Fire Chiefs Association of Santa Cruz County
FIRE PREVENTION OFFICERS SECTION

FIRE PREVENTION STANDARDS	DATE: **08/21/96**	NUMBER: **FP0-007**
	APPROVED:	REVISED: **12/1/08**
	TITLE: **Water Storage for non/sprinklered dwellings**	

Guide to Water Storage Requirements For Single and Two Family Dwellings (Non-Sprinklered)

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

1. Plans shall be submitted and approved prior to installation to the Fire Prevention Office having jurisdiction. Allow a minimum of 14 days for plan check and approval.

2. The National Standard for water storage requirements is the latest edition of NFPA 24.

3. The following information is required when submitting plans for a water storage tank.

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 Fire Department 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 insure that the tank is kept a minimum of 80% full.

4. Tank Location:

   The location of the tank shall be approved by the Fire Department having jurisdiction.

B. Fire Department Connection (Hydrant)

1. The fire hydrant location shall be a minimum if 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. Location subject to the approval of the Fire Department having jurisdiction.

   NOTE: The location of the fire hydrant cannot make the driveway or roadway impassible to other traffic when the fire apparatus is using the hydrant.

2. The fire department connection (hydrant) may be located at the base of the tank if accessible to fire department equipment and approved by the Fire Department having jurisdiction.

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. Contact the Fire Department having jurisdiction for further information.

4. All fire department connections (hydrants) shall be painted to conform to the requirements of the Fire Department having jurisdiction.

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. Contact Fire Department having jurisdiction with any questions. Indicate on plans with a detailed drawing.

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. Schedule 40 PVC is allowed for supply line from the tank to the bottom of the hydrant riser when the line is buried and installed per NFPA 24.

4. All transition from metal to plastic will be through schedule 80 plastic fittings. Metallic pipe shall 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 Fire Department having jurisdiction.

5. Concrete thrust blocks or other approved listed devices shall be required to stabilize the underground pipe.

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

6. A concrete pad 24" by 24" by a minimum of 4" shall be placed around the base of the hydrant.

7. An approved full flow hydrant line shut off valve shall be installed at the tank.

8. **All underground piping systems shall be inspected before back fill by the Fire Department having jurisdiction to verify compliance.**

9. Underground pipe shall be flushed with water until water runs clear, insuring the line is free of contamination.

10. See **Attachments E, F, G1, and G2** for tank and hydrant installation examples.

The appropriate local agency shall be contacted regarding local requirements and permit amounts. Refer to the following table to determine which fire agency will oversee plan review, installation activities, perform compliance inspections and collect permit fees, if any. For those agencies marked with an (*) on the following table, CAL FIRE/Santa Cruz County Fire Department is the agency responsible for all installations.

	Fire Agency Name	Address	Telephone
Aptos	Aptos/La Selva FPD	6934 Soquel Drive Aptos, CA 95003	(831) 685-6690
Ben Lomond	Ben Lomond FPD	9430 Hwy 9 Ben Lomond, CA 95005	(831) 336-5495
*Bonny Doon	CAL FIRE/ Santa Cruz County Fire Dept.	P.O. Drawer F-2 Felton, CA 95018	(831) 335-6748
Boulder Creek	Boulder Creek FPD	13230 Central Ave Boulder Creek, CA 95006	(831) 338-7222
Branciforte	Branciforte Fire Dept.	2711 Branciforte Dr. Santa Cruz, CA 95065	(831) 423-8856
Brookdale	Boulder Creek FPD	13230 Central Ave Boulder Creek, CA 95006	(831) 338-7222
Capitola	Central FPD	930 17th Ave. Santa Cruz, CA 95062	(831) 479-6843
*Corralitos	CAL FIRE/ Santa Cruz County Fire Dept.	P.O. Drawer F-2 Felton, CA 95018	(831) 335-6748
*Davenport	CAL FIRE/ Santa Cruz County Fire Dept.	P.O. Drawer F-2 Felton, CA 95018	(831) 335-6748
Felton	Felton FPD	131 Kirby St. Felton, CA 95018	(831) 335-4422
*Freedom	Pajaro Valley Fire District	P.O. Drawer F-2 Felton, CA 95018	(831) 335-6748
La Selva Beach	Aptos/La Selva FPD	6934 Soquel Drive Aptos, CA 95003	(831) 685-6690
Live Oak	Central FPD	930 17th Ave. Santa Cruz, CA 95062	(831) 479-6843
Mount Herman	Felton FPD	131 Kirby St. Felton, CA 95018	(831) 335-4422
Pajaro Dunes	CAL FIRE/ Santa Cruz County Fire Dept.	P.O. Drawer Felton, CA 95018	(831) 335-6748
Rio Del Mar	Aptos/La Selva FPD	6934 Soquel Drive Aptos, CA 95003	(831) 685-6690
*Salispuedes	Pajaro Valley Fire District	P.O. Drawer F-2 Felton, CA 95018	(831) 335-6748
Santa Cruz City	Santa Cruz FD	230 Walnut St. Santa Cruz, CA 95060	(831) 420-5280
Scotts Valley	Scotts Valley FPD	7 Erba lane Scotts Valley, CA 95066	(831) 438-0211
Soquel	Central FPD	930 17th Ave. Santa Cruz, CA 95062	(831) 479-6843
Watsonville	Watsonville FD	115 2nd St. Watsonville, CA 95076	(831) 768-3200
Zayante	Zayante FPD	7700 East Zayante Rd. Felton, CA 95018	(831) 335-5100

