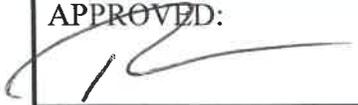




FIRE PREVENTION STANDARDS	DATE: 8/21/96	NUMBER: FPO-007
	APPROVED: 	REVISED: 01/22/2026
	TITLE: Guide to Water Storage for Fire Protection	

Guide to Water Storage for Fire Protection

These are the minimum requirements for water storage for fire protection.

1. The National Standard utilized for water storage requirements is the latest edition of NFPA 24.
2. All requirements and final locations of water tanks and fire hydrants shall be approved by the local fire agency Authority Having Jurisdiction (AHJ).
3. Plans shall be submitted to the AHJ for approval and permitting. When field variations are made to the approved water storage plans, the contractor shall provide "As-built" plans prior to the final inspection.

System Design Requirements

A. Water Supply (Storage Tank)

1. Minimum required amount of stored fire protection water for one- and two-family dwellings is 10,000 gallons.
2. For more than two dwellings, contact the local fire agency Authority Having Jurisdiction.
3. Domestic Water Storage:
The water tank shall be used for domestic water storage in conjunction with fire protection water storage and designed to the following standards:
 - a. The tank is equipped with a minimum 1-inch fill line and a float valve to ensure that the tank is kept a minimum of 80% full.
4. Tank Location:
The location of the tank shall be approved by the local fire agency Authority Having Jurisdiction.
5. A minimum 30' clearance of all vegetation and flammable and combustible materials around the circumference of the tanks shall be maintained.



B. Fire Department Connection (Hydrant)

1. The fire hydrant location shall be a minimum of 50 feet to a maximum of 150 feet from the protected structure and not more than six to eight feet from the edge of the driveway or roadway. The location of the fire hydrant shall not impede access road/driveway. Location subject to the approval of the local fire agency Authority Having Jurisdiction.
2. The fire department connection (hydrant) may be located at the base of the tank if accessible to fire department equipment.
3. The fire department connection (hydrant) must be equipped with a minimum of one 2 ½" National Standard Thread outlet. The outlet will be 30 to 36 inches above surrounding grade level and be equipped with a cap.
4. All fire department connections (hydrants) shall be painted and marked in accordance with the Santa Cruz County's Fire Prevention Officer's Standard FPO-017 "Fire Hydrant Markings".
5. All fire hydrants shall be maintained and have a 3' clear space around the circumference of the fire hydrant.

C. Fire Department Connection (Hydrant) Piping

1. The minimum size pipe and tank outlet for a fire line is 4 inches. For remote hydrants, a larger size may be required upon review of the systems hydraulic calculations.
2. Minimum underground pipe depth is 30 inches. Where piping passes under access roads or areas subject to heavy loads, the minimum bury is 36 inches.
3. Approved pipe materials for underground wharf hydrant supply piping shall include Ductile Iron, AWWA C900, AWWA C906 (HDPE), Schedule 40 CPVC or other material listed for fire protection service.
4. Where plastic pipe is used, tracer wire shall be secured to the top of the piping for its entire length.
5. All transition from metal to plastic will be through schedule 80 plastic fittings. Metallic pipe to extend 6 inches below grade level. No exposed PVC pipe allowed.

EXCEPTION: An approved AWWA Dressler coupling may be used in lieu of schedule 80 plastic fitting if approved by the local fire agency Authority Having Jurisdiction .

6. Concrete thrust blocks or other approved listed devices shall be required when appropriate as determined by the local fire agency Authority Having Jurisdiction to stabilize the underground pipe.



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NOTE: Underground metallic pipe shall be wrapped in accordance with the requirements of the Uniform Plumbing Code.

7. A concrete pad at grade, supporting the hydrant, shall be a minimum of 24"x24"x4" thick.
8. An approved full flow hydrant line shut off valve shall be installed at the tank.
9. All underground piping systems shall be inspected **before** back fill by the local fire agency Authority Having Jurisdiction to verify compliance.
10. Underground pipe shall be flushed with water until water runs clear, ensuring the line is free of contamination.

