WEST VIRGINIA INTERPRETIVE RULES
BOARD OF HEALTH

Design Standards for Small Septic Tank Systems

Chapter 16-1
Series VII
(1983)

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Subject: Design Standards for Small Septic Tank Systems

Section 1. General

1.1. Scope - These interpretive rules sets forth the minimum design, construction, and installation standards for septic tank, soil-absorption systems as established by the state department of health. The local health department is authorized only to issued permits for the installation of septic tank, soil-absorption systems as shown and described in this bulletin. All other types of septic tank, soil-absorption sytems, evapotranspiration systems or variations of on-site sewage disposal systems must be approved by the waste water division, state department of health, prior to installation.

1.2. Authority - These interpretive rules are issued under the authority of Chapter 16, Article 1, Section 7 and are related to Chapter 16, Article 1, Section 9 of the West Virginia Code of 1931, as amended.

1.3. Filing Date - These interpretive rules were filed on the 1st day of November 1975 in the Secretary of State's office.

1.4. Effective Date - These interpretive rules became effective on the 1st day of December 1975.

1.5. Refiling Date - These interpretive rules were refiled pursuant to Chapter 29A, Article 2, Section 5 of the West Virginia Code of 1931, as amended on the 30th day of December 1982, in the Secretary of State's office.

Section 2. Permit Required

2.1. Under the provisions of the state code and the state board of health regulations, a permit must first be obtained from the health department prior to construction or installation of a septic tank, soil-absorption system or any other type of small sewage or excreta disposal system. The code and regulations provide for a fine up to $500 for failure to comply with the requirements of the state code or the regulations adopted by the West Virginia state board of health. Each day's failure to comply with said code and regulations constitutes a separate offense.

2.2. A health department permit is required prior to construction or installation of a septic tank, soil-absorption system or other types of sewage or excreta disposal systems. Contact your local health department for the necessary permit application form and assistance in designing your septic tank or excreta disposal system.*

Section 3. What is a Septic Tank, Soil-Absorption System?

3.1. A septic tank, soil-absorption system consists of: (1) a holding (septic) tank for separating the solids from the liquid; and (2) a soil-absorption field permitting the liquid wastes (effluent) from the septic tank to be absorbed into the ground.

3.2. Wastes reaching the septic tank are attacked by bacteria and much of the solid matter is reduced to liquid. The remaining solid material either floats on the liquid (scum) or settles to the bottom of the tank (sludge) where bacterial action continues to digest the solids. Maximum bacterial action requires that the liquid remain in the tank for at least 24 hours. Liquid leaving the tank contains some suspended solids but is by

* Refer to Appendix.

no means sanitary and contains organisms from the intestinal tract of man consisting of non-pathogenic bacterial (nondisease causing) that multiply (disease causing), viruses, worm eggs and cysts. The presence of these pathogenic bacteria and micro-organisms make the sewage effluent a definite health hazard. Because of the possible presence of disease producing organisms, septic tank effluent must be disposed of in a manner so that it does not come in contact with man, animals or contaminate water supplies.

3.3. Dwellings located beyond or inaccessible to a public sewer system can often properly dispose of liquid wastes by the use of a septic tank, soil-absorption system, Providing there is ample space and topography and soil conditions are suitable. All liquid wastes from a dwelling including kitchen, bath, shower and sink wastes, except roof drains, Must go into the septic tank system. Roof drains and foundation drains Must Not discharge into septic tank, soil-absorption systems.

Section 4. General Considerations

4.1. Before the design of the septic tank and absorption field can be completed, the following items must be given due consideration:

4.1.1. Do Not plan to install a septic tank, soil-absorption system on a lot within a subdivision unless you are assured the subdivision and/or lot has met the requirements of Chapter 16, Article 1, Section 3 of the State Code, or has received a favorable declaratory ruling from the state department of health; refer to Sections 7.1 and 7.3 of the "Small Sewage and Excreta Disposal Systems Regulations" of the state board of health. Insist upon the seller showing you a copy of the above or check with your local health department.*

* Refer to Appendix

4.1.2. Do Not fail to consider a septic tank, soil-absorption system location when purchasing a lot and before selecting a site for constructing a dwelling.

4.1.3. Do Not plan a septic tank, soil-absorption system for a lot containing less than 10,000 square feet if a public water supply is available to the lot.

4.1.4. Do Not plan a septic tank, soil-absorption system for a lot containing less than 20,000 square feet if an individual water supply exists or is to be developed on the same lot.

4.1.5. Do Not locate the septic tank, soil-absorption system in an area subject to flooding or ponding, or in swampy or filled areas.

4.1.6. Do Not locate a septic tank, soil-absorption system closer than twenty (20) feet to an existing stream bank or roadside cut.

4.1.7. Do Not locate a septic tank, soil-absorption field closer than ten (10) feet to a lot line or building foundation.

4.1.8. Do Not locate the septic tank within fifty (50) feet of any well or other source of groundwater supply.

4.1.9. Do Not locate the soil-absorption field within one-hundred (100) feet of any well or other source of groundwater supply.

4.1.10. Do Not locate the septic tank or soil-absorption field uphill from any groundwater supply source.

4.1.11. Do Not locate the soil-absorption field in areas where the water table is less than four (4) feet below the bottom of the absorption field.

4.1.12. Do Not locate an absorption field on a slope greater than 25% (25 foot rise in 100 feet).

4.1.13. Do Not locate the absorption field in an area where rock or shale is within four (4) feet of a trench bottom.

4.1.14. Do Not locate the septic tank or soil-absorption field under areas to be paved, parking lots, driving surfaces, playgrounds or any type of structure.

4.2. After February 1, 1976 a septic tank, soil-absorption field must be constructed either by the owner or by a certified septic tank installer. Refer to Section 10 of the "Small Sewage and Excreta Disposal Systems Regulations".

Section 5. Septic Tank Construction Materials

5.1. Use reinforced concrete bottom and top. Use reinforced concrete or concrete block walls. Plaster the concrete block walls inside for water tightness. The cover (top) may be poured in sections and placed over tank to facilitate cleaning; otherwise, a manhole shall be provided. The top must be constructed and installed so as to be watertight.

5.2. Commercial septic tanks are acceptable Providing capacities and general design requirements of the state department of health are satisfied.

