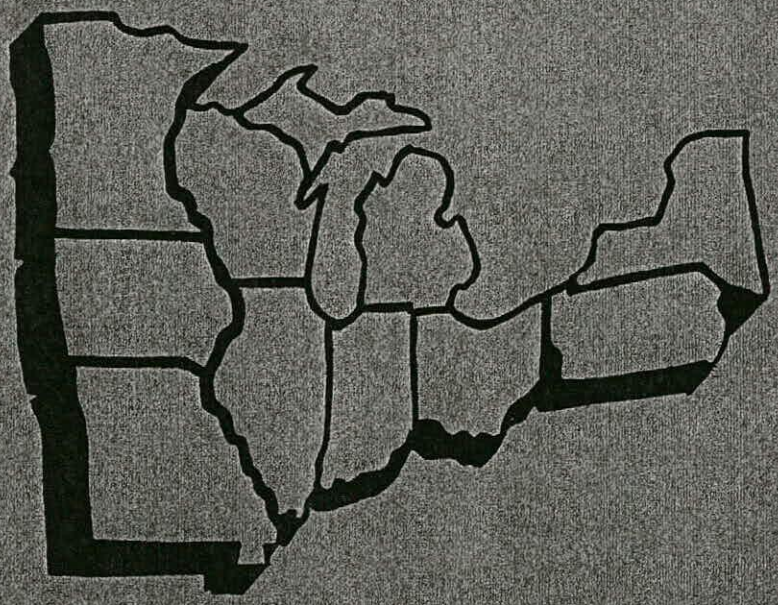
Recommended Standards for Individual Sewage Systems



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1980 EDITION

Great Lakes - Upper Mississippi River Board of State Sanitary Engineers

Recommended Standards for ndividual Sewage Systems

1980 Edition

Policies for the review and approval of plans and specifications for individual sewage systems.

A report of the committee of the Great Lakes-Upper Mississippi River Board of State Sanitary Engineers.

Member States

Illinois Indiana Iowa Michigan Minnesota Missouri New York Ohio Pennsylvania Wisconsin

I N D E X

CHAPTER 40 ABSORPTION SYSTEMS

APPENDICES

FOREWORD

The Great Lakes Upper Mississippi River (GLUMR) Board of State Sanitary Engineers, in 1974, appointed a Task Force to assess the question of establishing a Ten-State Standard Sewage Disposal Committee. Task Force members representing Michigan, Iowa, Wisconsin, Illinois, and Minnesota met in Minneapolis in January of 1975. They concluded and reported to the GLUMR Board that a Ten-State Committee was needed not necessarily for development of standards, but to serve as a medium for the exchange of policies, procedures and standards in the individual states, and to serve as a clearinghouse for the newer developments in the area of private waste disposal.

Subsequently, the Board, at its annual meeting in 1975, created a Ten-State Committee for Individual Sewage Systems consisting of one member from each of the ten member states and the Province of Ontario. The committee was assigned the responsibility to examine the entire problem of individual household sewage disposal, including evaluation of research, development of new concepts, development of criteria, conservation of water use, and finally, development of recommended standards.

The GLUMR Board, through the issuance of this standard, is not necessarily endorsing any one system presented therein since the acceptance and approval of any system is the prerogative of the regulatory agency. The purpose of the standards, however,is to provide what are considered to be the best engineered design standards for such systems, as determined by research and practical experience. Therefore, the standards which follow are intended to serve as a guide in the design and preparation of plans and specifications may be made by the reviewing authority; and to establish, as far as practicable, uniformity of practice among the several states. Because statutory requirements, legal authorities, and administrative procedures are not uniform and soil, geologic, and other site conditions differ among the states, the use of these standards may need to be adjusted.

Further, these standards are intended to be used by individuals who, by virtue of their education, training, and experience, are qualified to exercise the professional judgement necessary to select and design the on-site sewage disposal method most compatible with soil and site factors encountered at a given location. While the emphasis of this standard is upon sewage disposal, the responsible designer will recognize that protection of water-bearing formations used for drinking water purposes is of primary concern. A knowledge of area geology, particularly where fractured limestone or bedrock lie close to the surface, or other conditions exist which may make the potable water supply vulnerable to sources of sewage contamination is essential. Therefore, each site evaluation must consider the effect residential development will have upon the quality of potable water formations, and subsequently protection from any external sources of contamination.

The terms "shall" and "must" are used where practice is sufficiently standardized to permit specific delineations of requirements of where safeguarding the public health and environmental quality justify such definite action. Other terms such as "should," "recommended," and "preferred" indicate desirable procedures or methods with deviations subject to individual consideration.

Initial efforts of the committee were directed at developing standards for conventional on-site sewage systems. In doing so, the committee adopted the philosophy that where soil and site conditions permit, the least complex, easy to maintain, and most economical system should be used. Although it has not been possible to include standards for many of the more recently developed methods of on-site treatment and disposal, committee policy is to encourage development of such new systems, processes, and techniques. It is expected these standards will be reviewed and revised periodically and that standards for other alternative systems will be prepared as more experience and research data become available.

CHAPTER 10

SITE EVALUATION

Information concerning soil and site conditions is needed for the design of liquid waste treatment and disposal facilities. Those factors which must be evaluated are depth of permeable soil over high groundwater, bedrock, or other limiting layer, soil factors, land slope, flooding hazard, and amount of suitable area available.

10.1 Soils Factors

Soil texture and structure, stabilized percolation rate, groundwater and bedrock conditions must be evaluated.

10.2 Definitions

10.201 Bedrock Any rock which cannot be excavated by power equipment, is so slowly permeable that it will not transmit effluent, or has open fractures or solution channels.

10.202 High Groundwater Level The highest elevation to which the soil is saturated for a week or more as observed as a free water surface in an unlined hole, or has been saturated as may be indicated by mottling (soil color patterns), whichever of the two levels is higher.

10.203 Limiting Layer Any layer of soil with a stabilized percolation rate slower than 60 minutes per inch (2.5 cm).

10.3 Evaluation of Soil Factors Soil factors shall be evaluated by soil profile observations and, where required, be supported by percolation tests.

10.4 Soil Profile Observations Soil pits are recommended for soil observation in preference to bore holes. (It is recommended that the minimum depth of soil profile observations be at least five feet (1.5 m)). The following factors must be evaluated and reported for a depth of at least three feet (.9 m) below the proposed absorption system:

a. Thickness of layers or horizons.
b. Texture (USDA) of soil layers.
c. General color, and color variation (mottling).
d. Depth to water, if observed.
e. Depth to estimated high groundwater level.
f. Depth to and type of bedrock, if observed.
g. Other prominent features such as structure, stoniness, roots, etc.

10.5 Percolation Tests

Soil percolation tests, where required, should be conducted at the optimal depth based on soil profile textures indicating permeable conditions. They shall be conducted at the depth of proposed construction. Additional percolation tests may be needed to identify the existence of a limiting layer. The following is the falling head test procedure:

a. Dig or bore a hole, four to twelve inches (10-30.5 cm) in diameter, with vertical walls.
b. Scratch side wall and bottom, remove loose material.
c. Place one inch (2.54 cm) of coarse sand or gravel on bottom. In Sandy Soils - Place twelve inches (30.5 cm) of water in hole and determine time to seep away, repeat, and if second filling seeps away in ten minutes or less, proceed with test.

    1. Establish a fixed reference point, add water to six inches (15 cm) above gravel and measure water level drops every ten minutes for one hour.
    2. Use a shorter time interval if first six inches (15 cm) seeps away in ten minutes or less. refill when necessary, do not exceed six inches (15 cm) of water; use final water level drop to calculate rate. (See 10.5e)

    In Other Soils - Maintain at least twelve inches (30.5 cm) of water in the hole for at least four hours to presoak soil.

    1. Do not remove water remaining after four hours.
    2. Permit soil to swell at least 12 hours. (Dry clayey soils should be soaked and permitted to swell for longer periods to obtain stabilized percolation rates).
    3. After swelling, remove loose material on top of gravel.
    4. Use fixed reference point, adjust water level to six inches (15 cm) above gravel and measure water level drops every 30 minutes for four hours or until two successive drops do not vary by more than one-sixteenth inch (1.5 mm) (stabilized rate).
    5. If first six inches (15 cm) of water seeps away in less than 30 minutes, use a ten-minute interval and run one hour.

d. Refill with water only when necessary, but no adjustment during last three readings except to the limit of the last drop. Do not exceed six inches (15 cm) of water.
e. Use final drop to calculate rate:

$$\frac{\text{Time Interval}}{\text{Water Level Drop}} = \text{Perc rate}$$

10.6 Site Factors

The land slope, potential for flooding and surface water concentration, amount of suitable area must be evaluated.

10.601 Type and percent of land slope

The type (concave, convex, or plane), percent, and direction of land slope must be determined and reported.

10.602 Flooding and surface water

The potential for flooding and surface water concentration shall be evaluated.

10.603 Amount of suitable area

Sufficient suitable soil must be available for the initial absorption area while maintaining the minimum horizontal isolation distances required to protect water supply, surface waters, property lines, etc. It is recommended that sufficient suitable area be available for initial and replacement absorption systems.

(NOTE: Detailed soils maps are of value in providing a general indication of expected soil and site conditions. They are not, however, a substitute for on-site soil data.)

CHAPTER 20

TREATMENT TANKS

A treatment tank consists of one or more chambers which provide sufficient retention time to treat the raw sewage. Treatment tanks are designed to utilize either anaerobic treatment processes (septic tanks) or aerobic treatment processes (aerobic wastewater treatment plants).

20. Septic Tanks

20.1 General

20.101 Influent

All liquid waste and washwater shall discharge into the septic tank. Roof, footing, garage, surface water drainage, and cooling water shall be excluded.

20.102 Location

The septic tank shall be located where it is readily accessible for inspection and maintenance.
The following are minimum horizontal separation distances that must be provided between the septic tank and the features indicated:

Buildings	10 feet (3 m.)
Water wells and suction lines	50 feet (15 m.)
Property lines	10 feet (3 m.)
Water supply lines under pressure	10 feet (3 m.)
Lakes and streams	50 feet (15 m.)

20.2 Design

20.201

The septic tank shall be constructed of sound and durable material not subject to excessive corrosion or decay and structurally capable of supporting the loads to which it will be subjected. The tank shall be water-tight.

20.202 Sizing

The following schedule shall apply to septic tank sizing for residential use:

Number of Bedrooms	Minimum Liquid Capacity	
	Gallons	Liters
1 and 2	750	2,840
3	1,000	3,790
4	1,250	4,730
5	1,500	5,680
6	1,750	6,630

For each additional bedroom in excess of six, add 250 gallons (950 L).

20.203 Dimensions

The depth from the invert of the outlet to the floor of the tank (liquid depth) of any septic tank or compartment thereof shall not be less than four feet (1.2 m) and a liquid depth greater than six feet six inches (2 m) shall not be considered in determining tank capacity. The length of a septic tank should not be less than five feet (1.5 m) and should be approximately two to three times the width; but no tank or compartment thereof shall have an inside horizontal dimension less than two feet (0.6 m). The minimum inside diameter of a vertical cylindrical septic tank shall be five feet (1.5 m).

20.204 Inlets

The inlet connection to the septic tank shall not be less than four inches (10 cm) inside diameter and enter the tank at least three inches (7.6 cm) above the liquid level. The inlet connection of the septic tank and each compartment thereof shall be submerged by means of a vented tee or baffled so as to obtain effective retention of scum and sludge. The inlet tee or baffle shall extend above the liquid level to a point not less than one inch (2.5 cm) from the underside of the top of the tank to assure system venting. The inlet baffle or tee shall extend below the liquid level at least six inches (15 cm), but not more than 20 percent of the total liquid depth. Baffles shall be located a minimum of six inches (15 cm) from the inlet pipe.

20.205 Outlets

The outlet connection to the septic tank shall not be less than four inches (10 cm) inside diameter. The outlet connection of the septic tank and each compartment thereof shall be submerged by means of a vented tee or baffled so as to obtain effective retention of scum and sludge. The outlet tee or baffle shall extend above the liquid level not less than 20 percent of the liquid depth in tanks with straight vertical sides and 15 percent of the liquid depth in horizontal cylindrical tanks. The outlet tee or baffle shall extend below the liquid level a distance equal to 40 percent of the liquid depth for tanks with straight vertical sides and 35 percent of the liquid depth in horizontal cylindrical tanks. Baffles shall be located no more than six inches (15 cm) from the outlet pipe. There shall be at least a one inch (2.5 cm) vent space between the underside of the top of the tank and the top of the outlet baffle or tee.