Attachments:

- **6E – Fire Pump Contractors Materials and Test Certificate** – to be completed prior to final
- **G1 and G2 – Guide to Water Storage**
- **E and F – Storage Tank-Hydrant Line Detail**
- **6D- Underground Contractors Materials and Test Certificate** – to be completed prior to final

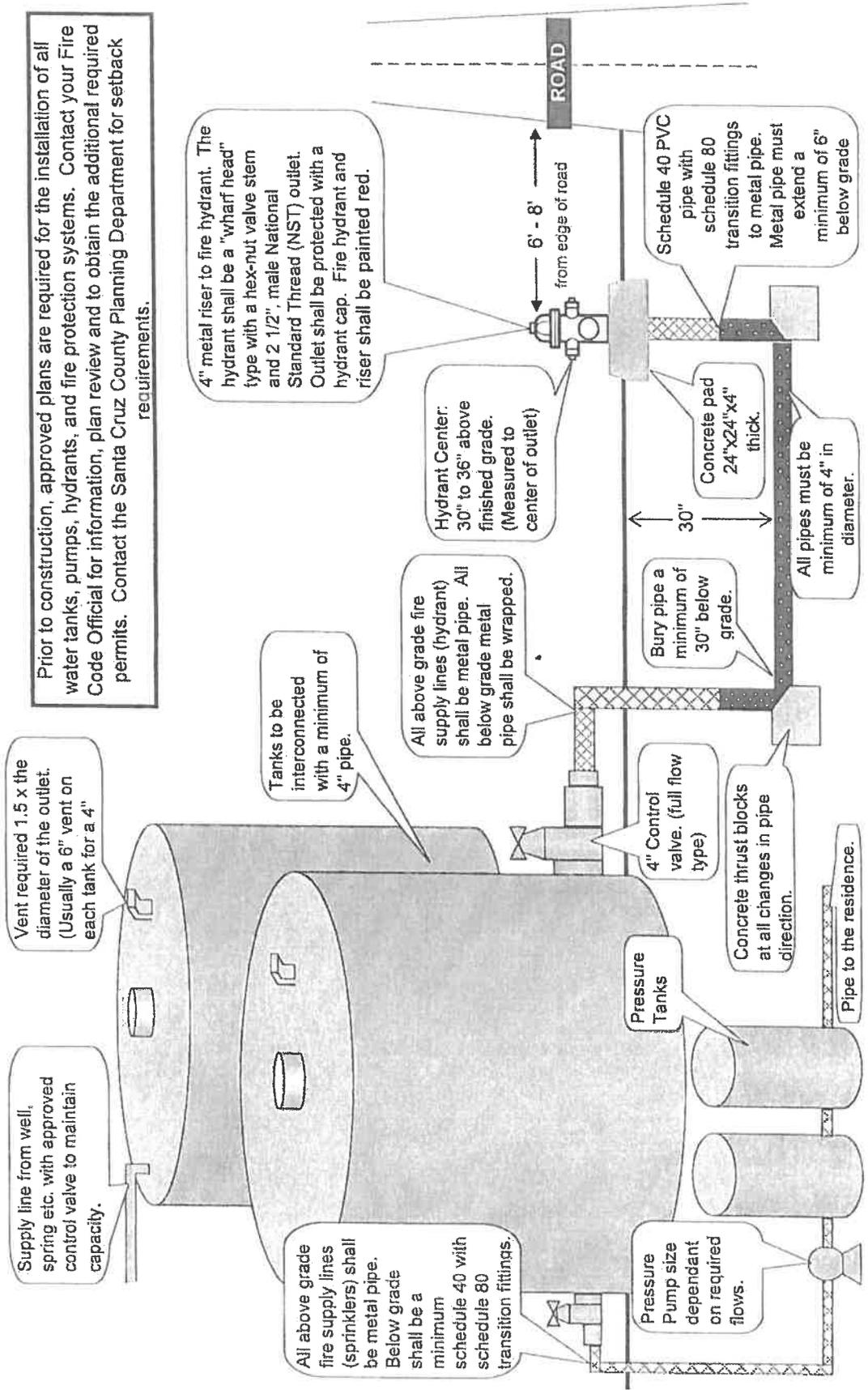
Contractor's Material and Test Certificate for Fire Pump Systems	
<p>PROCEDURE Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.</p> <p>A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.</p>	
PROPERTY NAME	DATE
PROPERTY ADDRESS	
PLANS	ACCEPTED BY APPROVING AUTHORITIES (NAMES)
	ADDRESS
	INSTALLATION CONFORMS TO ACCEPTED PLANS <input type="checkbox"/> YES <input type="checkbox"/> NO ALL EQUIPMENT USED IS APPROVED FOR FIRE SYSTEM SERVICE <input type="checkbox"/> YES <input type="checkbox"/> NO IF NO, STATE DEVIATIONS
INSTRUCTIONS	HAS PERSON IN CHARGE OF FIRE PUMP EQUIPMENT BEEN INSTRUCTED AS TO LOCATION OF SYSTEM CONTROL VALVES AND CARE AND MAINTENANCE OF THIS NEW EQUIPMENT? IF NO, EXPLAIN <input type="checkbox"/> YES <input type="checkbox"/> NO
	HAVE COPIES OF APPROPRIATE INSTRUCTIONS AND CARE AND MAINTENANCE CHARTS BEEN LEFT ON PREMISES? IF NO, EXPLAIN <input type="checkbox"/> YES <input type="checkbox"/> NO
LOCATION	SUPPLIES BUILDING(S) (CAMPUS, WAREHOUSE, HIGH RISE) EXPLAIN
PUMP ROOM EQUIPMENT	IS THE PUMP ROOM EQUIPMENT PER THE PLANS AND SPECS? <input type="checkbox"/> YES <input type="checkbox"/> NO
	IS THE FIRE PUMP PROPERLY MOUNTED AND ANCHORED TO THE FOUNDATION? IF NO, EXPLAIN <input type="checkbox"/> YES <input type="checkbox"/> NO
	IS THE FIRE PUMP BASE PROPERLY GROUTED? IF NO, EXPLAIN <input type="checkbox"/> YES <input type="checkbox"/> NO
	DOES THE PUMP ROOM HAVE THE PROPER FLOOR DRAINS? IF NO, EXPLAIN <input type="checkbox"/> YES <input type="checkbox"/> NO