Attachment "C"

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			
Plans	Accepted by approving authorities (names)		
	Address		
	Installation conforms to accepted plans	☐ Yes	☐ No
	Equipment used is approved If no, state deviations	☐ Yes	☐ 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	☐ Yes	☐ No
	Have copies of appropriate instructions and care and maintenance charts been left on premises? If no, explain	☐ Yes	☐ No
Location	Supplies buildings		
Underground pipes and joints	Pipe types and class	Type joint	
	Pipe conforms to _____ standard Fittings conforms to _____ standard If no, explain	☐ Yes ☐ Yes	☐ No ☐ No
	Joints needed anchorage clamped, strapped, or blocked in accordance with _____ standard If no, explain	☐ Yes	☐ No
Test description	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. 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 150 psi (10.3 bar) for 2 hours. Leakage: New pipe laid with rubber gasketed joints shall, if the workmanship is satisfactory, have little or no leakage at the joints. The amount of leakage at the joints shall not exceed 2 quarts per hour (1.89 L/hr) per 100 joints irrespective of pipe diameter. The leakage shall be distributed over all joints. If such leakage occurs at a few joints, the installation shall be considered unsatisfactory and necessary repairs made. The amount of allowable leakage specified above can be increased by 1 fluid ounce per inch valve diameter per hr. (30 mL/25 mm/hr) for each metal seated valve isolating the test section. If dry barrel hydrants are tested with the main valve open so the hydrants are under pressure, an additional 5 ounces per minute (150 mL/min) leakage is permitted for each hydrant.		
Flushing tests	New underground piping flushed according to _____ standard by (company) If no, explain	☐ Yes	☐ No
	How flushing flow was obtained ☐ Public water ☐ Tank or reservoir ☐ Fire pump	Through what type opening ☐ Hydrant butt ☐ Open pipe	
	Lead-ins flushed according to _____ standard by (company) If no, explain	☐ Yes	☐ No
	How flushing flow was obtained ☐ Public water ☐ Tank or reservoir ☐ Fire pump	Through what type opening ☐ Y connection to flange and spigot ☐ Open pipe	

Attachment "C", Cont.

Pressure reducing valve test	Location and floor	Make and model	Setting	Static pressure		Residual pressure (flowing)		Flow rate
				Inlet (psi)	Outlet (psi)	Inlet (psi)	Outlet (psi)	Flow (gpm)

Test description

Hydrostatic: Hydrostatic tests shall be made at not less than 200 psi (13.6 bar) for 2 hours or 50 psi (3.4 bar) above static pressure in excess of 150 psi (10.2 bar) for 2 hours. Differential dry-pipe valve clappers shall be left open during the test to prevent damage. All aboveground piping leakage shall be stopped.

Pneumatic: Establish 40 psi (2.7 bar) air pressure and measure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours. Test pressure tanks at normal water level and air pressure and measure air pressure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours.

Tests

All piping hydrostatically tested at _____ psi (____ bar) for _____ hours — If no, state reason

Dry piping pneumatically tested ☐ Yes ☐ No

Equipment operates properly ☐ Yes ☐ No

Do you certify as the sprinkler contractor that additives and corrosive chemicals, sodium silicate or derivatives of sodium silicate, brine, or other corrosive chemicals were not used for testing systems or stopping leaks?

☐ Yes ☐ No

Drain test — Reading of gauge located near water supply test connection: _____ psi (____ bar) — Residual pressure with valve in test connection open wide: _____ psi (____ bar)

Underground mains and lead in connections to system risers flushed before connection made to sprinkler piping

Verified by copy of the U Form No. 85B ☐ Yes ☐ No — Other — Explain

flushed by installer of underground sprinkler piping ☐ Yes ☐ No

If powder-driven fasteners are used in concrete, has representative sample testing be satisfactorily completed? ☐ Yes ☐ No — If no, explain

Blank testing gaskets

Number used	Locations	Number removed

Welding

Welding piping ☐ Yes ☐ No

If yes. . .

