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Your Home Septic System[1]

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Most homes in Florida are connected to a public sewage treatment system. However, over 1.3 million families (about 27% of Florida's housing units) live in rural and sparsely developed suburban areas not served with a public system.

Properly sited, designed, constructed, and maintained septic systems can provide an efficient and economical wastewater treatment alternative to public sewer systems.

People who have septic systems or who plan to buy property that has or will have a septic system should understand what the system does and how to use and maintain it.

WHAT DOES A SEPTIC SYSTEM DO?

Wastewater from homes is a by-product of most of the water-using processes carried on in the home. An average of 40 to 50 gallons of wastewater is produced per person per day. The purpose of on-site sewage systems is to dispose of these wastes and to treat the water so it will be safe when it reaches drinking water supplies or recreational waters. The septic system consists of more than just the septic tank itself. In fact, the largest part of the treatment of the wastewater actually takes place in the soil beneath the drainfield.

The Septic Tank

Wastewater flows through a pipe into the septic tank. Baffles or "tees" at the inlet and outlet of the tank slow the flow of water and prevent sewage from flowing directly through the tank (Figure 1).

Bacterial action within a septic tank helps to break down the solids in the wastewater that enter the tank. The tank must be large enough, and the rate of flow small enough, to ensure sufficient "residence time" of wastewater in the tank. Even when the tank is working properly and solids are being broken down at a rate sufficient to prevent their movement into the drainfield, partially digested solids and any materials that cannot be digested sink to the bottom of the tank and accumulate as sludge. Grease, foam, and lighter particles float to the surface and form a layer of scum. The exit baffle arrangement holds back sludge and scum while allowing a partially digested wastewater to flow out of the tank.

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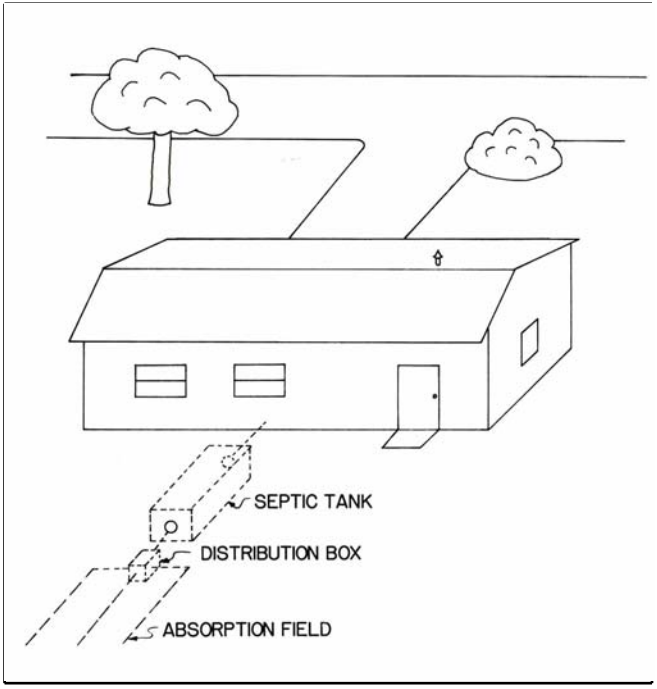

Figure 1. A typical septic system.

It is important that sludge and scum not get out of the tank and into the drainfield as they can clog soil pores and cause the septic system to fail. If allowed to build up in the tank, the volume available to accommodate liquid is drastically reduced. Therefore, the tank must be pumped out periodically.

Sizes of septic tanks that are required for different sizes of families and establishments are defined in Chapter 1OD-6 of the Florida Administrative Code, which sets the standards for on-site sewage disposal system design and installation in the state. With the exception of parts of extreme south Florida, the standards are uniform across the state. In addition, some counties have established rules that are more restrictive than state code. Information on state and county standards and their implications for individual systems may be obtained from the environmental health office of your county health unit.

The Distribution Box

Partially treated wastewater flows from the septic tank into a distribution box, or in some cases into a "header pipe". There, the wastewater is spread evenly into porous pipes arrayed in the absorption field. The distribution box may be attached directly to the septic tank or connected to it by a short length of pipe.