	IS THE SUCTION AND DISCHARGE PIPING PROPERLY SUPPORTED? IS THE PUMP ROOM HEATED AND VENTILATED PER NFPA 20? <input type="checkbox"/> YES <input type="checkbox"/> NO
PIPES AND FITTINGS	PIPE TYPES AND CLASS
	PIPE CONFORMS TO _____ STANDARD <input type="checkbox"/> YES <input type="checkbox"/> NO
	FITTINGS CONFORM TO _____ STANDARD <input type="checkbox"/> YES <input type="checkbox"/> NO
	SUCTION AND DISCHARGE PIPING ANCHORED OR RESTRAINED?: <input type="checkbox"/> YES <input type="checkbox"/> NO
PRE-PACKAGED PUMP HOUSE	IS THIS A PACKAGE OR SKID MOUNTED PUMP? <input type="checkbox"/> YES <input type="checkbox"/> NO
	IS THE PACKAGE/SKID PROPERLY ANCHORED TO A CONCRETE FOUNDATION? IF NO, EXPLAIN <input type="checkbox"/> YES <input type="checkbox"/> NO
	IS THE STRUCTURAL FOUNDATION FRAME FILLED WITH CONCRETE TO FORM A FINISHED FLOOR? <input type="checkbox"/> YES <input type="checkbox"/> NO
	IS THERE A FLOOR DRAIN INSTALLED? <input type="checkbox"/> YES <input type="checkbox"/> NO
TEST DESCRIPTION	HYDROSTATIC: Hydrostatic tests shall be made at not less than 200 psi (13.8 bar) for 2 hours or 50 psi (3.4 bar) above static pressure in excess of 200 psi (13.8 bar) for 2 hours.
	HYDROSTATIC TEST: ALL NEW PIPING HYDROSTATICALLY TESTED AT: _____ PSI/BAR FOR _____ HOURS NO LEAKAGE ALLOWED
FLUSHING TESTS	FLUSHING: Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blowoffs. Flush at flows not less than 390 gpm (1476 L/min) for 4 in. pipe, 610 gpm (2309 L/min) for 5 in. pipe, 880 gpm (3331 L/min) for 6 in. pipe, 1560 gpm (5905 L/min) for 8 in. pipe, 2440 gpm (9235 L/min) for 10 in. pipe, and 3520 gpm (13,323 L/min) for 12 in. pipe. When supply cannot produce stipulated flow rates, obtain maximum available.

