pump curve which shows the total system demand clearly plotted.

h. A reduction of 10% or 5 psi, whichever is greater, in the available city supply, and pump output, if a pump is provided, shall be provided for all systems.

D. Water supply, pumps, and tanks

1. Water supply

a. All sprinkler systems shall have a single supply main serving both the automatic sprinkler system and the domestic system.

Exception: The sprinkler system piping shall be permitted to have a water supply independent of the domestic water supply (i.e., separate water meter, supply from tank, etc.), provided the sprinkler system control valve is supervised by transmitting a distinctive supervisor signal to an off site alarm service.

b. Multipurpose systems, as outlined in NFPA #13D are not allowed.

c. All underground piping shall be adequately supported. All underground piping shall be buried at least 12 inches below the average local frost depth or a minimum of 12 inches below finish grade if frost is not applicable.

2. Automatic booster pump

a. When the domestic water supply has deficient pressure or a water tank is being used to supply the automatic sprinkler system, an automatic booster pump may be required to maintain the required pressure at the minimum gallons per minute.

b. The pump must automatically activate upon system demand.

c. Pumps which are not gravity fed shall be the self-priming type.

d. The pump must be U.L. (Underwriters Laboratories, Inc.) listed or approved by a recognized testing laboratory for electrical safety.

e. When a pump is used, it shall be located within an enclosure to protect against exposure from freezing and/or brush fires.

f. The pump shall be provided with a reliable automatic power supply.

g. The pump shall be adequately maintained and serviced at all times.

3. Water storage tanks

a. When a private water storage tank is used as the only source of supply, the size of the tank shall be determined by adding the following criteria together: (a) sprinkler system water demand multiplied times ten minutes plus, (b) water required for outside water streams as determined by square footage of the house from Chart 1, Appendix A, and (c) the total domestic need.

b. When calculating the required gallons for outside hose streams, the square footage of all levels of the building must be considered.

c. Each tank shall have a connection to a supply source to refill the tank. If a supply source is not available, an additional 500 gallons must be added if water is to be hauled in. When hauled water is to be used, a fill connection must be provided.

d. Water tanks must be in good condition and constructed of steel, redwood, concrete, or approved UV protected plastic.

e. When the tank's dimension in height is 1.5 times greater than the dimension of the tank's diameter, a building permit must be obtained from the jurisdictional building and safety office.

f. The storage tank must be installed, inspected and accepted by the Department prior to any building permit being issued for the residence.

E. Supply piping requirements

1. The hydrant connection shall be made a minimum of six inches above the bottom of the tank. The 6" measurement shall be measured from the tank base to the bottom of supply pipe. A readily accessible indicating control valve shall be provided for this line at the tank.

2. A minimum 4" schedule 40 pipe shall be used to supply the hydrant.

3. The pipe may be plastic, but only where buried. Pipe exposed to sunlight or above grade shall be protected metal.

4. The depth of bury for underground pipe shall be a minimum of 30" with a minimum of 36" where subject to vehicular travel.

5. Thrust blocks, rodding, or approved retaining glands shall be provided, per NFPA 13.

6. Supply piping shall not cross property lines.

F. Hydrant requirements

1. A single 2 ½" male National Standard Thread outlet shall be provided whenever a tank is installed.

2. The hydrant outlet shall be within five feet of the access roadway on the approach side of the structure and unobstructed within 15 feet on each side of the outlet.

3. The hydrant outlet shall be between 50 and 150 feet from the closest point of the structure, measured via vehicular access.

4. The hydrant outlet shall be gravity fed. This outlet shall be a minimum of one foot below the grade level of the tank for each 100 feet of supply pipe. This supply pipe must have a continuous downward gravity feed. If a pump is being used to supply the sprinkler system then the hydrant supply shall be connected to the supply side of the pump.

5. The hydrant outlet shall be located 14 to 24 inches above finished grade, as measured from the middle of the outlet.

6. A three-foot square by one-foot thick horizontal concrete pad shall be provided at grade around the hydrant to provide stability to the hydrant during Department operations.

G. System components

1. Valves and drains

a. Each system shall have a main control valve located on the system side of the water meter or pump. The main control valve shall be of the indicating type.

b. The valve shall control both the domestic water system and the automatic sprinkler system. The main control valve shall be readily accessible from the exterior and above grade. A separate shut off valve for the domestic shall be provided.

c. When more than one building is to be protected by a common water supply, a separate control valve and sprinkler riser shall be provided for each dwelling unit.

d. An approved rubber-faced check valve shall be located on the system side of the main control valve.

e. All valves shall have an all-weather sign affixed to them which indicates their function.

f. An inspector's test connection and gauge outlet shall be located at the most remote portion of the system and readily accessible. The orifice of the test connection shall be equal to the hydraulically calculated most remote sprinkler.

2. Calculation plate: The installer shall provide a permanently attached metal placard to the main riser indicating the flow and pressure required at the base of the riser with the hydraulically most remote head(s) flowing.

3. Sprinklers

   a. In areas where ambient temperatures exceed the specifications of the listed residential sprinklers (i.e., attics, utility rooms, and water heater closets), approved commercial quick response automatic sprinklers which have a fusing temperature not less than 35 degrees Fahrenheit above the maximum ambient temperature of that area shall be used. The orifice size shall be the same as the residential heads used.

   b. Approved ½" orifice intermediate temperature rated, quick response, commercial sprinklers shall be installed in garages.