The Soil Absorption Field

The soil absorption field is the land area where the wastewater from the septic tank is spread into the soil. One of the most common types of soil absorption field has porous plastic pipe extending away from the distribution box in a series of two or more parallel trenches, usually 1-1/2 to 2 feet wide. In conventional, below ground systems, the trenches are 1-1/2 to 2 feet deep.

The porous pipe is surrounded by gravel that fills the trench to within a foot or so of the ground surface. The gravel is covered by fabric material or building paper to prevent plugging.

Some absorption fields must be placed at a shallower depth than this to compensate for some limiting soil condition such as a hardpan or high water table. In some cases they may even be placed partially or entirely in fill material that has been brought to the lot from elsewhere.

Another type of drainfield consists of pipes that extend away from the distribution box not in trenches but in a single, gravel-filled bed that has several such porous pipes in it. As with trenches, the gravel in a bed is covered by fabric or other appropriate material.

Usually the wastewater flows gradually downward into the gravel-filled trenches or bed. In some instances, however, as where the septic tank is lower than the drainfield, a pump must be installed in order to lift the wastewater up into the drainfield. Whether gravity flow or pumping is used to get wastewater into the drainfield, wastewater must be evenly distributed throughout the drainfield.

It is important to ensure that the drainfield is installed with care to keep the porous pipe level, or at a very gradual downward slope away from the distribution box or pump chamber, according to specifications stipulated by local officials.

Soil beneath the gravel-filled trenches or bed must be permeable so that wastewater and air can move through it and come in contact with each other. Good aeration is necessary to ensure that the proper chemical and microbiological processes will be

occurring in the soil to cleanse the percolating wastewater of contaminants. A well-aerated soil also ensures slow travel and good contact between wastewater and soil.

SOIL CONSIDERATIONS

In former times the permeability of Florida soil was determined by a percolation test, or "perk" test. Such a test involved excavating a round hole in the soil at the site, filling the hole with water in a standard fashion, and measuring the subsequent rate of fall of the water level in the hole. However, the perk test has been de-emphasized as a site evaluation technique in Florida.

Instead, Florida's septic system siting standards require that a site investigation be conducted. The site investigation includes examination of the soils for a variety of characteristics that will help to predict septic system performance during all seasons of the year. The two most important soil attributes that must be described and understood in such a site investigation are: (1) soil permeability; and (2) wet-season water table.

Soil Permeability

In assessing soil permeability, more than one auger boring must be made and the soil described down at least to the 5-foot depth. Features studied and described include: 1) soil texture (proportions of sand, silt, and clay); 2) potentially restrictive layers, such as claypans or chemically cemented layers; 3) layers of organic matter (muck) or gravel; 4) zones of contrasting soil materials; and 5) variation in these sorts of soil features across the site.

If prohibited materials, such as hardpans, clay, muck, or gravel, are found in the 3-1/2 foot zone that will immediately underlie a proposed drainfield, then the unsuitable material must be excavated and replaced with appropriate fill material. Alternatively, depending on the water table and other conditions, the drainfield may be elevated above the unsuitable material by building a mound of permeable soil brought to the site from elsewhere. Or, where site conditions are extremely limiting, the permit may be denied altogether.

Assuming that the soil is found to be suitable in the 3-1/2 foot zone under the proposed drainfield, or that suitable fill can be placed there, the suitability of these soil materials still must be known in order to determine the size of the drainfield. This is necessary to ensure that the drainfield will receive wastewater from the septic tank at a rate not exceeding the capacity of the soil to accept it. The permitting officer must: 1) estimate the daily flow of wastewater; 2) determine the size of septic tank needed; 3) estimate the permeability of the soil in the 3-1/2 foot zone under the drainfield; and 4) compute the required drainfield size from the estimated flow rate and the estimated soil permeability at the site.

Generally, the more clayey soils will be found to have lower permeabilities and therefore will require larger drainfields. For example, a small home with sandy soils in its yard might be required to have only a 900-gallon tank and a drainfield with only 200 square feet of bottom. On the other hand, a large home (having greater wastewater flow) with more clayey (and therefore less permeable) soils might need a 1,200-gallon tank and a drainfield with 800 square feet of trench bottom.