FLUSHING TESTS (continued)	NEW PIPING FLUSHED ACCORDING TO _____ STANDARD <input type="checkbox"/> YES <input type="checkbox"/> NO BY (COMPANY) _____ IF NO, EXPLAIN _____
	HOW FLUSHING FLOW WAS OBTAINED <input type="checkbox"/> PUBLIC WATER <input type="checkbox"/> TANK OR RESERVOIR <input type="checkbox"/> OTHER (EXPLAIN) _____
	THROUGH WHAT TYPE OPENING <input type="checkbox"/> TEST HEADER <input type="checkbox"/> OPEN PIPE
	LEAD-INS FLUSHED ACCORDING TO _____ STANDARD <input type="checkbox"/> YES <input type="checkbox"/> NO BY (COMPANY) _____ IF NO, EXPLAIN _____
FIELD ACCEPTANCE TEST	HOW FLUSHING FLOW WAS OBTAINED <input type="checkbox"/> PUBLIC WATER <input type="checkbox"/> TANK OR RESERVOIR <input type="checkbox"/> OTHER (EXPLAIN) _____
	THROUGH WHAT TYPE OPENING <input type="checkbox"/> Y CONNECTION TO FLANGE & SPIGOT <input type="checkbox"/> OPEN PIPE
	ALL EQUIPMENT APPROVED? <input type="checkbox"/> YES <input type="checkbox"/> NO
	ALL REQUIRED REPRESENTATIVES PRESENT FOR TEST <input type="checkbox"/> YES <input type="checkbox"/> NO
	AHJ AND OWNER'S REPRESENTATIVE PRESENT FOR TEST <input type="checkbox"/> YES <input type="checkbox"/> NO IF NO, EXPLAIN _____
	ALL ELECTRICAL WIRING COMPLETE AND PER NFPA 70 AND NFPA 20 <input type="checkbox"/> YES <input type="checkbox"/> NO IF NO, EXPLAIN _____
	CALIBRATE TEST EQUIPMENT USED <input type="checkbox"/> YES <input type="checkbox"/> NO CALIBRATION DATE _____
	FLOW TESTS PUMP DESIGN _____ GPM _____ PSI
	DOES THE PUMP MEET OR EXCEED THE CERTIFIED CURVE? <input type="checkbox"/> YES <input type="checkbox"/> NO
	PUMP TYPE <input type="checkbox"/> HORIZONTAL <input type="checkbox"/> VERTICAL TURBINE <input type="checkbox"/> OTHER _____
	PUMP MAKE _____ MODEL # _____ SERIAL # _____
	COMMENTS _____
	ELECTRIC DRIVER OPERATIONAL TEST SATISFACTORY <input type="checkbox"/> YES <input type="checkbox"/> NO ELEC. DRIVER _____ MODEL # _____ SERIAL # _____
	VOLTAGE _____ VAC @ _____ HP _____ RPM _____ FLA _____
	ENGINE DRIVEN <input type="checkbox"/> YES <input type="checkbox"/> NO
	ENGINE MAKE _____ MODEL # _____ SERIAL # _____
	_____ HP _____ RPM SPEED
	DIESEL DRIVER OPERATIONAL TEST SATISFACTORY? <input type="checkbox"/> YES <input type="checkbox"/> NO OTHER _____ EXPLAIN _____
	CONTROLLER MAKE _____ MODEL # _____ SERIAL # _____
	VARIABLE SPEED PRESSURE LIMITING CONTROL <input type="checkbox"/> YES <input type="checkbox"/> NO TESTED AT MINIMUM, RATED, AND PEAK FLOW <input type="checkbox"/> YES <input type="checkbox"/> NO
CONTROLLER TEST: <input type="checkbox"/> YES <input type="checkbox"/> NO SIX AUTO STARTS <input type="checkbox"/> YES <input type="checkbox"/> NO SIX MANUAL STARTS <input type="checkbox"/> YES <input type="checkbox"/> NO	
PHASE REVERSAL TEST PERFORMED (ELECTRIC ONLY) <input type="checkbox"/> YES <input type="checkbox"/> NO	
ALTERNATE POWER SOURCE TESTED (ELECTRIC ONLY) <input type="checkbox"/> YES <input type="checkbox"/> NO	
ELECTRONIC FUEL MANAGEMENT (ECM) FUNCTION TEST PERFORMED (DIESEL ONLY) <input type="checkbox"/> YES <input type="checkbox"/> NO	
CONTROL VALVES	SYSTEM CONTROL VALVES LEFT WIDE OPEN <input type="checkbox"/> YES <input type="checkbox"/> NO IF NO, STATE REASON _____
	HOSE THREADS OF FIRE DEPARTMENT CONNECTIONS AND HYDRANTS INTERCHANGEABLE WITH THOSE OF FIRE DEPARTMENT ANSWERING ALARM <input type="checkbox"/> YES <input type="checkbox"/> NO
REMARKS	DATE LEFT IN SERVICE _____ ADDITIONAL COMMENTS: _____
SIGNATURES	NAME OF INSTALLING CONTRACTOR _____
	TESTS WITNESSED BY FOR PROPERTY OWNER (SIGNED) _____ TITLE _____ DATE _____
	FOR INSTALLING CONTRACTOR (SIGNED) _____ TITLE _____ DATE _____
ADDITIONAL COMMENTS AND NOTES: _____ _____	