20.206 Scum Storage and Venting

A septic tank shall provide an air space having a volume not less than ten percent of the liquid capacity of the tank. Clearance of at least nine inches (23 cm) shall be provided between the maximum liquid level at the outlet and the highest point on the ceiling of the tank body at each point along its length between the inlet and the outlet of the tank.

20.207 Access

Adequate access to each compartment of the tank for inspection and sludge removal shall be provided by a manhole or removable cover with a minimum dimension of twenty inches (51 cm). When tanks have been installed with the top of the tank more than twelve inches (30 cm) below grade, an inspection pipe of not less than six inches (15 cm) diameter expanding through the cover to a point above the tank not more than six inches (15 cm) below finished ground level shall be provided. The point at which the inspection pipe passes through the cover shall be so located that a downward projection of the pipe clears the inlet and outlet device by not less than two inches (5 cm). The top of the inspection pipe shall be provided with a readily removable water-tight cap or plug and its location shall be marked at the ground surface. The inlet and outlet devices shall be made accessible by removable covers, manholes, or by properly located inspection ports.

20.3 Multiple Compartments

20.301 When septic tank is divided into two compartments, the liquid volume of the first compartment shall be equal to one-half to two-thirds (1/2 to 2/3) of the total volume. Minimum size of the first compartment shall be 500 gallons (1890 L).

20.302 The minimum plan dimension of any compartment of the septic tank shall be twenty-four inches (61 cm).

20.303 A vent space shall be provided between compartments of a septic tank. Inlets and outlets to a compartmented tank shall be proportioned and located as for a single tank. The liquid connection between compartments shall consist of two or more openings equally spaced across the width of the tank with an area equal to three times the inlet and located at a depth of 40 percent of the liquid depth as measured from the liquid level.

20.4 Dosing

Where dosing tanks are provided, they shall meet the construction requirements specified for septic tanks. To provide storage, the total volume of the dosing tank should be equivalent to the average daily flow. The required volume of the dosing tank shall not be considered as any portion of the required volume of the septic tank. Dosing tanks must be provided with access ports sufficiently large to maintain the tank and pumps, and must be vented. In case of pump failure, a high water alarm switch set above the design volume of the dose, shall be provided on a separate circuit from the pump, and have an audible or visible alarm in the house. Pumps and control devices within the dosing tank shall be of an explosion proof design.

20.5 Maintenance

At least once a year, the depth of sludge and scum in the septic tank should be measured. When, as a result of such measurement, the top of the sludge layer in the tank or any compartment of the tank is found to be less than twelve inches (30.5 cm) below the bottom of the outlet baffle or submerged pipe, or if the bottom of the scum layer is within three inches (7.6 cm) of the septic tank outlet baffle or submerged pipe, the tank shall be pumped and sanitary disposal made of the contents. Annual pumping may be substituted for measurement. (Note: Following septic tank cleaning, all interior surfaces of the tank should be inspected for leaks and cracks using a strong light. Pumped-out septic tanks often contain toxic gases; therefore, only an experienced person should attempt to enter or repair a septic tank if this should become necessary. The average homeowner should not enter a septic tank.)

20.501 At least once a year, dosing tanks and distribution boxes should be opened and settled solids removed as necessary.

20.502 The use of biological or chemical additives in the septic tank is not recommended.

21. Aerobic Wastewater Treatment Plants

An aerobic wastewater treatment plant utilizes the principle of oxidation in the decomposition of sewage by the introduction of air into the sewage. An aerobic treatment plant may be used as the primary treatment unit instead of a septic tank except where special local conditions may limit their use. These special conditions may include, but not limited to, the following:

1. Where intermittent use will adversely affect the functioning of the plant.
2. Where dependable maintenance service is not available.
3. Where severe climatic conditions exist.

4. Where electrical service is unreliable.
5. Where local regulations restrict their use.

21.1 General

21.101 All liquid waste and washwater shall discharge into the aerobic treatment plant. Roof, garage, footing, surface water drainage, and cooling water shall be excluded.

21.102 The aerobic treatment plant shall be located where it is readily accessible for inspection and maintenance. The following are minimum horizontal separation distances that must be provided between the aerobic treatment plant and the features indicated:

Buildings	10 feet (3 m)
Water wells and suction lines	50 feet (15 m)
Property lines	10 feet (3 m)
Water supply lines under pressure	10 feet (3 m)
Lakes and streams	50 feet (15 m)

21.2 Design

21.201 All aerobic wastewater treatment plants shall comply with National Sanitation Foundation Standard No. 40 or standards and testing protocol accepted as equivalent or as required by the administrative authority. In addition, all aerobic wastewater treatment plants shall comply with the requirements stipulated in this chapter.

21.202 The aerobic plant shall have a minimum treatment capacity of 150 gallons (570 L) per bedroom per day or 500 gallons (1890 L), whichever is greater.

21.3 Effluent Disposal

21.301 Effluent from an aerobic treatment plant shall be discharged into a soil absorption system, sand filter, or other final treatment system approved by the administrative authority. No reduction in the area of soil absorption systems, sand filters, or other final treatment systems shall be permitted because of the use of an aerobic treatment plant instead of a septic tank.

21.302 Direct surface discharge from an aerobic treatment plant shall not be permitted.

21.4 Operation and Maintenance

21.401 Where aerobic treatment plants are used, institutional or administrative arrangements to control their use, operation, and maintenance are recommended.

21.402 Aerobic treatment plants shall be pumped at least once a year to remove excess solids from the plant.

CHAPTER 30

HOUSE OR BUILDING SEWER

30.1 Definitions

30.101 House or Building Drain

This is the pipe extending from the interior plumbing to a point at least three feet (0.9m) outside the foundation wall.

30.102 House or Building Sewer

This is the pipe connecting the house or building drain to the septic tank or other treatment device.

30.2 General

30.201 House or building sewers shall be of a sound, durable material of water-tight construction, have minimum diameter of four inches (10 cm) and be laid on a firm foundation at a minimum grade of one-fourth inch (6.4 mm) per foot.

30.202 House or building sewers should be installed with as straight aligment as possible. Where bends of 45° or greater are necessary, a cleanout fitting, the same size as the sewer, extending to the ground surface shall be provided.

30.203 There shall be access to every house or building sewer through a cleanout fitting in the house or building drain or sewer.

30.204 A minimum horizontal separation of ten feet (3 m) shall be provided between a house or building sewer and any water line. Suction lines from wells shall never cross under house or building sewers.

CHAPTER 40

ABSORPTION SYSTEMS

The common design of absorption systems is one using absorption trenches, each separate from the other and each containing a distribution pipe. This type of system should be used whenever practical. Other types of absorption systems may be used as alternatives where the site conditions meet the specific design requirements of such alternative systems.

40. Absorption Trenches

40.1 General

The absorption trench gives additional treatment to the sewage from the treatment tank. Regardless of its appearance of clarify or transparency, the outflow or effluent from a treatment tank is a dangerous source of contamination. The satisfactory operation of the sewage disposal system is largely dependent upon the proper site selection, design, and construction of the absorption trench.

40.2 Location

40.201 Absorption trenches shall be located at least fifty feet (15 m) from a potable water supply or pump suction line. Greater horizontal separation distances may be needed depending on engineering and hydrogeological data and type of water supply.

40.202 Absorption trenches shall be located at least fifty feet (15 m) from a stream, water course, lake, or impoundment.

40.203 Absorption trenches shall be at least ten feet (3 m) from property lines and buildings.

40.204 Absorption trenches shall not be constructed in soils having a percolation rate slower than 60 minutes per inch; or where rapid percolation may result in contamination of water-bearing formations or surface waters.

40.205 Absorption trenches shall not be constructed in soils rated as having severe or very severe limitations for subsurface sewage disposal by the Soil Conservation Service, U.S. Department of Agriculture, unless that limitation is not present as shown by field investigation or can be overcome.

40.206 The absorption trench shall be located on the property to maximize the vertical separation distance from the bottom of the absorption trench to the seasonal high groudwater level, bedrock, or other limiting layer, but

under no circumstances shall this vertical separation be less than three feet (0.9 m). Where water-bearing formations are in danger of contamination greater vertical separation may be required.

40.207 Absorption trenches shall not be constructed in unstabilized fill.

40.3 Design

40.301 Each absorption trench system shall have a minimum of two trenches.

40.302 The minimum area in any absorption trench system shall be based upon a flow of 150 gallons (570 L) per bedroom per day and in accordance with the following table:

Perc Rate (min./in.)	Absorption Area/Bedroom		Loading Rate/Day	
	Sq. Ft.	Sq. Meters	Gal/Sq.Ft.	Liters/Sq. Meters
0-5*	125	12	1.2	49
6-10*	165	15	0.9	37
11-30	250	23	0.6	24
31-45	300	28	0.5	20
46-60	330	31	0.45	18

*Sec. 40.204

40.303 The maximum length of any one trench shall be one hundred feet (30.5 m).

40.304 Absorption trenches shall be separated by at least five feet (1.5 m) of earth.

40.305 Absorption trenches shall be at least eighteen inches (45.7 cm) wide and no more than thirty-six inches (91 cm) wide. For design purposes, the maximum width of twenty-four inches (61 cm) shall be considered.

40.306 The bottom of the absorption trenches shall be at least eighteen inches (45.7 cm) and no more than thirty-six inches (91 cm) below the finished grade.

40.307 Gravity fed absorption field distribution lines should be at least four inches (10 cm) in diameter. If foot-long (30.5 cm) tiles are laid, they shall each be separated by a one-fourth inch (6.4 mm) space and the joint covered by a strip of untreated building paper.

40.4 Slope

40.401 Gravity fed absorption field distribution lines and trenches shall slope at the rate of two to four inches (5-10 cm) per hundred feet (30.5 m). Dosed absorption field distribution lines and trenches shall be level.

40.402 Absorption trenches should not be installed on land with a slope gradient greater than 12 percent.

40.403 On rolling or sloping land, each absorption trench shall approximate the land surface contour.

40.5 Material

40.501 If perforated distribution lines are used, the perforations shall be at least one-half inch (12.7 mm) and no more than three-fourths inch (19 mm) in diameter and spaced to provide at least the equivalent total opening of comparable diameter foot-long (30.5 cm) tile laid with one-fourth inch (6.4 mm) open joints.

40.502 Coiled perforated plastic pipe shall not be used when installing absorption systems. Straight lengths of pipe shall be used instead.

40.503 Pipe used for distribution lines shall meet the appropriate ASTM standard or those of an equivalent testing laboratory. Fittings used in the absorption field shall be compatible with the materials used in the distribution lines.

40.504 Gravel or crushed stone shall be washed and shall range in size from three-fourths to two and one-half inches (1.9 - 6.4 cm).

40.505 The material used to cover the top of the stone shall be untreated building paper, newspaper or a two-inch (5 cm) layer of straw. Other material must be approved by the health authority having jurisdiction. Plastic or treated building paper shall not be used.

40.6 Construction

40.601 A distribution box or header shall be installed between the septic tank and the absorption trenches. The header shall be of water-tight construction.

40.602 The distribution box shall be set level and arranged so that effluent is evenly distributed to each distribution line. Adequate provisions shall be taken to assure stability and provide access for inspection of the distribution box.

40.603 Each distribution line shall connect individually to the distribution box.

40.604 The pipe connecting the distribution box to the distribution line shall be of a tight joint construction laid on undisturbed earth or properly bedded throughout its length.

40.605 If a header is used, there should be an equal number of distribution lines spaced evenly on both sides of the junction of the leader to the header.

40.606 Each distribution line shall be equal in length.

40.607 When the trenches have been excavated, the sides and bottom shall be raked to scarify any smeared soil surfaces. Construction equipment not needed to construct the system should be kept off the area to be utilized for the absorption trench system to prevent undesirable compaction of the soils. Construction shall not be initiated when the soil moisture content is high. (Note: If a fragment of soil occurring approximately nine inches (23 cm) below the surface can easily be rolled into a wire, the soil moisture content is too high for construction purposes.)

40.608 At least six inches (15 cm) of gravel or crushed stone shall be placed in the bottom of the trench.

40.609 The distribution line shall be carefully placed on the bedding at a uniform slope and covered with at least two inches (5 cm) of gravel or stone.

40.610 The ends of distribution lines should be capped or plugged or, when they are at equal elevations, they should be connected.

