

STANDARD DETAILS & SPECIFICATIONS SUBJECT: Installation of Private Hydrants, Tanks, & Water Supplies for One-and Two-Family Dwellings and Associated Structures	Spec. No.: CFMO-W1 Rev. Date: 07/01/03 Eff. Date: 08/02/00 Approved By: J. Saunders Page: 1 of 12
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SCOPE

The Fire Chief is authorized to require the installation of fire protection water supplies (tanks) and fire hydrants in accordance with the provisions of the Fire Code. The information contained within this document is to serve as a standard for installation of such equipment related to residential occupancies, including non-dwelling structures on residential properties, located in the unincorporated areas of Santa Clara County.

DEFINITIONS

Rural / Urban: A 'Rural' lot shall be defined as a lot one acre or more in size. An 'Urban' lot is less than one acre in size. Note: this definition shall be independent of all Zoning designations.

Major Residential Subdivision: Five or more lots zoned for residential use.

Approved: Approved by the Santa Clara County Fire Marshal's Office.

Exempt Agricultural Building: Any structure designed and constructed to house farm implements, hay, grain, poultry, livestock or other horticultural products, and not exceeding ten thousand (10,000) square feet in total area located on a lot of ten (10) acres or greater. These structures shall not be a place of human habitation or a place of employment where agricultural products are processed, treated or packaged, nor shall it be a place used by the public. These structures do not require building permits, however they are not exempt from provisions of the Fire Code. Agricultural Exempt status is granted only by the Santa Clara County Planning Office.

Associated Structures to Single Family Dwellings: Structures on residential properties used for non-dwelling and non-commercial purposes.

Fire Protection Water Supply: Water provided for fire fighting purposes only. Water required for domestic, industrial, landscaping, agricultural or any other use shall be provided in addition to water required by this standard.

Modified NFPA 13D or 13R Automatic Fire Sprinkler System: See Standard Detail CFMO-SP3 and CFMO-SP4, respectively.

Ranchland: Designated as "AR" by the County Planning Department per the Santa Clara County Zoning Ordinance.

State Response Area (SRA): The State Responsibility Areas of Santa Clara County lie within the emergency response area of the California Department of Forestry and Fire Protection, and are subject to the requirements set forth under Title 14 of the California Code of Regulations. [REF: Public Resources Code §4290]

REQUIREMENTS

I GENERAL REQUIREMENTS

- A) These water requirements shall be provided and maintained for the purposes of fire protection only, and shall be in addition to water provided for any other purpose.

I GENERAL REQUIREMENTS (Continued)

- B) If a municipal fire protection water supply is available within 300 feet of any portion of the property line, the property owner shall be required to extend the water system to provide fire protection water to the property whenever it is feasible to do so.
- C) Section B7 of the County of Santa Clara Ordinance shall apply to all buildings except occupancy groups R-3 and U, as defined by the California Building Code, regardless of use, and shall supersede all other requirements in this Standard:
1. Buildings three (3) or more stories in height or 35 ft. in height, or that require a fireflow in excess of 2,000 gallons per minute, or where the total floor area is in excess of 10,000 square feet shall be equipped throughout with an approved automatic fire sprinkler system.
 2. Where water supplies available for fire protection do not meet the requirements of Appendix III-A, an approved sprinkler system installed throughout the building, in addition to fire protection water supply as required below, will be an acceptable alternate means of protection, provided that a sprinkler system is not otherwise required by the California Fire or Building Code.

II FIRE PROTECTION WATER SUPPLY – ONE & TWO FAMILY DWELLINGS & ASSOCIATED STRUCTURESA) Urban:

Up to 3,600 sf: 1,000 gpm at 20 psi for 2 hour duration from a recognized water purveyor. An approved standard hydrant located within 250 feet of the driveway is required.

Over 3,600 sf: As per Fire Code Table A-III-A-I for 2 hour duration from a recognized water purveyor. An approved standard hydrant located within 250 feet of the driveway is required.

Acceptable alternate methods of protection for URBAN applications:

1. The installation of an approved automatic fire sprinkler system will be deemed adequate provided a minimum of 500 gpm is available from approved standard hydrant(s). If the available fire flow is less than 500 gpm, or the hydrant is in excess of 250 feet from the driveway, the hydrant system shall be improved or extended to provide adequate water supply.
2. Individual tanks are not approved for urban locations.

B) Rural:

Up to 3,600 sf: 1,000 gpm at 20 psi for 30 minute duration provided by a recognized water purveyor. An approved standard hydrant is required.