5.3. Metal tanks Must be coated and bear the Underwriters Laboratories, Inc., label or the Kentucky Code Approved designation, or be approved by the state department of health.

5.4. Fiberglass tanks Must be approved by the state department of health.

Section 6. Septic Tank Operation and Maintenance

6.1. Septic tank operation is not significantly affected by the normal household use of synthetic detergents, bleaches, and cleaning com-

pounds. Commercial preparations for adding to septic tanks are generally of no value and may even damage the tank or absorption field.

6.2. A septic tanks should be pumped out by a cleaner licensed by the local health department when the sludge has accumulated to one-third of the total liquid depth. This may be 2 to 10 years depending on tank use and loading. Check the sludge depth once each year. Failure to clean the tank in time may result in a clogged soil-absorption field and an expensive replacement job. If a soil-absorption field becomes supersaturated (water-logged) additional soil-absorption field must be installed.

Section 7. The Soil-Absorption Field Must Be of the Absorption Type

7.1. Septic tank effluent is offensive and is a health hazard. Most septic tank, soil-absorption systems fail because of improper construction, poor soil conditions, high water table or insufficiently sized absorption fields. Soil absorption capacity must be estimated by precise percolation tests. Use the percolation test results and refer to the table on page 12 for size of disposal field to install. This table is calculated to accommodate liquid waste from *all household appliances. Construct soil-absorption field carefully. This is a very critical part of the system. In addition to the test holes required for the percolation test, at least one additional hole shall be bored at the proposed absorption site to a depth of six (6) feet to determine depth to rock and depth to water table or other geological characteristics.

7.2. Absorption Field

7.2.1. When excavating, care must be taken to prevent sealing of

*Including automatic washer and dishwasher.

the surface on the bottom and sides of soil-absorption trench. Trenches must not be excavated when the soil is wet enough to smear or compact easily. Open trenches must be protected from surface runoff. All smeared or compacted surfaces must be raked to a depth of 1 inch and loose material removed before gravel is placed in trench.

7.2.2. The pipe, laid in a trench of required width and depth, must be surrounded by clean, graded gravel or rock, broken hard burned clay brick or similar aggregate, and the material must range in size from one-half ($\frac{1}{2}$) inch to two and one-half ($2\frac{1}{2}$) inches. The material must extend from at least two (2) inches above the top of the pipe to at least six (6) inches below the bottom of the pipe. The top of the stone must be covered with untreated building paper, newspaper, a two (2) inch layer of hay or straw, or similar pervious material to prevent the stone from becoming clogged by the earth backfill. An impervious covering (tar paper, plastic, etc.) shall not be used as this interferes with evapotranspiration at the surface.

7.2.3. No trenches shall be longer than one-hundred (100) feet in length and no trench shall be wider than three (3) feet in width.

7.3. Pipe Requirements

7.3.1. Pipe laid from the structure to the septic tank, from the septic tank to the field, and pipe composing the field shall meet the following specifications:

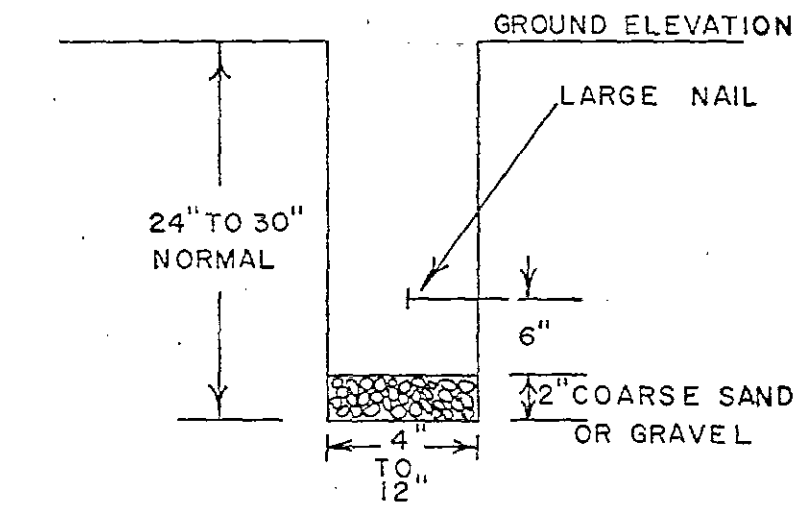
1. Plastic Pipe - ASTM F 405, D 2729, D 2751, D 2836, D 2852
2. Absbestos - Cement - Class 1500 or Class 2400

7.3.2. Pipe other than listed herein shall not be used unless

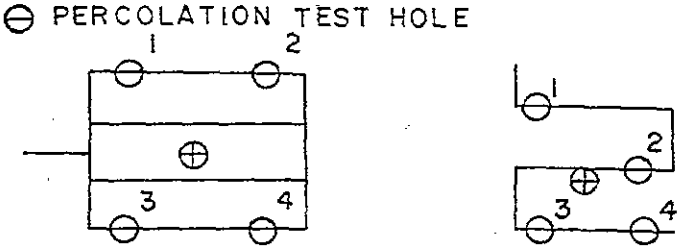
approved, in writing, by the state department of health.

7.3.3. Sewer line from structure to the septic tank shall be laid on a grade of not less than one-eighth (1/8) of an inch per foot (1%). The minimum size of a sewer line from a structure to a septic tank shall be four (4) inches.

SOIL PERCOLATION TEST



⊕ 6 FOOT DEEP BORE HOLE
⊖ PERCOLATION TEST HOLE



TYPICAL SPACING OF PERCOLATION TEST HOLES ON PROPOSED ABSORPTION FIELDS

Section 8. Percolation Test Procedure

8.1. Percolation tests must be made to determine the rate at which the soil will absorb the liquid from the septic tank. The rate of absorption and the number of bedrooms within the residence will determine the amount of area required for the soil-absorption field.

8.1.1. Location: Four (4) test holes shall be spaced at equal distances over the proposed absorption field site. If the results of the tests are reasonably close, an average result can be assumed. If the tests show extreme variations, it may be necessary to relocate the field in a more suitable area.

8.1.2. Dig or bore holes from four (4) to twelve (12) inches in diameter at the site where the soil-absorption field is to be installed. The holes shall be dug or bored to the depth of the soil-absorption field to be installed (24 inches minimum). All holes shall be dug or bored to the same depth.

