John D. [illegible] IV
Governor

L. Clark Hansbarger, M.D.
Director

State of West Virginia

DEPARTMENT OF HEALTH
CHARLESTON 25305

NOTICE OF PUBLIC HEARING

Pursuant to Section five, Article three, Chapter twenty-nine-A of the Code of West Virginia, one thousand nine hundred thirty-one, as amended, the Regulatory Services Division of the West Virginia Department of Health shall convene a public hearing on September 1, 1982 at 1:00 P.M., Capitol Conference Room C, 1900 Washington Street, East, Charleston, West Virginia for the purpose of taking evidence pertaining to the filing of proposed Legislative Rule "Water Well Regulations" and Interpretive Rule "Water Well Design Standards".

Any citizen or other interested party may appear in person to present evidence. Any citizen or other interested party may submit written evidence to the West Virginia Department of Health, Regulatory Services Division, Room 416, 1800 Washington Street, East, Charleston, West Virginia 25305 not later than 5:00 P.M., September 1, 1982.

The issues to be heard shall be limited to the actual information contained in the proposed and above-mentioned regulations. Copies of the regulations may be obtained from the Regulatory Services Division, address heretofore appearing or by telephoning 304-348-2411.

L. Clark Hansbarger, M.D.
Director

FILED IN THE OFFICE OF
A. JAMES MANCHIN
SECRETARY OF STATE
THIS DATE 7/19/82
Administrative Law Division
Entered

PROPOSED

WEST VIRGINIA INTERPRETIVE RULES
BOARD OF HEALTH

Water Well Design Standards

July 1, 1982

WEST VIRGINIA INTERPRETIVE RULES
BOARD OF HEALTH

Chapter 16-1
Series II
(1982)

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WEST VIRGINIA INTERPRETIVE RULES
BOARD OF HEALTH

Chapter 16-1
Series II
(1982)

Subject: Water Well Design Standards

Section 1. General

1.01. Scope - These interpretive rules establish the design standards for the construction of water wells and pump installation to provide adequate protection of public health and groundwater aquifers from contamination and pollution.

1.02. Authority - These interpretive rules are issued under the authority of and related to Chapter 16, Article 1, Section 9 of the West Virginia Code of 1931, as amended.

1.03. Filing Date - These interpretive rules were promulgated on the day of 19 , and were filed on the day of 19 , in the Secretary of State's office.

1.04. Effective Date - These interpretive rules became effective on the day of , 19 .

Section 2. Application and Enforcement

2.01. Application - These rules apply to all water well drillers.

Section 3. Definitions

3.01. Adequate Protection - means proper construction methods which provide protection of the potable water aquifer from contamination.

3.02. Annular Opening - means the water well opening constructed by excavation or penetration.

3.03. Annular Space - means the space between casings or between casing and excavation.

3.04. Concentric Pipe Installation - refers to the piping system between a jet pump and the well when the suction line must be buried. Concentric piping refers to the suction line being contained or located inside the pressure pipe.

3.05. Director - means the Director of the West Virginia Department of Health or his lawful designee.

3.06. Drawdown - in a well is the extent of lowering of the water level when pumping is in progress and is the difference, measured in feet, between the static water level and the pumping level.

3.07. Location - means the designation of the well site and other appurtenances of the water supply system.

3.08. NSF - means plastic materials such as pipe, fittings, solvents, etc., approved for use in potable water systems by the National Sanitation Foundation.

3.09. Pitless Well Adapter - is a device designed and approved for attachment to one of more openings through a well casing, and so constructed as to prevent the entry of contamination into the well or potable water, conduct water from the well, protect the water from freezing or extremes of temperature, and provide access of water system components within the well.

3.10. Pitless Well Cap - is an approved watertight, sanitary device that covers and encloses the upper termination of a pitless well unit or the well casing, and provided with water-tight connections for electrical power lines and well vent.

3.11. Pitless Well Unit - is an approved pre-assembled device which extends the upper end of a well casing to above grade, provided with an

approved pitless well cap, and so contructed as to prevent the entry of contamination into the well or potable water, conduct water from the well, protect the water from freezing or extremes of temperature, and provide access to the well and to the water system components within the well.