GUIDE TO WATER STORAGE FOR FIRE PROTECTION

Attachment G-1

Santa Cruz County requires a minimum of 10,000 gallons of water storage and a fire department hydrant to access the water for all new residential, non-residential and building additions of more than 500 square feet. (Exception: if an approved municipal water system fire hydrant is located within 600' of structure, then a private water supplied hydrant system is not required.) Note: All new dwellings require the installation of a residential fire sprinkler system. Hydrant location: To be a minimum of 50' and a maximum of 150' from the protected structures. The hydrant is to be located a minimum of 6' or a maximum of 8' from the edge of the road, driveway or turnout. A turnout is required if the driveway or road is less than 18' in width to allow additional fire apparatus to pass. Questions regarding the location of the fire hydrant will be addressed by the Fire Code Official.



Prior to construction, approved plans are required for the installation of all water tanks, pumps, hydrants, and fire protection systems. Contact your Fire Code Official for information, plan review and to obtain the additional required permits. Contact the Santa Cruz County Planning Department for setback requirements.

4" metal riser to fire hydrant. The hydrant shall be a "wharf head" type with a hex-nut valve stem and 2 1/2" male National Standard Thread (NST) outlet. Outlet shall be protected with a hydrant cap. Fire hydrant and riser shall be painted red.

Hydrant Center: 30" to 36" above finished grade. (Measured to center of outlet)

Tanks to be interconnected with a minimum of 4" pipe.

All above grade fire supply lines (hydrant) shall be metal pipe. All below grade metal pipe shall be wrapped.

Bury pipe a minimum of 30" below grade.

Concrete pad 24"x24"x4" thick.

Schedule 40 PVC pipe with schedule 80 transition fittings to metal pipe. Metal pipe must extend a minimum of 6" below grade

All pipes must be a minimum of 4" in diameter.

4" Control valve. (full flow type)

Concrete thrust blocks at all changes in pipe direction.

Pressure Tanks

Pressure Pump size dependant on required flows.

Pipe to the residence.