8.1.3. Scratch the bottom and sides of the hole with a sharp pointed instrument or wire brush to remove any smeared soil surfaces which may interfere with water being absorbed into the soil.

8.1.4. Remove the loose dirt from the bottom of the test holes and place two (2) inches of coarse sand or fine gravel into the holes to prevent sealing.

8.1.5. Place an 8 or 10 penny nail in the wall of each hole exactly six (6) inches above the level of the sand or gravel.

8.1.6. Completely fill the test hole with water to ground level. Keep water in the hole to a depth of at least twelve (12) inches for a mini-

mum period of four (4) hours before beginning the percolation rate measurement.

8.1.7. Percolation Rate Measurement:

(a) Upon completion of the above, adjust the water depth in the holes to the level of the nail, if necessary. Accurately determine how many minutes it takes for this 6 inches of water (all the water) to be absorbed into the soil. This time in minutes divided by 6 gives the rate of fall (or absorption) per inch and is used to calculate the amount of absorption field required.

(b) Average the rate of fall for all test holes. (Add the rate of fall per each test hole together and divide by the number of test holes.) This figure is the average rate of fall per inch for the absorption field and is the rate used in calculating the size of the soil-absorption field required. (See table I.)

If desired an alternate measurement may be utilized such as a marked measuring stick and batter board if approved by the local health department.

TABLE 1

Percolation Test Results Average Time In Minutes Required For Water To Fall One Inch	Minimum Total Length Of Trenches Required Per Bedroom When Using A Trench Width Of		
	1 Foot	2 Feet	3 Feet
5 minutes or less	125	63	42
6	133	66	45
7	141	71	47
8	149	75	50
9	157	79	52
10	165	83	55
15	190	95	63
20	210	105	70
25	230	115	77
30	250	125	83
35	263	131	88
40	276	138	92
45	289	145	96
50	302	151	101
55	316	158	106
60	330	165	110
Over 60	Consult with local sanitarian		

As the maximum length of trench allowed is 100 feet, systems of over 100 feet in length must be constructed using several lines of pipe, preferably of equal length.

If total area (square feet) of the field is desired, the following examples should be followed:

Number of bedrooms multiplied by the trench width multiplied by minimum lineal feet of pipe required for the percolation results. For example - a two bedroom home and a percolation test of 20 minutes per inch.

For 1 foot trench - 2x1x210 = 420 square feet

For 2 foot trench - 2x2x105 = 420 square feet

For 3 foot trench - 2x3x70 = 420 square feet

Section 9. Permit Requirements

9.1. Septic tank, soil-absorption systems for single residences shall be designed in accordance with these design standards and with the table and information shown on page 12.

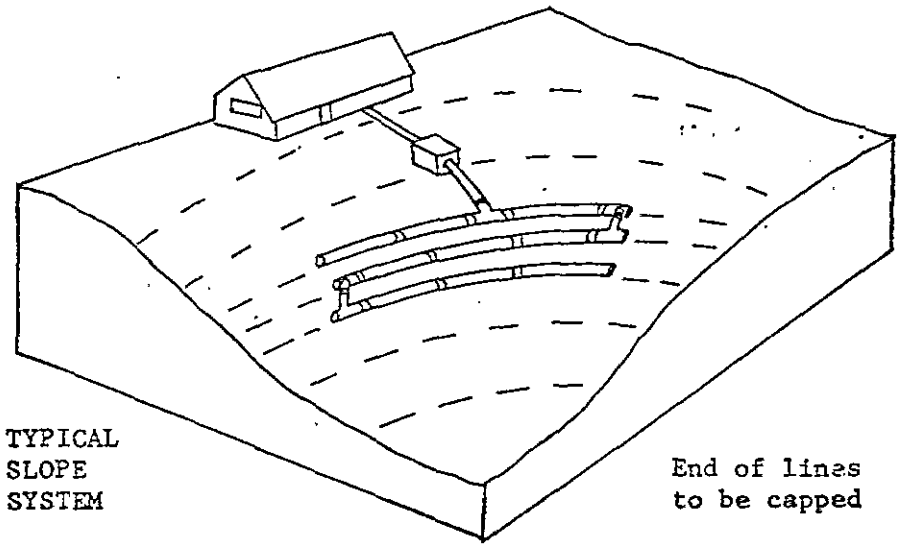
9.2. Septic tank, soil-absorption systems for establishments other than single residences shall be designed in accordance with the design flows contained in publication EG-6, "Permit Procedure and Design Requirements For Small Sewage Collection and Treatment Systems" and in accordance with these design standards and the table shown on this page.

9.3. Septic tank, soil-absorption systems with a design flow of 2,500 gallons or less and an absorption field not greater than 1,500 square feet require a permit from the local health department prior to installation.

9.4. Septic tank, soil-absorption systems with a design flow greater than 2,500 gallons and an absorption field greater than 1,500 square feet require a siphon chamber or pump chamber and distribution box. These systems require plan submission to and approval by the state department of health prior to installation.

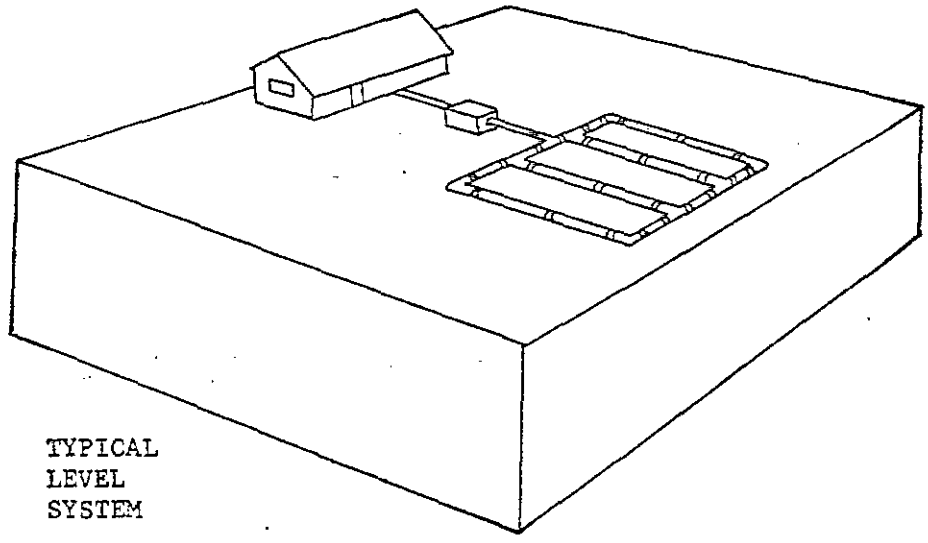
MINUTES REQUIRED FOR WATER TO DROP 1 INCH	SQUARE FEET OF AREA IN BOTTOM OF TRENCH* PER 1,000 GAL. SEWAGE PER DAY
1 or less	700
2	850
3	1000
4	1150
5	1250
10	1650
15	1900
30	2500
60	3300
over 60	not suitable for absorption

*Trench width between 12" and 36".