40.7 Dosing System Design

40.701 Dosing is recommended for all systems and shall be provided when the design sewage flow requires more than 500 lineal feet (150 m) of distribution line. When the design sewage flow requires more than 1,000 lineal feet (300 m) of distribution line, the absorption field shall be divided into two equal portions and each half dosed alternately, not more than four (4) times per day.

40.702 Dosing may be accomplished by either pumps or siphons. Each side of the system shall be dosed not more than four (4) times per day. The volume of each dose shall be the greater of the daily sewage volume divided by the daily dosing frequency, or an amount equal to approximately 3/4 of the internal volume of the distribution lines being dosed (approximately 0.5 gallons (1.89 L) per lineal foot of 4-inch pipe.)

40.703 In a system using pressure distribution, the field shall be dosed not more than two (2) times per day. The size of the dosing pumps and siphons shall be selected to maintain a minimum pressure of one (1) psi (703 kgs/sq. meter or 2.3 feet of head) at the end of each distribution line.

40.704 The pressure distribution pipe shall be rigid plastic pipe, schedule 40 or 80 with one inch (2.5 cm) nominal diameter. The pipe shall not exceed 25 feet (7.6 m) in length and shall provide a single row of one-fourth inch (6.4 mm) perforations in a straight line, thirty inches (76 cm) on center along the length of the pipe. An equivalent design that assures uniform distribution may be considered by the approving authority. All joints and connections shall be solvent cemented.

40.705 The time of each discharge shall not exceed 15 minutes to promote uniform distribution.

41 Deep Absorption Trenches

41.1 General

Deep absorption trenches may be considered where the depth of suitable soil is insufficient to permit the installation of a conventional trench system due to the presence of a limiting layer more than two feet (0.6 m) in depth which overlies suitable soils of sufficient thickness. Requirements for location, design, slope, material, construction and dosing system design contained in Section 40, Absorption Trenches, shall apply to deep absorption trenches except for depth of construction (40.306). In addition, the following design considerations shall apply:

a. The site evaluation procedure shall include soil profile observations of at least three (3) soil observation pits constructed to a minimum depth of three feet (0.9 m) below the proposed trench bottom. Monitoring to establish depth to seasonal soil saturation or high groundwater may be considered. The possibility of groundwater contamination shall be considered in accordance with Sections 40.201 and 40.206.

b. Deep absorption trenches shall be constructed at least one foot (0.3 m) into the suitable soil.

c. The distribution piping in deep absorption trenches shall be installed with the invert of the piping at a depth of not more than thirty inches (76 cm). Gravel or crushed stone shall be placed from the bottom of the trench excavation to a point two inches (5 cm) above the top of the distribution piping.

42. Absorption Beds

42.1 General

The absorption bed is similar in operation to the absorption field. It is generally installed when the lot size limitations preclude the installation of an absorption trench system. Since the operation of the absorption bed is primarily dependent upon the absorptive capability of the bed bottom, meticulous care must be given to proper design and construction.

42.2 Location

42.201 Absorption beds shall be located at least fifty feet (15 m) from a potable individual well water supply or pump suction line. Greater horizontal separation distances may be needed depending on engineering and hydrogeological data and type of water supply.

42.202 Absorption beds shall be located at least fifty feet (15 m) from a stream, water course, lake, or impoundment.

42.203 Absorption beds shall be at least ten feet (3 m) from property lines and buildings.

42.204 Absorption beds shall not be constructed in soils having a percolation rate slower than 30 minutes per inch, or where rapid percolation may result in contamination of water-bearing formations or surface waters.

42.205 Absorption beds shall not be constructed in soils rated as having severe or very severe limitations for subsurface sewage disposal by the Soil Conservation Service, U.S. Department of Agriculture, unless that limitation is not present as shown by field investigation or can be overcome.

42.206 The absorption bed shall be located on the property to maximize the vertical separation distance from the bottom of the absorption bed to the seasonal high groundwater level, bedrock, or other limiting layer, but under no circumstances shall this vertical separation be less than three feet (0.9 m). Where water-bearing formations are in danger of contamination, greater vertical separation may be required.

42.207 Absorption beds shall not be constructed in unstabilized fill.

42.3 Design

42.301 Each absorption bed shall have a minimum of two distribution lines.

42.302 The minimum area in any absorption bed shall be based upon a flow of 150 gallons (570 L) per bedroom per day and in accordance with the following table:

Perc Rate (min./in.)	Absorption Area/Bedroom		Loading Rate/Day	
	Sq. Ft.	Sq. Meters	Gal/Sq.Ft.	Liters/Sq. Meter
0-5*	250	23	.6	24
6-10*	330	31	.45	18
11-30	500	46	.3	12

*Sec. 42.204

42.303 The maximum length of any distribution line shall be one hundred feet (30 m).

42.304 The distribution lines within an absorption bed shall be uniformly spaced no more than six feet (1.8 m) nor less than four feet (1.2 m) apart.

42.305 The distribution lines within an absorption bed shall be placed no more than three feet (0.9 m) nor less than one and one-half feet (0.46 m) from the side wall of the bed.

42.306 The bottom of the absorption beds shall be at least eighteen inches (45.7 cm) and no more than thirty-six inches (91 cm) below the finished grade.

42.307 Gravity fed absorption bed distribution lines should be at least four inches (10 cm) in diameter. If foot-long (30.5 cm) tiles are laid, they shall each be separated by a one-fourth inch (6.4 mm) space and the joint covered by a strip of untreated building paper.

42.4 Slope

42.401 Absorption bed distribution lines shall be level.

42.402 The floor of the absorption bed shall be level.

42.403 Absorption beds shall not be installed on land with a natural land slope greater than eight (8) percent.

42.5 Material

42.501 If perforated distribution lines are used, the perforations shall be at least one-half inch (12.7 mm) and no more than three-fourths inch (19 mm) in diameter and spaced to provide at least the equivalent total opening of comparable diameter foot-long (30.5 cm) tile laid with one-fourth inch (6.4 mm) open joints.

42.502 Coiled perforated plastic pipe shall not be used when installing absorption bed systems. Straight lengths of pipe shall be used instead.

42.503 Pipe used for distribution lines shall meet the appropriate ASTM standards or those of an equivalent testing laboratory. Fittings used shall be compatible with the materials used in the distribution lines.

42.504 Gravel or crushed stone shall be washed and shall range in size from three-fourths to two and one-half inches (1.9 - 6.4 cm).

42.505 The material used to cover the top of the stone shall be untreated building paper, newspaper, or a two-inch (5 cm) layer of straw. Other material must be approved by the health authority having jurisdiction. Plastic or treated building paper shall not be used.

42.6 Construction

42.601 A distribution box or header shall be installed between the septic tank and the absorption bed. The header shall be of water-tight construction.

42.602 The distribution box or header shall be set level and arranged so that effluent is evenly distributed to each distribution line. Adequate provisions shall be taken to assure the stability and provide access for inspection of the distribution box.

42.603 Each distribution line shall connect individually to the box when a distribution box is used.

42.604 The pipe connecting the distribution box or header to the distribution lines shall be of tight joint construction laid on undisturbed earth or properly bedded throughout its length.

42.605 If a header is used, there should be an equal number of distribution lines spaced evenly on both sides of the leader to the header.

42.606 When the bed has been excavated, the sides and bottom shall be raked to scarify any smeared soil surfaces and the loose material removed.

42.607 At least six inches (15 cm) of gravel or crushed stone shall be placed in the bottom of the bed.

42.608 The distribution line shall be carefully placed on the bedding with no slope and covered with at least two inches (5 cm) of gravel or crushed stone.

42.7 Dosing System Design

42.701 Dosing is recommended for all systems and shall be provided when the design sewage flow requires more than 500 lineal feet (150 m) of distribution line. When the design sewage flow requires more than 1,000 lineal feet (300 m) of distribution line, the absorption bed shall be divided into two equal portions separated by ten feet (3 m) of undisturbed earth and each half dosed alternately, not more than four (4) times per day.

42.702 Dosing may be accomplished by either pumps or siphons. Each side of the system shall be dosed not more than 4 times per day. The volume of each dose shall be the greater of the daily sewage volume divided by the daily dosing frequency or an amount equal to approximately 3/4 of the internal volume of the distribution lines being dosed (approximately 0.5 gallons (1.89 L) per lineal foot of 4-inch pipe).

42.703 In a system using pressure distribution, the field shall be dosed not more than two (2) times per day. The size of the dosing pumps and siphons shall be selected to maintain a minimum pressure of one (1) psi (703 kgs/sq. meter or 2.3 feet of head) at the end of each distribution line.

42.704 The pressure distribution pipe shall be rigid plastic pipe, schedule 40 or 80 with one-inch (2.5 cm) nominal diameter. The pipe shall not exceed 25 feet (7.6 m) in length and shall provide a single row of one-fourth inch (6.4 mm) perforations in a straight line, thirty inches (76 cm) on center along the length of the pipe. An equivalent design that assures uniform distribution may be considered by the approving authority. All joints and connections shall be solvent cemented.

42.705 The time of each discharge shall not exceed 15 minutes to promote uniform distribution.

43. Seepage Pits

43.1 General

Soil absorption of treated effluent should be accomplished either through the construction of absorption trenches or absorption beds. Absorption trenches are the preferred choice. When limited available land area precludes the construction of these two types of absorption systems, seepage pits may be considered.

43.2 Location

43.201 Seepage pits shall be located at least one hundred feet (30 m) away from any potable individual well water supply or pump suction line. Greater horizontal separation distances may be needed depending on engineering and hydrogeological data and type of water supply.

43.202 Seepage pits shall be located at least one hundred feet (30 m) from a stream, water course, lake, or impoundment.

43.203 Seepage pits shall be at least ten feet (3 m) from any property line, twenty feet (6 m) from any building.

43.204 Seepage pits shall not be constructed in soils having a percolation rate slower than (weighted average) ten minutes per inch; or where rapid percolation through such soils may result in contamination of water-bearing formations or surface water.

43.205 Seepage pits shall not be constructed in soils rated as having severe or very severe limitations for subsurface sewage disposal by the Soil Conservation Service, U.S. Department of Agriculture, unless that limitation is not present as shown by field investigation or can be overcome.

43.206 The seepage pit shall be located on the property to maximize the vertical separation distance from the bottom of the seepage pit to the seasonal high groundwater level, bedrock, or other limiting layer, but under no circumstances shall this vertical separation be less than three feet (0.9 m). Where water-bearing formations are in danger of contamination, greater vertical separation may be required.

43.3 Design

43.301 The size of the seepage pit system shall be computed on the basis of percolation tests conducted in each vertical stratum penetrated. The weighted average of the results shall be used in selecting the design application rate.

43.302 The effective depth of a seepage pit shall be measured from the bottom of the inlet pipe to the pit bottom, with the thickness of strata of soils having percolation rates slower than 30 minutes per inch (2.54 cm) deducted. The effective diameter of seepage pits shall be the mean diameter of the excavation below the inlet pipe.

43.303 The effective area of a seepage pit shall be the vertical wall area of the pit excavation. No allowance shall be made for bottom area.

43.304 The minimum area in any seepage pit shall be based upon a flow of 150 gallons (570 L) per bedroom per day and in accordance with the following table:

Weighted Average Perc Rate (min./in.)	Absorption Area/Bedroom		Loading Rate/Day	
	Sq. Ft.	Sq. Meters	Gal/Sq.Ft.	Liter/Sq. Meter
0-5*	125	12	1.2	49
6-10*	165	15	0.9	37

*Sec. 43.204

43.305 The minimum inside dimension of the lining of any seepage pit shall be two feet (0.6 m).

43.306 When more than one seepage pit is used, they shall be separated by undisturbed soil at least equal to twice the pit depth or five feet (1.5 m), whichever is greater.

43.307 The top of the seepage pit shall be within twelve inches (30.5 cm) of final grade.

43.308 When more than one seepage pit is used, a distribution box shall be installed between the septic tank and all seepage pits.

43.309 The distribution box shall be set level so that the effluent is evenly distributed to each seepage pit.

43.310 The distribution box shall be connected individually to each seepage pit with pipe of water-tight construction at least four inches (10 cm) in diameter, and sloped at least one-eight inch (3.2 mm) per foot.

43.311 When more than one seepage pit is used, each pit shall have an equal effective area.

43.4 Construction

43.401 Seepage pits shall include a lining constructed of durable material that will permit free passage of waste without excessive plugging while still excluding the entry of surrounding soil.