Wet-Season Water Table Level

The other important soil feature that must be understood before a permit can be issued in Florida is the depth to which the water table rises in wet seasons. Once this is determined, the trench/bed bottom can be set at an elevation at least 2 feet above that wet-season water table level. The water table is the more-or-less horizontal boundary between unsaturated soil above and wet soil below. The depth to the water table varies greatly depending on location and on the nature of the soil and landscape at any given site.

Another key factor controlling depth of the water table is the weather. After an extended rainy period, the water table is likely to be much higher in the soil than it would be in the same soil following a long drought. The behavior of the water table is further complicated by the presence or absence of water-using vegetation on a site. Ground that seems rather dry when investigated while natural vegetation is intact may become wetter after the trees are cleared for development.

Site investigations need to proceed with the understanding that the depth to the water table is a dynamic feature of the soil. State septic system code requires that the depth to which the water table is likely to rise during wet seasons of most years be determined when site investigations are performed.

Septic system design depends heavily on the depth of the wet-season water table. Code stipulates that the bottom of the gravel-filled trench or bed must be at least two feet above that depth. If the wet-season water table is estimated to be 24 inches below the ground surface, for example, then the drainfield must be designed so that its bottom is at or above the natural ground surface. In this case, fill material would have to be brought in to allow the burial of the drainfield with a 2-foot separation.

PERMITTING AND INSTALLING A SEPTIC SYSTEM

Since 1983, Florida's septic system siting standards have required a site investigation to be conducted that includes examination of the soils for a variety of characteristics. Knowing these characteristics will help to predict septic system performance during all seasons. Approval of the site also must take into consideration numerous other factors, including proximity of the site to surface waters and to drinking water supply wells. The system can only be located, sized, and otherwise designed when the characteristics of the site are known. The investigation must be conducted by a qualified person from the county health unit, or from another agency or firm approved by that county health unit. After the system is permitted and installed, but before it is covered with soil, it must receive final approval. Questions should be directed to your local county health unit.

MANAGING A HOME SEPTIC SYSTEM

The home septic system should have been originally designed and installed to meet the normal wastewater disposal needs of a certain size home, given the soil conditions on the site.

Controlling Volume of Wastewater

Sending wastewater to the tank too fast can cause solid materials to pass into the drainfield without undergoing gradual anaerobic digestion. Conservative water use should be practiced in the house to ensure slow movement of wastewater into the tank, reasonably complete digestion of solids, and slow trickling of wastewater from the tank to the drainfield. Try to avoid consecutive, extra-large loads of laundry, marathon showers, and other excessive uses that may send big surges of wastewater into the system.

The brine solution and excess water from the backwash of a water softener probably will not harm most septic systems, although they could dictate the need for a slightly larger tank and drainfield. Water-saving devices available for toilets and shower heads are encouraged.

Do not connect sump pump outlets or roof gutters to the system. It would be wise to make sure that any runoff from the roof, the driveway, and other impermeable surfaces is directed well away from the drainfield. Doing so will prevent extraordinary buildup of water in the drainfield. Using the system at or below its design capacity will help to ensure against failure that could cause backing up of wastewater into the house and/or environmental contamination of the yard, of nearby surface waters, or of underlying ground water.

Controlling Quality of Wastewater

The quality of wastewater — not just its quantity — is also important in ensuring proper septic system function. Fats and grease should never be poured down the drain. They can solidify in the lines and cause failure; they can cause excessive buildup of the floating scum layer in the septic tank itself; and they can get into the drainfield and surrounding soil and seal the system off altogether.

Installation of garbage grinders is not encouraged in homes served by septic systems. If you have one, use it in moderation. Septic systems are intended to be used for the treatment and disposal of human wastes and wash waters that reasonably may be expected to come from the home. Allow

household cleansers, disinfectants, and bleaches into the septic system only in moderation. Anything else does not belong in a septic system. Do not put any toxic or hazardous materials, such as paints, thinners, waste oils, photographic solutions, or poisons into a septic system; they will not be treated sufficiently to prevent contamination of water that returns to your local ground and/or surface waters.