Do you certify as the sprinkler contractor that welding procedures comply with the requirements of at least AWS B2.1? ☐ Yes ☐ No

Do you certify that the welding was performed by welders qualified in compliance with the requirements of at least AWS B2.1? ☐ Yes ☐ No

Do you certify that the welding was carried out in compliance with a documented quality control procedure to ensure that all discs are retrieved, that openings in piping are smooth, that slag and other welding residue are removed, and that the internal diameters of piping are not penetrated? ☐ Yes ☐ No

Cutouts (discs)

Do you certify that you have a control feature to ensure that all cutouts (discs) are retrieved? ☐ Yes ☐ No

Hydraulic data nameplate

Nameplate provided ☐ Yes ☐ No — If no, explain

Remarks

Date left in service with all control valves open

Signatures

Name of sprinkler contractor

Tests witnessed by

For property owner (signed) — Title — Date

For sprinkler contractor (signed) — Title — Date

Additional explanations and notes

Attachment "D"

Contractor's Material and Test Certificate for Aboveground 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	

Plans

Accepted by approving authorities (names)

Address

Installation conforms to accepted plans ☐ Yes ☐ No

Equipment used is approved ☐ Yes ☐ No
If no, explain deviations

Instructions

Has person in charge of fire equipment been instructed as to location of control valves and care and maintenance of this new equipment? ☐ Yes ☐ No
If no, explain?

Have copies of the following been left on the premises?
1. System components instructions ☐ Yes ☐ No
2. Care and maintenance instructions ☐ Yes ☐ No
3. NFPA 25 ☐ Yes ☐ No

Location of system

Supplies buildings

Sprinklers

Make	Model	Year of manufacture	Orifice size	Quantity	Temperature rating

Pipe and fittings

Type of pipe _____
Type of fittings _____

Alarm valve or flow indicator

Alarm device			Maximum time to operate through test connection	
Type	Make	Model	Minutes	Seconds

Dry pipe operating test

Dry valve			Q. O. D.		
Make	Model	Serial no.	Make	Model	Serial no.

	Time to trip through test connection[1]		Water pressure	Air pressure	Trip point air pressure	Time water reached test outlet[1]		Alarm operated properly	
	Minutes	Seconds	psi	psi	psi	Minutes	Seconds	Yes	No
Without Q.O.D.									
With Q.O.D.									

If no, explain

Deluge and preaction valves

Operation ☐ Pneumatic ☐ Electric ☐ Hydraulics

Piping supervised ☐ Yes ☐ No | Detecting media supervised ☐ Yes ☐ No

Does valve operate from the manual trip, remote, or both control stations? ☐ Yes ☐ No

Is there an accessible facility in each circuit for testing? ☐ Yes ☐ No | If no, explain

Make	Model	Does each circuit operate supervision loss alarm?		Does each circuit operate valve release?		Maximum time to operate release	
		Yes	No	Yes	No	Minutes	Seconds

Attachment "D", Cont.

Pressure reducing valve test	Location and floor	Make and model	Setting	Static pressure		Residual pressure (flowing)		Flow rate
				Inlet (psi)	Outlet (psi)	Inlet (psi)	Outlet (psi)	Flow (gpm)

Test description

Hydrostatic: Hydrostatic tests shall be made at not less than 200 psi (13.6 bar) for 2 hours or 50 psi (3.4 bar) above static pressure in excess of 150 psi (10.2 bar) for 2 hours. Differential dry-pipe valve clappers shall be left open during the test to prevent damage. All aboveground piping leakage shall be stopped.

Pneumatic: Establish 40 psi (2.7 bar) air pressure and measure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours. Test pressure tanks at normal water level and air pressure and measure air pressure drop, which shall not exceed 1½ psi (0.1 bar) in 24 hours.

Tests

All piping hydrostatically tested at _____ psi (____ bar) for _____ hours ☐ Yes ☐ No — If no, state reason

Dry piping pneumatically tested ☐ Yes ☐ No

Equipment operates properly ☐ Yes ☐ No

Do you certify as the sprinkler contractor that additives and corrosive chemicals, sodium silicate or derivatives of sodium silicate, brine, or other corrosive chemicals were not used for testing systems or stopping leaks?

☐ Yes ☐ No

Drain test	Reading of gauge located near water supply test connection: _____ psi (____ bar)	Residual pressure with valve in test connection open wide: _____ psi (____ bar)

Underground mains and lead in connections to system risers flushed before connection made to sprinkler piping

Verified by copy of the U Form No. 85B ☐ Yes ☐ No — Other — Explain

flushed by installer of underground sprinkler piping ☐ Yes ☐ No

If powder-driven fasteners are used in concrete, has representative sample testing be satisfactorily completed? ☐ Yes ☐ No — If no, explain

Blank testing gaskets	Number used	Locations	Number removed

Welding

Welding piping ☐ Yes ☐ No

If yes. . .

