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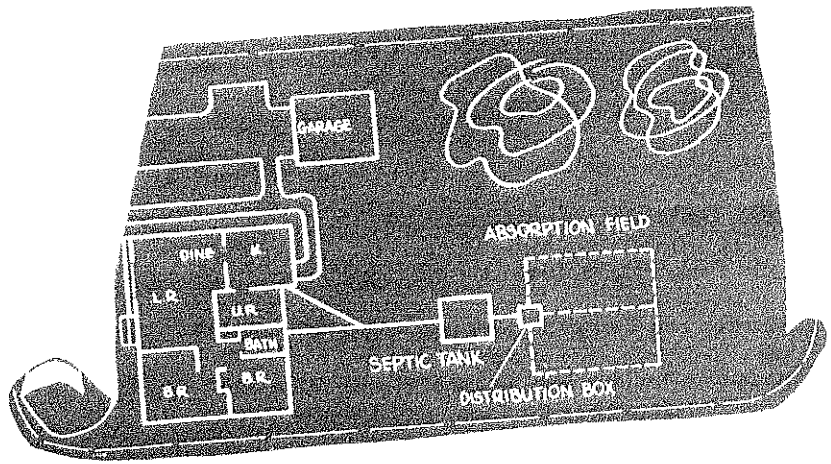
Indiana State Board of Health
1978

Septic Tank-Absorption Field Sewage Disposal Systems



for One or Two Family Dwellings

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Septic Tank-Absorption Field Sewage Disposal Systems for One or Two Family Dwellings

PART I

Public Health Aspects

Limitations of Individual Sewage Disposal Systems

Modernization of farm homes and suburban housing construction have greatly increased the use of septic tank sewage disposal systems. The fact that many homes use septic tank sewage disposal systems does not mean that this is the best method of sewage disposal. **Wherever possible, the use of municipal sewers and sewage treatment facilities should be given preference over individual sewage disposal systems.**

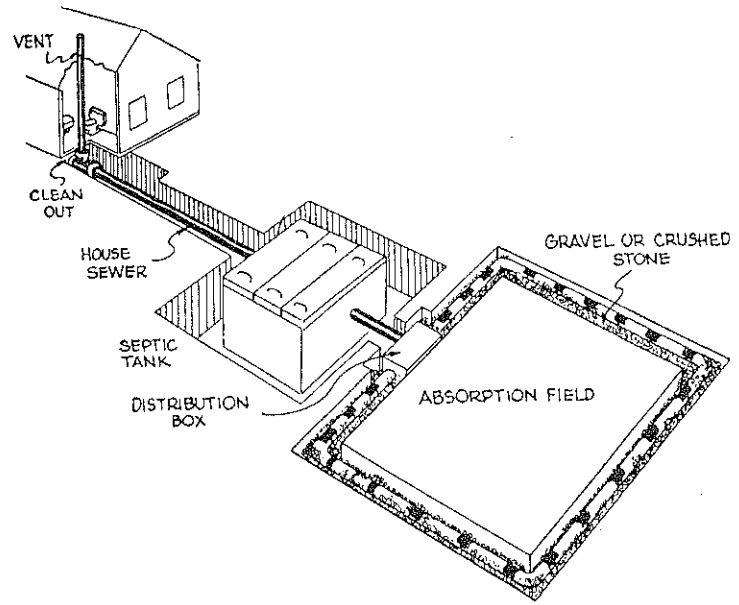


Figure 1—Diagrammatic sketch of a Septic Tank-Absorption Field Sewage Disposal System using a single compartment rectangular tank.

Limitations of Soil Sites

Soils differ in their ability to absorb, transmit and hold liquids, to change or biodegrade organic residues, and to render pathogenic organisms and toxic substances harmless. Some soils have only slight limitations when used for septic tank-absorption field sewage disposal systems; others have modern limitations but can be used if the system is designed and constructed to overcome these soils conditions. Soils with severe limitations may not be used for septic tank-absorption systems unless the limitation is not present as shown by field investigation or can be overcome.

Diseases

The use of unsatisfactory individual sewage disposal equipment and faulty location and construction has, in many instances, endangered public health. Typhoid fever, dysentery and diarrhea may be traceable to faulty sewage disposal and sickness and expense may result from these diseases. These disease organisms are found in the body discharges of individuals suffering from the diseases. Typhoid fever and dysentery may also be spread by "carriers" who are people that have disease organisms in their bodies but are not ill. Sewage must not be discharged into abandoned wells or fissured rock formations as it will contaminate the ground water. Sewage disposal systems located near wells may contaminate the water by surface drainage or underground seepage. Untreated or insufficiently treated sewage discharged to the ground surface also results in fly-breeding areas, filth and odors. Concentrations of insufficiently treated sewage discharged into lakes or streams can cause the water to be unfit for bathing, agricultural or other public and private uses.

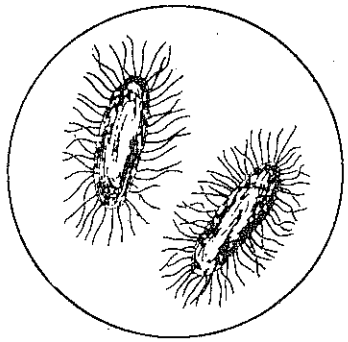


Figure 2—Diagrammatic sketch of Filth-Borne Disease Bacteria (Enlarged 10,000 times).

Filth-borne disease organisms usually reach the people they infect through: (1) water, (2) milk, (3) food, (4) flies, (5) rodents and (6) personal contact.