3.12. Pollution - means every contamination or other alteration of the physical, chemical, or biological properties, of any waters of the State, including change in temperature, taste, color, turbidity, or odor of the waters, or the discharge or deposit of any organic matter, harmful organisms, liquid, gaseous, solid, radioactive, or other substance into any waters of the State as will render the waters harmful, detrimental, or injurious to public health, safety, or welfare, domestic, commerical, industrial, agricultural, recreational, other legitimate beneficial uses, or livestock, wild animals, birds, fish, or other aquatic life.

3.13. Pumping Level - is the level at which water stands in a well when pumping is in progress.

3.14. Static Water Level - is the level at which water stands in a well when no water is being taken from the aquifer either by pumping or free flow. It is expressed as the distance from the ground surface to the water level in the well.

3.15. Water Well - is an excavation or penetration in the ground, whether drilled, bored, cored, diven, jetted or dug, for a water supply, for the exploration for water, or for removal of water to dewater construction sites.

3.16. Water Well - means a log accurately kept, at the time of drilling, showing the depth, thickness, character of the different strata

penetrated, location of water bearing strata, depth, size, and type of casing installed, together with any other data or information required by the Water Well Drilling and Pump Installation Regulations and on forms prescribed by said regulations.

3.17. Well Liner - means piping installed without driving which may be standard pipe weight or lighter and shall be of such minimum thickness as is required to withstand the structural load imposed by conditions inside and outside the well. Liner refers to piping placed inside or outside the well easing and maybe required due to conditions encountered during and after drilling.

3.18. Well-Yield - is the volume of water per unit time discharged from a well by pumping when the pumping level has generally stabalized for a given time period.

Section 4. Location of the Water Well

4.01. The water well shall be located as far as possible from any source or any potential source of pollution and specifically as listed below:

4.01.01. The required minimum horizontal distance separation between a water well and source or potential source of contamination is as follows.

Septic Tank	50' (200')*
Sewage Holding Tanks	100' (200')*
Sewage Absorption Field	100' (200')*
Sewers and Drains (Hydrostatically Tested)	10' **
Sewers and Drains (Non Water Tight)	100' (200')*
Privies (Leaching)	100' (200')*
Privies (Vault)	50' (200')*
Barnyard/Feeding and Watering Areas	100' (200')*
Streams, Impoundments, etc.	25' ***

(*) A water well shall not be located downhill in elevation from any septic tanks, home aeration units, privies, sewage holding tanks, trench fields, serial distribution system, beds, mound systems, and any other soil absorption systems unless the well is two hundred feet (200') minimum from the referenced sources of contamination.

(**) Sewer and drain materials shall be of waterline grade and quality and shall be hydrostatically tested by completely filing the line with water and observing that there is no leakage over a four (4) hour time period.

The sewer or drain line length that is required to be tested and constructed of waterline grade and quality shall be that section of line that is located within one hundred feet (100') of a water well that is higher in ground elevation than the referenced sewer or drain line.

The sewer of rain line length that is required to be tested and constructed of waterline grade and quality shall be that section of line that is located within two hundred feet (200') of a water well that is lower in

ground elevation than the referenced sewer or drain line.

(***) When possible, the well casing shall extend above the 50 year flood level. When the 50 year level is not known, then the referenced flood level shall be designated at six feet (6') above normal water level of the stream as a minimal standard.

Section 5. Water Volume Guidelines

5.01. Well water supply systems shall be designed to provide at least a minimum flow rate of 2 gallons per minute at any outlet or plumbing fixture.

5.02. The well shall be test pumped or bailed to establish the capacity of the system's well pump. Total water pumped must be a minimum of 250 gallons per single family dwelling per day. Recovery rate of the water level within the well must be determined. The water level in the well should fully recover to original static water level within 24 hours after the pumping or bailing test period is completed.

5.03. Minimum sizing of the hydropneumtic tank for an individual water system shall be based on the installed pump capacity as follows:

Installed Pump Capacity (GPM @ 40 PSI)	Minimum Hydropneumatic Standard Tank (Gal.)	Tank Size Captive Air (Gal.)
9 GPM or Greater	42	25
6 GPM to less than 9 GPM	82	45
4 GPM to less than 6 GPM	120	70
Less than 4 GPM	220	130

Note: Additional storage capcity will be required for chlorine contact time.