3,601-10,000 sf: 1,500 gpm at 20 psi for 30 minute duration provided by a recognized water purveyor. An approved standard hydrant is required.

B) Rural: (Continued)

10,001 -15,000 sf: 1,500 gpm at 20 psi for 60 minute duration provided by a recognized water purveyor. An approved standard hydrant is required.

Over 15,000 sf: 1,500 gpm at 20 psi for 2 hour duration provided by a recognized water purveyor. An approved standard hydrant is required.

Exception: Residential riding arena canopy structures of totally noncombustible construction with no sides, where the roof covers only the dirt arena, shall have no requirements for fire protection water supply, provided they are not used in any way for combustible or noncombustible storage.

Acceptable alternate methods of protection for RURAL applications in dwellings:

Up to 3,600 sf: Installation of an approved fire sprinkler system, a minimum of 5,000 gallons of above-ground water storage for fire protection use only, and one wharf hydrant with a single 2-1/2" outlet. [REF: Standard: CFMO-SP3, CFMO-W4 and CFMO-W5]

3,601-10,000 sf: Installation of an approved fire sprinkler system, a minimum of 10,000 gallons of above-ground water storage for fire protection use only, and one wharf hydrant with a single 2-1/2" outlet. [REF: Standard: CFMO-SP4, CFMO-W4 and CFMO-W5]

10,001-15,000 sf: Installation of an approved fire sprinkler system, a minimum of 30,000 gallons of above-ground water storage for fire protection use only, and one wharf hydrant with a single 2-1/2" outlet. [REF: Standard: CFMO-SP4, CFMO-W4 and CFMO-W5]

Over 15,000 sf: Installation of an approved fire sprinkler system, a minimum of 45,000 gallons of above-ground water storage for fire protection use only, and one wharf hydrant with a single 2-1/2" outlet. [REF: Standard: CFMO-SP4, CFMO-W4 and CFMO-W5]

- OR -

Up to 3,600 sf: 30,000 gallon approved fire protection above-ground water storage tank and one wharf hydrant with a single 2-1/2" outlet.

3,601-10,000 sf: 45,000 gallon approved fire protection above-ground water storage tank and one wharf hydrant with a single 2-1/2" outlet.

10,001 -15,000 sf: 90,000 gallon approved fire protection above-ground water storage tank and standard hydrant(s) capable of delivering 1,000 gpm at 20 psi. The number of hydrants provided shall be sufficient to satisfy the requirement for placement within 150 ft. of the furthest portion of the structure.

Over 15,000sf: 180,000 gallon approved fire protection above-ground water storage tank and standard hydrant(s) capable of delivering 1,000 gpm at 20 psi. The number of hydrants provided shall be sufficient to satisfy the requirement for placement within 150 ft. of the furthest portion of the structure.

Acceptable alternate methods of protection for RURAL application in non-dwelling structures on residential properties:

1. Water storage shall be provided as follows regardless of construction type or use:

500 - 3,600 sq. ft.: 5,000 gallons (7,500 gallons with exposure within 50 ft.)*

3,601 – 10,000 sq. ft.: 15,000 gallons (22,500 gallons with exposure within 50 ft.)*

10,001 – 15,000 sq. ft.: 30,000 gallons (45,000 gallons with exposure within 50 ft.)*

For every additional 10,000 square feet thereafter, or increment thereof, 30,000 gallons shall be added to the base amount.

*NOTE: Water storage requirements shall be increased by 50% for all structures located within fifty (50) feet of other significant structures or a property line.

2. A wharf hydrant with a single 2-1/2" outlet is required.
3. A minimum of 5,000 gallons of above-ground storage and a wharf hydrant with a single 2-1/2" outlet shall be provided for non-dwelling structures less than 500 sq. ft. in size, located in the State Response Areas. Structures 500 sq. ft. and over shall comply with items II.B.1 and II.B.2, above.

C) Dwellings in designated Ranchland areas located within the State Response Area (SRA):

1. **Up to 2,500 sq. ft.:** Minimum of 5,000 gallons of above-ground water storage for fire protection use only, and one wharf hydrant with a single 2-1/2" outlet.
2. **Over 2,500 sq. ft.:** Installation of an approved fire sprinkler system. In addition to the water required for the sprinkler system, a minimum of 5,000 gallons of above-ground water storage for fire protection use only, and one wharf hydrant with a single 2-1/2" outlet. [REF: Standard: CFMO-SP3 & SP4, CFMO-W4 and CFMO-W5]

D) Residential Exempt Agricultural Buildings:

1. Water storage requirements for buildings that have been designated by the Planning Department as 'Agricultural Exempt' will be determined per NFPA 1142: Standard for Water Supplies for Suburban and Rural Fire Fighting, however a minimum of 5,000 gallons in above-ground storage shall be provided. [REF: CFMO-W5]
2. A wharf hydrant with a single 2-1/2" outlet is required. A wharf hydrant shall be provided within 400 feet of all exterior portions of the structure(s). [REF: Standard: CFMO-W4]

Acceptable alternate methods of protection for Residential Exempt Agricultural Buildings:

The installation of an approved NFPA 13 automatic fire sprinkler system will be deemed adequate. Requirements for water storage quantity shall be as calculated for

Residential Exempt Agricultural Buildings: *(Continued)* system demand for a minimum of 30 minute duration, with a minimum of 5,000 gallons storage. Hose streams may be deleted from such system calculations. A wharf hydrant with a single 2-1/2" outlet is required, and shall be provided within 400 feet of all exterior portions of the structure(s).

III FIRE FLOW REQUIREMENTS FOR NEW MAJOR RESIDENTIAL SUBDIVISIONS

- A) A new major subdivision shall require either a connection to a recognized water purveyor, or the formation of a Mutual Water Company if there is no recognized water purveyor available. New mutual water companies shall provide the minimum required fireflow for single family dwellings [REF: § II-A and II-B, above] without mitigative measures (i.e.: fire sprinklers). Individual tanks and shared water systems are not allowed. If the required fireflow from standard hydrants cannot be supplied by an existing water system, an approved fire sprinkler system shall also be required in each dwelling as a mitigative measure, provided a minimum of 500 gpm is available from area hydrants.
- B) Duration for fireflow shall be for two (2) hours regardless of structure size.
- C) Fireflow requirements for subdivisions shall be based on the largest proposed structure in the subdivision.
- D) Approved standard hydrants shall be required and shall be spaced a maximum of 500 feet apart. No driveway shall be in excess of 250 feet from an approved hydrant. Additional hydrants may be required if driveways exceed 150 ft. in length.

IV HYDRANT & TANK SPECIFICATIONS

- A) General:
 - 1. The hydrant make/model shall be subject to fire department approval.
 - 2. Hose threads for all hydrants shall meet National Hose Standard (NHS) requirements.
 - 3. Hydrants located within the 250 foot maximum distance to driveways may not be considered usable if railroad tracks, fences or major streets/highways/other obstructions lie between the subject occupancy and the hydrant.
 - 4. When subject to the possibility of vehicle impact, fire hydrants shall be protected by approved bollards, installed per CFMO-C1.
 - 5. Both wharf and standard type hydrants shall be painted & marked with a reflective marker in accordance with County Standard CFMO-W3.
 - 6. Hydrants shall be maintained in operative condition at all times, and shall be repaired where defective.

A) General: (Continued)

7. A 3-foot clear space (8-foot clear space in SRA) shall be maintained around the circumference of all fire hydrants, regardless of type.

B) Hydrant Location:

1. Wharf Hydrants: The hydrant shall be installed a minimum of 55 ft. from the closest portion and a maximum of 150 ft. from the furthest portion of any structure).
2. Standard Hydrants: Pressurized standard hydrants shall be located within 150 ft. of the furthest portion of the structure, but no closer than 55 ft. of the nearest portion of the structure.
3. The hydrant shall be located within 8 ft. of a driving surface. When located adjacent to a driveway, an 8 ft. wide by 40 ft. long turnout shall be provided.
4. Driving surface adjacent to hydrants shall have a maximum grade of 5% in any direction.
5. Hydrant placement shall be subject to Fire Department approval.

C) Hydrant Types: Hydrants shall comply with the following except where otherwise specified in this document:

1. Wharf Hydrant: Residential type hydrant with a single two and one-half inch (2-1/2") outlet, typically supplied from an on-site tank. Wharf hydrants shall be maintained wet, and have a positive flow at all times. [REF: CFM-W4: *Residential Wharf Hydrant Standard*]
2. Standard Hydrant: Pressurized commercial-style wet barrel-type hydrant with a four inch (4") or four-and-one-half inch (4-1/2") pumper connection and double two-and-one-half inch (2-1/2") outlets. Outlet size shall be based upon the responding fire jurisdiction's specifications (see note below). Hydrants shall be installed such that the center of the pumper connection outlet is not less than eighteen inches (18") above the finish grade, and shall face the driving surface. Hydrant may be fed from either a storage tank or recognized water purveyor. Dry barrel hydrants are not allowed.

