FORD-IROQUOIS PUBLIC HEALTH DEPARTMENT
SEWAGE SYSTEM GUIDE

Purpose: The purpose of this guide is to help the homeowner explore the common sewage system options available and to provide guidance in the construction of suggested systems.

When evaluating what sewage system to use, the soil and surrounding areas must be evaluated. The suitability of the soil is determined by performing a perc test. This test will determine whether a seepage system may be used or if another option will be necessary.

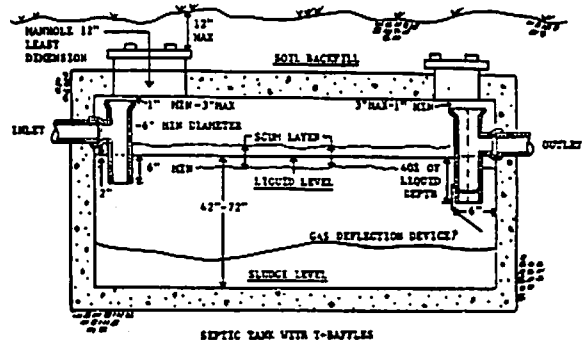
In most cases the soil will give an adequate perc rate to allow for a seepage system. The most common of these is a gravel seepage trench method, which is very reliable and by far the most common of all of the seepage systems. This guide will go into more detail as to the construction of these systems. Other systems are available, including graveless systems, seepage beds, and the Infiltrator seepage system. If you are interested in any of these systems, contact the health department to discuss construction.

In the cases where the soil does not have a perc rate adequate for a seepage system, a buried sand filter is suggested. These filters are very reliable, easily maintained, and comparably priced to other options. This guide will go into more detail about buried sand filters. Other options are available, such as aerobic units. Contact the health department about alternate systems if a buried sand filter is not practical.

Septic Tanks

Septic tanks are required for almost every type of sewage system used. A septic tank is designed to retain sewage for 24-48 hours, during which time the heavy solids (sludge) drops to the bottom and the grease and foam(scum) rise to the top. It is important to note that the tank is designed to keep sludge within the tank. This allows time for the natural bacterial processes to decompose the stored sludge and scum. The liquid between the sludge and scum layers (effluent) flows out of the tank. The effluent should contain only small suspended particles. Baffles around the tank outlet keep the scum from leaving the septic tank. If the tank is not pumped every three to five years, this scum could get so thick as to pass the baffle and go out into the field and clog it.

Figure 1- A Typical Septic Tank



SEPTIC TANK WITH T-BAFFLES

Determining the size septic tank needed is an easy process. Simply determine the number of bedrooms in the house and whether a garbage grinder will be used, and follow this chart:

No. of Bedrooms	2 or less	3	4	5	6	7
No Garbage Grinder	750 gal	1000 gal	1250 gal	1500 gal	1750 gal	2000 gal
With Garbage Grinder	1250 gal	1500 gal	2000 gal	2200 gal	2600 gal	3000 gal

Obtaining a Septic Tank

The following is a list of local distributors or contractors selling septic tanks that meet the Illinois State Private Sewage Disposal guidelines.

Name	Address	Telephone	Sizes Available
Cline's Concrete Products	500 W. Thompson, Hoopeston	(217) 283-5012	Concrete – 1000 gallon and 1500 gallon
Eastern Illinois Clay Co.	460 S. Elm Street, St. Anne	(815) 427-6627	Plastic – 1000 gallon and 1500 gallon

The Preferred Option- The Subsurface Seepage Systems

What is a Subsurface Seepage System:

Subsurface seepage systems are simple systems which let the soil act as a filter for the sewage. All subsurface seepage systems share some common characteristics. All of them have a septic tank and a seepage field. Subsurface Seepage systems do have their advantages and disadvantages.

Advantages
- Least expensive option to install
- No electrical or mechanical parts to maintain
- No operational costs for electricity
- Water is returned to the soil

Disadvantages
- Some soils not suitable (slow perc or high water table)
- Extremely wet conditions can cause temporary failure
- Lifetime is limited, but can be extended with proper care
- Must be enough ground area to install the system

Some keys to extending the life of your subsurface seepage systems should be kept in mind when planning, constructing and maintaining your system.