5.04. Use of a single well or interconnected wells for supplying from

two (2) to six (6) residences with potable water from a common water system shall require the use of a hydropneumatic tank/pumping system as follows:

Dwellings	Minimum Pump Capacity @ 40 PSI	Hydropneumatic Standard Tank	Tank Size (Minimum) Captive Air
2	6 GPM	120	70
3	9 GPM	120	70
4	9 GPM	220	130
5	10 GPM	220	130
6	10 GPM	315	190

Note: Additional storage capacity will be required for chlorine contact time.

5.05. Water systems utilizing approved elevated or reservoir storage facilities shall be required to have minimum storage and distribution facilities as follows:

Dwellings	Minimum Storage Volume	Minimum Distribution Line Diameter (Main)
1	250 Gal	3/4"
2	500 Gal	1"
3	750 Gal	1"
4	1000 Gal	2"
5	1250 Gal	2"
6	1500 Gal	2"

Section 6. Materials

6.01. Well casing may be of iron or steel with minimum wall thickness of 0.142 inches (for undriven casing) and 0.187 inches (for driven casing), minimum casing inside diameter of five and one half inched (5½") (Also see Section 7.10.03), and shall have welded or threaded pipe joints and shall be watertight for protection against contamination.

6.02. Use of plastic well casing shall not be permitted.

6.03. Any casing used must be adaptable to stresses to which they will be subjected during installation.

6.04. When permanent well casing is driven, a standard drive shoe shall be welded or threaded on the lower end of the string of casing. The shoe shall have a beveled and tempered cutting edge of metal forged, cast or fabricated for this purpose. It shall be the well driller's responsibility to utilize the equipment he deems suitable to insure that the well will maintain alignment, plumbness, and roundness during installation.

6.05. Outer casing and liners, or temporary casing and liners installed without driving may be standard pipe weight or lighter. Lighter weight materials shall be of such minimum thickness as is required to withstand the structural load imposed by conditions inside and outside the well. The outer casing shall be withdrawn during grouting.

6.06. Driven casing shall have minimum weights and thicknesses given in Tables 1 and 2.

6.07. Use of plastic pipe for well liners and temporary casing shall be permitted provided that the following requirements are not:

6.07.01. Plastic pipe shall meet National Sanitation Foundation (NSF) Standards or equivalent.

6.07.02. Electric grounding to plastic pipe is not approved.

6.08. Pitless adapters, Pitless Units, Well Caps and Related Accessories shall be Water Systems Council recommended - Recommended Standards (PAS-1) dated February 1980 or latest revision thereto or National Sanitation Foundation (criteria C-8) approved or equivalent.

6.09. Well Screens

6.09.01. Well screens may be fabricated from either plastic or approved metal materials.

6.09.02. Plastic well screens shall be Schedule 40 (minimum) or equivalent as specified in ASTM D 1785 and ASTM D 1537 or the latest revision thereto and the material shall be NSF approved.

6.09.03. Well screen openings shall provide the maximum amount of open area consistent with strength of screen material and sediment grain size of the water bearing formation or any sand or gravel pack placed adjacent to the screen. The screen shall permit maximum water transmission with clogging.

6.09.04. Well screens other than those made commercially are prohibited for use.

6.09.05. Slotted pipe shall not be used in place of well screens.

6.09.06. The well screens shall be provided with such fittings as are necessary to close the bottom of the screen.

6.09.07. Well screen and fittings used shall be compatible with the chemical characteristics of the water.

6.10. Distribution Piping

6.10.01. Any plastic piping used shall bear the seal of the National Sanitation Foundation (NSF-pw) or be National Sanitation Foundation approved.

6.10.02. Plastic solvents, joint compounds, fittings, etc. used shall be National Sanitation Foundation approved.

6.10.03. Any other type distribution piping may be used if approved and used per American Water Works Association Standard.

6.11. Grouting Material - Only the following materials shall be acceptable for the grouting of the annular space between the oversize drill hole, excavation, etc. and the well casing.

6.11.01. Neat Portland Cement or quick setting cement utilizing no more than 7½ gallons of water per 94 pounds of cement.

6.11.02. Neat Portland Cement or quick setting cement dry blended with no more than 7½ pounds of sodium base bentonite clay per 94 pounds cement and no more than 10 gallons of water.

6.12.03. Bentonite clay alone shall not be used for grouting.

Section 7. Construction Requirements

7.01. Casing

7.01.01. The minimum length of casing placed in any water well shall be twenty feet (20'). This minimum length of casing includes one foot (1') minimum above ground level or well house floor level. Where possible, the well casing shall terminate above the fifty (50) year flood level.