Do you certify as the sprinkler contractor that welding procedures comply with the requirements of at least AWS B2.1? ☐ Yes ☐ No

Do you certify that the welding was performed by welders qualified in compliance with the requirements of at least AWS B2.1? ☐ Yes ☐ No

Do you certify that the welding was carried out in compliance with a documented quality control procedure to ensure that all discs are retrieved, that openings in piping are smooth, that slag and other welding residue are removed, and that the internal diameters of piping are not penetrated? ☐ Yes ☐ No

Cutouts (discs)

Do you certify that you have a control feature to ensure that all cutouts (discs) are retrieved? ☐ Yes ☐ No

Hydraulic data nameplate

Nameplate provided ☐ Yes ☐ No — If no, explain

Remarks

Date left in service with all control valves open

Signatures

Name of sprinkler contractor

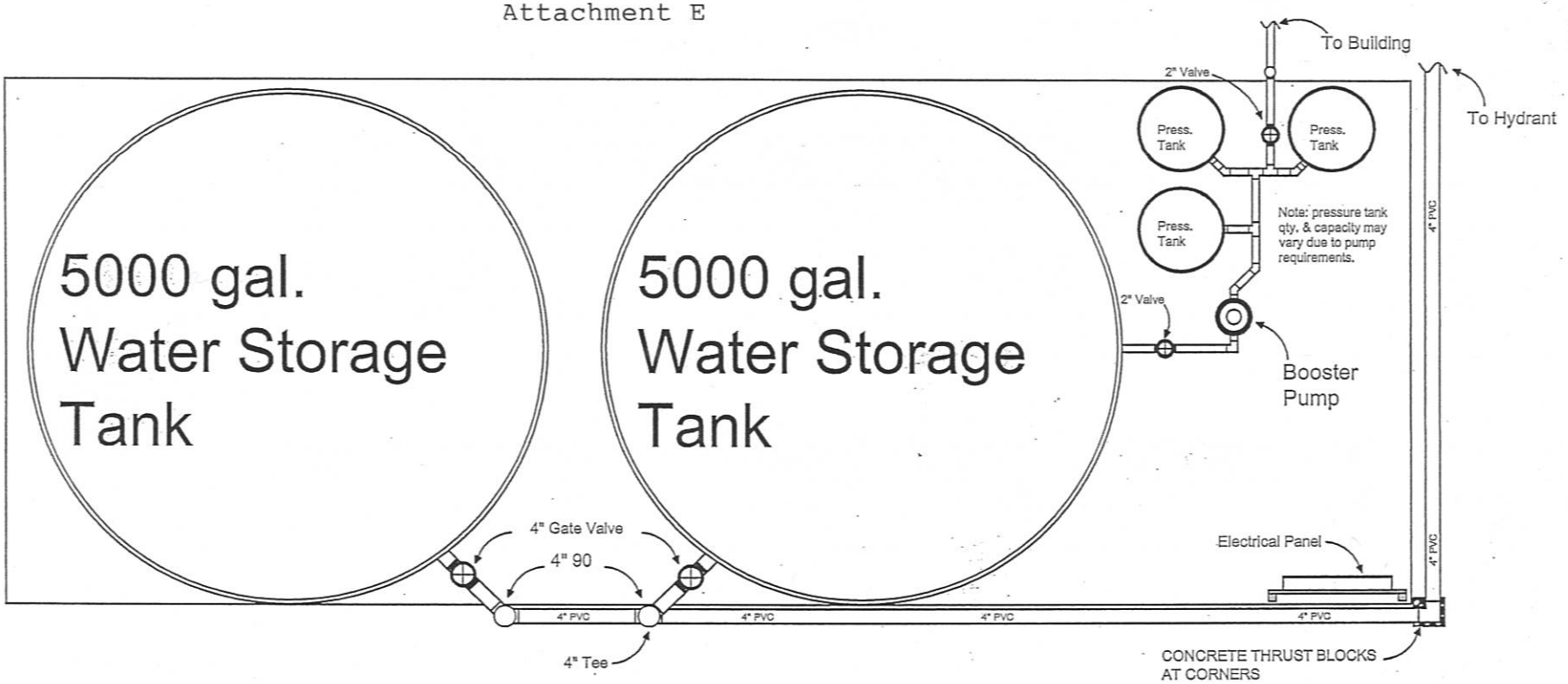
Tests witnessed by

For property owner (signed) — Title — Date

For sprinkler contractor (signed) — Title — Date

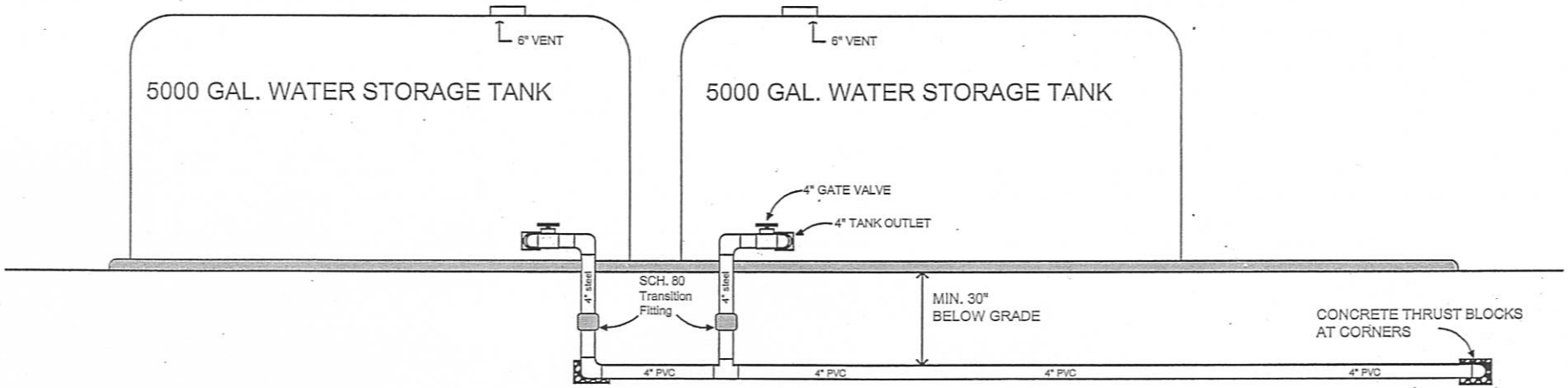
Additional explanations and notes

Attachment E



STORAGE TANK/PUMP STATION DETAIL

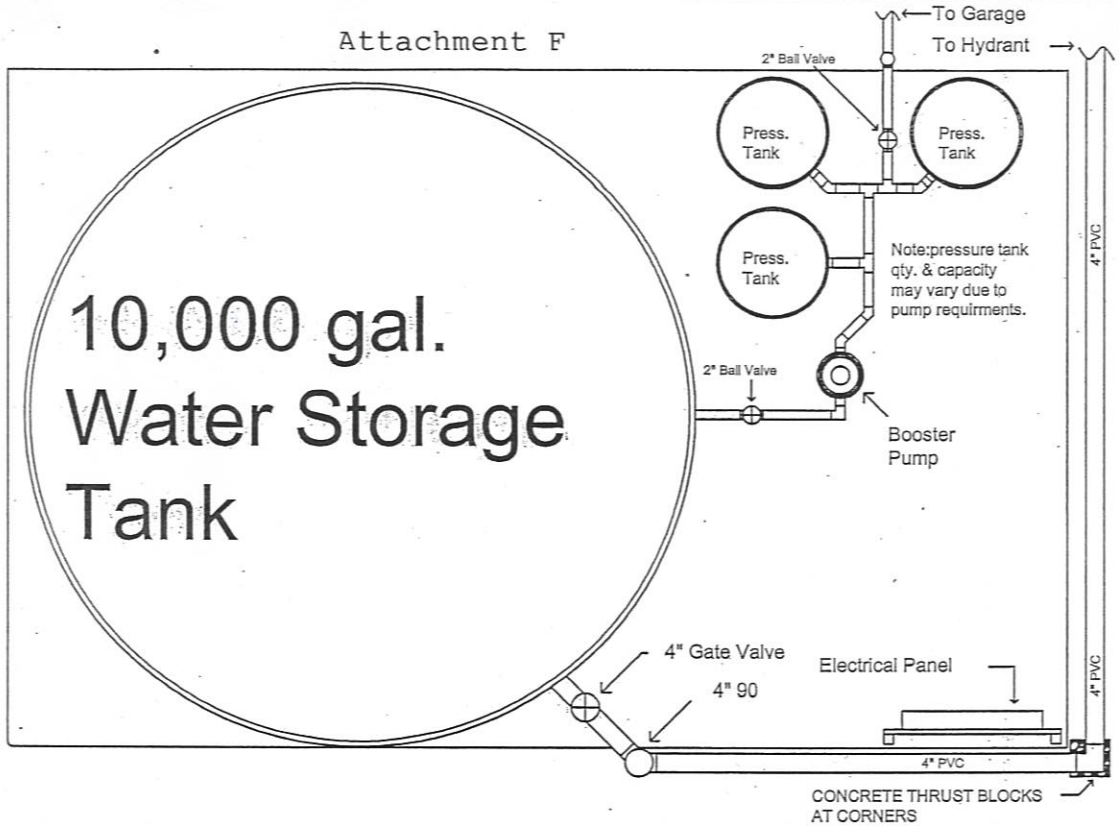
TOP VIEW - N.T.S.



