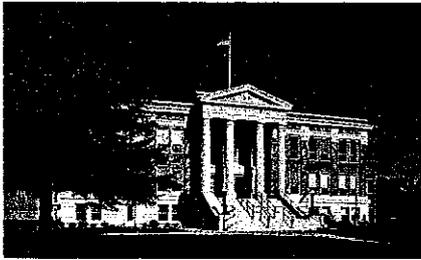


Fire Flow Water Storage & Dry Hydrant Design Standards





Grant County
Department of Building/Fire Marshal
P O Box 37
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(509) 754-2011

GRANT COUNTY GUIDE FOR REQUIRED FIRE FLOW

BASIC PROVISIONS OF THE INTERNATIONAL FIRE CODE (IFC) SECTION 507

Properties upon which facilities, buildings or portions of buildings are constructed on, or are moved onto within Grant County, are required to provide an approved water supply for purposes of fire suppression to be used by fire departments.

A water supply shall consist of reservoirs, pressure tanks, elevated tanks, water mains with fire hydrants, or other fixed systems capable of providing the required fire flow for the buildings on the premises. The amount of fire flow required is determined using the IFC and/or NFPA 1142 for rural settings. Private fire service mains and appurtenances shall be installed in accordance with NFPA 24. Water tanks for private fire protection shall be installed in accordance with NFPA 22.

Numerous factors are considered when determining the amount of on-site water storage required for projects. To assist the Fire Marshal's Office in calculating the amount of fire flow required for your project, you will need to provide the following information:

- a) The total square foot area of each level of the building
- b) The total volume of the building
- c) The type of construction of the building (wood frame, steel, concrete, etc.)
- d) The use of the building (offices, machine shop, storage, service station, etc.)
- e) Exposure distances to other buildings and/or property lines
- f) Whether or not the building will be equipped with an automatic sprinkler system
- g) Fire flow is calculated on the largest building on the property. If the proposed building is not the largest building on the property, provide the volume of the largest building in order to complete the calculations.

Please review the content of this handout to answer the questions you may have. If you need further information, contact the Grant County Fire Marshal's Office at (509) 754-2011 ext. 3001.

WATER SUPPLY RESEVOIR REQUIREMENTS

- Types of Fire Flow Water Storage Vessels are as follows:
 - Typical below ground cisterns
 - Buried fiberglass tank
 - Above ground constructed tank (a building permit may be needed for this type of tank).
 - Ponds (ponds are to be lined, covered to prevent debris from collecting in the pond, and a permit is required).
- Water tanks are required to have a 5' setback from all property lines for Fire Marshal requirements. Check with The Grant County Planning Dept. on their setback requirements.
- To be an acceptable water source for firefighting the water supply shall be maintained and accessible year round.
- Roads leading to any required water supply shall be constructed and maintained in accordance with the following:
 - The maximum grade shall not exceed 8 %.
 - The road shall be maintained and treated for year round use and shall be suitable for all weather use.
 - Lanes for any roadway will have a minimum 12' width.
- A secondary means of filling the tank via a fire department connection into a steel pipe attached to the outside of the tank is required. The siamese connection will be a minimum of 2 ½" in diameter, female with National Standard threads.
- Water tanks or cisterns will have a vent pipe, fill pipe, manhole for inspections, and a dry hydrant suction connection.
- The suction point inside the tank will have a anti-vortex plate.
- Any water supply resevoir that will be subject to freezing (ponds for example) must provide for the water that will not be available due to freezing. The volume of the resevoir will need to be increased to insure the required fire flow requirements will be available to the fire department.

- The pipe to fill the tank shall be sized to fill the tank in a maximum of 8 hours.
- The tank shall be kept filled, and the water shall never be more than 4 inches below the designated “full” mark established.