7.01.02. Casing shall enter into unweathered rock a minimum of five (5') feet.

7.01.03. Inside diameter of water well casing shall not be less than five and one half inches (5½"). Lesser diameter casing may be used for those depths in excess of twenty feet (20') where conditions dictate use of additional casing.

7.02. Annular Openings

7.02.01. The annular opening of the drill hole, well boring, etc., shall be at a minimum three inches greater in diameter than the dimension of the outside diamenter of the well casing.

7.02.02. The annular opening shall extend the full depth of the well casing and terminate a minimum of five feet (5') into rock.

7.02.03. The annular opening for water wells constructed in unconsolidated materials shall be maintained by use of twenty foot length (minimum) of outer casing which shall be removed uring the grouting operation.

7.03. Grouting

7.03.01. Grout shall be placed by means of a grout pump from the bottom of the annular opening upward in one continuous operation.

7.03.02. Gravity placement of grout (poured, rodded, or vibrated) shall not be permitted.

7.03.03. During the grouting operation, the casing shall be maintained in a centered position within the oversize drill hole.

Section 8. Well Head

8.01. The well head shall be constructed as to assure adequate protection of the well and to exclude entry of any contaminant.

8.02. Any well casing must extend a minimum of twelve inches (12") above ground level or finished floor level of a pump house as applicable. Where possible, the well casing shall terminate above the fifty (50) year flood level.

8.03. Installation of pits or well houses below ground level is prohibited for any well water system or pumping system.

8.04. The well casing shall be provided with either a pitless unit installation and well cap for outdoor installation or sanitary seal for indoor (well house) installation approved by the Water Systems Council or be NSF approved.

8.05. Well vents shall be provided where required. The well vent shall be constructed with a down-facing elbow or mushroom type head located at least twelve inches (12") above floor or ground level and above 50 year flood elevation where possible. All vents shall be screened against the entry of insects.

8.06. Wells shall be properly capped during construction of the water system to exclude the entry of contamination as applicable.

Section 9. Pitless Well Installation

9.01. A pitless well installation shall consist of either a pitless well unit or pitless well adapter, and a pitless well cap.

9.02. Pitless well units, pitless adapters and pitless well caps shall be constructed in accordance with Criteria C-8 of the National Sanitation Foundation or the Recommended Standards (PAS-1) of the Water Systems Council or latest revision thereto and be recommended for use by the Water Systems Council or equivalent.

9.03. The pitless well unit installation shall terminate not less than twelve inches (12") above the ground surface, and above the 50 year flood elevation as applicable or practical and shall be provided with a pitless well cap and a well vent (where required) which shall be protected with a down-facing elbow or mushroom-type head located above the referenced flood level where applicable or ractical and screened against the entry of insects.

9.04. The cement grouting of the annular space of the well shall extend to within six inches (6") of the connection between the well casing and the pitless installation.

9.05. The lateral discharge line shall be provided with a minimum of three feet (3') of earth cover, or a sufficient earth cover to prevent freezing.

9.06. Pitless Well Adapters Connection to Casing

9.06.01. The hole used to install the lateral discharge line to the well casing shall be made in such a manner as to provide a watertight connection.

9.06.02. The exterior connection between the adapter and the well casing may be welded, or may be of the threaded or clamp-on gasket type. Extreme care shall be exercised when the connection is welded to assure a complete, watertight seal. A clamp-on gasket adapter shall be installed only on a smooth, clean surface.

9.07. Pitless Well Unit Connection to Casing

9.07.01. At the point of attachment to the well casing a pitless well unit may be welded, threaded, or of the slip-on type with O-ring gasket and shall be of watertight construction.

9.07.02. If the connection is to be by means of a field weld, the pitless well unit must be specifically designed for welding. The only field welding permitted shall be that needed to attach the pitless well unit to the well casing.

9.07.03. If the connection is of the slip-on type with O-ring gasket, the surface of the well casing shall be smooth and clean.

9.07.04. The filed connection between the pitless well unit and the lateral discharge line shall be threaded, flanged on a mechanical joint, and shall be so constructed and installed as to be watertight.

Section 10. Pumping Equipment

10.01. Pumps and pumping systems shall be designed and installed to insure a contamination proof and frost proof installation.