43.402 The lining and cover of any seepage pit shall be capable of supporting the normal loads imposed. The cover shall be water-tight and shall be removable or equipped with a manhole at least twenty inches (50.8 cm) in diameter.

43.403 The lining shall be surrounded by at least six inches (15 cm) of washed gravel or crushed stone ranging in size from three-fourths to two and one-half inches (1.9 - 6.4 cm). The thickness of the gravel or stone shall not exceed the diameter of the lining.

43.404 At least six inches (15 cm) of washed gravel or crushed stone shall be placed in the bottom and under the lining.

43.405 The material used to cover the top of the stone or gravel surrounding the lining shall be untreated building paper, newspaper, or a two-inch (5 cm) layer of straw. Other material must be approved by the health authority having jurisdiction. Plastic or treated building paper shall not be used.

44. Elevated Sand Mounds

44.1 General

Elevated sand mounds may be considered whenever site conditions set forth in Chapter 10 of this document preclude the use of absorption trenches, beds, or seepage pits. The construction of a mound shall be initiated only after a site evaluation has been made and landscaping, dwelling placement, effect on surface drainage and general topography have been considered. Due to the nature of this alternative system, actual selection of mound location, size of mound, and construction techniques must be carefully considered and the criteria established in this standard implicitly followed. (See Policy Statement re Management of Individual Sewage Systems in Appendices and Design Calculation and Drawings.)

44.2 Location

44.201 Elevated sand mounds shall not be utilized on sites which meet the definition of the Soil Conservation Service for floodplain, poorly drained, very poorly drained, or stoney soils.

44.202 Elevated sand mounds shall not be utilized on soils where the high groundwater level, bedrock, or other strata having a percolation rate slower than 120 minutes per inch occurs within twenty-four inches (61 cm) of natural grade or where rapid percolation may result in contamination of water-bearing formations of surface waters. Elevated sand mounds shall be constructed only upon undisturbed naturally occurring soils.

44.203 Elevated sand mounds shall be located at least fifty feet (15 m) from a potable individual well water supply or pump suction line as measured from the outer edge of the mound. Greater horizontal separation distances may be needed depending on the type and location of nearby water supplies.

44.204 Elevated sand mounds shall be located at least fifty feet (15 m) from a stream, watercourse, lake, or impoundment as measured from the outer edge of the mound.

44.205 Elevated sand mounds shall be located a minimum distance of ten feet (3 m) as measured from the outer edge of the mound from property lines, buildings, driveways, or any other subsurface obstructions except that this distance shall be fifty feet (15 m) on the down gradient side of the mound. No future construction activity is to take place in the effluent dispersal area described in this section as long as the mound is in use.

44.3 Fill Material

44.301 The fill material from the natural soil plowed surface to the top of the trench or trenches shall have a sand texture as classified by the Soil Conservation Service, U.S. Department of Agriculture. Within that sand textural range, the sand fill shall contain a maximum of 50 percent very fine to fine sand and a minimum of 25 percent medium sand.

44.302 Rock fragments larger than 1/16 inch (2.0 mm) shall not exceed fifteen (15) percent by volume of the material used for sandy fill.

44.4 Design

44.401 There shall be a minimum of one foot (0.3 m) of fill material and two feet (0.6m) of naturally occurring soils between the bottom of the gravel or crushed stone and the highest elevation of the limiting conditions as defined in Section 44.202.

44.402 A minimum of two feet (0.6m) of fill material must be placed between the bottom of the gravel or crushed stone and the plowed surface of the undisturbed naturally occurring soils where creviced or permeable bedrock is the limiting layer.

44.403 Gravel or crushed stone shall be washed and shall range in size from three-fourths to two and one-half inches (1.9 - 6.4 cm).

44.404 Elevated sand mounds shall utilize absorption trench distribution design, and shall not be installed on land with a slope greater than twelve (12) percent. The trenches shall be installed with the long dimension of the trench parallel to the land contour. The minimum spacing between trenches shall be four feet (1.2 m), a maximum trench width of four feet (1.2 m) shall be permitted. No more than three (3) parallel trenches may be installed within a mound.

44.405 A minimum total trench length of forty (40) feet (12 m) shall be provided in each trench in mounds constructed in soils with percolation rates of 60 to 120 minutes per inch when two or more trenches are used.

44.406 The required bottom area of the trench or trenches shall be based upon a flow of 150 gallons (570 L) per bedroom per day with a application rate of 1.2 gallons/day/square foot (49 L/d/m^2).

44.407 The effective basal area of the mound for soils with a percolation rate of 61 to 120 minutes per inch is to be calculated on a maximum application rate of 0.24 gallons/day/square foot (10 L/d/m^2).

44.408 The effective basal area of the mound for soils with a percolation rate of 5 to 60 minutes per inch is to be calculated on an application rate of 0.74 gallons/day/square foot. (29 $L/d/m^2$).

44.409 The land area fifty feet (15 m) down gradient of the elevated sand mound is the effluent dispersal area and soil in this area may not be removed or disturbed except as specified herein.

44.410 The area of sand fill shall be sufficient to extend three feet (0.9 m) beyond the edge of the required absorption (or stone) area before the sides are shaped to a 4:1 slope.

44.5 Construction

44.501 Construction equipment which would cause undesirable compaction of the soils shall not be moved across the plowed surface or the effluent dispersal area. However, after placement of a minimum of six (6) inches (15 cm) of sand fill over the plowed area, construction equipment may be driven over the protected surface to expedite construction. Construction and/or plowing shall not be initiated when the soil moisture content is high. (Note: If a sample of soil obtained from approximately nine inches (23 cm) below the surface can be easily rolled into a wire the soil moisture content is too high for construction purposes.)

44.502 Above-ground vegetation must be closely cut and removed from the ground surface throughout the area to be utilized for the placement of the fill material. Prior to plowing, the dosing pump discharge line from the pump chamber to the point of connection with the distribution piping header shall be installed. The area shall then be plowed to a depth of seven to eight inches (18-20 cm), parallel to the land contour with the plow throwing the soil upslope to provide a proper interface between the fill and natural soils. Tree stumps should be cut flush with the surface of the ground and roots should not be pulled.

44.503 The area surrounding the elevated sand mound shall be graded to provide for diversion of surface runoff waters.

44.504 Construction should be initiated immediately after preparation of the soil interface by placing all of the sand fill needed for the mound (to the top of the trench) to a minimum depth of twenty-one inches (53 cm) above the plowed surface (thirty-three inches (84 cm) where creviced bedrock is the limiting layer). This depth will permit excavation of trenches to accommodate

the nine inches (23 cm) of gravel or crushed stone necessary for the distribution piping. After hand leveling of the absorption area, place the stone into the trench, hand level. Place the distribution pipe, and cover the pipe as specified in Section 44.604. After installation of the distribution system, the entire mound is to be covered with topsoil native to the site, or of similar characteristics to support vegetation found in the area. Crown the entire mound by providing twelve inches (30.5 cm) of topsoil on the side slopes, with a minimum of eighteen inches (45.7 cm) over the center of the mound. The entire mound shall be seeded, sodded, or otherwise provided with vegetative cover, to assure stability of the installation.

44.6 Dosing System Design

44.601 Pressure dosing shall be required for the elevated sand mound system.

44.602 The field shall be dosed not more than two times per day. The size of the dosing pump or siphon shall be selected to maintain a minimum pressure of one psi (703 kg/m^2 or 2.3 feet of head) at the end of each distribution line.

44.603 The pressure distribution pipe shall be rigid plastic pipe, schedule 40 or 80 with one inch (2.5 cm) nominal diameter. The pipe shall provide a single row of 1/4 inch (6.4 mm) perforations in a straight line thirty inches (76 cm) on center along the length of the pipe. The length of the distribution line from the header shall not exceed twenty-five feet (7.6 m). An equivalent design that assures uniform distribution may be provided with the approval of the administrative authority. All joints and connections shall be solvent cemented.

44.604 The pressure distribution pipe shall be placed in gravel or crushed stone with the holes downward. The gravel or stone shall be six inches (15 cm) in depth below and two inches (5 cm) in depth above the pipe. The material used to cover the top of the stone shall be untreated building paper, newspaper, a two-inch (5 cm) layer of straw or other suitable material. Plastic or treated building paper shall not be used.

44.605 Antibackflow valves are prohibited. The pressure discharge line shall be graded to permit gravity flow to the absorption area or back to the dosing tank.

44.606 The ends of all distribution pipes in an elevated sand mound shall be capped.

CHAPTER 50

DISCHARGING SYSTEMS

The term "discharging" systems is utilized in this standard to denote the process whereby treated sewage effluent is released to the surface of the ground or any receiving water course. All effluents so discharged must be acceptable and in accordance with the water quality criteria of the responsible state. Policy relating to the acceptability and use of such systems is a matter of state responsibility.

50 Subsurface Sand Filters

50.1 General

The utilization of sand filters as a method of providing additional treatment of effluent discharged from a septic tank or aerobic treatment unit may be considered whenever site conditions set forth in Chapter 10 of this document preclude the use of absorption trenches, beds, seepage pits, or mounds. The design criteria shall include, but not necessarily be limited to, the type of usage, primary treatment, filter media, filtration rate, and dosage rate.

50.2 Location

50.201 Subsurface sand filters shall not be installed in areas where creviced bedrock is within three feet (0.9 m) of the top of the sand filter media. The seasonal high groundwater table shall not rise above the invert of the underdrains.

50.202 Subsurface sand filters shall be located at least fifty feet (15 m) from a potable individual well water supply or pump suction line. Greater horizontal separation distances may be needed depending on engineering and hydrogeological data, and type of water supply.

50.203 Subsurface sand filters shall be located at least ten feet (3 m) from property lines and buildings.

50.204 Subsurface sand filters shall not be constructed in unstabilized fill.

50.3 Design

50.301 The minimum area in any subsurface sand filter shall be based upon a flow of 150 gallons (570 L) per bedroom per day.

50.302 The application rate for sand filters shall be in accord with the following table:

Effective size (mm)	Application Rate Gal/day/ft^2	Liter/day/m^2
0.3 - 0.6	0.5	20
0.6 - 2.5	1.0	41

50.303 Collection lines and the bottom of the excavation shall have a slope of ten inches (25 cm) per 100 lineal feet (30 m) and one collection line shall be provided for each six feet (1.8 m) of width or fraction thereof. A minimum of two collection lines shall be provided. The upper end of the collection line shall be sealed or plugged.

50.304 Distribution lines shall be level and shall be horizontally spaced a maximum of three feet (0.9 m) apart, center to center.

50.305 Venting shall be placed on the downstream end of the distribution lines with each distribution line being vented or connected to a common vent. Vents shall extend at least twelve inches (30.5 cm) above the ground surface with the outlet screened, or provided with a perforated cap.

50.306 The minimum depth of filter media shall be twenty-four inches (0.6 m). The filter media shall be separated from the gravel or crushed stone by three inches (7.6 cm) of pea gravel.

50.4 Construction

50.401 Gravel or crushed stone shall extend from three inches (7.6 cm) above distribution and collection lines.

50.402 The filter shall be covered with twelve to eighteen inches (30-45 cm) of soil.

50.5 Materials

50.501 The filter media shall have an effective size of 0.3 to 2.5 mm and a uniformity coefficient of less than 3.5. The filter media shall be washed and free of clay or silt.

50.502 Gravel or crushed stone shall be washed and shall range in size from three-fourths to two and one-half inches (1.9-6.4 cm).

50.503 Pea gravel shall be washed and range in size from one-eighth to three-eighths inch (3.2-9.6 mm).

50.504 The material used to cover the top of the gravel or stone shall be untreated building paper, newspaper, or a two-inch (5 cm) layer of straw. Other material must be approved by the health authority having jurisdiction. Plastic or treated building paper shall not be used.

50.505 Pipe used for distribution and collection lines shall meet the appropriate ASTM standard or those of an equivalent testing laboratory. Fittings used shall be compatible with the materials used in the distribution and/or collection lines.

50.506 Materials selected shall be constructed of cement or rigid plastic pipe. If perforated distribution and/or collection lines are used, the perforation shall be at least one-half inch (12.7 mm) and no more than three-fourths inch (19 mm) in diameter and spaced to provide at least the equivalent total opening of comparable diameter foot-long (30.5 cm) tile laid with one-quarter inch (6.4 mm) open joints.

50.6 Dosing System Design

50.601 Dosing is recommended for all sand filters, but shall be provided when the design sewage flow requires more than 500 lineal feet (150 m) of distribution line.