PART II

Permits and Plans

Permits

Indiana Rule 410 IAC 6-8-12 requires that a permit be obtained from the local health department before a septic tank absorption field sewage disposal system is installed. It is recommended that a soil survey map with interpretations for septic tank absorption fields accompany the application. **Inquire about local ordinances before starting construction.**

Services

Advice and planning aid for individual residential sewage disposal system installation may be obtained from (1) local health departments, (2) city or county planning commissions, (3) county cooperative extension specialists, (4) local Soil anc Water Conservation Districts, (5) Purdue University, and (6) the Indiana State Board of Health.

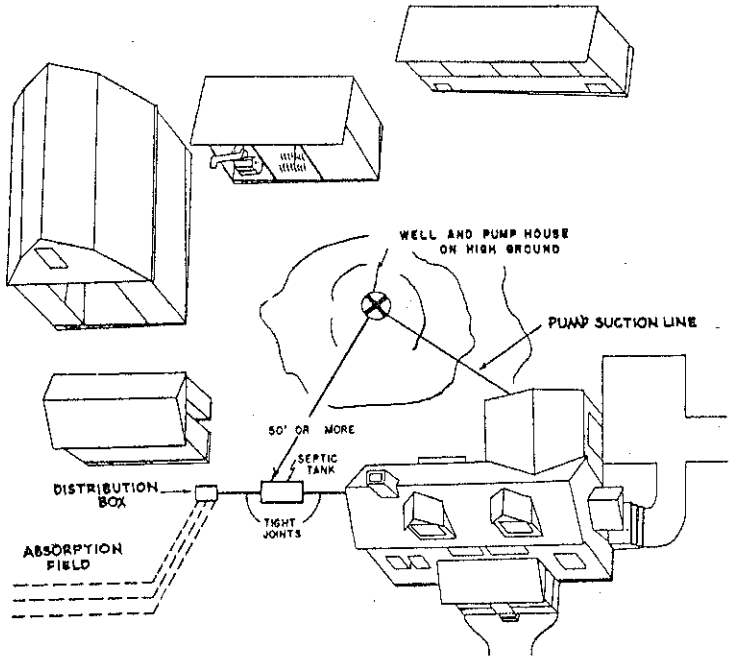


Figure 3—Location of the Sewage Disposal System for a Farm Home.

Plans

All sewage treatment facilities should be carefully laid out and installed. Good design and installation will reduce the possibility of failure. A plan of the sewage disposal system should be made and kept on file by the owner so that the location and details of construction are not forgotten. In case of failures or alterations, a plan of the system is essential so that the troubles can be easily located and repairs made at minimum expense. Pencil sketches are satisfactory as plans of residential sewage disposal systems, providing they show distances from buildings, property lines, wells, dimensions of the system and other similar information.

Some Planning Considerations

The plan for the septic tank-absorption field sewage disposal system should fit into the overall planning of the home. Normally, hundreds of gallons of sewage must be disposed of each week from a home equipped with water-using facilities; therefore, it is important to consider and follow the suggested planning guides. In platting subdivisions consideration should be given to planning the location of all wells and sewage disposal systems so that the development of any one lot will not restrict the development of an adjacent lot.

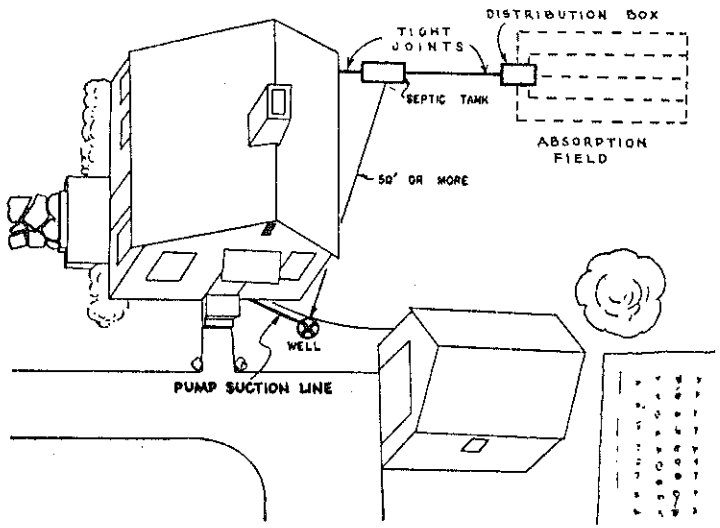


Figure 4—Location of the Sewage Disposal System for a Suburban Home.

The following suggested planning guides should be considered in the overall planning for the home before construction is started.

Suggested Planning Guides

1. Soil Conservation Service data of the area planned is helpful in determining soil capabilities and hazards. In addition, soil percolation tests are used to determine the soil absorption rate and size of the absorption trench as explained in Part VI of this bulletin.

2. The following minimum lot sizes should be provided where private sewage disposal facilities are utilized:

Class	Percolation test minimum required for water to fall one inch	Minimum lot area square feet
1	3 minutes or less	10,000
2	3 to 15 minutes	15,000
3	15 to 60 minutes	18,000
4	Over 60 minutes	Unsuitable for septic tank-absorption fields.
5		Soils classified as having severe limitations are not suitable for the development of private subsurface sewage disposal systems.

3. Topography: The slope of the land will affect construction costs, depth of sewers, direction of surface drainage, erosion and sedimentation control, and the method of draining the basement fixtures. Land on slopes of greater than 12 percent gradient should not be used for septic tank absorption fields. There are suggested plans for developing absorption fields on slopes up to 12 percent gradient in U. S. Public Health Bulletin No. 526.

4. Soil Wetness, Ponding and Flooding: Septic tank sewage disposal systems are not permitted in areas that are seasonally wet, pond water, or periodically flood during any part of the year.