10.02. Use of jet pumps with buried suction lines shall require the use of Water Systems Council recommended pitless units and concentric pipe installation. Other methods may be considered and approved by the director.

10.03. Each pumping system shall be installed with a foot valve or check valve.

10.04. In a screened well, the pump setting and suction inlet shall be so located that the pumping level of the water in the well cannot be drawn below the suction inlet.

10.05. Suction lift pumps shall not be used where the maximum suction head exceeds twenty-two feet (22').

10.06. Pump Location

10.06.01. It is required that the pump be located and designed as to eliminate the use of pump pits.

10.06.02. It is recommended that the pump location be such as to permit convenient access for the removal and repair of the pump, drop pipe and other accessories.

10.06.03. It is recommended that the pump be suitably mounted to avoid objectionable vibration and noise, and to prevent damage to pumping equipment.

10.06.04. Pump controls and accessories shall be protected from weather.

10.07. Pump Controls

10.07.01. Pump operation should be controlled by pressure switch.

10.07.02. The pump should be protected by a thermal overload switch.

10.07.03. A pressure relief valve is recommended on any pump capable of producting pressure in excess of the pressure rating of the installed hydropneumatic tank or other water system components.

10.07.04. When the capacity of the installed pump, expressed in gallons per minute, exceeds the safe yield of the well, one of the following pump-down controls shall be installed, as applicable:

10.07.04.01. Thirty feet (30') of tailpipe below a jet pump on deep well installations.

10.07.04.02. A vertical suction line no less than thirty feel (30') in lengt on shallow well jet installations.

10.07.04.03. A low water level cut-off switch on all other pumps.

Section 11. Well Log - A completed well log shall be submitted to the director. The well log submitted shall be on the form prescribed by the director.

Section 12. Well Abandonment

12.01. Any test well or water well which is not in use shall be sealed by such measures as necessary as to restore the controlling geological conditions which existed prior to well construction.

12.02. Wells to be abandoned shall be sealed by filling the well with concrete to prevent exchange of water from one geological strata to another.

12.03. Notification of well abandonment shall be provided to the director on forms prescribed by the director.

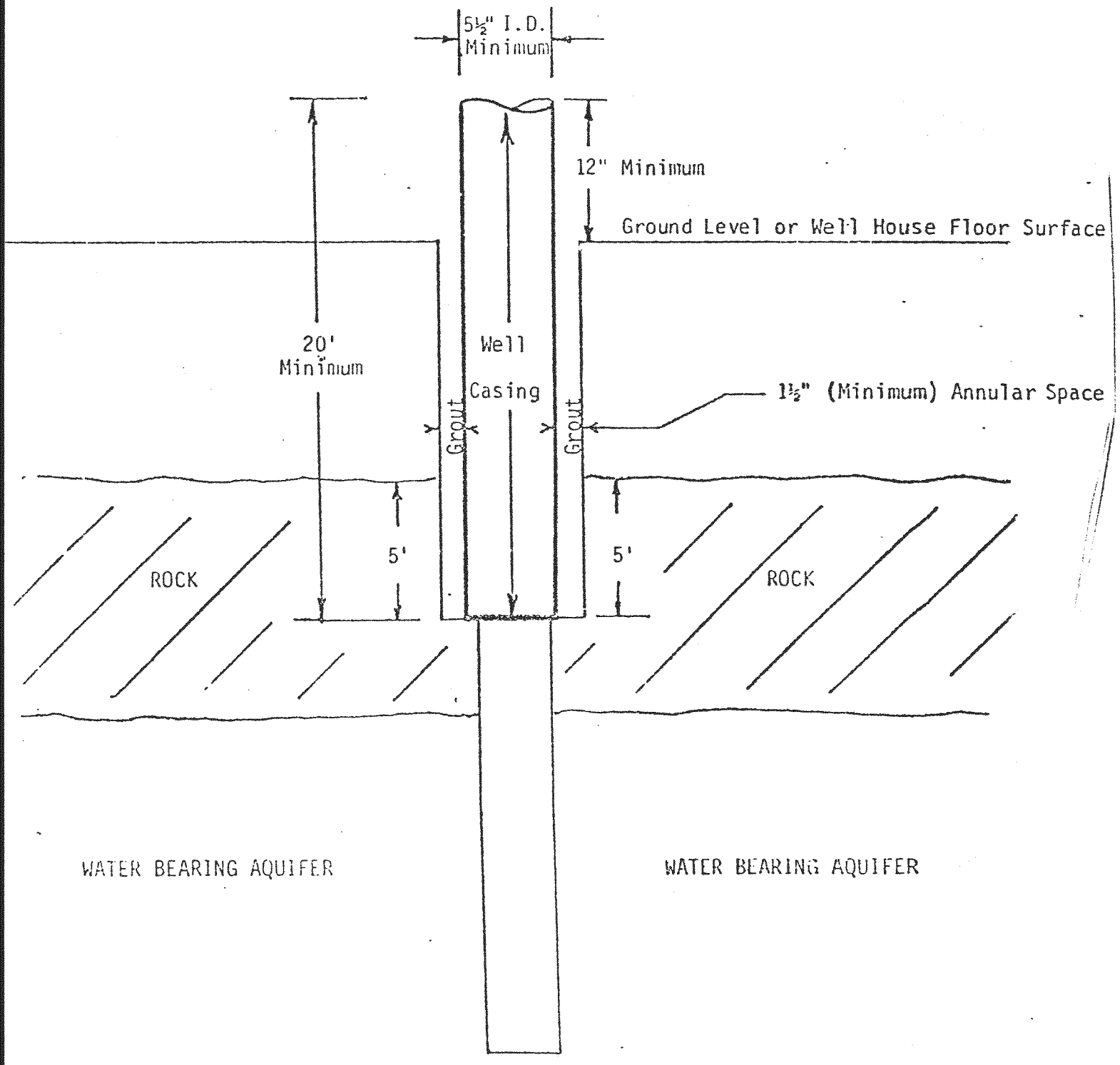
Section 13. Additional Requirements - all installations and operation shall