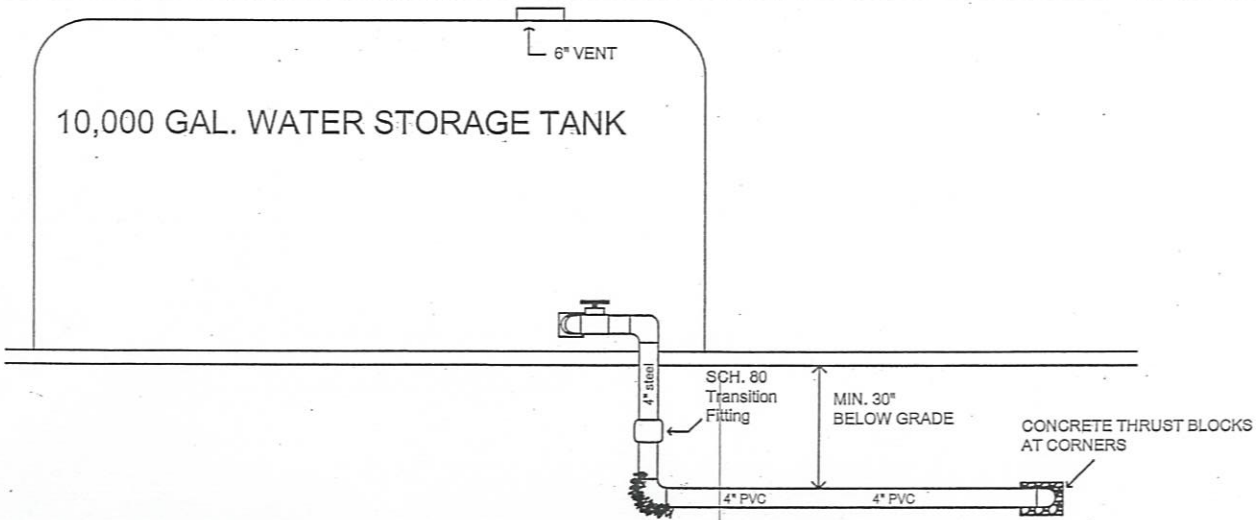
STORAGE TANK/HYDRANT LINE DETAIL

SIDE VIEW - N.T.S.

Attachment F



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

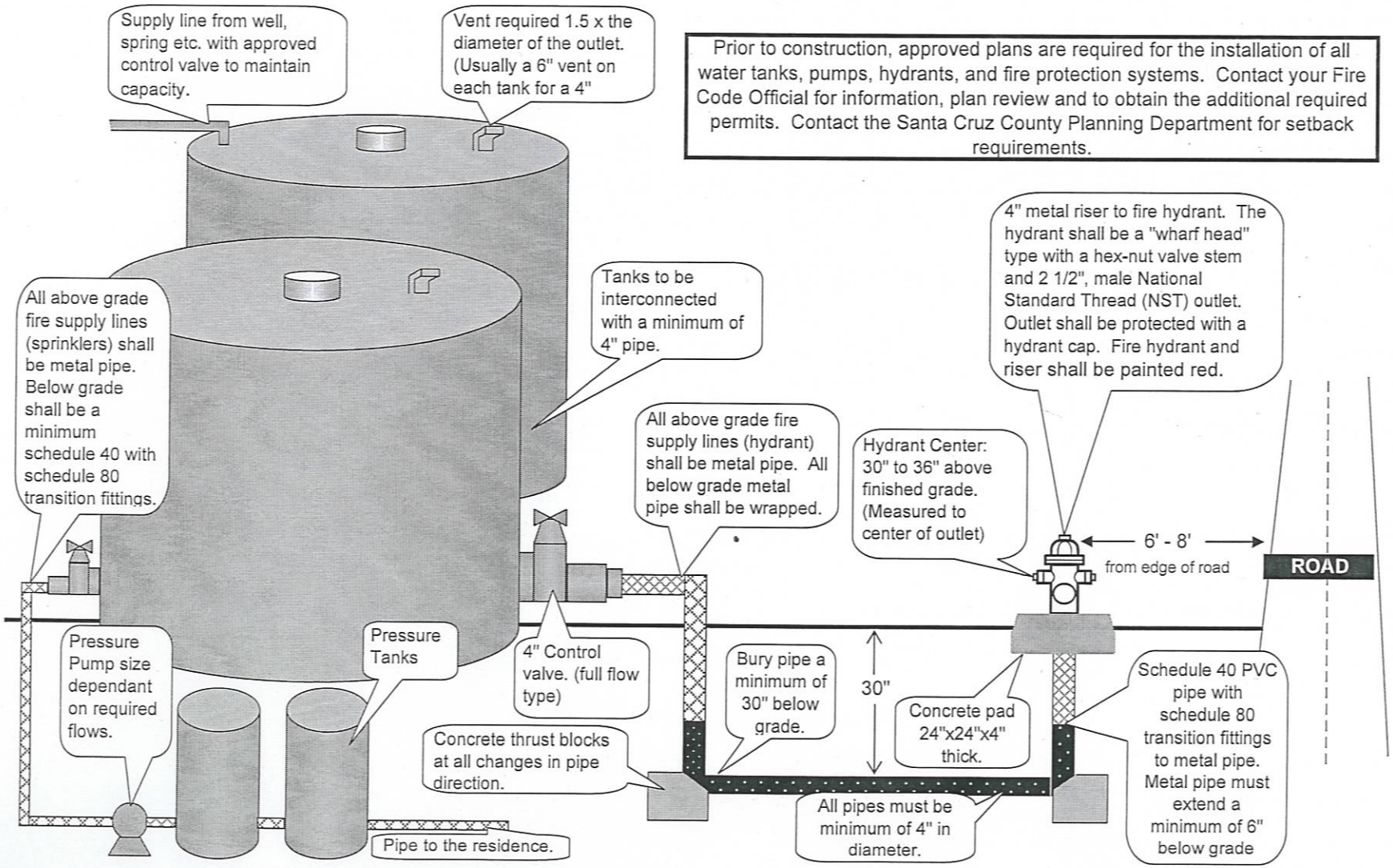


STORAGE TANK/HYDRANT LINE DETAIL SIDE VIEW - N.T.S.