5. Water Supply: Protect the water supply from contamination by safe location and construction of the sewage disposal system as described in this bulletin and in Bulletin S. E. 15. Some soils that absorb and transmit liquids at a rapid rate have a hazard of possible contamination of local water supplies. Refer to minimum distance of sewage facilities to private water supply wells in this bulletin.

6. Plumbing: The plumbing in the house should be laid out so that there is a minimum of bends and turns required from facilities to the septic tank.
7. Location and Construction: Comply with local ordinances and the recommendations of this bulletin.

PART III

The Sewage Disposal System

The Parts of the System

The essential parts of a septic tank-absorption field sewage disposal system are: (1) the house plumbing, (2) the sewer from the house to the septic tank, (3) the septic tank, (4) the tank outflow sewer or effluent sewer, (5) the distribution box and (6) the underground absorption or seepage lines.

Sewage Characteristics

Untreated household sewage is principally composed of human excreta, paper, garbage and wash water from the plumbing fixtures and drains. Many kinds of bacteria are present in the sewage. Some of these bacteria may be pathogenic or disease-producing bacteria. Much of the solid material in sewage is organic and will decompose readily.

Sewage Flows

Household sewage flows are usually 50 to 75 gallons per person each day, but in some instances they may be much higher.

PART IV

Sewers

The House Sewer
Function

The house sewer conducts the sewage from the house plumbing to the septic tank.

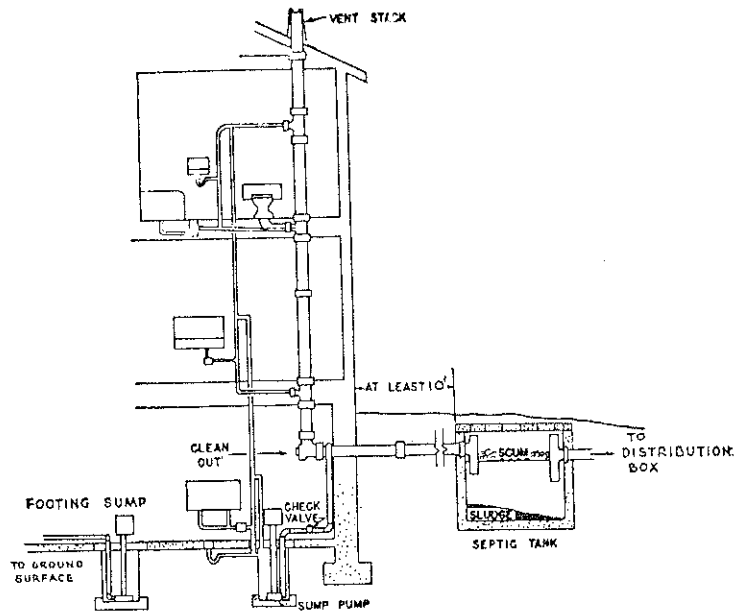


Figure 5—In reasonably level areas a sump pump may be used for elevating sewage from basement to the septic tank.

Where it is necessary to pump water from foundation drains, install a separate sump pump and pump this water to a separate drain discharging to the ground surface.

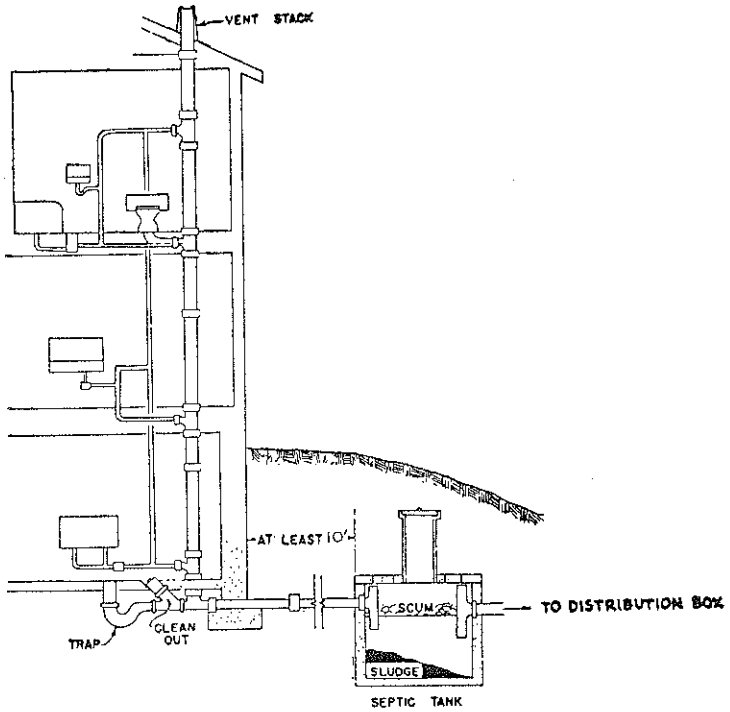


Figure 6—Where the land slopes down hill from the house, it may be possible to drain the basement fixtures directly into the septic tank.

Do not connect foundation drains to the septic tank or absorption field.

Location

Minimum Distance of House Sewer from—

Private water supply well	50 feet
Underground pump suction line	50 feet
Property lines	5 feet

The building sewer shall be located at least 50 feet from any water supply well or pump suction line serving a residence; however, sewers constructed of water works grade ductile iron having mechanical or push-type joints or of waterworks grade pressure-type plastic with an SDR rating of 26 having compression gasketed joints may be located within the 50-foot distance but not closer than 20 feet to dug and bored wells and not closer than 10 feet to drilled and driven wells or underground pump suction lines.

The building sewer shall be so designed and constructed to give mean velocities, when flowing full, of not less than 2.0 feet per second, based on Kutter's formula using an "N" value of 0.013.

Size

A four-inch sewer is satisfactory for residential disposal systems.