4. Pressure gauge: Pressure gauges shall be installed and maintained on the sprinkler system riser. A pressure gauge shall be installed on both the system side and supply side of the check valve.

5. Copper tubing: When copper tubing is soldered, 95/5 solder shall be used, or brazed.

6. Plastic piping: Approved plastic pipe may be used when installed in accordance with the manufacturer's listing. When installed in attics, adequate insulation shall be provided on the attic side of the piping to avoid exposure of the piping to temperatures in excess of its rated temperature.

7. Alarms

   a. Each automatic sprinkler system shall be provided with an electronic water flow detector installed at the riser on the system side of the main control valve and down stream of the domestic tie-in. Pressure switches are not allowed.

   b. Where a water storage tank is provided, the water tank shall be equipped with a low water alarm which is actuated when the water level falls below the minimum storage requirements for Department use. This alarm shall be audible at the residence.

   c. The water tank low level alarm shall be permanently affixed to the tank and the level that the alarm sounds shall not be adjustable.

H. Special requirements

1. Single and two family residences greater than 10,000 sq. ft. shall be designed per NFPA #13D with the most remote four heads flowing and shall be provided with a fire department connection in an approved location.

2. When non-standard conditions exist (i.e., sloped, beamed, and pitched ceilings) special design considerations may be required. Early contact with the Department's Sprinkler Plan Check Unit is encouraged.

3. Sprinkler protection shall be provided in attached garages.

   a. Sprinklers adjacent to overhead doors shall be located at their maximum spacing so as to provide protection under the door when it is in the open position.

   b. Sprinklers may be omitted in garages if <u>all</u> the following apply.

      (1) There is a one-hour fire resistive wall that meets the requirements of Table 7-B of the Los Angeles County Building Code between the R-3 and U-1 occupancies.

(2) A listed, approved heat detector is located in the garage and wired to the sprinkler system alarm device.

(3) The residence is not located in the Very High Fire Hazard Severity Zone.

4. Garages less than 750 sq. ft., or with no more than six sprinkler heads, shall be designed per NFPA #13 with a two-head calculation for an Ordinary Hazard Group 1 occupancy.

5. Garages greater than 750 sq. ft. or with more than six sprinkler heads, shall be designed per NFPA #13 for an Ordinary Hazard Group 1 occupancy. A one-hour, fire-resistive wall may be used to create separate fire areas.

6. If the available fire flow from the city supply is less than 400 GPM at 20 psi residual, the sprinkler system shall be supplied from a private water storage tank.

7. A bucket test may be required, upon discretion of the Sprinkler Plan Check Unit or field inspector.

8. A minimum ¼" relief valve, set at 175 psi, shall be provided on the system side of the sprinkler riser check valve, when the maximum system pressure exceeds 125 psi.

9. A single sprinkler head shall be provided over any heating equipment that is located in an attic space.

10. Tandem systems are <u>not</u> allowed by the Department.

Definition: A tandem system is a sprinkler system in a detached building which is supplied from the overhead fire sprinkler system piping of another building or has its supply piping running through the other building.

APPENDIX

ONE STORY, SINGLE-FAMILY DWELLINGS

Building Sq/Ft	Reserved For hose	+	Sprinkler/ Domestic	=	Minimum Tank Size
up to 500	1,000 gal		500 gal		1,500 gal
501 to 1,000	1,000 gal		500 gal		1,500 gal
1,001 to 1,500	1,500 gal		500 gal		2,000 gal
1,501 to 2,000	1,500 gal		500 gal		2,000 gal
2,001 to 2,500	2,000 gal		1,000 gal		3,000 gal
2,501 to 3,000	2,000 gal		1,000 gal		3,000 gal
3,001 to 3,500	2,500 gal		1,000 gal		3,500 gal
3,501 to 4,000	2,500 gal		1,000 gal		3,500 gal
4,001 to 4,500	3,000 gal		1,500 gal		4,500 gal
4,501 to 5,000	3,000 gal		1,500 gal		4,500 gal
5,001 to 5,500	3,500 gal		1,500 gal		5,000 gal
5,501 to 6,000	3,500 gal		1,500 gal		5,000 gal
6,001 to 6,500	4,000 gal		2,000 gal		6,000 gal
6,501 to 7,000	4,000 gal		2,000 gal		6,000 gal
7,001 to 7,500	4,500 gal		2,000 gal		6,500 gal
7,501 to 8,000	4,500 gal		2,000 gal		6,500 gal
8,001 to 8,500	5,000 gal		2,500 gal		7,500 gal
8,501 to 9,000	5,000 gal		2,500 gal		7,500 gal
9,001 to 9,500	5,000 gal		3,000 gal		8,000 gal
9,501 to 10,000	5,000 gal		3,000 gal		8,000 gal

For areas greater than 10,000 sq/ft, add 500 gallons for each 500 sq/ft increment.

Include square footage in additional floor levels, attached garages, sheds, etc.

If water is to be hauled due to lack of a well, add 500 gallons to total fire storage.