ABCC Projects

Operation and Maintenance Manual

Sand Filter Septic System

Created by ABCC Projects

12/12/2022

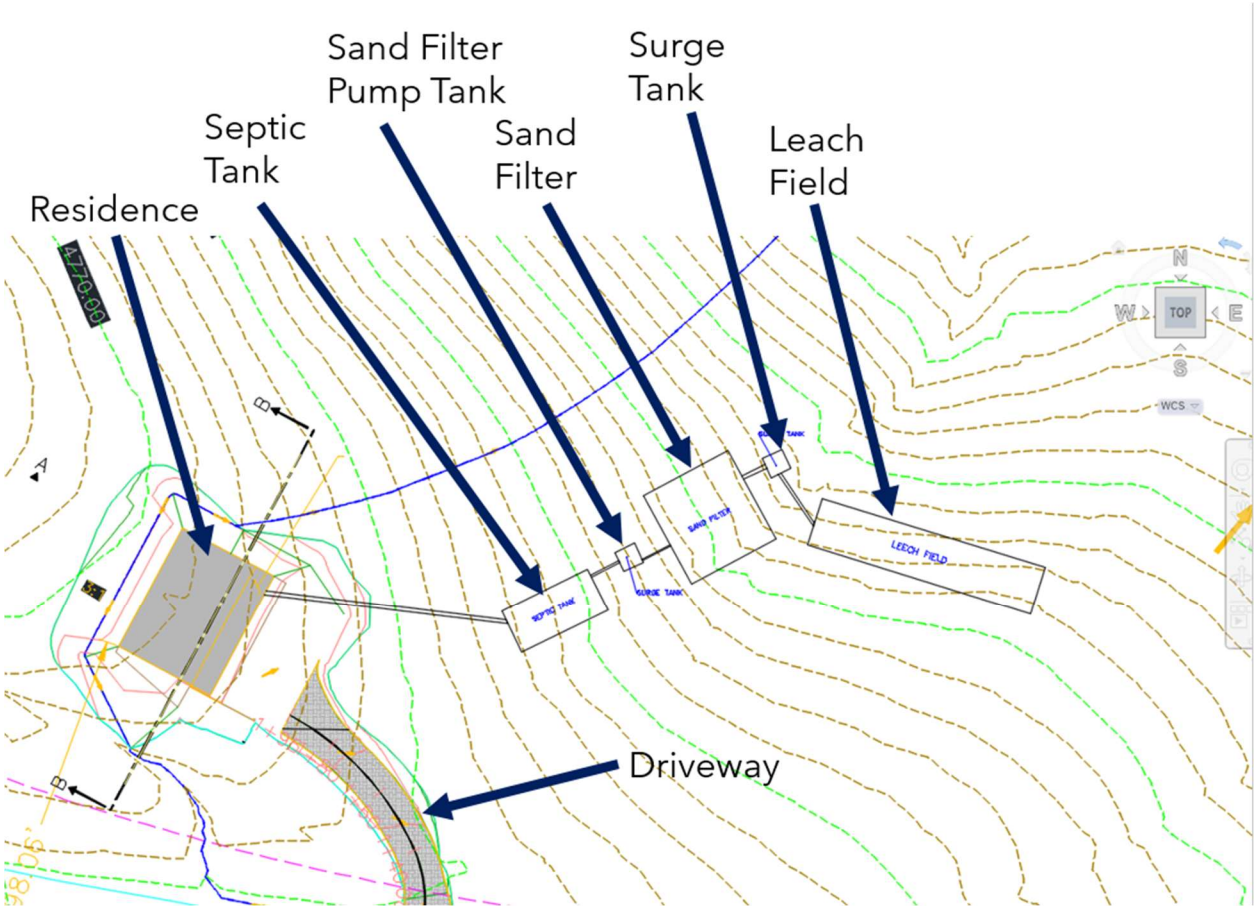
1.0 Definition of Sand Filter Septic System

A sand filter septic system is a type of residential wastewater treatment system that takes the dirty water flowing from a household and treats it. This treatment prepares the water so it may be reused for irrigation on site, and so that it may be discharged back into the earth, thus allowing one to have residential wastewater treatment without connection to a city sewer network.