Slope

The house sewer should slope not less than 4 inches in 25 feet. Slopes from 4 inches to 8 inches in 25 feet are generally recommended. Slopes greater than 3 feet in 25 are undesirable and may result in agitation or mixing of the septic tank contents by the entering sewage.

Material

Where water works grade pipe is not required, the house sewer may be constructed with vitrified clay sewer tile, concrete sewer tile, cement-asbestos sewer, bituminous fibre, plastic, or copper (hard drawn, type K or L) sewer pipe, all with tight joints.

Construction

1. Use cast iron soil pipe or copper (hard drawn, type K or L) as the house sewer to at least three feet outside the foundation wall.
2. Use cast iron soil pipe, other special construction or materials where root clogging is likely.
3. Run the house sewer in a straight line. If bends or turns are unavoidable, install manholes or clean-outs.
4. Dig the sewer trench at least 12 inches wide at the bottom to provide room for laying the sewer.
5. Maintain a uniform slope on the sewer.
6. There shall be no construction of any kind, including driveways, covering any portion of a residential sewage disposal system. The connecting sewers between the house and the septic tank (building sewer), the septic tank and the distribution box and the distribution box and the absorption lines may be installed under driveways if the sewer is constructed of cast iron.
7. Generally, mortar joints are not recommended for house sewers.
8. The first 6 to 12 inches of back fill around the sewer should not contain large stones or rubble.
9. The sewer should have at least 18 inches of cover to prevent freezing.

The Effluent Sewer

Function

The effluent sewer carries the septic tank overflow to the absorption field.

Location

Minimum Distance of Effluent Sewer from—

Private water supply wells	50 feet
Underground pump suction lines	50 feet
Property lines	5 feet
Stream or ditch	25 feet
Lake	50 feet

Size

The effluent sewer should be the same size as the house sewer.

Slope

The effluent sewer slope should not exceed 4 inches in 25 feet. Steeper slope will increase the velocity of the effluent and tend to concentrate it in the farthest absorption lines.

Material

The effluent sewer may be constructed from vitrified clay sewer tile, concrete sewer tile, cement-asbestos, bituminous fibre, plastic, or copper (hard drawn, type K or L) sewer pipe, all with tight joints.

Construction

1. Avoid locating effluent sewer near shrubs or trees or under walks or drives.
2. Dig the trench at least 12 inches wide at the bottom to provide room for the workmen laying the sewer tile.
3. Construct the effluent sewer with tight joints.
4. Maintain a uniform grade on the sewer.
5. Generally, mortar joints are not recommended for effluent sewers.

PART V

Septic Tanks

Function

The sewage flowing into the tank is slowed and distributed through the tank by the inlet baffling device without disturbing

the scum. The tank must be large enough to provide storage space for accumulations of scum and sludge in addition to detaining the sewage for 24 hours. While detained in the tank, a part of the sewage solids settle to the bottom of the tank and the greases and soaps rise to the liquid level of the tank. A free space above the liquid level of the tank is necessary for some scum storage, venting the tank and the absorption field, and changes in liquid level for different conditions of flow. The gas from the system is vented through the main vent stack in the house plumbing system. Bacteria which work in the absence of air digest the settled solids in the tank. The septic tank provides only partial sewage treatment. Additional treatment is needed in an absorption field.

Location

Minimum Distance In Feet from - to	Septic Tank	Absorption System
Private water supply source	50	50
Semi-public water supply source	100	100
Public water supply source	200	200
Lake or reservoir	50	50
Stream, ditch, or drainage tile	25	25
Dwelling or other structure	10	10
Side or rear lot lines	5	5
Front lot lines	5	5
Water lines continually under pressure	10	10
Suction water lines	50	50

Types

When properly sized and constructed, compartmental or multiple unit tanks will give a satisfactory performance on a basis of settleable solids removed. However, performance may be influenced by compartment construction, inter-compartment flow arrangements, compartment size, sludge accumulations and overall capacity. The bottom of the inlet to the first compartment receiving the flow should be 3 inches above the bottom of the outlet from the compartment. Multiple unit tile tanks should be set on a 6-inch thick concrete floor slab. The tile-to-slab connection should be sealed with mortar. The tanks should be constructed so that the sewage will flow from one tank into the second tank in series. Where two tanks of varying sizes are used, the larger tank should be placed first and the smaller tank second.

When a 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. The minimum plan dimension of any compartment of the septic tank shall be 24 inches. 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.

From the standpoint of the individual builder who does not wish to install a prefabricated tank, built-in-place, single compartment, rectangular tanks are probably easiest to construct. When properly sized and constructed, satisfactory efficiencies are obtained with single compartment round or rectangular tanks.

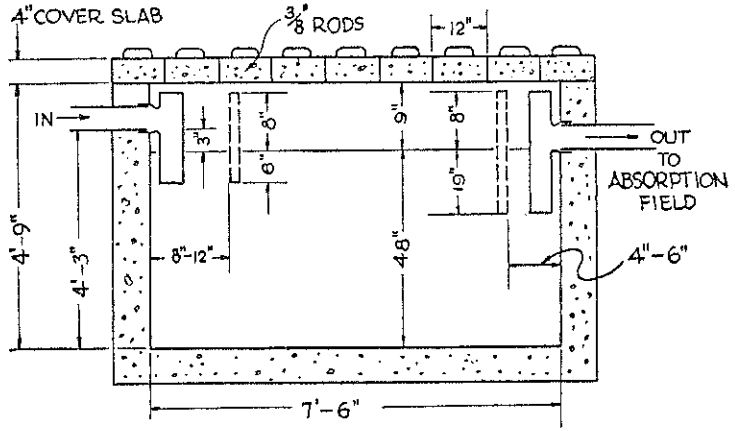


Figure 7—Diagrammatic sketch of a section through a 750-gallon septic tank having a 3-foot 6-inch inside width. Cast-in-place concrete tanks have walls and floors 6 inches thick.