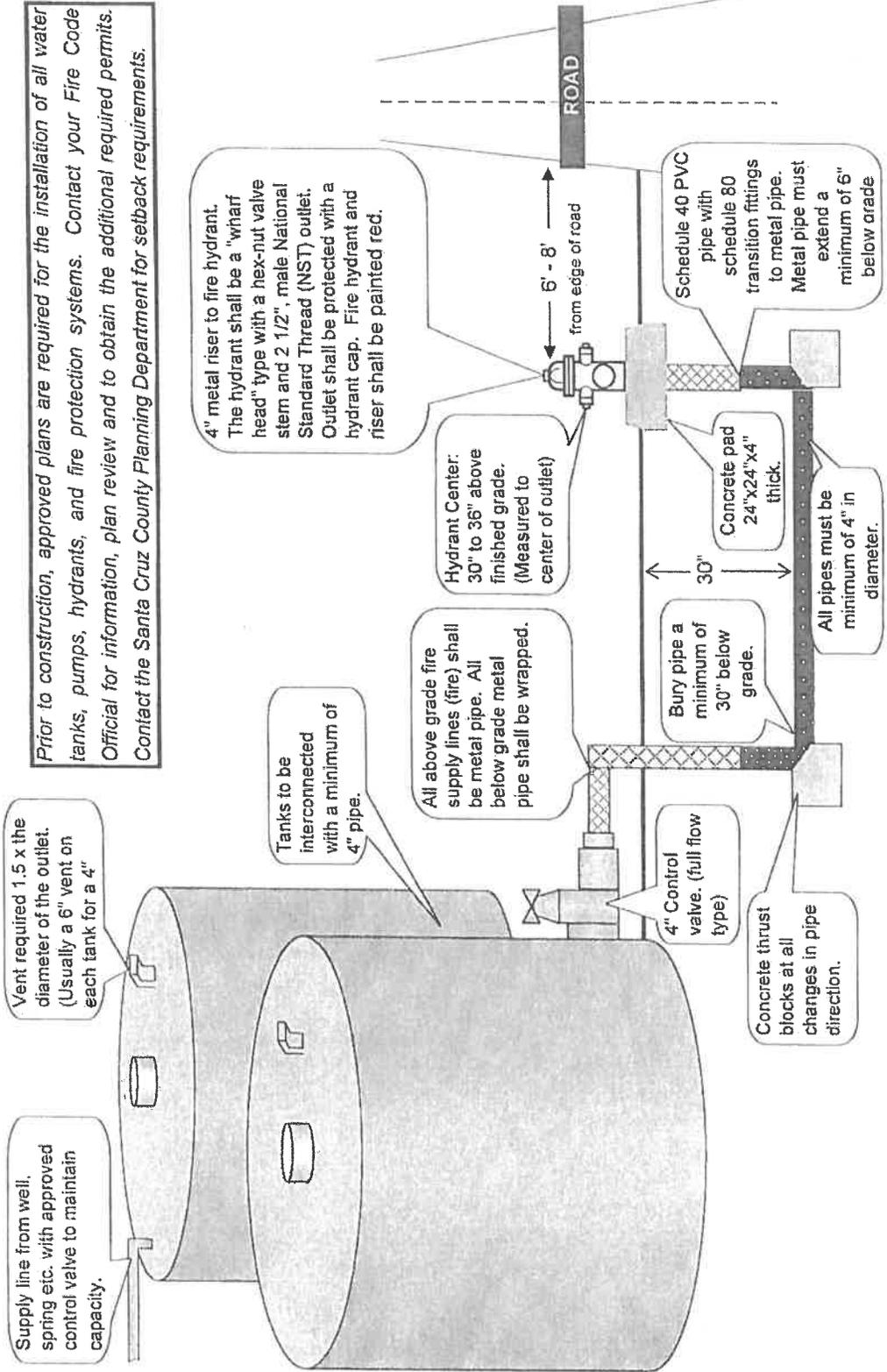
ROAD

6' - 8' from edge of road

GUIDE TO WATER STORAGE FOR FIRE PROTECTION

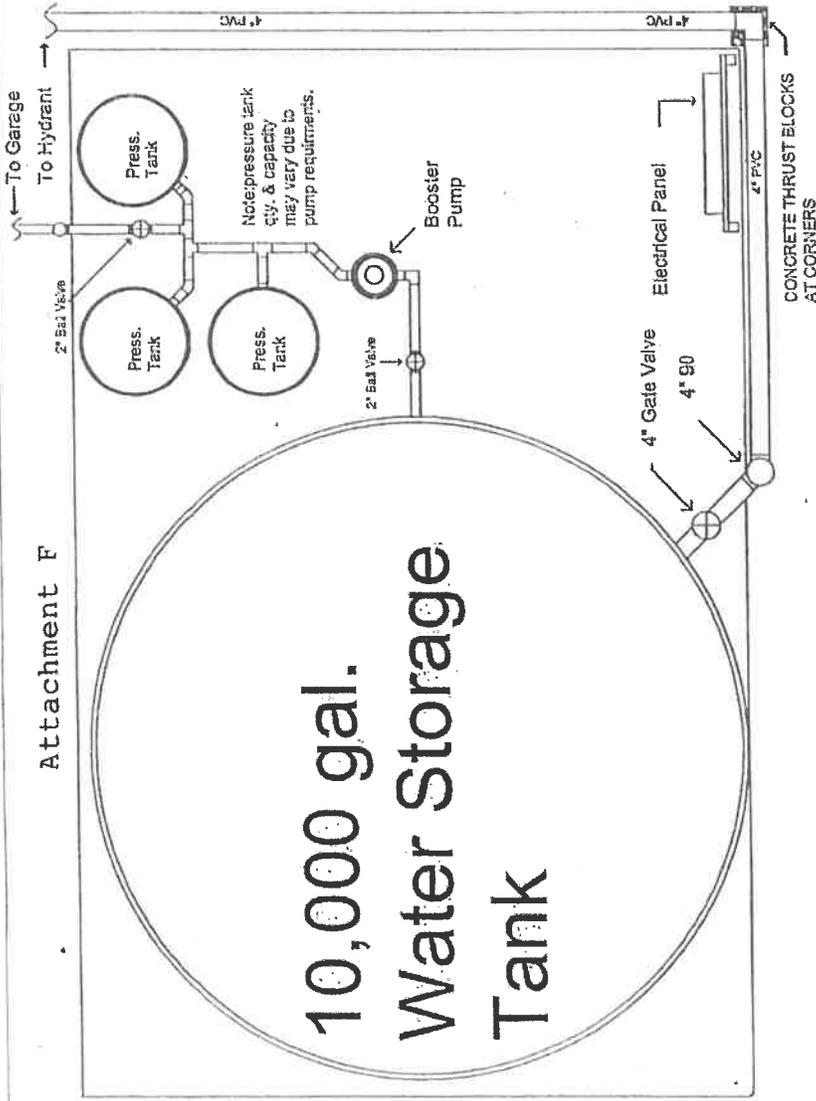
Attachment G-2

Santa Cruz County requires a minimum of 10,000 gallons of water storage and a fire department hydrant to access the water for all new residential, non-residential and building additions of more than 500 square feet. (Exception: If an approved municipal water system fire hydrant is located within 600' of structure, then a private water supplied hydrant system is not required.) Note: All new dwellings require the installation of a residential fire sprinkler system. Hydrant