Other materials that cannot be decomposed in a septic system include coffee grounds, dental floss, disposable diapers, cat box litter, cigarette butts, sanitary napkins, tampons, plastics, facial tissues, and paper towels. Such materials merely increase the risk of plugging and necessitate more frequent cleaning.

Maintaining the Septic Tank

Slow buildups of sludge and scum are normal. Removal of these materials by periodic pumping and appropriate disposal is necessary to protect the absorption field from materials that will damage its effectiveness.

Annual or biannual inspection of the septic tank is advisable to determine the thickness of the sludge and scum layers. A probe may be put into the tank from one of its access ports to make this determination. If the homeowner or other resident has any doubts about inspecting the septic tank, a private contractor who specializes in septic system cleaning and pumping should be contacted. Such a service will cost the homeowner some money, but it should be thought of as preventive maintenance.

Additives that are marketed as septic tank cleaners, rejuvenators, or primers are not recommended. Strong chemicals can harm a septic system, and Florida's code prohibits the sale of organic chemical solvents for the purpose of degreasing or declogging septic systems.

Maintaining the Drainfield

Activities that help to maintain the septic tank itself will serve similarly to maintain the drainfield. If the tank is free of excessive sludge and if it is used well within its designed capacity, and if the quality of wastewater sent to it is proper, then the drainfield is likely to last for a long time without a major dig-out and repair. All this assumes that the wet-season water table is at least 2 feet below the bottom of the drainfield, and that the soil is adequately permeable.

Additional measures that the homeowner can take include such things as: 1) do not allow vehicular traffic over the drainfield, which can compact the soil and possibly break drain lines; 2) try to position trees so that their roots will not enter the drainlines and plug them; and 3) keep a healthy grass cover over the system to prevent exposure of the soil and possible erosion around the drain lines.

REPAIRS TO YOUR SEPTIC SYSTEM

You may not know you have experienced a septic system failure until the first obvious signs show up in the yard, in the form of wet, smelly spots. Or, worse, the failure may cause the toilets and other drains to back up.

Depending on the nature of the failure, repairs to a septic system can range widely in complexity and cost. One failure might turn out to require only a simple clearing of the household sewer lines to remove a stoppage. Another problem might be solved by having the septic tank pumped out. In other instances, significant repairs will be necessary to restore proper system function. These repairs may consist of enlarging the drainfield; rebuilding a broken distribution box; replacing the septic tank or drainfield; or splitting the wastewater stream so that "black water" (predominantly toilet wastes) goes to one septic system and "gray water" (predominantly laundry waste) goes to a separate septic system.

Get price quotations from septic system contractors. Deal only with contractors who are duly registered by the Florida Department of Health and Rehabilitative Services. Check with your county health unit to verify that you are dealing with a properly registered contractor, to make sure that your repairs are being made according to standard, environmentally sound practices, and to ensure that county/state requirements are being followed.

CONCLUSION

We tend to think that our septic system is working as long as the plumbing seems to work and there's no smell in the yard or adjacent ditches. But is it?

Environmental contamination may not be apparent and could go undetected for years until a drinking water supply is found to be contaminated — until water quality surveys show nearby lakes to be contaminated, or until other evidence of environmental contamination is assembled.

The homeowner should be concerned not only with the hydraulic functioning of the system, but also with its environmental functioning. Ensure that your system is installed and operated in compliance with state and county codes. Have the tank inspected regularly, and pumped when necessary to avoid failure. Your attention to these concerns will help keep your system working properly and protect the environment at the same time.

Septic system contractors are registered and regulated by the Florida Department of Health and Rehabilitative Services. If you have questions about who is properly registered in your area, direct your inquiries to your county health unit (listed in the phone book under County Government).

Strive to understand the soils on your land. For information on the soils of your county, contact your Soil and Water Conservation District Office (usually listed under county government), the local office of the Cooperative Extension Service (also under county government), and the Natural Resources Conservation Service (listed under U.S. Department of Agriculture).

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