DRY HYDRANT REQUIREMENTS

- Dry hydrants constructed of PVC pipe shall be not less than Schedule 40 pipe and fittings.
- Dry hydrants constructed of steel pipe shall be not less than Schedule 40 pipe and will be painted to prevent rust and corrosion.
- Pipe shall not be less than 6” in diameter.
- Regardless of the type of construction, the outlet shall consist of a brass or pyrolyte fitting that has National Standard Threads and is 4 ½” in diameter. Outlets shall be capped to prevent introduction of foreign material into the pipe.
- Dry hydrant risers shall extend above adjacent ground level not less than 24” and not more than 36”. Steel riser pipe should be painted red and PVC pipe may remain white.
- Risers shall be protected against collision by fire trucks or other vehicles.
- Risers constructed of PVC pipe shall be braced to prevent deflection when needed. Bracing will consist of concrete blocking or rigid guy poles. Guy wires shall not be considered adequate bracing.
- The underground base of the riser shall be installed below frost level to prevent freezing. The riser, including the underground portion, shall not exceed 12 feet of rise.
- Horizontal runs of pipe shall not exceed 50 feet of run and shall be buried below the frost level.
- Following installation, flow tests shall be conducted by the owner, installer, or by the servicing fire district to establish the proper operation and the fire flow requirements are met. Documentation of the test shall be supplied to the Fire Marshal’s Office if not witnessed by them. Dry hydrants that do not meet the minimum fire flow requirements will not

be accepted or approved by the Grant County Fire Marshal's Office and/or the Fire Department that serves your area.

- It is the responsibility of the owner to ensure proper maintenance of the hydrant. The owner or the fire department shall flow test the hydrant annually to ensure proper operation and flow requirements.
- Dry hydrants shall be a minimum of 100' from any structure and shall require not more than 20' of hard suction hose to connect to a fire department pump.
- No parking or other obstacles will be allowed within 20' of the dry hydrant fire department connection.

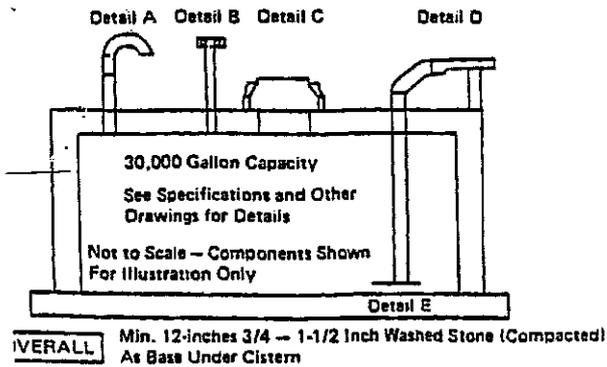


Figure B-4-6(b).

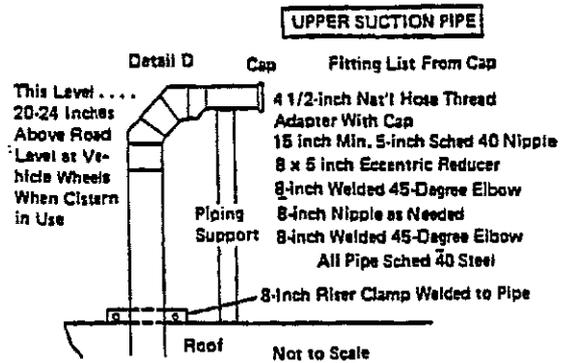


Figure B-4-6(f).

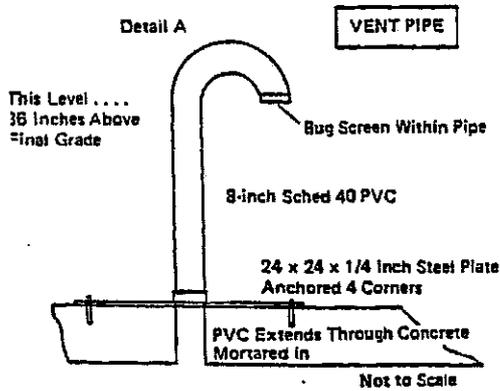


Figure B-4-6(c).