2.0 Parts of the Sand Filter System

This system has a series of tanks that each perform an important function to creating irrigation quality water and discharging the rest. The first is the septic tank, following by a tank to hold water for the pump for dosing the sand filter. The sand filter, one of the larger pieces of the system, does most of the work in creating the irrigation quality water. This water then sits in the surge tank until it is either used or discharges to the leach field.

Below is a schematic of these item's locations.



2.1 Septic Tank

A septic tank is a large watertight container that is buried underground outside of the house. The septic tank is the first step in the treatment process. The wastewater from the house flows into the septic tank. In the tank solids settle out of suspension onto the bottom creating a sludge layer. Lighter materials float on the surface of the water creating a scum layer. Microorganisms can be found and they

breakdown some of the sludge and scum. The tank needs to be pumped regularly to remove the solid waste in the tank to prevent the solid waste moving out of the septic tank and clogging different parts of the system.

2.2 Pump Tank/ Pump

This pump tank collects the water coming out of the septic tank so that a pressure dosing pump can distribute the water into the sand filter, as this is required.

2.3 Sand Filter

A sand filter is the third step in the water treatment process in this specific design. A sand filter's main purpose is to filter out various particles from the volumetric flow from the surge tank. This is achieved through the naturally occurring filter properties that sand possesses. The small pores in sand allow for the water to infiltrate but trap the larger waste particles.

2.4 Surge Tank

The surge tank houses the treated water that comes out of the sand filter. This tank allows a pump to move the water to irrigation based on a set timer or allow the water to escape to the leach field for more standard disposal of treated water.

2.5 Subsurface Irrigation

This set of pipes leads from the surge tank pump to the plants that are desired to be watered. The pipes are buried to prevent human contact with the water that is not fully safe for human consumption but is safe for irrigation. The pipes disburse the water to the plants automatically via a pump controller in the surge tank. This is not pictured or discussed further.

2.6 Leach field

A leach field is the final step of the system, it is what distributes the treated water back into the soil when unused or purposely discharged. The goal of a leach field is to spread out the water as much as possible over a given area to prevent pooling. In the case of this system, two 40-foot pipes are installed with aggregate below to help distribute evenly.

3.0 Maintenance, Upkeep, and Inspections

3.1 Septic Tank

Operation

Day to day, a septic system does not need much attention if used properly. One of the downsides talked about in the presentation is that users of a septic tank must put in a lot more thought about what goes into it and how it operates in order to prevent premature maintenance.

A septic tank will need regular maintenance mainly due to the fats, oils, and greases (F.O.G.) that accumulate at the top of the liquid level. The F.O.G. that builds up at the top of the tank can cause major damage to a system similar to this one, and therefore it is recommended that the tank should be pumped out by a third-party contractor at least every 3 years.

Maintenance

There are many factors that affect how often to pump your system, and therefore a yearly inspection is recommended to prevent any build up in the system, potentially causing further damage downstream of the septic tank. Many actions can be taken in order to try and prevent maintenance from being done on the system, which are detailed in sections 4.0 and 5.0.

3.2 Pump Tank

Operation

The pump tank doses the sand filter with 29.2 gallons of septic water 12 times a day. This dosing enhances the health of the bacterial colonies living in the sand filter and ensures good operation.

It is vitally important that the pump that performs this dosing remain powered and functional at all times. If the dosing ever stops, the septic tank and the pump tank will fill with water and cause a failure. Check the pump often and whenever a fault is thought to have occurred.

Maintenance

Check the pump tank periodically for any buildups around the tank. Some materials may make it from the septic tank into this tank, and bacterial colonies may begin to grow. When this occurs, a professional pumping and cleaning will be required. This should only be done as needed.