If tees are used instead of baffles with the 9-inch minimum scum and air space, the bells must be removed from the tees. This can be avoided by increasing the scum and air space.

Size

The septic tank for the usual single family residence must have at least 750 gallons liquid capacity. Larger tanks are sometimes necessary. Table I gives minimum tank capacities based on the number of bedrooms in the home. The dimensions shown are suggested for built-in-place, single compartment, rectangular tanks.

TABLE I

REQUIRED CAPACITIES AND SUGGESTED DIMENSIONS FOR SEPTIC TANKS

(Minimum size tank 750 gallons liquid capacity)

No. of Bedrooms in Dwelling	Max. No. of Persons Served	Normal Liquid Cap. of Tank in Gallons	Suggested Dimensions for Rectangular Tanks			
			Inside Width	Inside Length	Liquid Depth	Total Depth
2 or less	4	750	3'-6"	7'-6"	4'-0"	4'-9"
3	6	900	3'-6"	8'-6"	4'-0"	4'-10"
4	8	1,100	4'-0"	8'-6"	4'-6"	5'-5"
5	10	1,250	4'-0"	9'-6"	4'-6"	5'-5"
6	12	1,500	4'-6"	10'-0"	4'-6"	5'-6"

Material

The home owner may construct a septic tank from cast-in-place concrete or masonry units or purchase a prefabricated tank which meets the minimum standards in the Appendix.

A cast-in-place concrete tank should have walls and floors 6 inches thick, poured in one operation. It is important that the volume of mixing water for each batch of concrete be only two-thirds the volume of cement used in the batch. This should make a mushy, workable mix by using one part cement, two parts sand, and three parts gravel or crushed stone by volume. Using more than two-thirds as much mixing water as cement is apt to make the concrete too porous to be water-tight. Spade or puddle the concrete in the walls with a board or spading hoe to assure smooth, tight walls. Forms for a single installation may be made of scrap lumber.

Bill of Materials for 750-Gallon Cast-in-Place Concrete Septic Tank

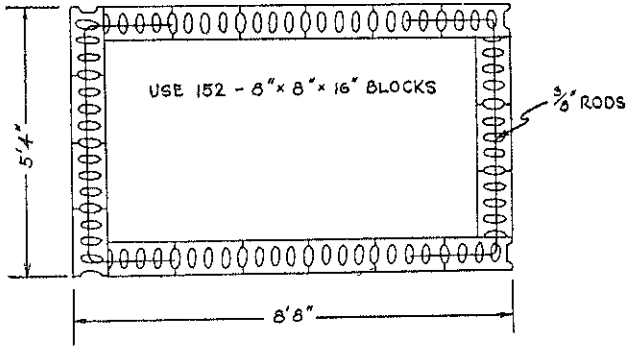
(Approximately 3½ cubic yards of concrete)
22 bags of cement
2¼ cubic yards of fine gravel
2¾ cubic yards of coarse gravel or crushed stone

Mixing water
18⅜-inch steel bars 4'-6" long—Cover slabs
18⅜-inch steel bars 1 foot long—Cover slab handles

Metal tanks are acceptable when adequately protected from corrosion by suitable coatings. Field investigations conducted by the U. S. Public Health Service indicate that improperly coated metal tanks suffer serious corrosion damage after an average of seven years' service.

Fibre glass tanks may be acceptable when properly designed and constructed for strength and operating characteristics.

Concrete block tanks should have 8-inch walls. Fill cores with concrete. Brick tanks should have two-course walls. Use tight mortar joints for brick or concrete block construction. Reinforce the walls at the corners as shown in Figure 8. Set the walls on a 6-inch thick concrete floor slab and seal the wall-to-floor connection with mortar.



PLAN OF FIRST COURSE

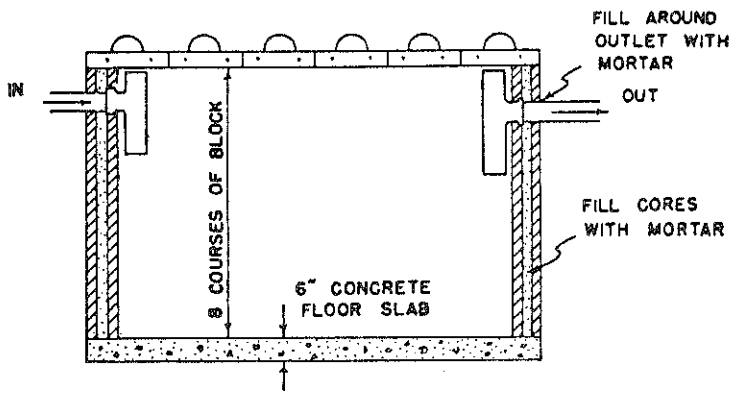
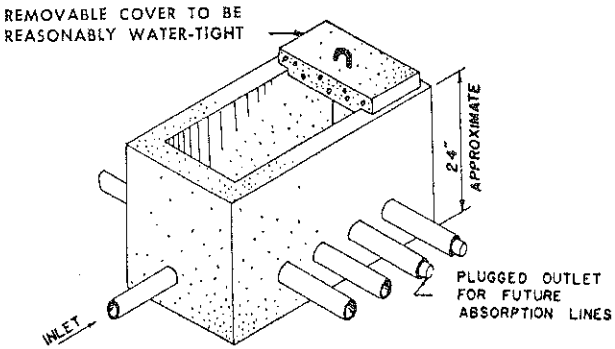


Figure 8—Concrete blocks may be used for the walls of the septic tank. Fill all the cores with concrete and reinforce the corners. This is a 750-gallon septic tank.