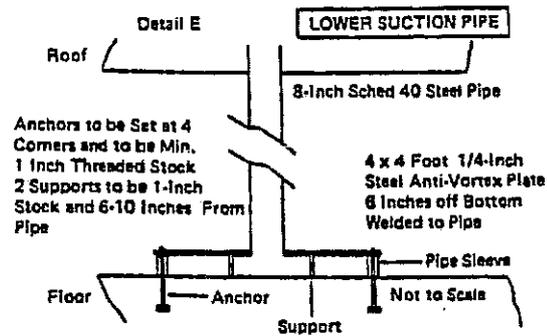


Figure B-4-6(e).

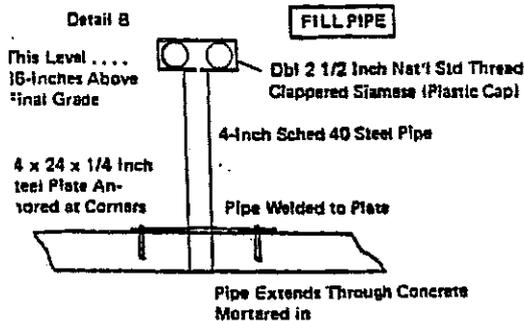


Figure B-4-6(d).

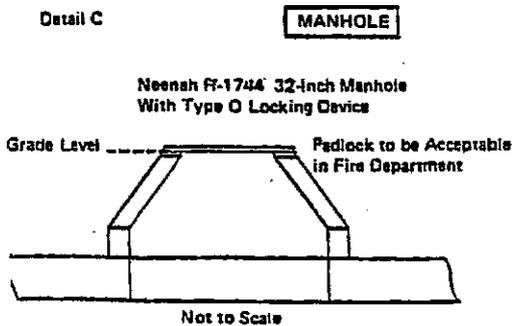
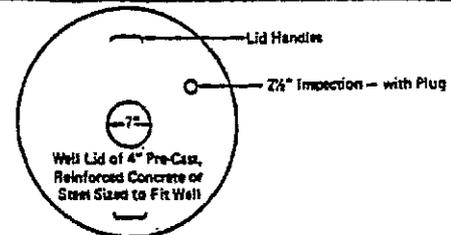


Figure B-4-6(e).

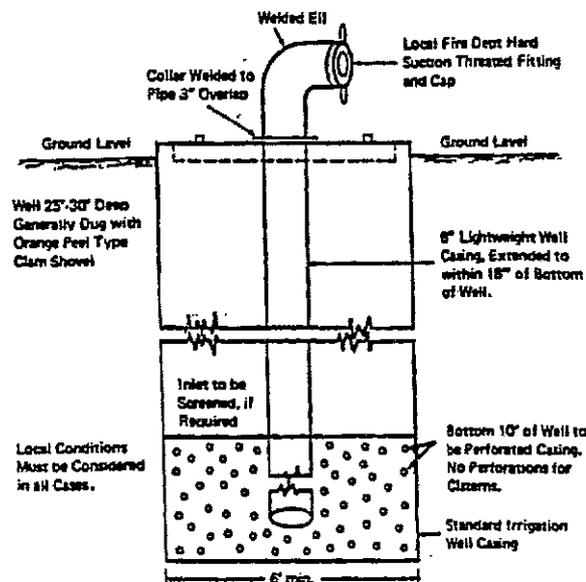


Figure B-4-6(h) Typical well (cistern) with dry hydrant installed. Same design suitable for cistern if bottom of casing is not perforated. For usable water depth, see B-4-7 warning.

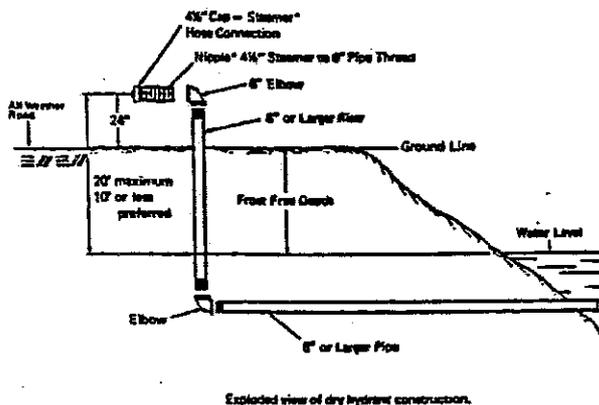
the pipe) a pump connection may be made to draft water much as from a well hydrant. Material on this technique is available from the U.S. Forest Service. A high water table is a prerequisite to using this method. Fire fighting units in areas conducive to this technique should have the necessary equipment for such installations.