50.602 Dosing may be accomplished by either pumps or siphons. The time of each discharge shall not exceed 15 minutes to promote uniform distribution.

50.603 It is recommended that sand filters be dosed two times per day; however, no filter shall be dosed more than four (4) times per day with a minimum four-hour rest period between dosings.

50.604 Where dosing tanks are provided, they shall be designed in accordance with Section 20.4 of Chapter 20.

50.605 In a system using pressure distribution, the field shall be dosed not more than two (2) times per day. The size of the dosing pumps and siphons shall be selected to maintain a minimum pressure of one (1) psi (703 kg/m^2 or 2.3 feet of head) at the end of each distribution line.

50.606 The pressure distribution pipe shall be rigid plastic pipe, schedule 40 or 80 with one inch (2.5 cm) nominal diameter. The pipe shall provide a single row of one-fourth inch (6.4 mm) perforations in a straight line, thirty inches (76 cm) of center along the length of the pipe, or an equivalent design that assures uniform distribution. All joints and connections shall be solvent cemented.

51. Recirculating Sand Filters

51.1 General

When a recirculating sand filter is used, effluent from the septic tank or other primary treatment device must discharge directly to the recirculation tank. The minimum criteria relative to the location, design considerations, materials, dosing and general construction details provided for subsurface sand filters shall also apply to recirculating sand filters except as follows:

a. The design of a recirculating sand filter is similar to the design of a subsurface sand filter except that it must be located to permit gravity flow into the top of the recirculation tank from the collecton line of the filter.
b. The depth of filter media shall be at least 30 inches (0.75 m).
c. The maximum application rate shall be three gallons/day/ft^2 (122 L/day/m^2) of filter area.
d. The liquid capacity of the recirculation tank shall be equal to 750 gallons (2840 L) or one and one-half times the daily design sewage flow.
e. The filter effluent line, passing through the recirculation tank, shall be provided with a control device that directs the flow of the filter effluent. The filter effluent will be returned to the recirculation tank for recycling or be discharged to the surface of the ground, or water course, depending upon the liquid level in the recirculation tank.
f. The recirculating pump shall be of adequate size to recirculate the daily design sewage flow at least four (4) times through the sand filter. The recirculating pump shall be sized to dose the filter every one-half hour within a 10-minute period. The dose volume is, therefore, four (4) times the daily flow divided by 48. Dosing frequency may be reduced as dictated by climatic conditions to minimize the possibility of freezing of the filter surface.
g. The effluent shall be discharged in such a manner as to provide uniform distribution through a system of pipes or troughs supported above the filter surface.
h. The filter surface which is sand rather than gravel must be raked and leveled on a routine basis. The filter shall be kept free of weed growth and the accumulation of all debris. Where climatic conditions dictate the installation of a cover, it shall be constructed to minimize freezing, support anticipated snow loads, and permit air circulation. After extended periods of operation, a crust may develop on the surface of the sand in some areas. When ponding occurs, the upper one-half to one inch (1.3-2.5 cm) of crust and sand should be removed and discarded. The sand surface may then be raked and leveled and the process continued until a minimum of twenty-four inches (61 cm) of sand remains. At that time, the filter shall be reconstructed by adding new, coarse sand and the operation of the filter reinstituted.
i. A small hole shall be provided on the pump discharge line inside the recirculation tank to allow the discharge line to drain back into the recirculation tank.

CHAPTER 60

SINGLE RESIDENCE WASTE STABILIZATION LAGOONS

A waste stabilization lagoon can provide satisfactory sewage treatment for residences in rural areas where soils are not suited for absorption systems. Single residence waste stabilization lagoons are not generally acceptable in concentrated housing developments (see Policy Statement Management or Individual Sewage Systems in Appendix).

60.1 Location

60.101 The following minimum separation distances may be modified as necessary to accommodate site requirements or local codes:

a. The lagoon shall be located a minimum of fifty feet (15 m) from property lines, as measured from the adjoining lagoon shoreline. However, this distance must be increased where necessary to be sure that all effluent is disposed of upon the property.
b. The lagoon shall be located a minimum of two hundred feet (61 m) from the nearest residence.
c. The lagoon shall be located at least fifty feet (15 m) from a potable water supply or pump suction line. Greater horizontal separation distances may be needed depending on engineering and hydrogeological data and type of water supply.
d. The lagoon shall be located at least fifty feet (15 m) from a stream, water course, lake or impoundment.

60.102 Steeply sloping areas should be avoided.

60.103 The lagoon shall be located in soils where the vertical separation from the bottom of the lagoon and permeable or creviced bedrock is a minimum of three feet (0.9 m) with a percolation rate slower than 120 minutes per inch. Site modification may be accomplished to provide this minimum soil requirement.

60.104 The minimum operating level of the lagoon shall be located above the seasonal high groundwater level.

60.105 Selection of the site should consider a clear sweep of the surrounding area by prevailing winds. Heavy timber should be removed for a distance of one hundred feet (30.5 m) from the water's edge to enhance wind action and prevent shading.

60.2 Design

60.201 The lagoon shall be designed on the basis of 440 square feet (41 sq. meters) of water surface area per bedroom. A minimum water surface area of 1500 square feet (140 square meters) is recommended.

60.202 The hydraulic capacity of a single-cell lagoon should be equivalent to a 60-day minimum retention time based upon the average daily sewage flow of 75 gallons (285 liters) per person or actual flow. Where severe winter conditions preclude discharge, additional storage capacity shall be provided.

60.203 A properly sized and constructed septic tank or individual aerobic wastewater treatment plant should precede the lagoon if a garbage grinder is used.

60.204 A single cell is generally acceptable for lagoons. If multiple cells are used for further polishing or storage of effluent, the secondary cell should have an additional surface area of 0.3 that of the primary cell. When a third cell is provided, it should have an additional surface area of 0.1 the area of the primary cell.

60.205 The minimum embankment top width should be four feet (1.2 m).

60.206 The embankment slopes shall not be steeper than 3 horizontal to 1 vertical on the inner and outer sides.

60.207 Inner embankment slopes shall not be flatter than 4 horizontal to 1 vertical. Outer embankment slopes shall be sufficient to prevent the entrance of surface water into the lagoon.

60.208 Freeboard shall be at least two feet (0.6 m). Additional freeboard may be provided.

60.209 Embankments shall be seeded with a locally hardy grass, from the outside toe, to 1 foot (.3 m) above the water line, measured on the slope, to minimize erosion and facilitate weed control. Alfalfa or similar long-rooted crops which may interfere with the water holding capacity of the embankment shall not be used. Riprap may be necessary under unusual conditions to provide protection of embankments from erosion.

60.210 The influent line shall be of a sound, durable material of water-tight construction, have a minimum diameter of four inches (10 cm) and be laid on a firm foundation at a minimum grade of one-fourth inch (6.4 mm) per foot.

60.211 The influent line to round or square lagoons shall be center discharging. Influent lines to rectangular lagoons shall terminate at the third point farthest from the outlet structure.

60.212 A cleanout or manhole shall be provided in the influent line near the lagoon embankment. From this point, the line should be laid to the inner toe of the embankment and then on the bottom of the lagoon to the terminus point. A concrete splash pad three feet (0.9 m) square should be placed under the terminus of the pipe.

60.213 The elevation of the cleanout or manhole bottom should be a minimum of six inches (15 cm) above the high water level in the lagoon.

60.214 The effluent line(s) shall be designed to permit operation of the lagoon at depths of from three to five feet (0.9-1.5 m), and be located so as to minimize short-circuiting from the influent line.

60.215 The shape of the lagoon should be such that there are no narrow or elongated portions. Round, square, or rectangular cells are considered most desirable. Rectangular cells shall have a length not exceeding three times the width. No islands, peninsulas, or coves shall be permitted. Embankments should be rounded at corners to minimize accumulations of floating materials.

60.3 Construction

60.301 The floor of the lagoon shall be stripped of vegetation and leveled to the proper elevation.

60.302 Organic material removed from the lagoon area shall not be used in embankment construction.

60.303 The wetted area of the lagoon must be sealed to prevent excessive exfiltration. Seals consisting of soils and sealing aids such as Bentonite or synthetic liners may be used, provided the permeability, durability and integrity of the proposed materials can be demonstrated for anticipated conditions.

60.304 Embankments shall be constructed of impervious materials, and compacted sufficiently to form a stable structure.

60.305 The influent line shall be installed at sufficient depth to protect the line from freezing and be properly bedded to prevent structural damage to the pipe from wheeled vehicles that routinely cross the area. Slope of the line shall be such that excessive velocities do not cause scouring at the discharge point, but shall be adequate to prevent depositing within the line. Where

site conditions require pumping of influent prior to discharge into the lagoon, a manhole shall be installed as close to the lagoon as topography permits to provide for gravity discharge to the lagoon.

60.306 Effluent should be withdrawn from six inches (15 cm) below the water surface. This can be accomplished by placing a tee on the inlet end of the pipe or by placing the outlet pipe eight to ten inches (20-25 cm) lower on the inlet end than the outlet end of the pipe.

60.307 Riprap or a concrete apron should be provided at the outfall to prevent erosion of the embankment.

60.308 The lagoon area shall be enclosed with a four-foot high (1.2 m) woven or chain-link fence to preclude livestock and discourage trespassing. The fence shall be so located to permit mowing of the embankment top and slopes. A gate of sufficient width to accommodate mowing equipment should be provided.

60.309 Appropriate warning signs shall be provided to designate the nature of the facility and discourage trespassing.

60.4 Effluent Disposal

60.401 Effluent from a lagoon may be disposed of by using one or a combination of the following methods:

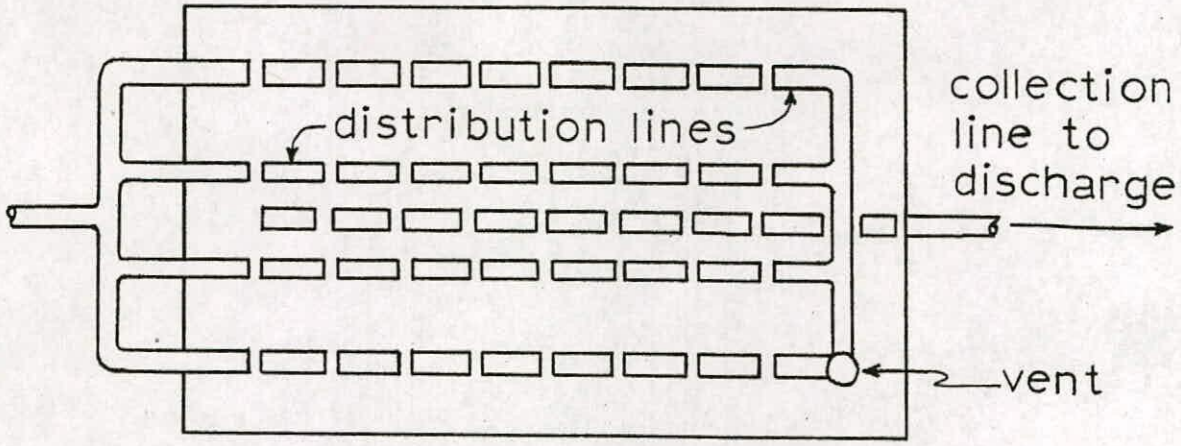
a. Discharged directly to a surface water course.
b. Disinfected prior to discharge.
c. Retained on the individual property, utilizing controlled surface irrigation for disposal.
d. Construction of a separate holding basin in combination with the lagoon to minimize discharge or achieve a no-discharge system.
e. Utilization of a surface sand filter to reduce BOD (biochemical oxygen demand) and SS (suspended solids) prior to discharge.