meet or exceed relevant requirements of national, state, local or trades good practices or codes, whichever has jurisdication.

meet or exceed relevant requirements of national, state, local or trades good practices or codes, whichever has jurisdication.

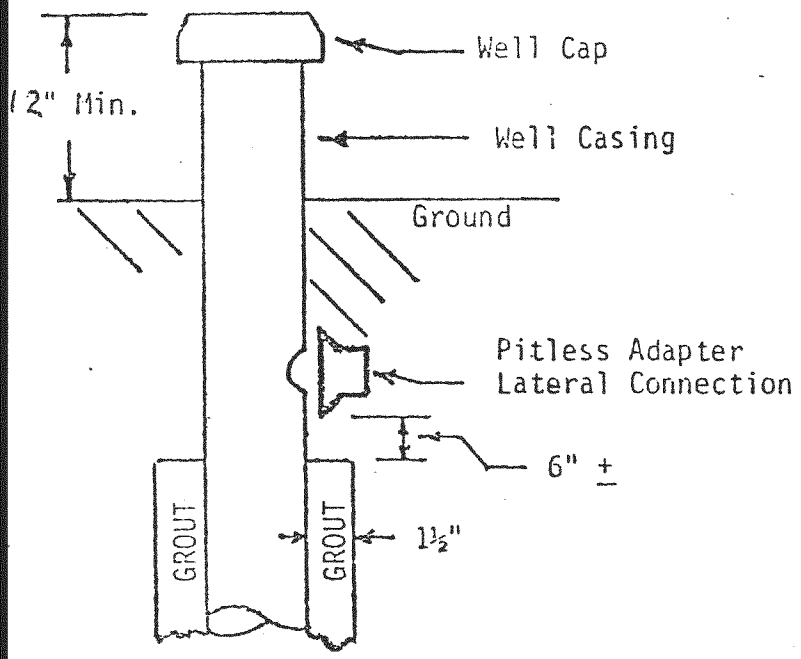
DRILLED

WELL CONSTRUCTION TYPICAL

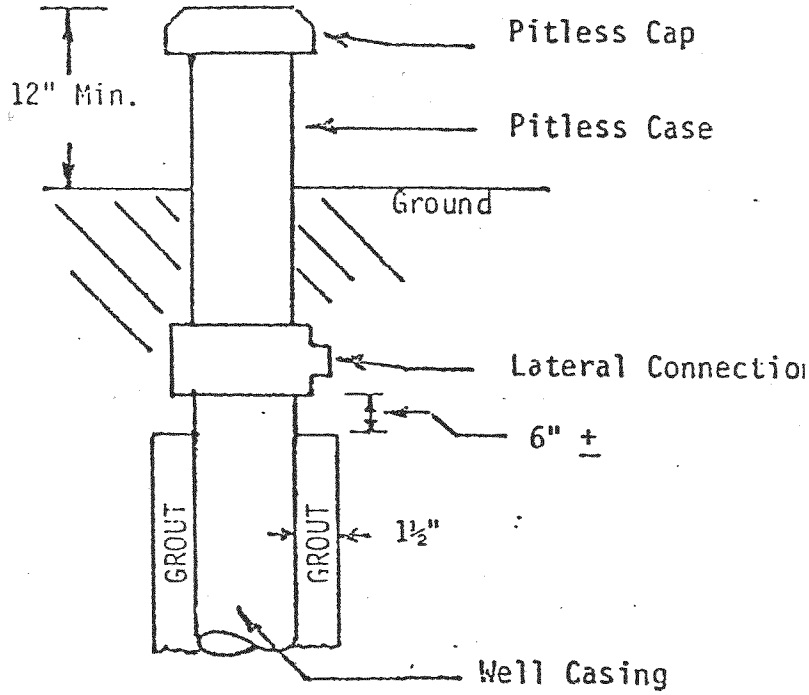


WELL HEAD CONSTRUCTION

INDOOR INSTALLATIONS



PITLESS ADAPTER
BELOW GROUND



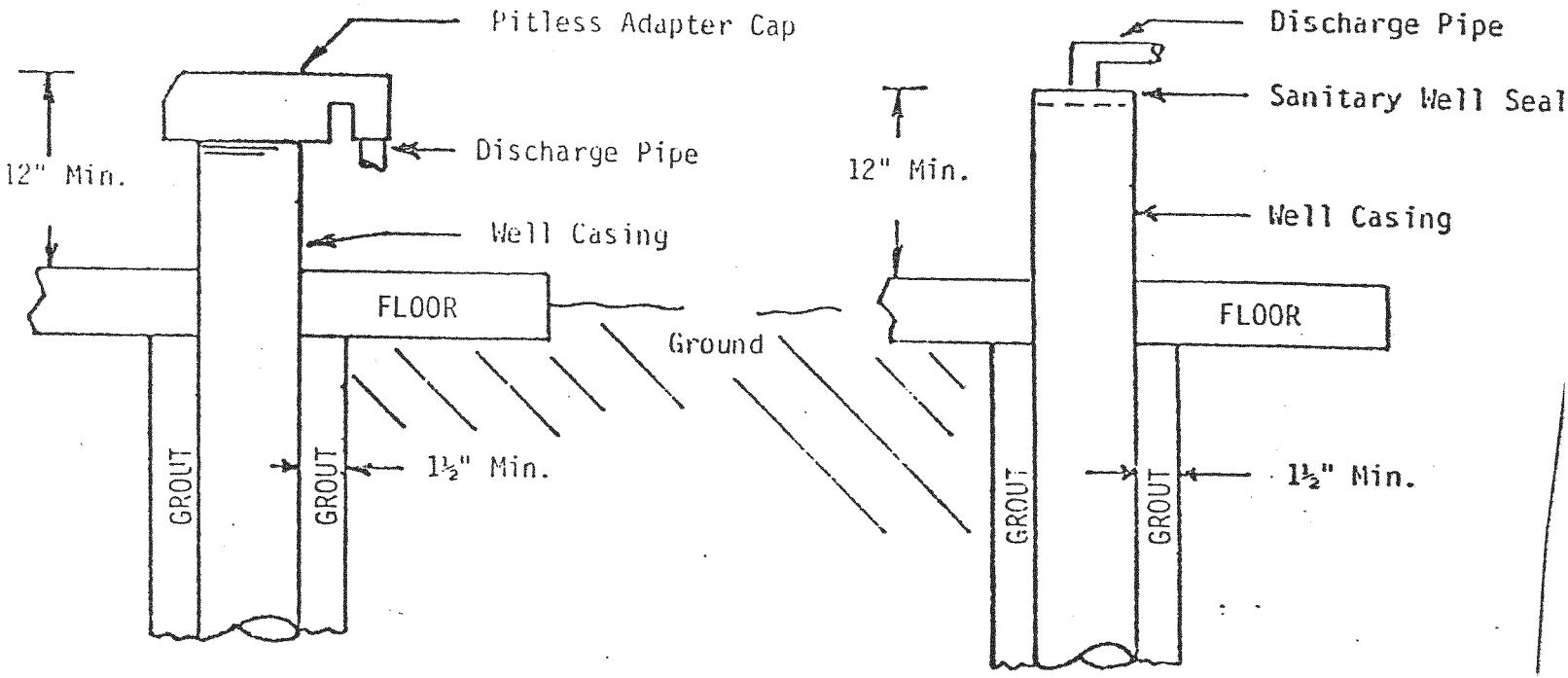
PITLESS UNIT

RULES

1. Indoor well heads for drilled water wells shall be constructed in accordance with one of the above standards.
2. Grout shall extend to ground/floor level.
3. Pitless adapter, pitless adapter caps, sanitary well seals and related accessories used in water well construction must meet the Recommended Standards (PAS-1) of the Water Systems Council or Criteria C-8 of the National Sanitation Foundation or equivalent.
4. Properly constructed vents shall be provided as applicable.

WELL HEAD CONSTRUCTION

OUTDOOR INSTALLATIONS



PITLESS ADAPTER ABOVE GROUND/FLOOR LEVEL.

SANITARY WELL SEAL ABOVE GROUND/FLOOR LEVEL

NOTES

1. Outdoor well heads for drilled water wells shall be constructed in accordance with one of the above standards.