TYPICAL
SLOPE
SYSTEM

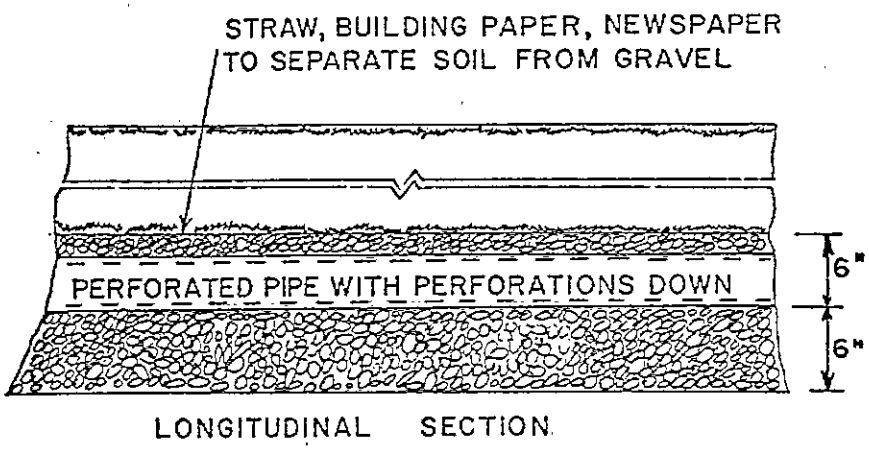
In constructing a septic tank filter field on sloping land, the lines should be laid on contour. Serial distribution depicted above should be used on most sloping fields or in fields where there is a change in soil type.



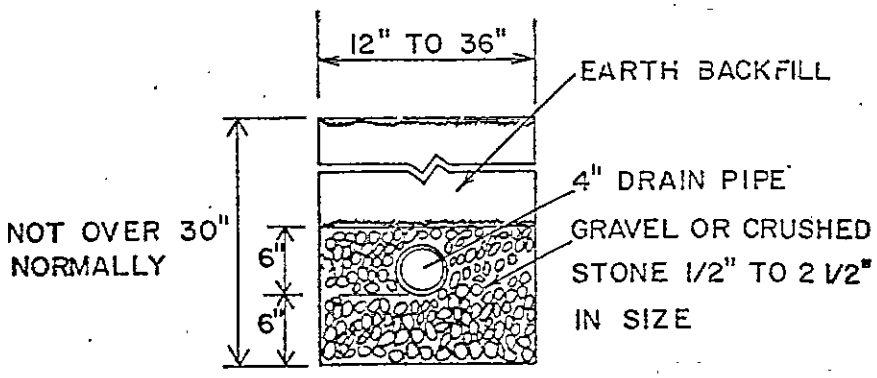
TYPICAL
LEVEL
SYSTEM

A septic tank filter field as it might be constructed on a level field.