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.

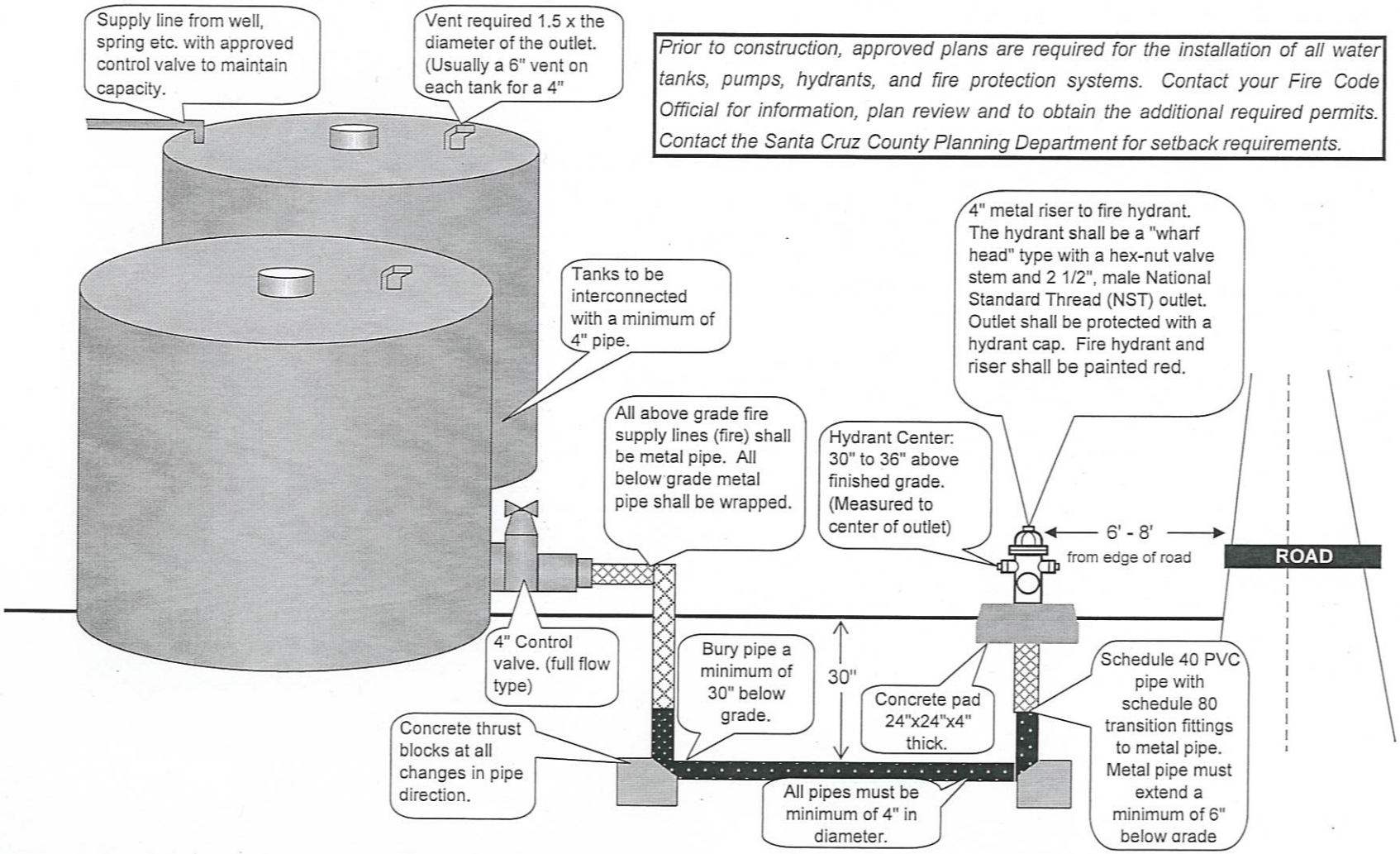


GUIDE TO WATER STORAGE FOR FIRE PROTECTION

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.

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.