60.402 All methods of final effluent disposal shall be approved by the appropriate responsible administrative authority.

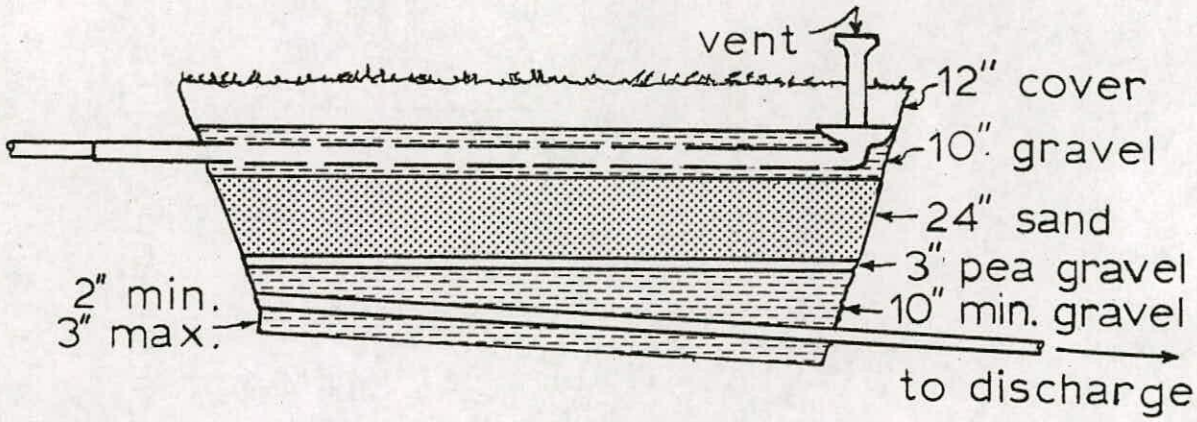
60.5 Operation and Maintenance

60.501 It may be necessary to introduce water into the lagoon to facilitate startup of the biological processes.

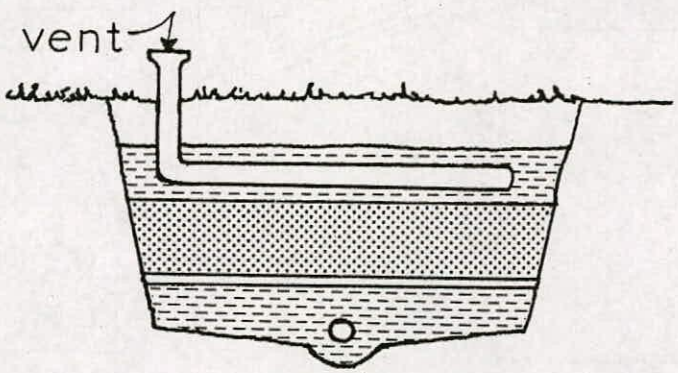
60.502 Odor problems caused by spring turnover of water, temporary overloading, ice cover, atmospheric conditions, or anaerobic conditions may be controlled by broadcasting sodium or ammonium nitrate over the surface of the lagoon.