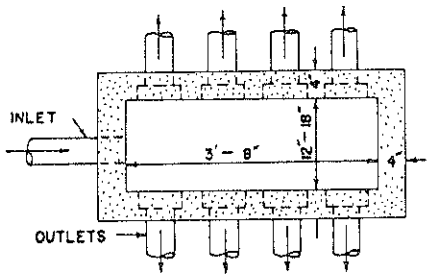
Construction

1. Do not locate the tank near trees or in areas subjected to flooding.
2. Do not locate the tank inside any building or where remodeling or right-of-way changes will interfere.

3. The tank may be placed near the surface of the ground. If the top of the tank is above the ground surface, mound soil over it. If the system is used every day it will not freeze.
4. An access opening shall be brought close to the ground surface and shall be so located that sludge and scum measurements may be readily ascertained in each compartment of the tank. This opening shall be a minimum of 8 inches in its least dimension. In the event the tank is covered by 24 inches or more of earth backfill, a manhole with a suitable cover shall be extended to within 6 inches of the ground surface, such manhole to be least 30 inches in diameter and placed over an access opening in the top of the tank.
5. The walls and floor of the tank should be constructed as nearly water-tight as possible.
6. Septic tank outflow or effluent should discharge to an absorption system and **not** into lakes, streams or ditches.



INLET 2" ABOVE BOTTOM OF TANK
OUTLETS EVEN WITH BOTTOM OF TANK



BOX LENGTH MAY VARY TO PROVIDE SPACE FOR NUMBER OF OUTLETS NEEDED

Figure 9—Details of Effluent Distribution Box.

PART VI

Septic Tank Effluent Disposal

Absorption Trench

Function

The absorption trench gives needed additional treatment to the sewage from the septic tank. Regardless of its appearance of clarity or transparency, the outflow or effluent from a septic tank is a dangerous source of contamination. The satisfactory operation of the sewage disposal system is largely dependent upon the proper design and construction of the absorption trench. Seepage pits and absorption beds are not satisfactory substitutes for absorption trenches. In the absorption trench the effluent is treated by bacteria that live in the upper reaches of the soil. Final disposal is accomplished by ground absorption. The absorption area needed is determined by Soil Conservation Service data or percolation tests. The procedure for making percolation tests is explained below.

Location

Minimum Distance in Feet from - to	Septic Tank	Absorption System
Private water supply source	50	50[1]
Semi-public water supply source	100	100
Public water supply source	200	200
Lake or reservoir	50	50
Stream, ditch, or drainage tile	25	25
Dwelling or other structure	10	10
Side or rear lot lines	5	5
Front lot lines	5	5
Water lines continually under pressure	10	10
Suction water lines	50	50

(1) If the subsoil receiving the sewage is **not** effectively separated from the water supply formation by an extensive, continuous, impervious strata of clay, hardpan, rock, etc., a separation distance of 100 feet is advisable.

Soil Profile

Properties of the soil profile of each site shall be analyzed using guidelines as set forth in the soil manuals and handbooks of the Soil Conservation Service, U.S. Department of Agriculture, and, where necessary, by percolation tests conducted in accordance with the provisions of this regulation. If soil profile observations are used to determine site feasibility, Table III shall be used to determine the absorption system size.

TABLE II

DATA FOR DETERMINING SQUARE FEET OF ABSORPTION AREA NEEDED PER BEDROOM FOR ABSORPTION TRENCHES USING SOIL ANALYSIS FIGURES

Permeability Rating	Square Feet Needed in Trench Bottom per Bedroom
More than 6 inches per hour	165 sq. ft. per bedroom
2 inches to 6 inches per hour	250 sq. ft. per bedroom
1 inch to 2 inches per hour	330 sq. ft. per bedroom
Less than 1 inch per hour	Unsuitable for absorption field

Percolation Test

After a tentative site for the absorption trench has been selected, at least three percolation tests should be made in the area to be used for the absorption system. The percolation test determines the absorption rate of the soil. Knowing the absorption rate of the soil, the absorption area needed per bedroom can be taken from Table II.

The procedure for conducting the percolation test is as follows:

1. Dig or bore holes with horizontal dimensions of from 4 to 12 inches and vertical sides to the estimated depth of the bottom of the proposed absorption trench. In order to save time, labor and volume of water required per test, the holes may be bored with a 4-inch auger.
2. Scratch the bottom and sides of the hole with a knife blade or sharp pointed instrument in order to remove any smeared soil surfaces and to provide a natural soil interface into which water may percolate. Remove all loose soil from the hole. Place about 2 inches of clean coarse sand or fine gravel in the bottom of the hole.
3. Carefully fill the hole with clear water. By refilling if necessary, keep the hole full of water for at least 12 hours. This saturation procedure will give most soils ample time to swell and approach the conditions that prevail during the wetter seasons of the year. Thus, the test will give comparable results whether made during a wet or dry season.
4. After the 12-hour saturation period, allow the water in the hole to seep away completely. Remove that portion of the sand or gravel which has become coated with soil particles.
5. Pour about 12 inches of water into the hole and wait until about 6 inches of this water remains.
6. With about 6 inches of water remaining in the hole, establish a reference point by use of a nail stuck in the side of the hole near the top of the hole. From this point obtain

a measurement to the top of the water level. Record the measurement and the exact time.

7. Continue the measurement to the top of the water surface and time recording until at least three consecutive readings of approximately the same rates of percolation are obtained. It may be necessary to add another 6 inches of water more than once to obtain the consecutive same-rate readings.
8. Convert the time interval obtained in "7" above to minutes and divide this figure by the number of inches of water which has seeped away in that interval to obtain the time for one inch of water to seep away. The system design should be based on the percolation rate of the slowest hole.
9. Determine from Table II the square feet of trench bottom area needed for each bedroom. See Table IV for width and spacing of absorption trenches.
10. Multiply the square feet of trench bottom absorption area needed for each bedroom by the number of bedrooms in the house to get the total trench bottom area needed.