Attachment H

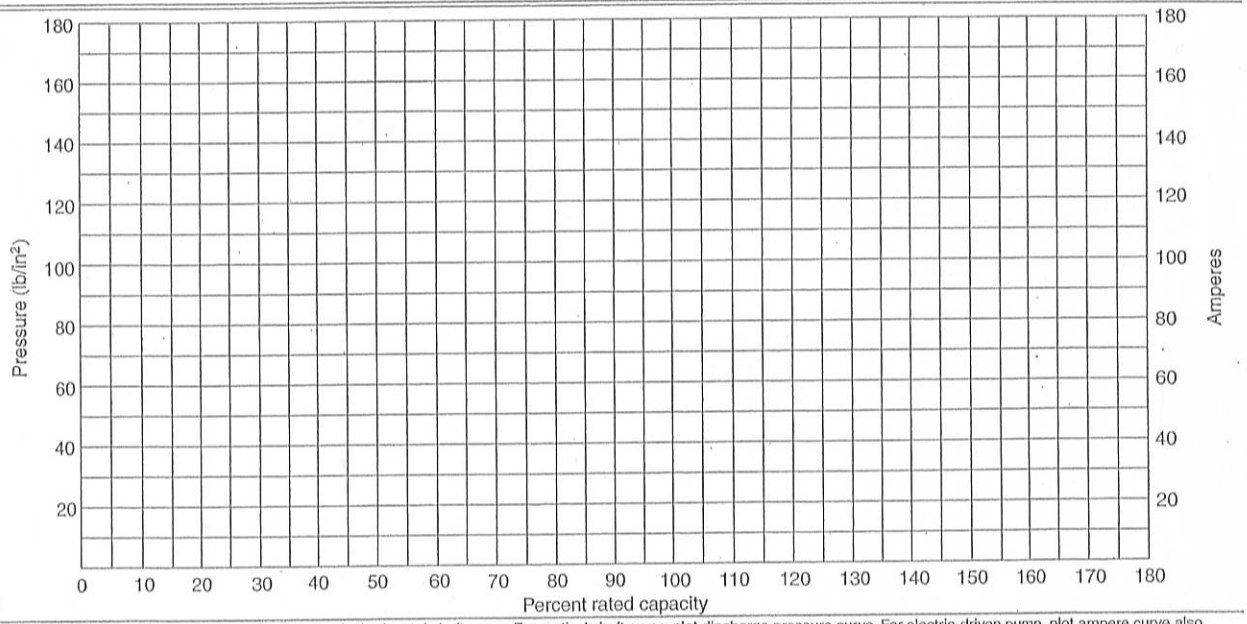
PUMP ACCEPTANCE TEST DATA Refer to P & P F(A) – 512.12 & DS 3 – 7N

PROPERTY OF		INDEX NO.	DIST. OFFICE
ADDRESS		TESTED BY	DATE
CITY	STATE	PLACO	CODE
SUBJECT	CONFERRED WITH		

PUMP	SHAFT ☐ HORIZONTAL ☐ VERTICAL	MANUFACTURER	APPROVED ☐ YES ☐ NO	SHOP OR SERIAL NO.		MODEL OR TYPE
	RATED GPM	RATED HEAD-FT. (psi)	RATED RPM	SUCTION FROM	TANK SIZE	TANK HEIGHT
IF VERTICAL TYPE	VERTICAL DIST. DISCH. GAUGE TO WATER LEVEL	STATIC FT / PUMPING FT	RIGHT-ANGLE GEAR DRIVE	MANUFACTURER / MODEL OR TYPE	SHOP OR SERIAL NO. / PERFORMANCE ☐ SMOOTH ☐ ROUGH	APPROVED ☐ YES ☐ NO
DRIVER	MANUFACTURER	APPROVED ☐ YES ☐ NO	SHOP OR SERIAL NO.	MODEL OR TYPE	RATED H.P.	RATED RPM
	☐ ELECTRIC MOTOR	RATED VOLT.	OPERATING VOLT.	RATED F.L. AMPS	AMPS AT 150%	PHASE / CYCLES / SERVICE FACTOR
	☐ DIESEL ENGINE ☐ GASOLINE ENGINE ☐ GAS ENGINE ☐ STEAM TURBINE	☐ PRESS. GOVERNOR BUILT IN	☐ INDEPENDENT	☐ TURBINE STEAM PRESS		
CONTROLLER	MANUFACTURER	APPROVED ☐ YES ☐ NO	START ____ psi ☐ MANUAL ☐ AUTO ☐ PRESS DROP ☐ WATER FLOW	STOP ____ psi ☐ MANUAL ☐ AUTO	JOCKEY PUMP ☐ YES ON ____ psi ☐ NO OFF ____ psi	
	SHOP OR SERIAL NO.	MODEL OR TYPE				

SPEED RPM	DISCHARGE PRESSURE PSI	SUCTION PRESSURE PSI	NET HEAD PSI	STREAMS NO.	STREAMS SIZE	STREAMS PITOT PRESSURE	GALLONS PER MINUTE	PERCENT OF RATED CAPACITY	VOLTS	AMPS	STEAM PRESSURE THROTTLE	STEAM PRESSURE CHEST

Readings marked (+) in suction column are heads above atmosphere, those marked (–) are lifts.
For vertical shaft pumps omit suction pressure and net head readings.



Plot discharge pressure and net head curves for horizontal shaft pump. For vertical shaft pump, plot discharge pressure curve. For electric-driven pump, plot ampere curve also.

105 (9-77) ENGINEERING PRINTED IN USA

Low Water Cut-Off	Pump low water cut-off switch is set to activate _____ inches above centerline of suction discharge pipe.
Name & Address of pump contractor	
Tests witnessed by	
Signatures	For Property Owner (signed) Title Date
	For Pump Contractor (signed) Title Date