

A Simple Septic Tank for the Farm

By

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A COMPLETE discussion of farm sewage disposal would cover such subjects as outdoor closets, leaching cesspools, chemical closets, and septic tanks. This bulletin is limited to the description of one type of septic tank which can be made the basis of the sewage disposal for the majority of Ohio farm homes. It is essentially the same as the septic tank recommended by the Department of Agricultural Engineering since 1916. A number of minor changes have been made to simplify the construction as much as possible.

It has sometimes been said that the effluent from a well-constructed septic tank is "as pure as average drinking water." This is not true. Under proper conditions it will be fairly clear and practically odorless, yet it has not been completely purified. Consequently this tank is recommended for use only where there is a satisfactory outlet into a tile drain or open ditch, the water from which is not used for a domestic supply. If such conditions are not available, a secondary disposal system must be provided for the effluent which leaves the septic tank. Plans for such conditions will be furnished upon request. This septic tank should be used only for farm sewage disposal. It is not designed for use in villages, for school houses, churches, or other public buildings.

Size of the Tank

This septic tank is 3 feet wide, by 4 feet deep, by 8 feet long, inside measurements. It will take care of the sewage from a family

of four to eight persons. If the tenant house is within 200 feet of the main residence, one septic tank can often be made to serve both, provided the width of the tank is increased to about 4 feet.

Location of Tank

The septic tank should be located from 50 to 100 feet from the house and within easy access to an outlet drain. Do not place it near a well or cistern. A location having been chosen, the next

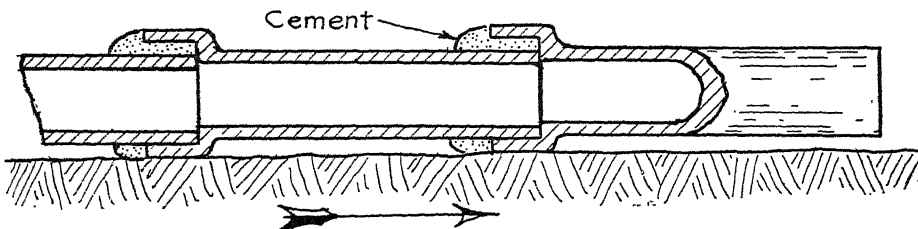


Fig. 1.—Incorrect method of joining sewer tile

step is to dig and grade a trench for the house sewer from the point where the soil pipe passes thru basement wall to the location selected. Four-inch sewer tile should be used for this drain, which must be free from sharp curves and have a fall of not less than $\frac{1}{4}$ inch nor more than $\frac{1}{2}$ inch per foot. The tile are laid with the "bell" end up-stream or toward the house, and the joints are carefully cemented with a mortar made of one part Portland cement and two parts clean sand.

Figure 1 shows the incorrect way of connecting two pieces of sewer tile together. The plain end of one tile rests directly on the

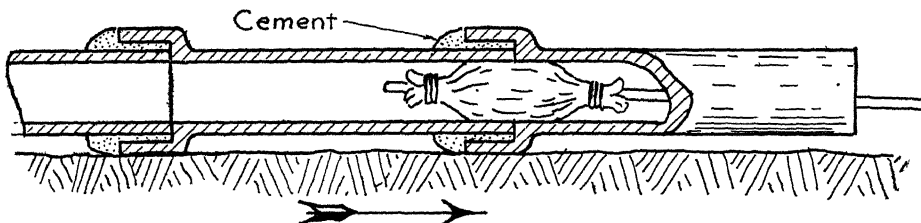


Fig. 2.—By inserting a swab in tile while mortar is being placed, the joints are centered and a smooth finish obtained

bell of the next tile below it. Solid particles of sewage are liable to collect at this point and clog the sewer. Figure 2 shows the correct method of centering the joints. A swab is made by wrapping burlap around an old broom handle. This swab should fit just tight enough in the tile to hold the joints in place while the mortar is being placed. The sewer should be at least 2 feet deep where it enters the septic tank.