location: To be a minimum of 50' and a maximum of 150' from the protected structures. The hydrant is to be located a minimum of 6' or a maximum of 8' from the edge of the road, driveway or turnout. A turnout is required if the driveway or road is less than 18' in width to allow additional fire apparatus to pass. Questions regarding the location of the fire hydrant will be addressed by the Fire Code Official.

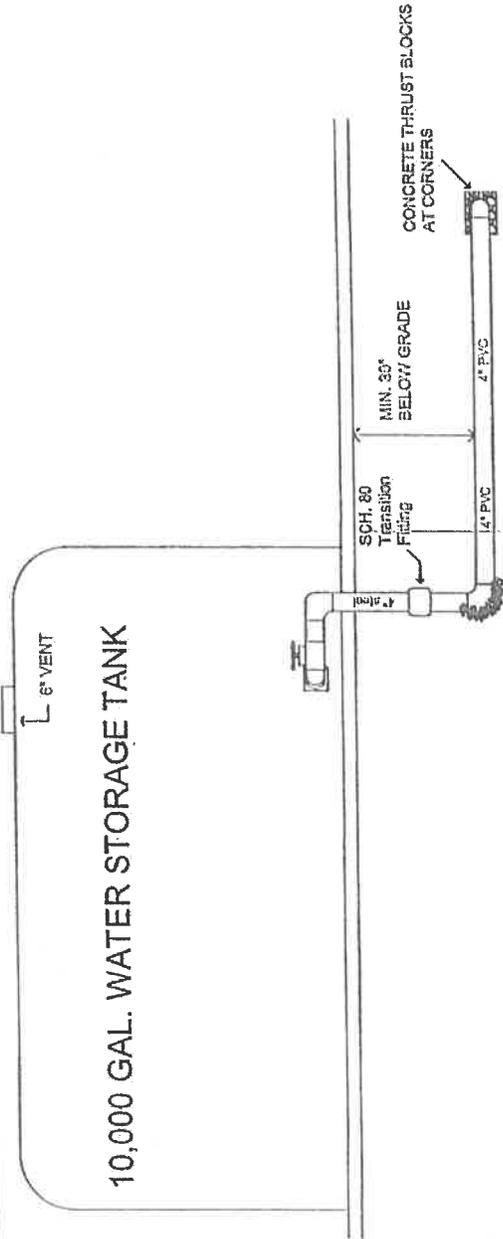


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10,000 gal. Water Storage Tank



STORAGE TANK/PUMP STATION DETAIL TOP VIEW - N.T.S.



STORAGE TANK/HYDRANT LINE DETAIL SIDE VIEW - N.T.S.