2. Pitless adapters, pitless units, well caps, and related accessories used in water well construction must meet the Recommended Standards (PAS-1) of the Water Systems Council or Criteria C-8 of the National Sanitation Foundation or equivalent.

3. Grouting of the well casing should not cover the pitless adapter, pitless unit or the lateral connection, etc.

4. The recommended depth of the lateral connection is three feet (3') minimum or below the frost line to avoid freezing.

5. Use of jet pumps with buried suction lines shall require the use of Water Systems Council recommended pitless units with concentric pipe installation. The suction line shall be contained inside the buried pressure line.

6. Properly constructed vents shall be provided as applicable.

Table 1 - Driven Casing
IRON PIPE

SIZE (inches)	DIAMETER (inches)			WEIGHT PER FOOT (pounds)	
	EXTERNAL	INTERNAL		PLAIN ENDS (calculated)	WITH THREADS AND COUPLINGS (nominal)
6	6.625	6.250	0.187	-	-
6	6.625	6.053	0.286	18.97	19.45
8	8.625	7.967	0.329	28.55	29.35
10	10.750	10.005	0.372	40.48	41.85
12	12.750	11.985	0.383	49.56	51.15
14	14.000	13.234	0.383	54.56	57.00
16	16.000	15.234	0.383	62.58	65.30
18	18.000	17.165	0.417	76.84	81.20
20	20.000	19.000	0.500	102.10	106.62