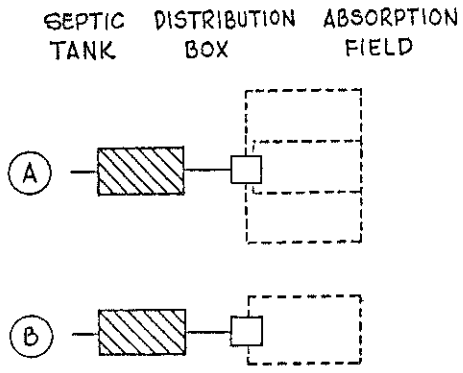


Figure 10--Absorption field patterns for reasonably level land.

TABLE III

DATA FOR DETERMINING SQUARE FEET OF ABSORPTION AREA NEEDED PER BEDROOM FOR ABSORPTION TRENCHES

Average time in minutes for water to fall one inch	*Effective absorption area in square feet needed in trench bottom per bedroom
3 minutes or less per inch	100 sq. ft. per bedroom
4 minutes per inch	115 sq. ft. per bedroom
5 minutes per inch	125 sq. ft. per bedroom
10 minutes per inch	165 sq. ft. per bedroom
15 minutes per inch	190 sq. ft. per bedroom
30 minutes per inch	250 sq. ft. per bedroom
60 minutes per inch	330 sq. ft. per bedroom
Over 60 minutes	Unsuitable for absorption field

*Size

The size of the absorption trench will vary with soil absorption rate and house size. Any system must have a minimum of two absorption tile lines. The minimum area in any absorption field is 200 square feet of trench bottom area. The maximum length of any one trench is 100 feet. Space the trenches according to Table IV.

TABLE IV

SIZE AND SPACING REQUIREMENTS FOR ABSORPTION TRENCHES

Width of Trench at Bottom in Inches	Depth of Trench in Inches	Effective Absorption Area in Square Feet per Linear Foot	Minimum Spacing of Lines C to C in Feet
18	18 to 30	1.5	7.5
24	18 to 30	2.0	7.5
30	18 to 36	2.5	7.5
36	24 to 36	3.0	7.5

Slope

Slope the absorption lines **2 to 4 inches per 100 feet.** Progressive clogging of the absorption lines may develop if the slope of the lines is increased or decreased.

Material

Absorption lines may be constructed with 4-inch field tile or properly perforated sewer tile. Place strips of treated building paper or similar material over the open joints of the field tile. Surround the pipe completely with coarse gravel or stone. (See figure 11.)

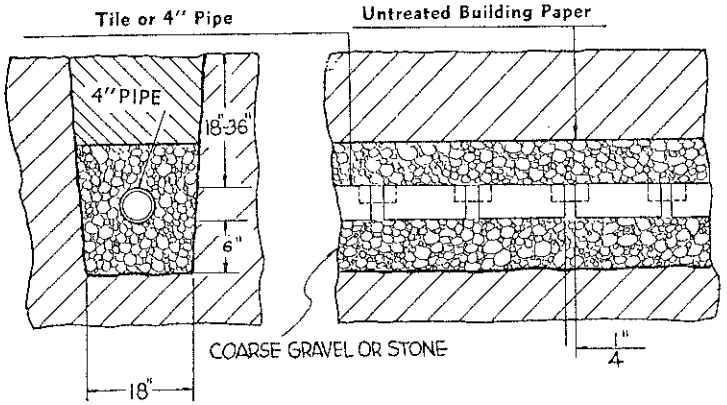


Figure 11—Details of Absorption Trench and Line, for Non-Perforated Sewer Pipe.

Construction

1. Do not locate under drives, walks or in vegetable gardens.
2. Absorption trenches will not work in areas that are periodically flooded or where ground water levels rise to the pipe or tile. Absorption trenches will not work in extremely tight soils.
3. Do not locate where surface drainage is toward the well or house.
4. Minimum trench width is 18 inches with a maximum trench depth of 48 inches. Depths of 18 inches to the top of the tile are satisfactory.
5. The absorption tile or perforated pipe should be completely surrounded by coarse gravel or stone with at least 6 inches below the tile or pipe and extending upward to at least 2 inches above the tile or pipe.
6. The top of the stone should be covered with untreated building paper, 2-inch layer of straw, or equal to prevent the stones becoming clogged with the earth fill.
7. Lay field tile one-fourth inch apart.
8. Absorption lines located near trees or shrubs should have at least 12 inches of coarse gravel or stone below the pipe or tile.
9. The gravel or stone should be a mixture ranging in size from one-half to 2½ inches. Fines, dust, sand and clay must be removed from the material before placing in the trench.
10. Absorption lines should be individually connected to a distribution box to insure equal distribution to the entire field.
11. Make all 90° bends or turns with an appropriate fitting.

Absorption Trenches in Sloping Land

Absorption fields should not be constructed in areas where the land surface gradient is greater than 12 percent.