-Install curtain drains around the seepage field to lower seasonally high water tables, reduce wetness and possibly speed up perc rate.
-Install a field 25% larger than required.
-Landscape so runoff water from surrounding land does not run onto field and roots do not grow into distribution lines.
-Install a larger size tank than needed, a multiple compartment tank, or more than one tank in series.
-Install water saving shower heads, toilets, faucets and clothes washers.
-Install a "riser" over the septic tank inspection ports to make pumping easy, check tank yearly, and pump it every three years.

Percolation Testing

Perc testing is of great importance when determining what sewage system to use. A detailed description of how to perform a perc test can be obtained from the Health Department, but the basics are as follows:

Perc tests shall not be made in frozen ground or ground that has been filled in the past 12 months

Number and location of test holes- Select an area the seepage field would be located. At least three perc test holes shall be performed at the site of the disposal area, at least 50 feet from each other. At least one hole shall be located at the lowest elevation of the proposed field.

Depth and width of test hole- Dig or bore the holes 4-6 inches in diameter to the depth of the desired field.

Preparation of the test hole- Carefully pick the bottom and sides of the hole with a knife blade or other pointed instrument to remove smeared or smoothed soil and to provide a natural soil interface to which the water may percolate. Remove all loose material from the hole. Add 2 inches of coarse gravel to protect the bottom from scouring and sediment.

Presoaking- On the day prior to the perc test, carefully fill the hole with water and keep it full for at least 4 hours. The perc test shall be conducted on the day following this presoaking at least 18 hours after pre-soaking is completed, but prior to 30 hours.

Testing- On the day of the test, fill the holes 12 inches above the gravel. Allow the water to drop to 6 inches above the gravel (If this does not happen within 6 hours, a seepage system is not an option). Measure the amount of time it takes for the last six inches.

Calculating the Perc Rate- Average the two highest perc times and this is the perc rate in which you will size your system. If the rate is under 60, the perc rate shall be considered 60. If the perc rate is over 360, the soil is not suitable for a seepage system and an alternate method must be used. If the perc rates vary more than 30 minutes do not average, use the highest perc rate.

Determination of Square Footage Needed Using a Gravel Trench Seepage System- Use the following table to determine the amount of trench bottom area that is needed per bedroom.

Perc Rate	60min	90min	120min	150min	180min	240min	300min	360min
Sq. Ft. Area Per Bedroom	200ft²	210ft²	235ft²	265ft²	290ft²	320ft²	350ft²	385ft²

Once the total square footage needed is determined, the size and configuration on the lot can be determined. It is important to remember the over sizing considerations mentioned earlier at this time.

*All of the information that you collect should be submitted on the Property Permit Application Worksheet, available at the Health Department.

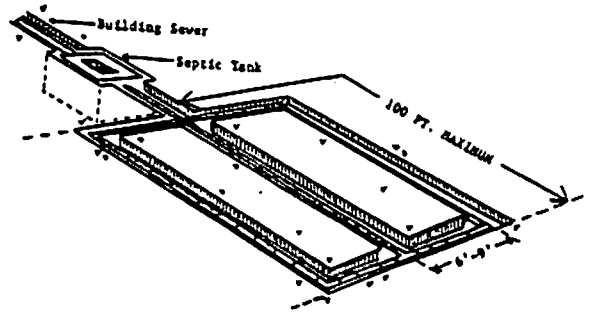
Designing a Layout

Layouts for seepage trenches may vary, but there are a few generalizations that may be made when laying out the design. Use three foot wide trenches, so every one foot of trench would equal 3 square feet of seepage trench. If using a three foot wide trench, simply divide the amount of square footage of seepage area needed by 3. This gives you your total running feet. When configuring your trenches, do not count corner areas twice (one corner can only count for 3 running feet of one of the distribution lines).

Seepage System Construction Suggestions

1. Use a 36 inch wide trench (unless impossible)
2. Loop all distribution lines.
3. Trenches shall be no closer together than 9 feet center to center.
4. Allow at least 5 feet from house to septic tank, and 5 feet from tank to distribution system.
5. Follow strictly the Subsurface Seepage System Distance Standards sheet.
6. All tile should be 4 inch.

A Basic Layout



*After designing is complete, it will be necessary to complete the APPLICATION FOR PERMIT TO CONSTRUCT OR REPAIR A PRIVATE SEWAGE DISPOSAL SYSTEM. This form may be obtained from the Health Department via the mail or by stopping by the office.

The form must be returned and approved by the Health Department before construction may begin.