22	22.000	21.000	0.500	112.57	
24	24.000	23.000	0.500	123.04	
26	26.000	25.000	0.500	133.51	
28	28.000	27.000	0.500	143.99	
30	30.000	29.000	0.500	154.46	

TABLE 2 - Driven Casing
STEEL PIPE

SIZE	DIAMETER (inches)		THICKNESS (inches)	WEIGHT PER FOOT (pounds)	
	EXTERNAL	INTERNAL		PLAIN ENDS (calculated)	WITH THREADS AND COUPLINGS (nominal)
6	6.625	6.250	0.187	-	-
6	6.625	6.065	0.280	18.97	19.18
8	8.625	7.981	0.322	28.55	29.35
10	10.750	10.020	0.365	40.48	41.85
12	12.750	12.000	0.375	49.56	51.15
14	14.000	13.250	0.375	54.57	57.00
16	16.000	15.250	0.375	62.58	65.30
18	18.000	17.250	0.375	70.59	73.00
20	20.000	19.250	0.375	78.60	81.00
22	22.000	21.000	0.500	114.81	
24	24.000	23.000	0.500	125.49	
26	26.000	25.000	0.500	136.17	
28	28.000	27.000	0.500	146.85	
30	30.000	29.000	0.500	157.53	
32	32.000	31.000	0.500	168.21	
34	34.000	33.000	0.500	178.89	
36	36.000	35.000	0.500	189.57	

Section 14. Severability - If any provisions of these rules or the application thereof to any person or circumstance shall be held invalid, such invalidity shall not affect the provisions or the application of these rules which can be given effect without the invalid provisions or application, and to this end the provisions of these rules are declared to be severable.