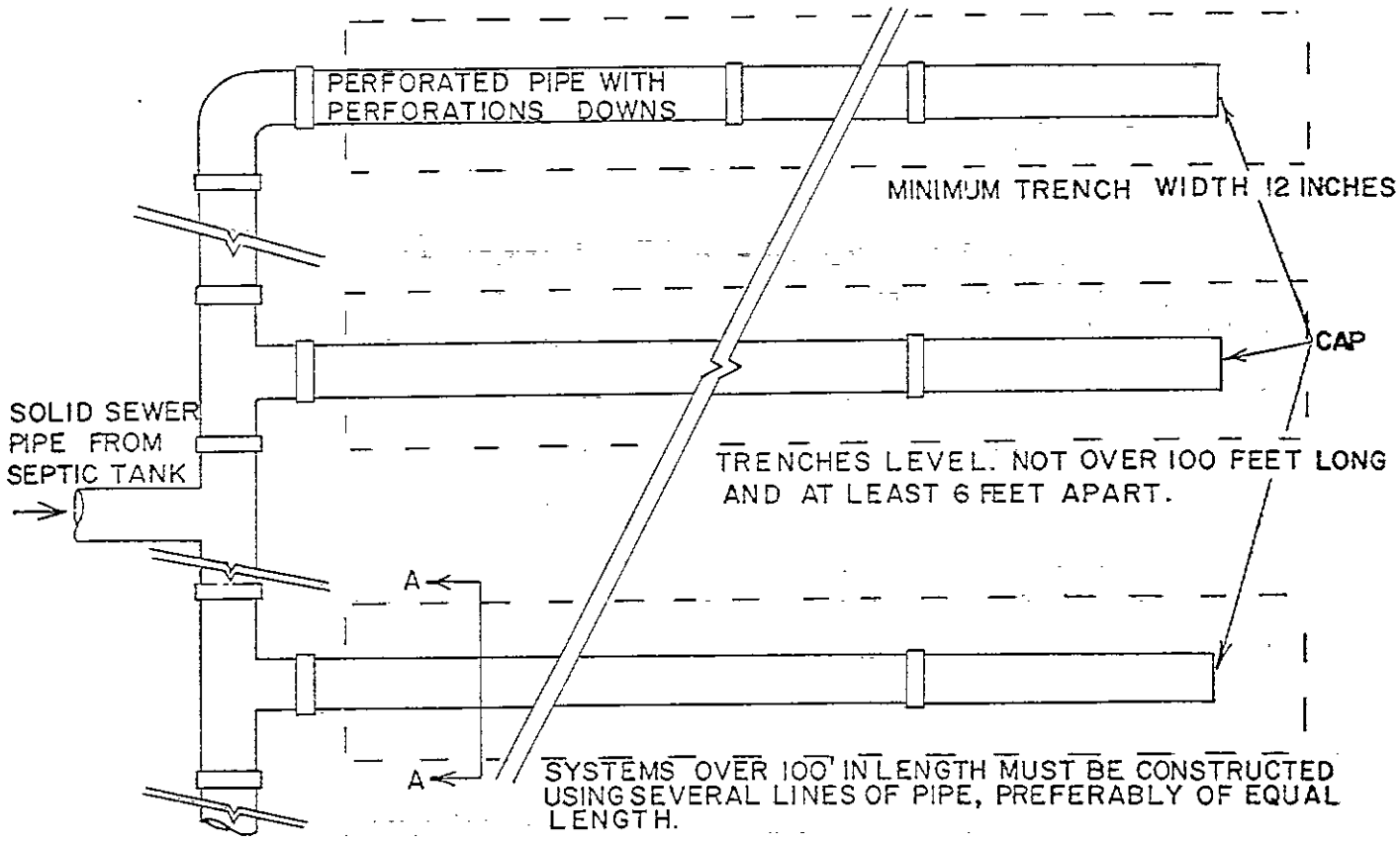
DISPOSAL FIELD
ABSORPTION TYPE



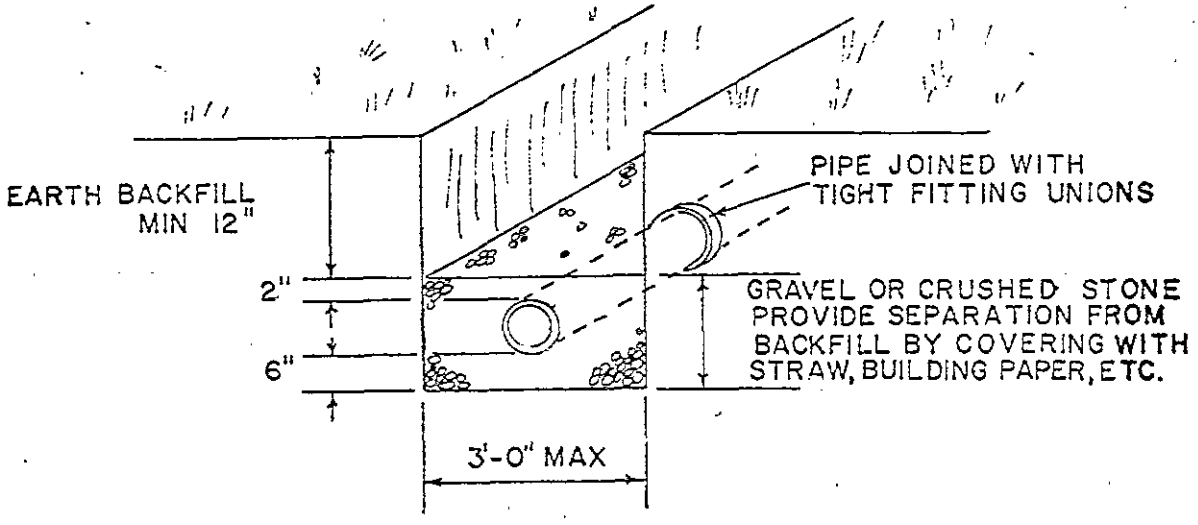
LONGITUDINAL SECTION



CROSS SECTION
OF ABSORPTION TRENCH

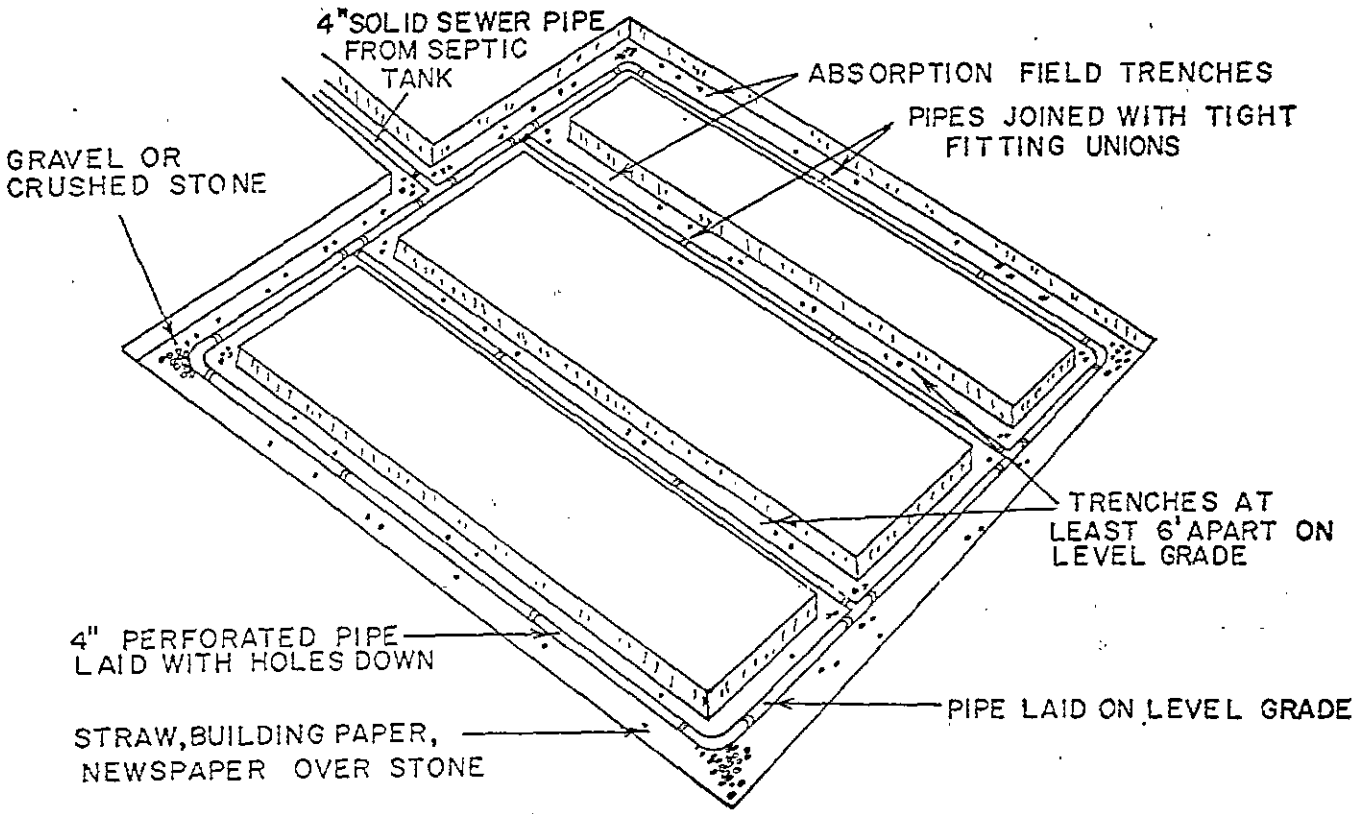

PERFORATED PIPE WITH PERFORATIONS DOWNS
MINIMUM TRENCH WIDTH 12 INCHES
CAP
SOLID SEWER PIPE FROM SEPTIC TANK
TRENCHES LEVEL. NOT OVER 100 FEET LONG AND AT LEAST 6 FEET APART.
A
A
SYSTEMS OVER 100' IN LENGTH MUST BE CONSTRUCTED USING SEVERAL LINES OF PIPE, PREFERABLY OF EQUAL LENGTH.

ABSORPTION FIELD
SERIAL DISTRIBUTION FOR LEVEL GROUND