B-5 Dry Hydrants.

B-5-1 General. The use of natural water sources and man-made water sources requires an understanding of dry hydrant construction, as the dry hydrant provides a ready means of suction supply without the longer time often involved in direct drafting. Although most rural fire departments are equipped to draft water directly from farm ponds or streams, and all should be, a dry hydrant [see Figure B-5-1(b)] with an all-weather road access is preferable.



Figure B-5-1(a) Dry hydrant.

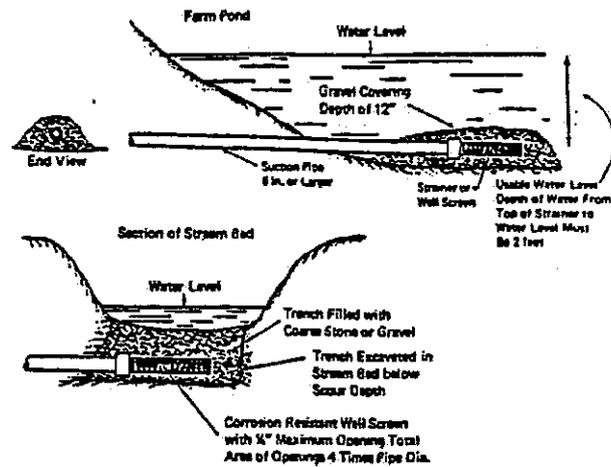


Exploded view of dry hydrant construction.

Figure B-5-1(b) Dry hydrant construction. [See Figure B-5-2(c).]

NOTE: Riser should be protected by post if subject to damage by auto or fire equipment.

*Steamer should be fire department's hard suction hose size and thread type.



Details of screen layout - pond and stream sites.

Figure B-5-1(c) Details of screen layout - pond and stream sites.

B-5-2 Dry Hydrant Construction. Depending upon the desired flow, the distance to the water, and the difference in elevation between the hydrant and water source, a 6-in. (152-mm) or larger pipe is necessary. The pipe and material should be suitable for the use and installed to manufacturer's standard. In some areas of the country, PVC pipe is being used for the construction of dry hydrants. (See B-5-2.2.) However, in other areas of the country, brass or bronze caps and steamer connections are being used along with iron pipe elbows and risers with asbestos cement or bituminized fiber pipe between risers and the water supply. Pipe and material used should be based on local conditions and common usage.

Table B-5-2 may be used to determine pipe size of a given hydrant line basing the flow upon 10 psi or 20 ft of head.

Table B-5-2
Gallons per Minute Flow at 20 Feet of Head
on Typical 6-in. Pipe

Length	Bituminous Fiber or Steel (C=120)	Cast Iron (C=110)	Asbestos Cement (C=130)
25 ft	3,400	3,060	3,650
50 ft	2,300	2,100	2,500
100 ft	1,600	1,475	1,700
500 ft	660	615	720
1000 ft	460	425	495

For SI Units: 1 ft = 0.305 m; 1 gpm = 3.785 L/min.

Based upon the Hazen-Williams formula with estimated values of C. Courtesy of Dr. Gilbert Levin.

A strainer or well screen is needed for the suction end of the pipeline to keep foreign materials out of the pipe and the pumper using the dry hydrant. A well screen as a strainer is shown in Figure B-5-1(c). However, a strainer may be constructed by boring 1/4-in. (6.4-mm) or 3/8-in. (9.5-mm) holes through the pipe. The holes should be spaced on 1/2-in. (12.7-mm) centers, with at least 12 rows drilled. Total area of strainer holes must exceed four times