On rolling or sloping land where the gradient is less than 12 percent, each absorption line should follow approximately the land surface contour. This procedure is necessary to **keep the slope of the lines between 2 and 4 inches per 100 feet.**

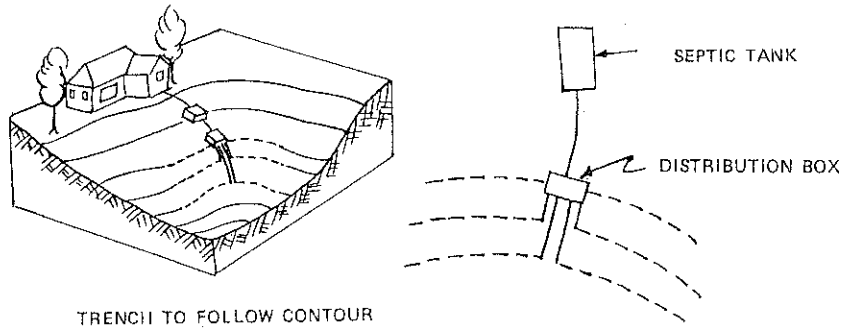


Figure 12—Absorption Trench for Rolling or Sloping Land.

PART VII

Operation and Care of Septic Tank-Absorption Field Systems

Starters

The sewage flowing into the septic tank will soon provide sufficient bacteria to start the tank working. The addition of so-called "starters," "bacterial feeds" or "cleaners" after the tank is in operation is not necessary.

Footing and Roof Drainage

Do not run footing and roof drainage into the sewage disposal system, as this would needlessly overload it. Water from these drains may be discharged to the ground surface or to a storm water drain.

Drain Solvents and Household Cleaners

Moderate use of household drain solvents, cleaners, disinfectants and softeners will not interfere with the operation of the sewage disposal system.

Cleaning the Tank

It is difficult to fix a definite time interval for sludge and scum removal from the tank. Sludge and scum accumulations will vary with the many conditions of tank use. Periodic inspection of the tank is advisable to determine the extent of sludge and scum accumulation. Sludge depths of 18 inches or more will indicate a need for sludge removal. Normally the tank should be cleaned every three to five years. Sludge and scum are removed by pumping. There are no chemicals or compounds which will clean the tank. The tank does not need to be "scrubbed down" or "washed out" after the sludge and scum have been removed. The remaining tank contents will help restart the septic tank action.

Garbage Grinders

Private sewage disposal systems do not need to be increased in size where garbage grinders are used, if these systems are designed in accordance with this bulletin.

Locations

A chart showing the location of the septic tank and absorption field should be kept to enable future maintenance and repair to be made when necessary.

Grease Interceptors

Properly sized and installed septic tanks are designed to take care of all household wastes including normal household greases.

Abandoned Septic Tanks

Abandoned septic tanks should be filled with earth, sand or gravel, or removed.

APPENDIX

State Board of Health Minimum Standards for Commercial Septic Tanks

Precast concrete septic tanks shall have the walls and floor at least 2½ inches thick and preferably poured in one operation. The walls and floor shall be adequately reinforced to withstand excessive tensile, temperature and shrinkage stresses.

All vitrified clay and concrete pipe used for septic tanks shall meet the American Society for Testing Materials (ASTM) specifications for standard strength sewer pipe except for the following minimum dimensional and strength requirements and shall be plainly marked "SEPTIC TANK PIPE" with at least one-half inch letters.

All metal septic tanks must be coated in compliance with Commercial Standard 177-51 U. S. Department of Commerce.

Fiberglass tanks may be acceptable when properly designed and constructed for strength and operating characteristics.

Minimum wall thickness of tanks shall conform to the following specifications:

Steel	¼ inch thick
Fiberglass	¼ inch thick
Segmented blocks, bricks, etc.	8 inches thick
Poured concrete	6 inches thick
Poured concrete, reinforced ($\leq$4000 psi)	4 inches thick
Poured concrete, reinforced ($>$4000 psi)	2½ inches thick

MINIMUM DIMENSIONAL REQUIREMENTS FOR SEPTIC TANKS

1. The liquid capacity of precast or prefabricated tanks shall be based on recommendations in Table 1, page 15.
2. The liquid depth of any tank or compartment shall not be less than 30 inches. A liquid depth of greater than 6½ feet will not be considered in computing tank capacity.
3. No tank or compartment shall have an inside horizontal dimension of less than 2 feet.
4. In multiple compartment tanks the liquid capacity of any compartment shall not be less than 200 gallons.

5. Scum storage capacity (space between the liquid surface and the top of the inlet and outlet devices) shall not be less than 15 percent of the total required liquid capacity. In multi-compartment tanks the scum storage shall be approximately equally distributed among the compartments.

6. The inlet baffle or sanitary tee shall extend 6 inches below the liquid surface and above the crown of the inlet sewer.

7. The depth below the liqud level of the outlet baffle or sanitary tee and the baffles or submerged pipe outlets between compartments will be determined by multiplying the liquid depth by 4/10.

8. There shall be at least one-inch space between the underside of the tank cover and the top of the inlet and outlet baffles, sanitary tees and partitions.

9. Where baffles are used, the inlet baffles shall not be more than 12 inches or less than 8 inches from the inside inlet end of the tank. The outlet baffle shall not be more than 6 inches or less than 4 inches from the inside outlet end of the tank. Baffles will be constructed from sound, durable material not subject to excessive corrosion or decay.

10. The bottom of the inlet to the first compartment receiving the flow shall be not less than 3 inches above the bottom of the outlet from that compartment.

11. An access opening shall be brought close to the ground surface and shall be so located that sludge and scum measurements may be readily ascertained in each compartment of the tank. This opening shall be a minimum of 8 inches in its least dimension. In the event the tank is covered by 24 inches or more of earth backfill, a manhole with a suitable cover shall be extended to within 6 inches of the ground surface, such manhole to be least 30 inches in diameter and placed over an access opening in the top of the tank.

12. The liquid capacity of the tank shall be based on the number of bedrooms in the dwelling served. The minimum tank liquid capacity is 750 gallons. The tank shall be constructed of sound, durable material not subject to excessive corrosion or decay.