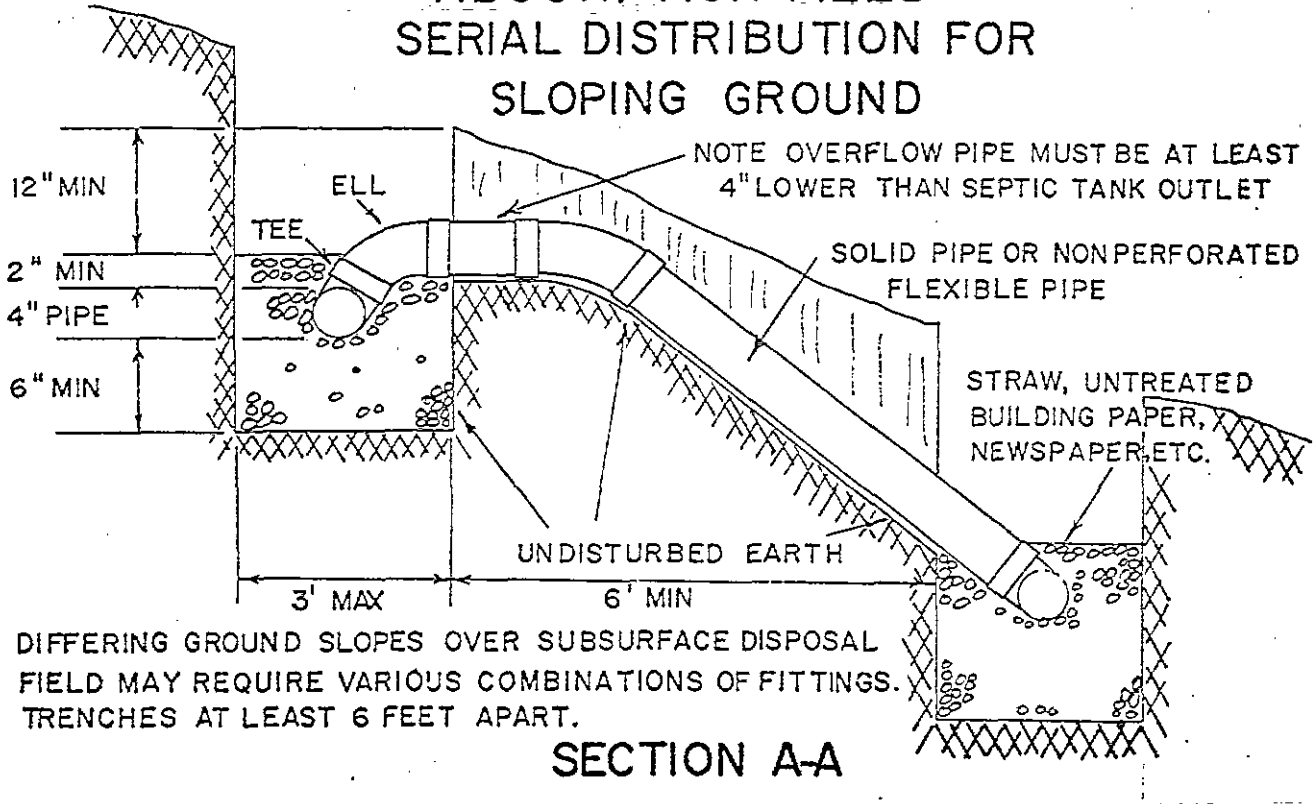


ABSORPTION TRENCH

DETAILS


4"SOLID SEWER PIPE FROM SEPTIC TANK
ABSORPTION FIELD TRENCHES
PIPES JOINED WITH TIGHT FITTING UNIONS
GRAVEL OR CRUSHED STONE
TRENCHES AT LEAST 6' APART ON LEVEL GRADE
4" PERFORATED PIPE LAID WITH HOLES DOWN
PIPE LAID ON LEVEL GRADE
STRAW, BUILDING PAPER, NEWSPAPER OVER STONE

ABSORPTION FIELD SERIAL DISTRIBUTION FOR SLOPING GROUND



DIFFERING GROUND SLOPES OVER SUBSURFACE DISPOSAL FIELD MAY REQUIRE VARIOUS COMBINATIONS OF FITTINGS. TRENCHES AT LEAST 6 FEET APART.