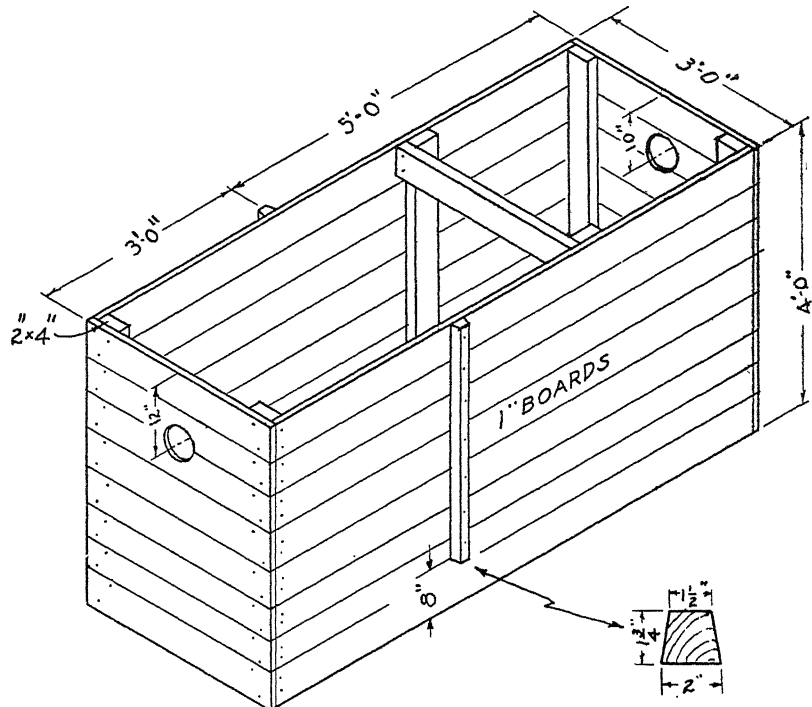


Fig. 3.—The inner form—2 by 4's for framework, sides of 1-inch boards

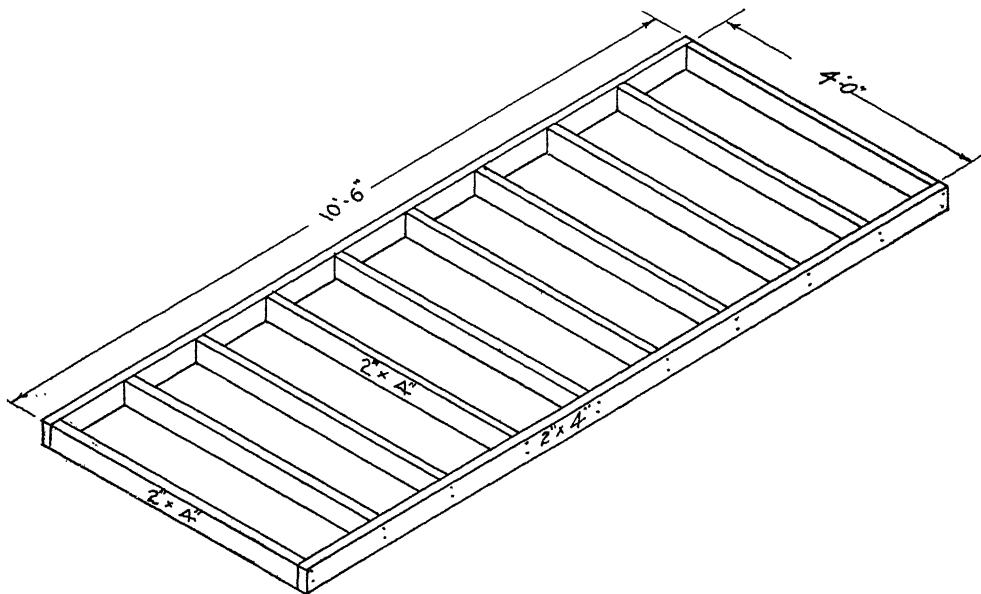


Fig. 4.—Form for the cover slabs. The 4-foot crosspieces are spaced 14 inches on center

It will be necessary to excavate a hole 4 feet wide by 9 feet long to a depth of 3 feet 7 inches below center of inlet sewer at the point where it enters the tank. If in digging the hole the sides are kept true and smooth they may serve as the outer forms for the concrete.

Making the Inner Form

A simple rectangular box 3 feet wide, 8 feet long, and 4 feet deep will be required. The framework is made of 2- by 4-inch pieces placed as shown in Figure 3.