3.3 Sand Filter

Operation

The sand filter is fed water from the pump tank. This runs through a series of dosing pipes and over the sand. The water infiltrates the sand and eventually into the discharge pipes that leave the sand filter. It is at this stage that operation could become an issue. Periodically, the sand grains may become clogged. In order to fix this and ensure operation, a task called ‘raking’ must be performed.

Raking involves taking a long rake and brushing the top several inches of the sand to break up the clogs. The deeper this raking, the better. A professional can be hired to do this, or the owner can perform this if they have the right tools. Be sure not to touch the dosing pipes when doing this.

Maintenance

Every 3-5 years, the sand grains will become so clogged that no amount of raking will remove the clog. When this occurs, the sand filter will need to be pumped empty of sand and replaced with new sand. This can usually be well timed with the pumping of the septic tank by a professional at the same rate of every 3-5 years.

Inspections

Professional inspections should occur at the same rate as the septic tank, once a year. These inspections will help deduce whether something is about to break, or whether the sand tank will need to have its sand pumped and replaced soon.

3.4 Surge Tank

Surge Tank Timing

The surge tank is timed to ensure water never sits for more than 24 hours. This is to protect the water from becoming septic and dangerous since some biological pollutants may still exist in the water. Additionally, the pump controller will turn on the pump to send water to the irrigation line, which will occur in the morning at a desired time. It is suggested this time be about 10am, so that morning shower water can be used for irrigation.

After an irrigation process is performed, the pump controller will open the empty valve to fully empty the tank of any remaining water not used for irrigation. This will ensure that water never stands in the system. If such an action is taken, the 24-hour timer will be reset as well.

Whenever an automatic emptying is triggered, the pump controller will open the valve for 1.5 minutes every 15 minutes, 4 times in an hour. This helps reduce the immediate load on the leach field and allows for infiltration to occur.

If for any reason the surge tank fills up entirely, a float valve exists to allow this extra water out without emptying the entire tank.

Winter/No Irrigation Periods

During the colder months or times where plants are not being irrigated, the system should be set to manual empty mode. Open the manhole to the irrigation surge tank. Inside is a valve which must be turned on to prevent the tank from accumulating water during these times when the water is not being used. Holding such water without a use will wear down the system. At the same time, deactivate the pump controller system in the surge tank. It will not need to be on while the surge tank is in manual empty mode.

When irrigation is desired again, undo the manual empty valve so water may collect in the tank. Turn the pump controller back on at the same time.

Maintenance

No professional inspections are required for this tank. However, it would be prudent to have a professional who, when coming to inspect the sand filter, will also inspect the surge tank. The tank mainly needs to be checked for three things: operation of the leach field valve, the pump, and the pump controller.

The leach field valve should be tested to ensure it lifts correctly to allow flow to leave the tank. It should also seal properly so water is held.

The pump should be checked to ensure it is actually pumping, and that no damage has accumulated in it.

The pump controller should be confirmed as working and operable.

These should be done at least once a year, but should also be done immediately upon signs of a failure of any of these parts, including but not limited to: lack of irrigation water making it to irrigation, surge tank strange noises, or water coming out of the surge tank access cover.

Additionally, some sand may make its way to the surge tank from the sand filter. While unlikely, it is safer for the pump to ensure this sand never builds up. If sand is found in the surge tank, it is suggested to have a professional pumper remove it. This could easily be done at the same time of regular septic or sand tank pumpings.

3.5 Leach Field

Ensuring Operation

The leach field should require very little effort to ensure it functions. Do not allow heavy vehicles or items to sit on the leach field as this will damage the pipes and gravel below.

Be watchful for any wet zones arising from the leach field. If the soil above ever becomes saturated or smells, there is a likelihood that the leach field is clogged and has failed. Call a professional if this ever happens and refrain from touching any part of the system.