plan view

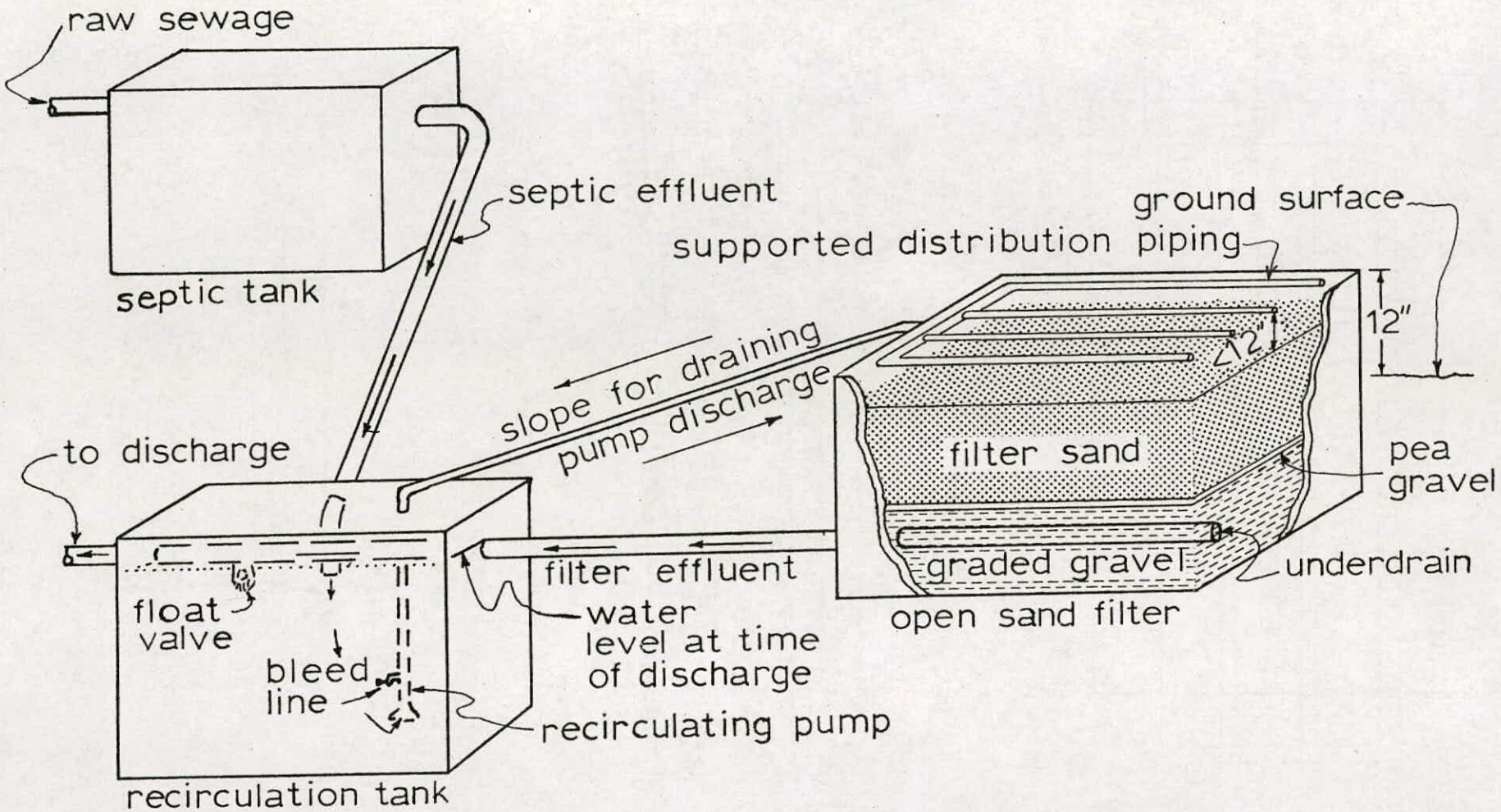


side view

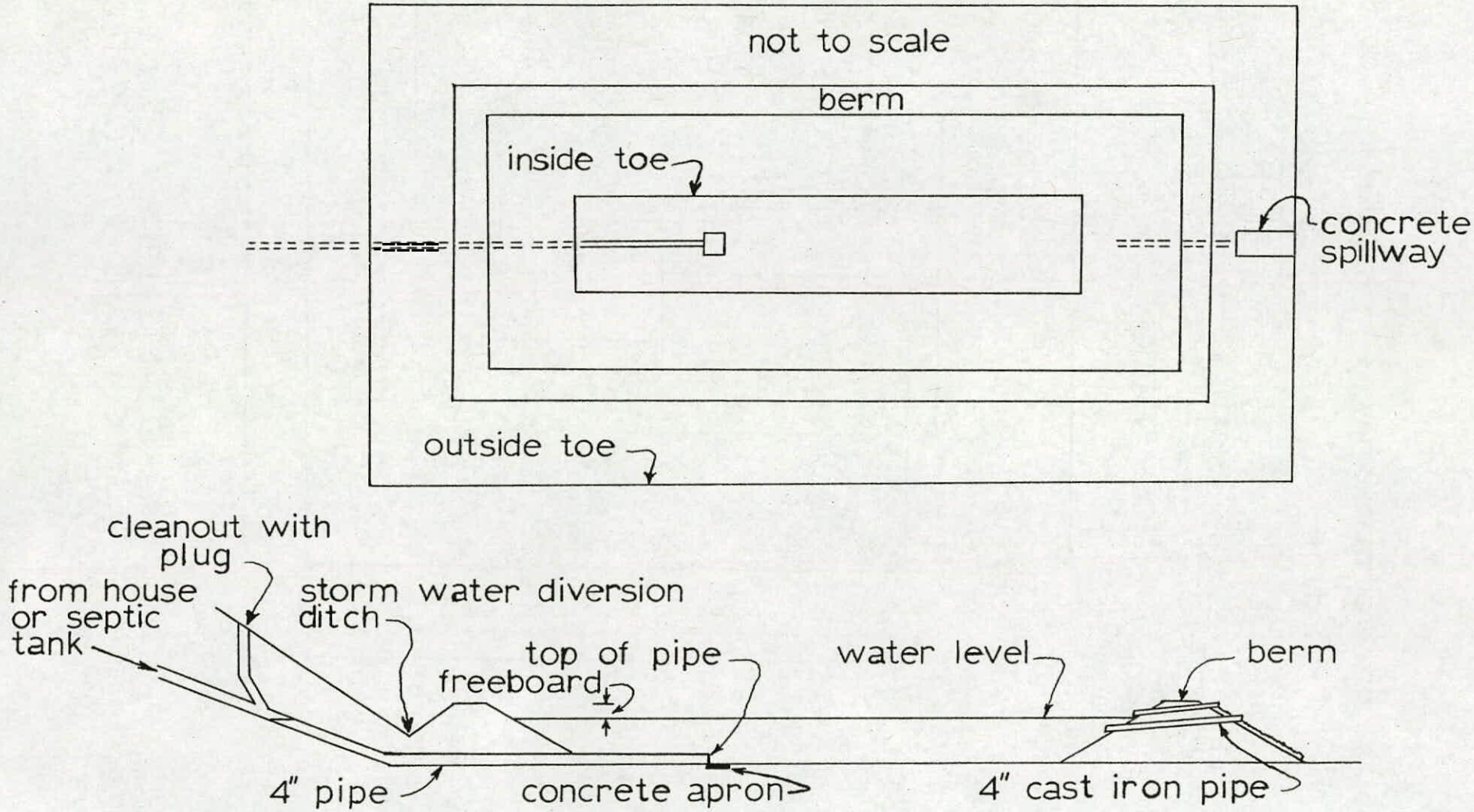


end view

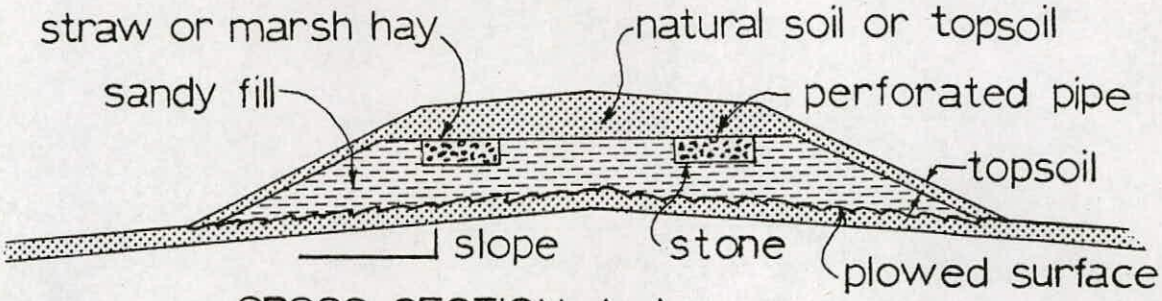
BURIED SAND FILTER



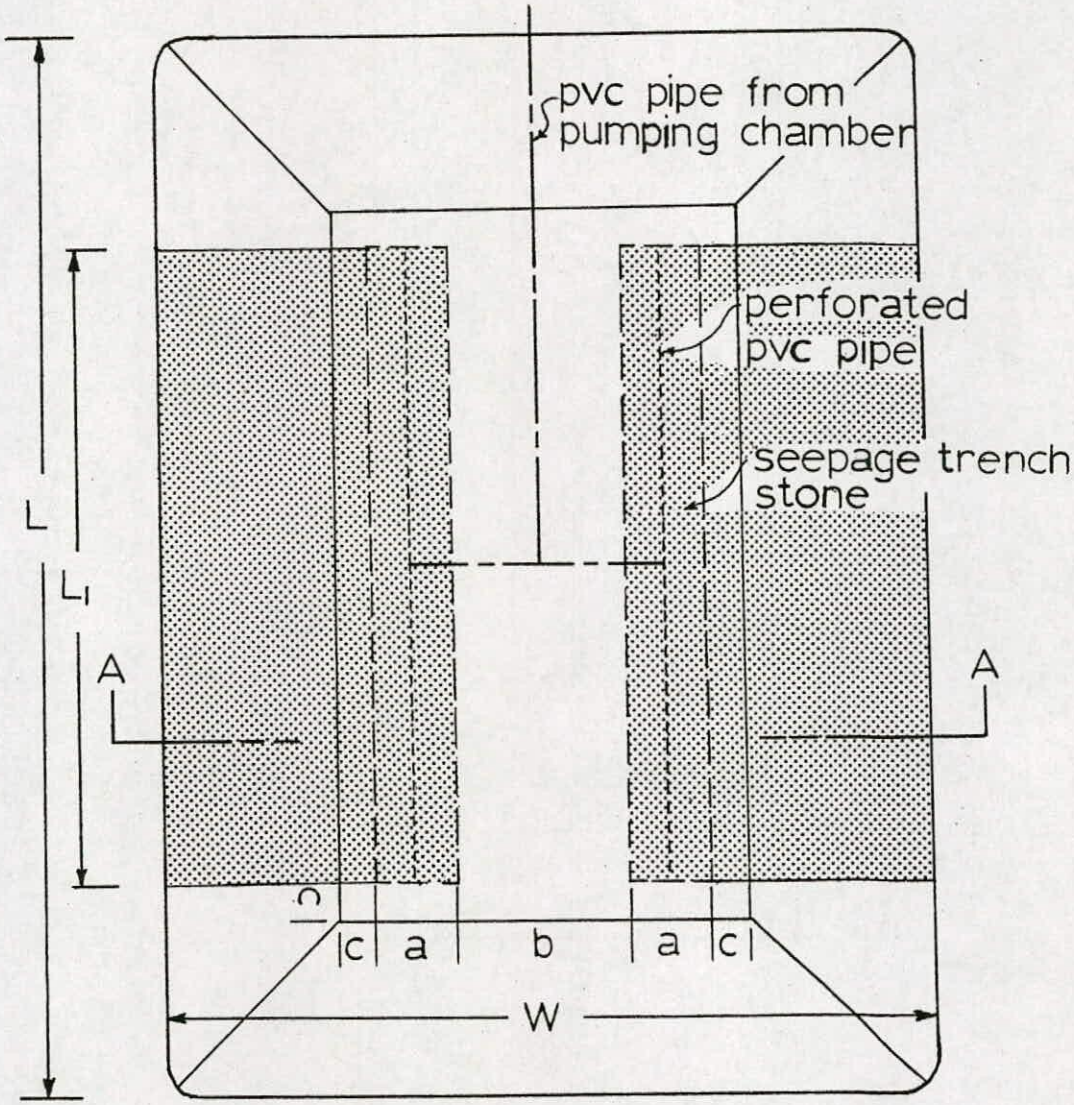
RECIRCULATING SAND FILTER SYSTEM



SINGLE RESIDENCE WASTE STABILIZATION LAGOON



CROSS SECTION A-A



PLAN VIEW

MOUND SYSTEM FOR A 2 OR 3 BEDROOM HOME ON A CRESTED SITE

DESIGN CALCULATIONS
FOR AN ELEVATED SAND MOUND AT A CRESTED SITE

The design of a mound includes four steps: They are: (1) flow estimation, (2) design of the aborption trenches, (3) dimensioning the mound, and (4) checking for limiting conditions.

GIVEN: A three bedroom home, a percolation rate of 80 minutes per inch at a depth of 24 inches below ground surface, a crested site with a land slope of two percent, high groundwater is 36 inches below ground surface and all other site factors are satisfactory.

DESIGN: 1. Estimated daily flow in gallons per day (gpd) = Q

$$Q = \text{No. of bedrooms} \times 150$$

$$Q \equiv 3 \times 150 = 450 \text{ gpd}$$

2. Absorption trench system

$$\text{Trench bottom in ft.}^2 = \frac{\text{Daily flow in gpd}}{\text{Application rate in fill (gal/day/ft.}^2\text{)}}$$

$$\text{Trench bottom area} = \frac{450 \text{ gpd}}{1.2 \text{ gal/day/ft.}^2} = 375 \text{ ft.}^2$$

$$l_1 \equiv \text{Total trench length} = \frac{\text{Trench bottom area}}{\text{Trench width (a)}}$$ Use a width of 3 ft. (a

$$l_1 \equiv \text{Trench length} = \frac{375}{3} = 125 \text{ feet}$$

For a crested site, two trenches must be used.

$$l_1 = \text{Trench length} = \frac{125}{2} = 62.5 \text{ feet}$$

Minimum trench length is 40 feet because the natural soil percolation rate is between 60 and 120 minutes per inch. Use 2 trenches, 3 feet wide and 65 feet long.

In Section 44.603 for a pipe size of 1 inch and holes of 1/4 inch diameter at 30 inches spacing it was found that the maximum pipe run from a header was 25 feet for a total trench length of 50 feet. To accommodate the 65 foot trench required it is necessary to: a) Increase pipe size, or b) decrease perforation size, or c) increase spacing between holes, or d) a combination of the above.

Trench spacing (b). At least four feet must be provided between trenches. For crested sites it is desirable to provide at least ten feet between trenches. This design will use ten foot spacing (b).

3. Dimensioning the sand fill portion of the mound.

Mound Length, L

The length of the mound is computed by adding the length of the top (horizontal extent) of the sand fill (1_1 + 2c) and the horizontal distances on each end of the top needed to provide a side slope of one vertical to four horizontal. Note that 12 inches of fill must exist below the trench and a trench is 9 inches deep. Thus:

$$L = \text{Mound Length} = 1_1 + 2c + \frac{(2 \text{ sides} \times 4 \text{ vert.} \times \text{Vert. thickness of fill, inches})}{(1 \text{ horizontal} \times 12 \text{ inches/foot})}$$

$$L = \text{Mound Length} = 65 + (2 \times 3) + \frac{2 \times 4\ (9 \text{ in.} + 12 \text{ in.})}{12 \text{ in./ft.}} = 85 \text{ feet}$$

6 + 14

Use 85 feet as the length of the mound at the crest of the site.

Mound Width, W

The width of the mound is computed in a similar manner using the width of the trenches (a), number of trenches and trench spacing (b). Thus:

$$W \equiv \text{Mound Width} \equiv 2a + b + 2c + \frac{(2 \text{ sides} \times 4 \text{ vert.} \times \text{Vert. thick. of fill, in.})}{(1 \text{ horizontal} \times 12 \text{ inches/foot})}$$

$$W \equiv \text{Mound Width} = (3 \times 2) + 10 + 6 + 14 = 36 \text{ feet, 0\% slope}$$

For a two percent slope, the vertical fall is about 0.36 feet in a horizontal distance of 18 feet. The approximate additional width of the mound on a crested site with two percent slopes is 0.36 x 4 x 2 = 2.9 feet. Thus:

W = Total mound width = 36 + 3 = 39 feet.

The mound length, L at the downslope base of the sand fill will be 88 feet. Note that additional land area is needed for the mound for placement of the top soil over the sand fill portion of the mound.

4. Checking for limiting conditions.

The effective basal area of the sand fill (shaded area in plan view) in the mound below and downslope of the trenches must be large enough to absorb the estimated daily waste flow. In calculating this basal area, exclude the portions of the mound on each side of the ends of the trench or trenches and their extension downslope.

In this calculation:

A = Effective basal area of the mound, $ft.^2$ = shaded area in plan view
Q ≡ Estimated daily flow, gpd
R ≡ Natural soil infiltration rate, $\frac{gpd}{ft.^2}$

Thus, $R = \frac{Q}{A}$, expressed in gallons per day per square foot.

In this case, a crested site is used and the trench on each side receives one half of the daily flow and functions independently. Thus:

A is computed by multiplying the trench length, 1_1 by the sum of the trench width, a, the horizontal extent of fill beyond the trench, c, and the horizontal distance needed to provide the side slope. (One half of the correction used for total mound width.)

$A = 1_1 (a + c + 7 + 1.5)$

$A \equiv 65 (3 + 3 + 7 + 1.5)$

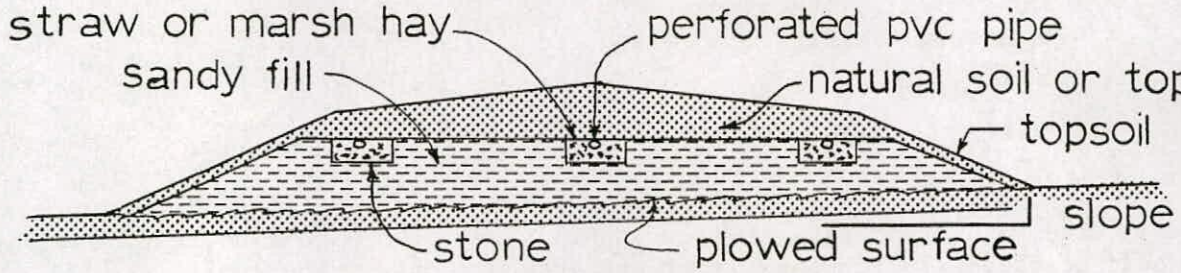
$A = 942 \text{ ft.}^2$

$Q \equiv \frac{450}{2} = 225 \text{ gpd}$

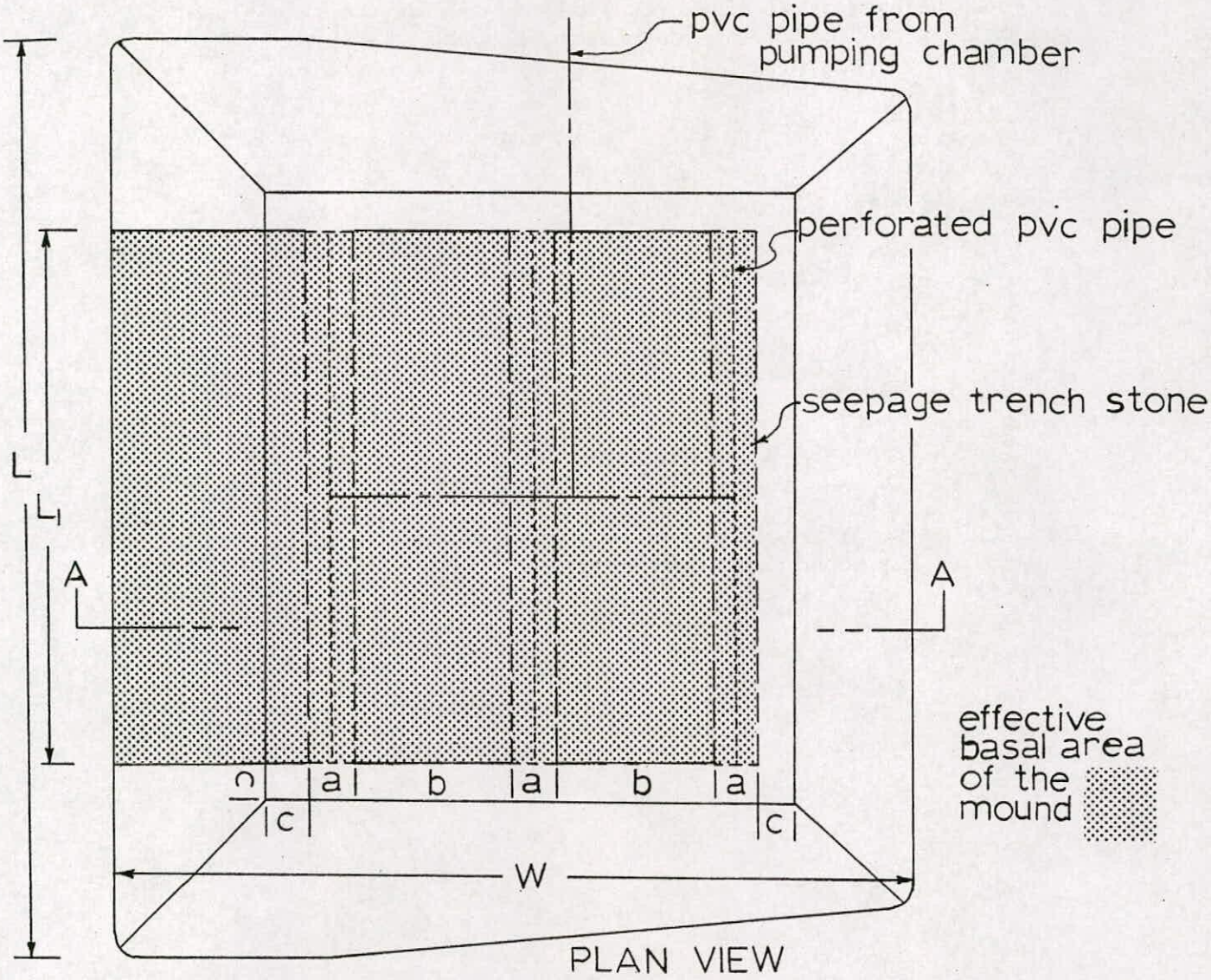
$R = \frac{Q}{A} = \frac{225}{906} \equiv 0.24 \frac{gpd}{ft.^2}$

From Section 44.407, R must not exceed $0.24 \frac{gpd}{ft.^2}$

THIS DESIGN IS SATISFACTORY. If calculated R exceeds the maximum, increase the size of the mound downslope or trench length to provide a satisfactory value for R.