The sides are covered with 1-inch boards. Rough lumber may be used, altho the use of dressed lumber will result in smoother walls. The form should have no bottom. Use six-penny nails, so that the form may readily be torn apart. One hole, located as shown and large enough easily to admit a 4-inch sewer tile, is required at each end of the form, the inlet hole being 2 inches nearer top of form than the outlet hole. A partition of 2-inch planks divides the tank into two compartments. The 2-inch baffle boards forming the partition fit into grooves in the sidewalls. These grooves are made by nailing beveled strips to the outside of the form as show in figure 3, running from top of form to within 8 inches of the bottom, at a distance of 3 feet from outlet edge of form.

Forms for the cover slabs are made by cutting ten pieces of 2 by 4's each 4 feet long. These are spaced 14 inches on centers between two longer 2- by 4-inch pieces as shown in figure 4.

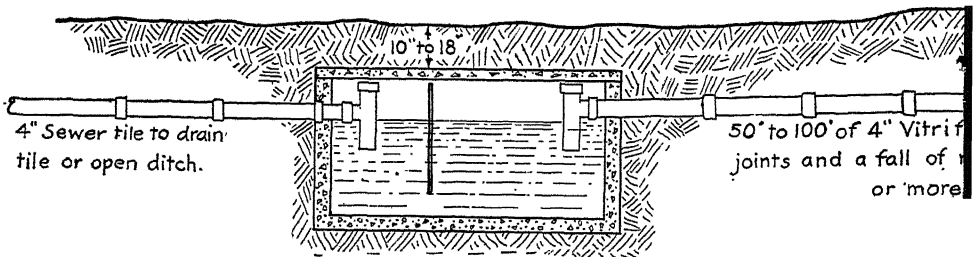
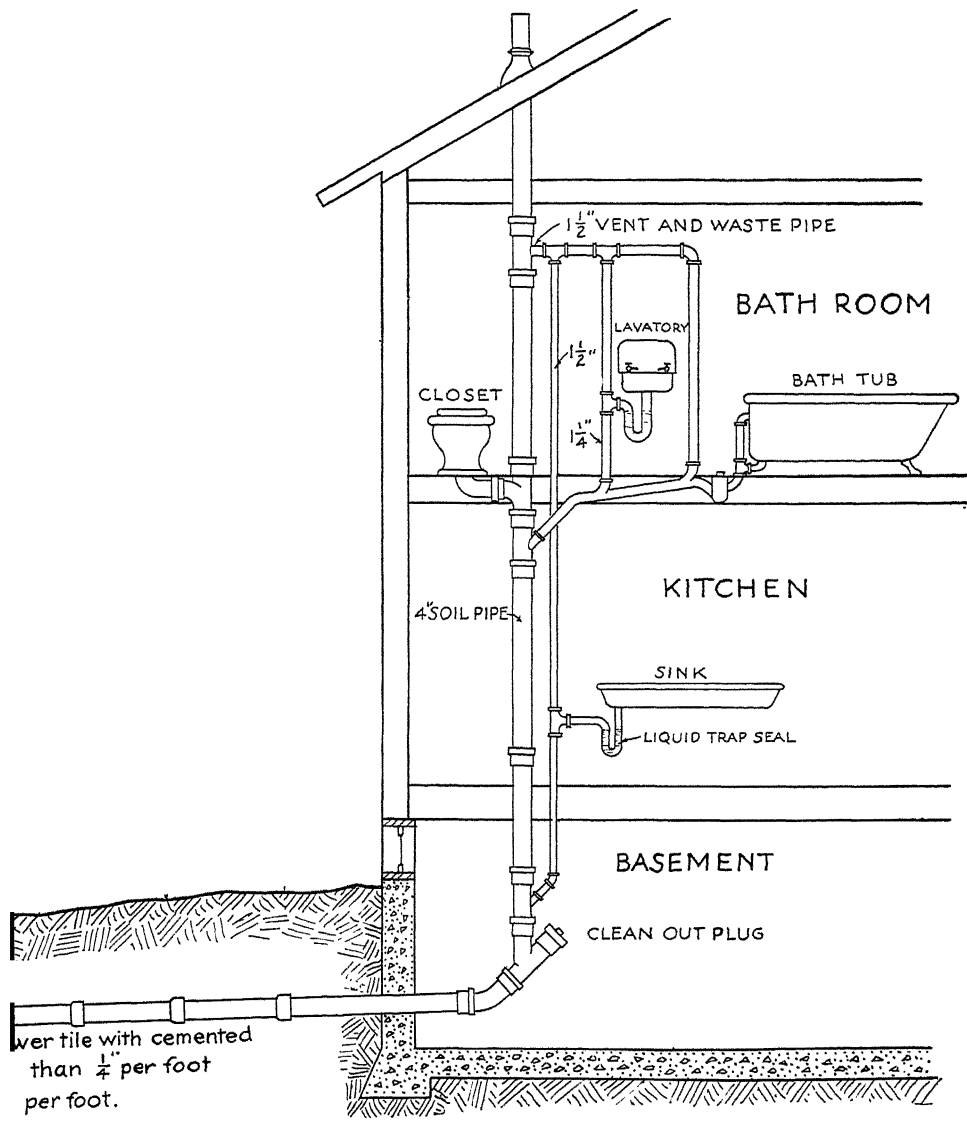