The leach field should run successfully for at least 15 years without issue, and it will likely last much longer than this under normal use. Since the load on this system will be lower due to irrigation use of water, this might be even longer. However, it should still receive the regular inspections as expected with the septic tank itself.

3.6 Parts Maintenance

For this system, no specific pumps, parts, or tanks have been chosen. As such, when properly install, it is important to follow all cut sheets, information logs, and instructions of those specific parts. The manufacturer will have additional rules and maintenance items that will be required to keep those components working. These would be provided by the contractor who chooses these individual parts, and should be given to the owner upon system completion.

4.0 Do Not Flush or Dump

In order to protect your septic system do not flush or dump the following items.

- Coffee Grounds
- Dental Floss
- Disposable Diapers
- Baby Wipes / Facial Tissues
- Sanitary Napkins / Tampons
- Condoms
- Fats, Grease, or Oil
- Cigarette Butts
- Unused prescription Drugs or Over the Counter Medications
- Flushable wipes

Chemicals

- Paints
- Varnishes
- Thinners / Solvents
- Anti- Freeze
- Photographic Solutions
- Pesticides / Herbicides

Use caution with the household cleaners used that go into the septic system. Some cleaners are not compatible with bacteria in the septic tank. When purchasing items read the labels to see if they are septic system safe. Some cleaners that could cause problems are caustic drain cleaners, laundry detergent that contains high levels of bleach, anti- bacterial soaps and bathroom cleaners.

5.0 Do's and Don'ts

5.1 Do's

- Do keep records of all important documents such as system permits, inspections, pumping, and repairs.
- Do have the system inspected annually.
- If issues or problems arise with the system, such as a failure, have a licensed professional come take care of the issues.
- Do know where the system is in your yard. This means knowing where the tanks, filter, and leach field are located.
- Do make sure not to saturate the area of the system. This means diverting water sources away from the system.
- Do conserve water to not saturate the system. Saturating the system can lead to a system failure. If your surge tank commonly fills and has to be drained with the overflow float valve, it is likely the system is oversaturated.
- Do limit the use of the garbage disposal to reduce the number of times the tank needs to be pumped.
- Do be careful about water softener backwash to enter the septic tank.
- Do make sure that all tank covers are on property

5.2 Don'ts

- Don't use your toilet as a trash can for non-biodegradable materials.
- Don't use excess amounts of anti-bacterial soaps, bathroom cleaners, or laundry detergent with high levels of bleach
- Don't run successive loads of laundry. Overloading your septic tank can cause a short period of time that the tank does not work and the water is not treated safely for irrigation quality water.
- Don't drain a hot tub into your septic tank. Instead drain into areas that are away from the system.
- Don't construct any buildings, home additions or any hard surfaced areas over the septic tank or leach field.
- Don't plant trees or vegetation over or near the tank except grass. Don't allow larger vegetation to migrate and take root. Large roots will eventually damage the system, especially the leach field.
- Don't allow anyone to drive over or park on any part of the septic tank or leach field.
- Don't ignore unsecured covers, pooling water or soggy soil, toilet or sink backups or excessive green grass/ weeds growing over the leach field.

6.0 Signs of Septic System Failure and Reasons for Malfunction

If a failure is expected or detected, immediately call a professional septic maintenance group. Let professionals do all maintenance and repair work.

6.1 Signs of System Failure

- Water and sewage from toilets, drains, and skins are backing up into the house.
- Bathtubs, showers, and sinks drain very slowly.
- Gurgling sounds in plumbing systems.
- Standing water or damp spots around the septic tank or drain field.
- Odors around septic tank or leach field.
- Signs of mechanical failures of pumps (smoke, disturbing noises, etc)

6.2 System Malfunction Causes

- The pipe from the house to the tank is clogged.
- The inlet baffle to tank is blocked.
- Outlet baffle or filter is clogged.
- Drain field failure.
- A pump has failed
- The sand filter is clogged
- The surge tank is not draining to the leach field