Fire Chiefs Association
FIRE PREVENTION OFFICERS SECTION

of **Santa Cruz County**

Contractor's Material and Test Certificate for Underground Piping

PROCEDURE

Upon completion of work, inspection and tests shall be made by the contractor's representative and witnessed by an owner's representative. All defects shall be corrected and system left in service before contractor's personnel finally leave the job.

A certificate shall be filled out and signed by both representatives. Copies shall be prepared for approving authorities, owners, and contractor. It is understood the owner's representative's signature in no way prejudices any claim against contractor for faulty material, poor workmanship, or failure to comply with approving authority's requirements or local ordinances.

Property name		Date
Property address		APN
Plans	Accepted by approving authorities (names)	
	Address	
	Installation conforms to accepted plans	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Equipment used is approved If no, state deviations	<input type="checkbox"/> Yes <input type="checkbox"/> No
Instructions	Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? If no, explain	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Have copies of appropriate instructions and care and maintenance charts been left on premises? If no, explain	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Location	Supplies buildings
Underground pipes and joints	Pipe types and class	Type joint
	Pipe conforms to _____ standard	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Fittings conform to _____ standard If no, explain _____	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Joints needing anchorage clamped, strapped, or blocked in accordance with _____ standard If no, explain _____	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Test description	
<p>Flushing: Flow the required rate until water is clear as indicated by no collection of foreign material in burlap bags at outlets such as hydrants and blow-offs. Flush at flows not less than 390 gpm (1476 L/min) for 4 in. pipe, 880 gpm (3331 L/min) for 6 in. pipe, 1560 gpm (5905 L/min) for 8 in. pipe, 2440 gpm (9235 L/min) for 10 in. pipe, and 3520 gpm (13,323 L/min) for 12 in. pipe. When supply cannot produce stipulated flow rates, obtain maximum available.</p> <p>Hydrostatic: All piping and attached appurtenances subjected to system working pressure shall be hydrostatically tested at 200 psi (13.8 bar) or 50 psi (3.4 bar) in excess of the system working pressure, whichever is greater, and shall maintain that pressure \pm 5 psi for 2 hours.</p> <p>Hydrostatic Testing Allowance: Where additional water is added to the system to maintain the test pressures required by 10.10.2.2.1, the amount of water shall be measured and shall not exceed the limits of the following equation (For metric equation, see 10.10.2.2.4):</p> $L = \frac{SD\sqrt{P}}{148,000}$ <p>L = testing allowance (makeup water), in gallons per hour S = length of pipe tested, in feet D = nominal diameter of the pipe, in inches P = average test pressure during the hydrostatic test, in pounds per square inch (gauge)</p>		

Attachment 6D

Flushing tests	New underground piping flushed according to _____ standard by (company) <input type="checkbox"/> Yes <input type="checkbox"/> No	
	If no, explain _____	
	How flushing flow was obtained <input type="checkbox"/> Public water <input type="checkbox"/> Tank or reservoir <input type="checkbox"/> Fire pump	Through what type of opening <input type="checkbox"/> Hydrant butt <input type="checkbox"/> Open pipe
	Lead-ins flushed according to _____ standard by (company) <input type="checkbox"/> Yes <input type="checkbox"/> No	
	If no, explain _____	
	How flushing flow was obtained <input type="checkbox"/> Public water <input type="checkbox"/> Tank or reservoir <input type="checkbox"/> Fire pump	Through what type of opening <input type="checkbox"/> Y connection to flange and spigot <input type="checkbox"/> Open pipe
Hydrostatic test	All new underground piping hydrostatically tested at _____ psi for _____ hours	Joints covered <input type="checkbox"/> Yes <input type="checkbox"/> No
Leakage test	Total amount of leakage measured _____ gallons _____ hours	
	Allowable leakage _____ gallons _____ hours	
Hydrants	Number installed _____ Type and make _____	All operate satisfactorily <input type="checkbox"/> Yes <input type="checkbox"/> No
Control valves	Water control valves left wide open <input type="checkbox"/> Yes <input type="checkbox"/> No If no, state reason _____	
	Hose threads of fire department connections and hydrants interchangeable with those of fire department answering alarm <input type="checkbox"/> Yes <input type="checkbox"/> No	
Remarks	Date left in service _____	
Signatures	Name of installing contractor _____	
	Tests witnessed by	
	For property owner (signed) _____	Title _____ Date _____
	For installing contractor (signed) _____	Title _____ Date _____
Additional explanation and notes		