Fig. 5.—Diagram showing correct method of connecting house plumbing to septic tank. The not discharge directly into the soil pipe, but are connected with vent pipes. This 'b neglected in farm plumbing.



Should be located at least 50 feet from house. The waste pipes from kitchen and bathroom do not have "air" traps, which prevent loss of trap seal by siphonage, and is an important point that is very often

Placing the Concrete

Five inches of 1:2:4 concrete are poured into the bottom of the hole excavated for the tank. Carefully level the concrete and set the form in place on it. The inlet and outlet tiles should extend 4 to 5 inches thru the form. The use of a common 4-inch drain tile thru the wall at the outlet end will bring the bell ends of the outlet sewer up-stream. In pouring the walls care must be taken to keep the concrete even around all four sides to prevent the form from being forced out of place by unequal pressure on opposite sides. To secure smooth walls it is necessary to carefully spade the concrete against the form. Finish the walls by smoothing off the top level with the top of the form, which should be allowed to stand one week before removing.

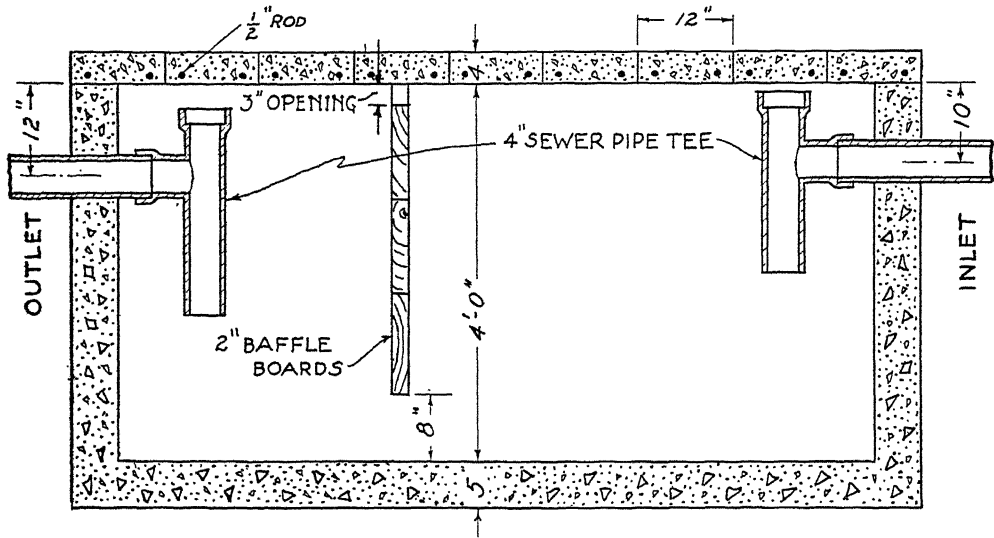


Fig. 6.—Cross section of a finished tank

After removing the form, block the sewer pipe tees up to their proper position and cement them into place with mortar made of one part cement and two parts sand. The blocking can be removed after three or four days. The tops of the tees should be left open for ventilation. The outlet of the tank can be connected with a farm drain or open ditch except for conditions mentioned on page 1. Sufficient 4-inch sewer tile with cemented joints should be used at the outlet to carry the sewage at least 300 feet from the nearest well. A fall of $\frac{1}{8}$ inch per foot is sufficient. Figure 6 shows cross section of finished tank, and figure 7 shows a view from the top.