NOTE : Standard hydrants located within the South Santa Clara County Fire Protection District, all State Response Areas (SRA), on the Stanford University campus, and within the Palo Alto Fire Department's sphere of influence require a 4-1/2 inch pumper connection.

D) Hydrant Supply Piping:

1. Standard hydrants: Supply piping shall be a minimum diameter of 6 inches for required flows up to 1,000 GPM, and shall be 8 inches or greater for flows in excess of 1,000 GPM. Contact the Fire Marshal's Office for specific sizing requirements of mains and fire service connections. Hydrant supply piping shall be installed per NFPA 24; *Private Fire Service Mains*.

2. Wharf hydrants: Supply piping (including riser) shall be a minimum diameter of 4 inches. Height of risers for wharf hydrants shall be a minimum of 24 inches and a maximum of 48 inches. All underground supply piping shall be buried to a minimum depth of 36 inches. The system shall be designed and installed such that the integrity of the piping and the connection of all appurtenances allow for a proper draft to be initiated and maintained at all times. See CFMO-W4.
3. Riser and elbow shall be steel. Buried horizontal piping runs may be of an approved plastic pipe.
4. Concrete thrust blocks (when required) shall be sized in accordance with national standards shall be provided at all changes in pipe direction, regardless of hydrant type.
5. Fire service piping shall not be installed under buildings. When portions of the piping must penetrate building foundations or footings, it shall be installed per NFPA 24; *Standard for the Installation of Private Fire Service Mains and their Appurtenances*, and protected by a sleeved penetration that provides a minimum two-inch (2") annular clear space. Underground fire service piping shall not be encased in concrete.
6. Fire service piping shall not cross property lines unless documentation is provided showing a recorded easement for a shared water agreement.

E) Tank Specifications:

1. Tank Location: Tanks feeding hydrants not required to be pressurized shall be located at an elevation which provides adequate positive pressure at the hydrant to facilitate a draft, unless an approved fire pump is provided. (NOTE: Although desirable, pressure above that needed to provide a positive head for wharf hydrants is not required when it is not practical.) When multiple tanks are connected together to provide the total required capacity, all tanks shall be located at the same elevation, unless the system is rated for pressurization.
2. Tank Type/Construction: Fire protection water supply tanks shall be constructed of approved plastic, metal, cement, etc. Swimming pools, wooden tanks, streams, ponds, or other unreliable sources are not allowed. Underground tank(s) that require drafting of water will not be permitted. Tanks located within 20 feet of a structure shall be constructed of non-combustible material.
3. Tank Installation Configuration: Tanks supplying wharf hydrants shall be installed per CFMO-W5 to avoid interference in water delivery by backflow preventers, which are required by the California Plumbing code whenever a possibility of contamination of the domestic water supply by a fire apparatus exists. Any alternative tank arrangement shall require an Alternate Means of Protection submittal.
4. Interconnection of Tanks: Interconnection of tanks shall be accomplished by a minimum pipe size of 4 inches (4") for combined storage capacity of up to 10,000 gallons maximum and six inches (6") for combined storage capacity over 10,000

4. Interconnection of Tanks: (Continued) gallons. Piping for tank interconnections shall be steel pipe unless buried. Buried horizontal piping runs may be of an approved plastic pipe.
 5. Tank Outlets: Tank outlets (a direct connection to a tank) may not be used in place of required wharf hydrant(s) or standard hydrant(s) unless the installation is for an approved agricultural exempt use. Tank outlets may only be used when other installations are not practical, and require prior approval by the Fire Marshal.
 6. When tanks are the sole source of water for the property, water supply for any fire sprinkler systems shall be supplied from the same tank as the domestic water or other approved use to ensure proper maintenance of the system.
 7. Landscaping Water Supply: Landscaping water supply shall not be stored in tanks providing water for fire sprinklers or hydrants unless it can be shown that adequate water will be provided to satisfy all current and future landscaping needs in addition to that required for fire protection.
 8. An automatically activated solenoid valve shall be required when necessary to avoid pressure loss in fire protection water supply due to large-demand devices fed from the same water supply (i.e.: landscaping or agricultural irrigation).
 9. Tanks supplying water for fire protection purposes shall be maintained at full required capacity at all times, and shall be automatically refilled.
- F) Valves: Control valves shall be provided for all installations. Valves shall be of the indicating type. The following control valves shall be provided:
1. Hydrant supply piping control valve. This valve located between the tanks and the hydrant shall be placed at location(s) approved by the Fire Marshal's Office.
 2. Water Source Control Valves shall be provided to isolate tanks from water fill sources.