SECTION A-A

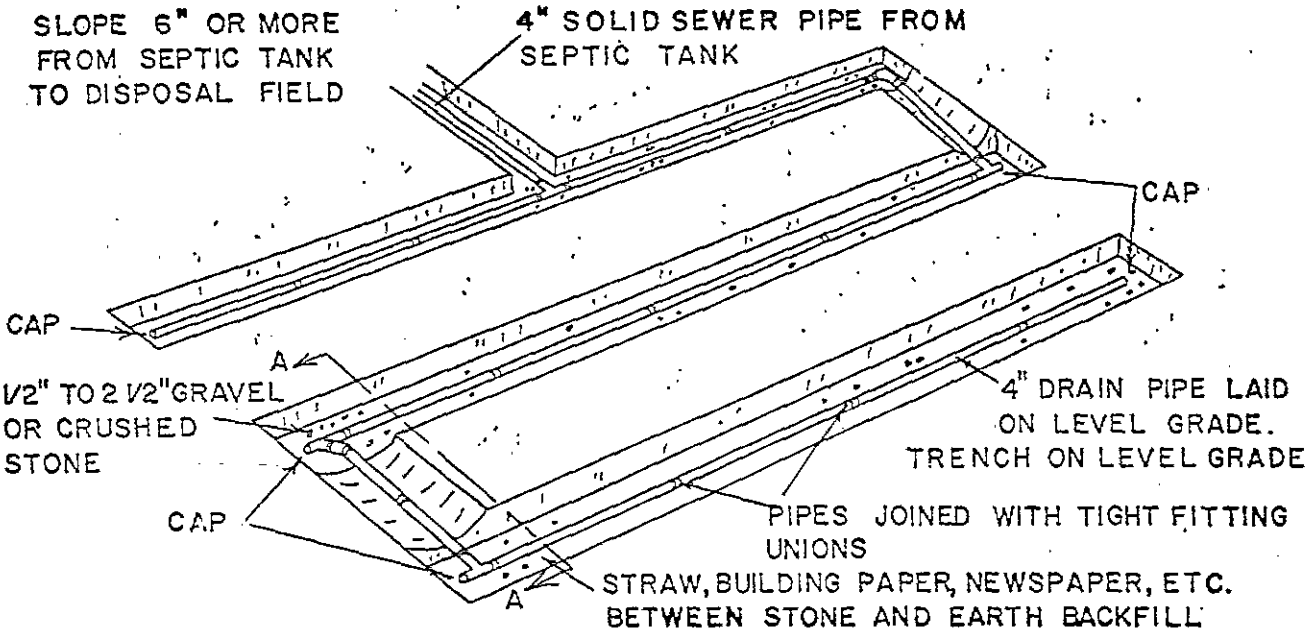

SLOPE 6" OR MORE FROM SEPTIC TANK TO DISPOSAL FIELD
4" SOLID SEWER PIPE FROM SEPTIC TANK
CAP
CAP
A
1/2" TO 2 1/2" GRAVEL OR CRUSHED STONE
4" DRAIN PIPE LAID ON LEVEL GRADE. TRENCH ON LEVEL GRADE
CAP
PIPES JOINED WITH TIGHT FITTING UNIONS
A
STRAW, BUILDING PAPER, NEWSPAPER, ETC. BETWEEN STONE AND EARTH BACKFILL

TABLE OF APPROXIMATE VOLUMES OF MATERIAL REQUIRED FOR ABSORPTION FIELD TRENCHES OF GIVEN WIDTHS AND LENGTHS

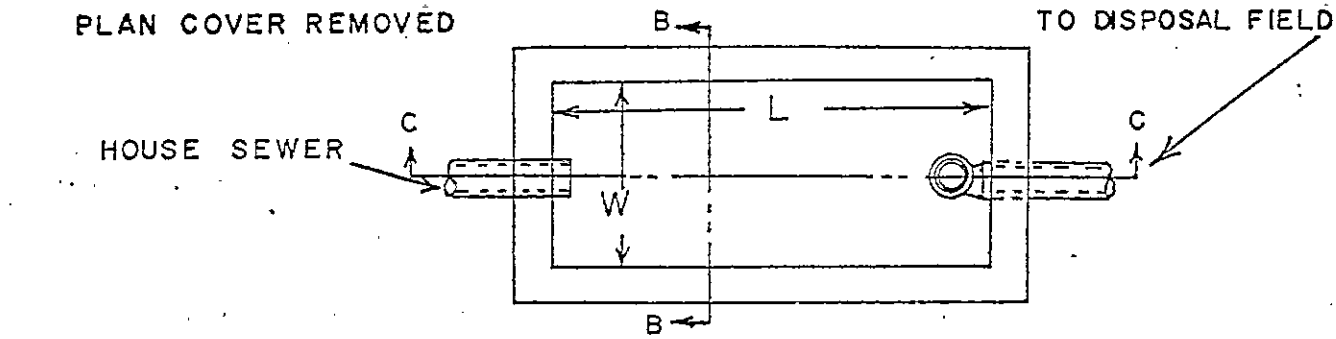
TRENCH WIDTH		TOTAL LENGTH OF PIPING - ABSORPTION FIELD											
		100	200	300	400	500	600	700	800	900	1000	1100	1200
12 Inches	Cubic Yards	3.4	6.8	10.1	13.6	17.0	20.3	23.8	27.1	30.4	33.8	37.2	40.6
18 Inches	Cubic Yards	5.2	10.5	15.6	20.9	26.1	31.4	36.6	41.8	47.2	52.3	57.6	62.8
24 Inches	Cubic Yards	7.1	14.2	21.2	28.3	35.4	42.5	49.6	56.7	63.7	71.0	78.0	85.1
30 Inches	Cubic Yards	8.9	17.9	26.9	35.7	44.6	53.8	62.5	71.5	80.0	89.0	98.0	107.0
36 Inches	Cubic Yards	10.8	21.6	32.3	43.1	53.9	64.7	75.5	86.3	97.1	107.0	118.7	129.5

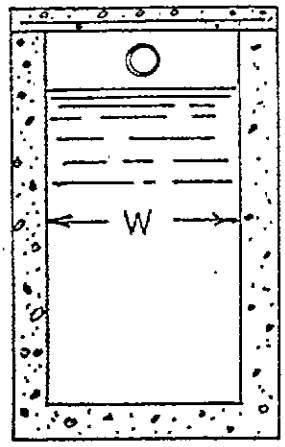
SEPTIC TANK ON-SITE CONSTRUCTION DETAILS