To make the cover slabs, place the slab form on a level floor or board platform. Pour a layer of 1:2:4 concrete into each compartment to a depth of 1 inch. Then place two $\frac{1}{2}$ -inch reinforcing rods in each slab 2 inches from either edge. Finish filling the form and smooth off the surface. Allow the cover slabs to remain in the form at least a week before placing them on the tank. Simply lay them on the tank side by side without the use of mortar. Finish the job by placing dirt over the slabs until level with the surrounding ground.

Using the Tank

The question is frequently asked "What kind of chemical shall we use in this tank?" The answer is simple—do not use any. With-

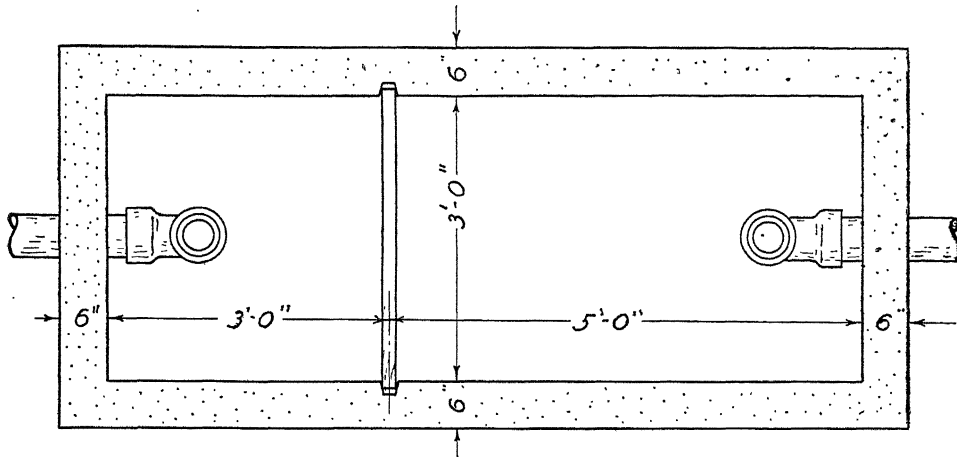


Fig. 7.—View from the top of the tank

in the tank the raw sewage is changed into liquid, gas, and ash by the action of millions of microscopic organisms or bacteria. Chemicals will destroy these bacteria, with the result that the desired action will not take place.

"Where shall we get these bacteria to start this action?" is another common question. We need not worry about this at all. They are already present in the sewage when it enters the tank. In building the septic tank we have simply provided proper conditions for their development.

"How often shall the tank be cleaned?" If the tank is properly built it should not be necessary to clean it out more than once in five years. If the tank is examined after several months of use a thick scum will be found on the surface of the liquid in the large

compartment. This is a proper condition and the scum should not be disturbed.

The Plumbing

Figure 5 shows the correct method of connecting the septic tank up with the plumbing in a farm house. There is an unobstructed passage for gases from the septic tank, thru the house sewer up thru the 4-inch castiron soil pipe within the house, to a point above the roof. This prevents the accumulation of gases within the tank or sewer. This free passage should not be obstructed by closing the upper end of the sewer pipe tees within the tank or by placing a trap in the house sewer as is frequently done. The waste pipe of the kitchen sink, bath tub, lavatory, and stool are each provided with a trap to prevent foul odors from coming into the house. It should be noticed that these waste pipes do not discharge directly into the 4-inch soil pipe but are connected with vent pipes. Without such "back venting" loss of trap seal by siphonage is likely to occur. There being no rigid inspection of farm plumbing, bad design, poor material, and careless workmanship must often be guarded against by the farmer himself.

BILL OF MATERIAL

1¼ yards of sand
2½ yards of gravel or crushed stone
16 sacks cement
18 ½-inch reinforcing rods 3 feet
8 inches long
2 four-inch sewer pipe tees
Sufficient four-inch sewer tile to
reach from house to tank
2 lbs. sixpenny nails

Form lumber:

2 pieces 2"x4"x12'
8 pieces 2"x4"x4'
10 pieces 2"x4"x4'
18 pieces 1"x6" boards 8' long
18 pieces 1"x6" boards 3' long
The equivalent amount of 1-
inch lumber in other widths may
be used.