CROSS SECTION A-A



PLAN VIEW

MOUND SYSTEM FOR A 3 OR 4 BEDROOM HOME ON A LEVEL OR SLOPING SITE

DESIGN CALCULATIONS
FOR AN ELEVATED SAND MOUND AT A SLOPING SITE

The design of a mound includes four steps. They are: (1) flow estimation, (2) design of the absorption trenches, (3) dimensioning the mound and (4) checking for limiting conditions.

GIVEN: A four bedroom home, a percolation rate of 45 minutes per inch at a depth of 24 inches below ground surface, land slope is 4 percent, high groundwater is 36 inches below ground surface and all other site factors are satisfactory.

DESIGN:

1. Estimated daily flow in gallons per day (gpd) = Q

   Q ≡ No. of bedrooms x 150

   Q ≡ 4 x 150 = 600 gpd

2. Absorption trench system

   $$\text{Trench bottom area, in ft.}^2 \equiv \frac{\text{Daily flow in gpd}}{\text{Application rate in fill (gal/day/ft.}^2\text{)}}$$

   $$\text{Trench bottom area} = \frac{600 \text{ gpd}}{1/2 \text{ gal/day/ft.}^2} = 500 \text{ ft.}^2$$

   $$\text{Total trench length} = \frac{\text{Total bottom area}}{\text{Trench width (a)}}$$ Use a width of 4 ft. (a).

   $$\text{Total trench length} = \frac{500}{4} = 125 \text{ feet}$$

   Where the natural soil percolation rate is faster than 60 minutes per inch, it is desirable to limit trench length to 50 feet for ease in designing the pressure distribution system. Generally, it is best to design a mound with long trenches.

   $$\text{Number of trenches} = \frac{\text{Total trench length}}{\text{Optimum trench length}}$$

   $$\text{Number of trenches} = \frac{125}{50} = 2.5, \text{ use 3 trenches}$$

   $$l_1 \equiv \text{Trench length} \equiv \frac{125}{3} = 41.67, \text{ use a trench length of 42 feet.}$$

   Trench spacing, (b). At least four feet must be provided between trenches. Use a four foot spacing (b).

3. Dimensioning the sand fill portion of the mound.

Mound Length, L

The length of the mound is computed by adding the length of the top (horizontal extent) of the sand fill (l_1 + 2c) and the horizontal distances on each end of the top needed to provide a side slope of one vertical to four horizontal. Note that 12 inches of fill must exist below the trench and a trench is 9 inches deep. Thus:

$$L = \text{Mound Length} = l_1 + 2c + \frac{(2 \text{ sides} \times 4 \text{ vert.} \times \text{Vert. thickness of fill, inches})}{(1 \text{ horizontal} \times 12 \text{ inches/foot})}$$

$$L = \text{Mound Length (at the trench)} = 42 + (2 \times 3) + \frac{2 \times 4 \ (9 \text{ in.} + 12 \text{ in.})}{12 \text{ in./ft.}}$$

$$6 + 14$$

L = Mound Length = 62 feet

Use 62 feet as the length of the mound at the upslope base of the fill.

Mound width, W

The width of the mound is computed in a similar manner using the width of the trenches, number of trenches and trench spacing. Thus:

$$W = \text{Mound Width} = 3a + 2b + 2c + \frac{(2 \text{ sides} \times 4 \text{ vert.} \times \text{Vert. thick. of fill, in.})}{(1 \text{ horizontal} \times 12 \text{ inches/foot})}$$

W = Mound Width = (4 x 3) + (2 x 4) + 6 + 14 = 40 feet (0% slope)

The approximate additional downslope width of the mound at a sloping site with a four percent slope is:

$$\frac{4 \text{ vertical}}{1 \text{ horizontal}} (3a + 2b + c + 14/2) \frac{4\%}{100}$$

4 [(3 x 4) + (2 x 4) + 3 + 7] 0.04 = 4.8 feet, use 5 feet.

W = Total mound width + 40 + 5 = 45 feet.

The mound width correction upslope is neglible. Thus the mound width of the sand fill portion measured from the center of the mound will be 20 feet upslope and 25 feet downslope. The mound length at the downslope base of the sand fill will be 72 feet.

Note that additional land area is needed for the mound for placement of the top soil over the sand fill portion of the mound.

4. Checking for limiting conditions.

The effective basal area of the sand fill (shaded area in plan view) in the mound below and downslope of the trenches must be large enough

to absorb the estimated daily waste flow. In calculating this basal area, exclude the portion of the mound upslope from the trenches and the portion of the mound on each side of the ends of the trenches and their extension downslope.

In this calculation:

A = Effective basal area of the mound, $ft.^2$ = shaded area in plan view
Q ≡ Estimated daily flow, gpd
R = Natural soil infiltration rate, $\frac{gpd}{ft.^2}$

Thus, $R \equiv \frac{Q}{A}$, expressed in gallons per day per square foot.

A is computed by multiplying the trench length, l_1 by the sum of the trench widths, the spaces between trenches, the horizontal extent of fill beyond the last trench and the horizontal distance needed to provide the side slope. (Including the correction for total mound width.)

$$A = l_1 \ (3a + 2b + c + 7 + 5)$$

$$A = 42 \ [(4 \times 3) + (2 \times 4) + 3 + 7 + 5)]$$

$$A = 1{,}470 \ ft.^2$$

$$Q = 600$$

$$R = \frac{600}{1{,}470} = 0.41 \ \frac{gpd}{ft.^2}$$

From Section 44.408, R must not exceed 0.74 $\frac{gpd}{ft.^2}$

THIS DESIGN IS SATISFACTORY. If calculated R exceeds the maximum, increase the size of the mound by increasing spacing between trenches, or by increasing trench length.

POLICY STATEMENT

ON

EVAPORATION-TRANSPIRATION

The position of the GLUMR Board as relates to the installation of wastewater disposal systems relying entirely upon evaporation-transpiration in the ten-state area is as follows:

The GLUMR Board is unable to recommend such designs for a variety of reasons:

1. Primary problems have been encountered with snow cover and freezing temperatures over the disposal area, effectively blocking the upward migration of effluent, and subsequently, evaporation.

2. Much of the ten-state region receives precipitation at a rate closely approximating the evaporation rate (on a yearly basis) necessitating exceptionally large storage areas to accommodate effluent when effective evaporation is not possible.

These factors limit the effectiveness of evaporation-transpiration and thus the system does not readily lend itself to this climate. However, where the precipitation-evaporation relationships in a given geographical area favors evaporative conditions, the evaporation-transpiration system may be a viable alternative. -

POLICY STATEMENT

ON

MANAGEMENT OF INDIVIDUAL SEWAGE SYSTEMS

Design standards by themselves do not provide for long-term performance of individual sewage systems. Significant emphasis must be placed on the proper siting, installation, and continued maintenance of these systems.

Any agency or jurisdiction (state, county, and/or local) intending to utilize these standards must address the institutional and administrative arrangements to insure the satisfactory application of the standards. One or more of the following elements are essential to any program concerning individual sewage disposal systems:

1. Licensing of system installers.

2. Inspection and the issuance of permits for all individual sewage systems.

3. Certification of enforcement personnel and/or soil testers.

4. The creation of sewage management districts or agencies.

5 The institution of training programs or other measures to improve construction and maintenance practices.

6. Any combination of the foregoing.

Absence of proper institutional and administrative arrangements for the total management of these systems is likely to lead to failure of the various wastewater disposal systems described in these standards.

POLICY STATEMENT

ON

PROPRIETARY DEVICES

Proprietary devices are defined as all devices designed to reduce, process, or treat all or a select portion of wastewater generated within the individual home. They include, but are not limited to, water recycle and reuse, water conservation devices, composting units, and other devices that are intended to reduce the volume of waste generated or water consumed. In all installations, the resulting effluent (liquid, solid, or gas) leaving the dwelling must be disposed of in a manner acceptable to the state or local health agency having jurisdiction.

Where these devices are proposed, a number of considerations are essential:

a. The possiblity of a "governmental unit" accepting responsiblity for operation and maintenance of the system.

b. Adaptability of the household plumbing system to incorporate conventional plumbing fixtures and provisions for future expansion of the disposal system to accommodate any additional wastewater flows.

c. Provisions for the periodic maintenance of the device throughout its anticipated life.

d. The availability of a back-up solution (such as sewers, subsurface absorption, etc.) where the proposed device is new to the locality or experience is lacking and whenever such devices are proposed for new construction.

e. The possibility of reduction in the size of any component portion of a wastewater disposal system resulting from the use of a proprietary device. (Primary treatment capacity should only be reduced when the proprietary device significantly reduces both organic and hydraulic loading.)

The use of a proprietary device to solve a wastewater disposal problem at an existing dwelling may be considered and may, in fact, be the most feasible and practical approach, both from the economic and engineering viewpoint.

As experience is gained with these devices, modifications to this policy statement may be anticipated.

POLICY STATEMENT

ON

PUMP AND HAUL PROCEDURES

Where site limitations are such that methods of on-site wastewater disposal described herein cannot be utilized, the possibility of temporarily storing the dwelling's wastewater in water-tight tanks with periodic pumping and disposal offsite is often a consideration. The Great Lakes Upper Mississippi River Board recognizes the use of water-tight holding tanks as an interim solution only. These systems require continuous maintenance and frequent pumping and depend upon offsite disposal which is cost prohibitive for the long term. Their use should be limited to the following situations:

-- Where municipal sewers or other long-term solutions for wastewater disposal will definitely be available within a reasonable period of time.

-- Where temporary malfunction of an on-site disposal system occurs and occupancy of the home must continue while the system is renovated.

The use of pump and haul procedures is not considered to be a viable alternative for new construction due to the following:

1. Continuing costs.

2. The lack of management mechanisms to assure the continuation of pumping contracts.

3. The difficulty in finding disposal area for the sewage.

4. The potential for illicit connections to drains, ditches, or surface waters.

This policy statement does not preclude the possibility of establishing a management or service program under the control of a government entity or property owners association that is acceptable to the administrative authority.

POLICY STATEMENT

ON

SYSTEM FAILURES

The definition of "failure" adopted by the GLUMR Board is stated as follows:

Failure of a subsurface soil absorption system shall include, but not be limited to, the occurrence of any one, or combination of, the following factors:

1. The system refuses to accept sewage effluent at the rate of design application resulting in interference with plumbing fixture use.

2. Sewage effluent exceeds the infiltrative capacity of the soil resulting in objectionable odors, ponding, seepage, or other discharge of the effluent to the surface of the ground or surface waters.

3. Effluent discharges from the absorption system result in contamination of a potable water supply, groundwater, or surface waters.

Conditions of malfunction caused by a rarely occurring phenomenon which is not seasonal, and is self-correcting without physical alteration of the absorption system are not considered to be failures.

POLICY STATEMENT

ON

DISCHARGE OF BACKWASH WATERS FROM
WATER SOFTENERS TO SOIL ABSORPTION SYSTEMS

The proper functioning of a soil absorption system is dependent upon the maintenance of sufficient permeability in the soil to dispose of the effluent. Although the deleterious effects of high sodium waters on the permeability of some structural clay soils (Montmorillinite) has been recognized for many years, the disposal of brine waste from water softening equipment does not have a significant effect upon the permeability of soils suitable for soil absorption systems.

Further, the additional concentration of sodium ions (Na^+) from the brine waste has not shown any adverse effect on the microbial action within the primary treatment chamber nor upon shallow rooted plant life which overlies the soil absorption system.

Therefore, the disposal of brine waste from water softening equipment may be discharged to the wastewater treatment system. Where the utilization of water softening equipment is desirable or necessary to reduce hardness in a potable water supply, the volume of brine waste discharge and the frequency of regeneration of the water softening equipment should be evaluated to determine any necessary changes in the design of the system to accommodate additional hydraulic loading.