SEPTIC TANK CAPACITIES	
NUMBER OF BEDROOMS	MINIMUM CAPACITY OF GALLONS
2 OR LESS	750
3 AND 4	1000

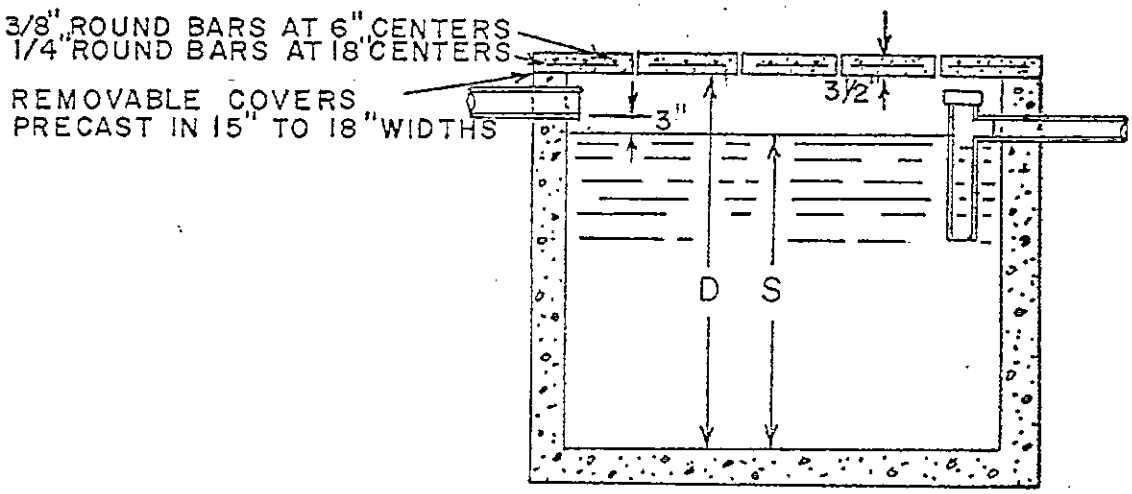
FOR EACH ADDITIONAL BEDROOM ADD 250 GALLONS

SEPTIC TANK DIMENSIONS				
SIZE IN GALLONS L	INSIDE LENGTH L	INSIDE WIDTH W	INSIDE DEPTH D	SEWAGE DEPTH S
750	6'-8"	3'-4"	5'-4"	4'-6"
1000	8'-0"	3'-4"	6'-0"	5'-2"
1250	8'-8"	4'-0"	6'-0"	5'-0"
1500	10'-0"	4'-0"	6'-6"	5'-0"
2000	12'-0"	4'-6"	6'-6"	5'-0"
2500	13'-6"	5'-0"	6'-6"	5'-0"





SECTION B-B END VIEW



SECTION C-C SIDE VIEW

APPENDIX

Chapter 16, Article 1, Section 3, West Virginia State Code:

...Provided, That no rules or regulation shall be promulgated or enforced restricting the subdivision or development of any parcel of land within which the individual tracts, lots, or parcels exceed five acres each in total surface area and which individual tracts, lots or parcels have an average frontage of not less than three hundred feet, even though the total surface area of said tract, lot or parcel equals or exceeds five acres in total surface area, and which tracts are sold, leased or utilized only as single family dwelling units. The provisions next above notwithstanding, nothing in this section shall be construed to abate the authority of the state health department to restrict the subdivision or development of such tract for any more intense or higher density occupancy than such single family dwelling unit or to restrict any subdivision or development which might endanger the public health, the sanitary condition of streams, or sources of water supply.

Chapter 16, Article 1, Section 9, West Virginia State Code:

No person, firm, company, corporation, institution, whether public or private, county or municipal, shall install or establish any system or method of drainage, water supply, sewage or excreta disposal, or solid waste disposal without first obtaining a written permit to install or establish such system or method from the state director of health or his authorized representative. All such systems or methods shall be installed or established in accordance with plans, specifications and instructions issued by the state director of health or which have been approved in writing by the

APPENDIX

state director of health or his authorized representative.

Section 7. Subdivisions, "Small Sewage And Excreta Disposal Systems Regulations"

7.1. All subdivisions or housing developments originating after July 1, 1970, the effective date of the previous regulations, shall be served by an approved public sewage system or by an approved water-carried sewage disposal system specifically designed to serve the entire subdivision or housing development.

7.3. Individual sewage systems may be constructed or installed in a subdivision or housing development within which the individual tracts, lots or parcels are less than five (5) acres each in total surface area and which tracts are sold, leased or utilized only as single family dwelling units, when the state department of health declares it impractical due to distance, population, topography, geological formation or other pertinent factors for the subdivision or housing development to be served by an approved public water system or by an approved sewage system designed specifically to serve the entire subdivision or housing development.

WEST VIRGINIA INTERPRETIVE RULES
BOARD OF HEALTH

Design Standards for Small Septic Tank Systems

Chapter 16-1
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(1983)

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Obsolete Series 7 & 9 were superseded 10/31/83

WEST VIRGINIA INTERPRETIVE RULES
BOARD OF HEALTH

Chapter 16-1
Series VII
(1983)

Subject: Sewage Treatment and Collection System Design Standards

Section 1. General

1.1. Scope - These interpretive rules establish the design standards for sewage treatment or collection system construction and operation.

1.2. Authority - These interpretive rules are issued under the authority of Chapter 16, Article 1, Section 7 and are related to Chapter 16, Article 1, Section 9 of the West Virginia Code or 1931, as amended.

1.3. Filing Date - These interpretive rules were promulgated on the 19th day of August 1983, and were filed on the 27th day of October 1983, in the Secretary of State's office.

1.4. Effective Date - These interpretive rules became effective on the 1st day of December, 1983.

1.5. Supersession and Repeal - These interpretive rules supersede and repeal interpretive rules 16-1, Series VII, Design Standards for Small Septic Tank Systems and 16-1, Series IX, Permit Procedures and Design Requirements for Small Sewage and Water Systems.

Section 2. Application and Enforcement

2.1. Application - These interpretive rules apply to any person engaged in the construction or operation of sewage treatment or collection systems requiring approval by the department of health under Chapter 16, Article 1, Section 9 of the West Virginia Code of 1931, as amended.

2.2. Enforcement - The enforcement of these interpretive rules is