V REQUIRED PLANS SUBMITTAL, PERMITS & INSPECTIONS

- A) Submittals: Plans for standard hydrant system installations shall be submitted to the Fire Marshal's Office for review prior to installation. Details for residential installations shall be included in the Building Permit set. All plans shall be drawn to scale and contain the following information:
1. A complete description and diagram of all water sources, including size/capacity/available pressure, location and type. Examples would include, but are not limited to, import lines, tanks, private or public wharf/standard hydrants and wells.
 2. Size, type, and location of all piping, including the class and type and depth of cover.

A) Submittals: *(Continued)*

3. Size, type and location of all control valves.
4. Size, type and location of all hydrants, including diameter of pumper connection.
5. Manufacturer's specification sheets for all equipment including hydrants, tanks and valves.
6. Size, location and type of thrust blocks or anchor points.
7. Hydraulic calculations may be required to verify required fire flow at pressurized hydrants prior to installation. Maximum Velocity Factor shall be 15 feet per second for hydraulic calculations.

B) Installation Requirements:

1. Installation shall be performed by fully experienced and responsible persons. Poor workmanship shall not be accepted.
2. All materials shall be new.

C) Permits:

1. A permit from the Fire Marshal's Office is required for the installation of standard hydrants or hydrant systems. A special permit from the Fire Marshal's Office is not required for a residential-style wharf hydrant or tank installation for single family use, unless the tank-only alternate to lack of required fireflow from a recognized water purveyor is chosen (See § II-B, above). Contact this office for details regarding permits, applications, and fees.
2. No work shall commence prior to permit issuance.
3. Permits from other County Departments may be required. Contact the County Building Inspection Office at (408) 299-5700, Planning at (408) 299-5770, and Environmental Health at (408) 299-5748 for further information.

D) Installation Inspection:

1. Residential wharf hydrants/tank systems shall be inspected by the Building Inspection Office during a regularly scheduled building permit inspection when fully installed and after pipe has been covered. A Building Inspector must observe adequate water flowing from hydrant in order for the project to continue past the foundation stage.

NOTE: Fire protection water shall be provided prior to the start of any wood framing in order to protect the structure during construction. Failure to do so or to provide access to hydrants may result in a Stop Work order being placed on the project.

- D) Installation Inspection: (*Continued*)
2. All underground piping for standard hydrants and standard hydrant systems shall require a permit from the County Fire Marshal's Office, and shall be inspected under pressure prior to covering. Flow and water flushing tests shall also be required prior to final acceptance of the standard hydrant or hydrant system installation.

VI MISCELLANEOUS DETAILS

- A) Fireflow requirements for multiple structures shall be calculated based on the largest structure covered by the permit application.
- B) Fire protection water supply for structures of mixed construction types may be determined either by calculating each type separately then adding them together, or by using the most restrictive type for the entire structure, whichever yields the lowest flow rate.
- C) Where the flow from a single hydrant is insufficient to meet fireflow demands, the combined flow from two hydrants may be used, provided that 1) the nearest hydrant is located no more than 250 feet from the driveway, and 2) the second hydrant is no more than 500' from the first hydrant, and 3) the driveway is not in excess of 150 feet from street to all portions of the structure. It is not necessary for both hydrants to be on the same main.
- D) If the water supply for an existing structure is sufficient in quantity to meet the requirements for any additional structures as calculated separately, the existing approved supply may be used to supply both structures, and no additional water will be required.
- E) If an existing on-site hydrant is located within the proper distance of multiple structures required by this document, it may satisfy the hydrant requirement for all such structures, provided the water supply is sufficient for each. If the existing hydrant is located too far away, a second hydrant may be required.
- F) Privately owned hydrants or tanks located off the property shall not be considered usable unless they are part of an approved shared water system or water mutual, and the property owner can show he/she has rights to the water or equipment.
- G) If an agricultural or domestic well and pump is to be used as the sole source for fire protection water, a well report shall be provided from a licensed well-drilling contractor or a registered Civil engineer to show that both the well and the pump can provide adequate fireflow as required in other sections of this standard.
- H) If a well and pump are to be used to supply fire protection water, the pump must be one that is used regularly, and that will be noticed if not working. This is what we consider to be a 'reliable water source'. A pump used for nothing except fire protection water shall be a listed fire pump.

- I) A storage tank which is refilled manually is not considered to be a reliable water source.
- J) Use of water from a Santa Clara County Water District major conduit for fire protection water supply shall be prohibited due to the unreliability of the source. (REF letter from SCVWD, dated 2/1/2002)

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