Construction of a Gravel Trench Seepage System

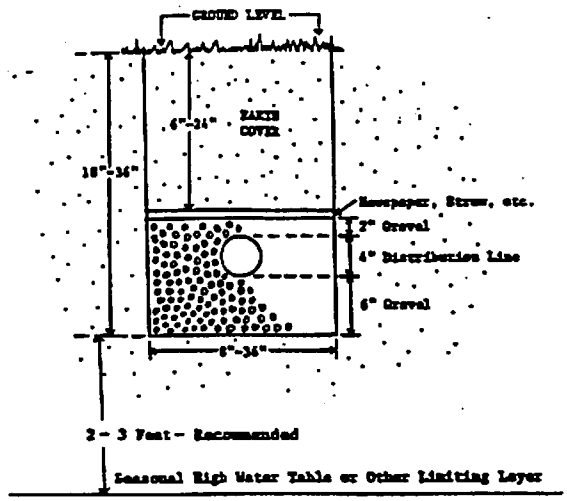
Septic Tank Installation

The tank shall be set level (level meaning plus or minus ½ inch in any one direction). The lines coming in and out of the tank shall be watertight using tar , silicone caulk or mastic. There should be a minimum drop from the house to the septic tank of at least 12 inches per 100 feet. From the tank to the distribution line there shall be a minimum of a one inch drop from the invert of the outlet of the septic tank to the top of the gravel of the trench. There shall be no joints, splices, or fittings within the area of overdig around the tank. It is also suggested that once the tank is in place that the tank is filled with water to hold it in place.

Field Construction

The basic construction of the trench is relatively simple. The trench is dug to the desired depth (a minimum of 18 inches and a maximum of 36 inches to the bottom of the trench), uniformly level throughout the entire field, 36 inches wide. It is important to note that the earth between and immediately around the trenches should remain undisturbed, as they are the essential part of the system and may contribute to the failure of the system.The actual trench space is only 12 inches deep and consists of 6 inches of gravel, the 4 inch perforated distribution pipe (level) surrounded by gravel, and another 2 inch layer of gravel on top of the line. This is then covered by a layer of straw or rosenpaper to prevent soil infiltration and the rest of the trench is then filled with soil no less than six inches and no greater than 24 inches deep. This can be seen on the diagram. All connections must be water tight.

Figure 2- Trench Construction



Materials Used

The pipe from the house to the septic tank should be Schedule 40 PVC or greater, and it is suggested that the pipe from the septic tank to the leach field be of equal strength. There are many types and brands to choose from, but the most commonly used and available can be seen in Table 4. Table 4 also lists the common types of distribution pipe most often used and preferred.

Table 4-Pipes Approved For Use in Septic Systems **Bold Indicates Most Commonly Used Pipe**

PIPE	ASTM STANDARD CODE
From Building to Septic Tank and From Septic Tank to 5 Feet After Septic Tank	Schedule 40 (F628, D2661, D1527, **D2665**,F891, F949, **D3034***, **D3033***)
From 5 Feet Past Septic Tank to Distribution Line	F628, D2661, D1527, **D2665**,F891, F949, D3034*, D3033*,D2729, F405HD (Heavy Duty Only)
Distribution	F628, D2661, D1527, D2665,F891, F949, **D3034***, **D3033***,**D2729**, F405HD (Heavy Duty Only), F667
	*- Pipe Shall Be SDR 35

Non-Seepage System Alternative

If the ground did not perc suitably or is not capable of supporting a seepage system, the suggested choice for an alternative is a **Buried Sand Filter.**

What is a Buried Sand Filter?

A Buried Sand Filter is exactly what the name says. The sewage goes from the house to the septic tank, like a seepage system, but from the septic tank the effluent goes to the distribution line of the filter. The effluent seeps through the sand, which acts as a media for biological organisms which break down the effluent. The treated water is then collected at the bottom and drained to the surface, a stream or other location.

Buried Sand Filters are reliable and relatively long lasting. The system requires no power unless the situation exists where the drain of the filter is lower in elevation than the area the filter must drain to. In this case, a lift station with a lift pump would be required to bring the effluent up to the drain area.

Designing a Buried Sand Filter

Perc test results are not used because the soil is not what is filtering the water. To figure the square footage needed is simple; 200 sq.ft per bedroom. When planning the system keep in mind that a larger filter will probably extend the life of the system.

Figures 4 and 5 show the requirements of a buried sand filter.

Figure 4- Top View, Buried Sand Filter

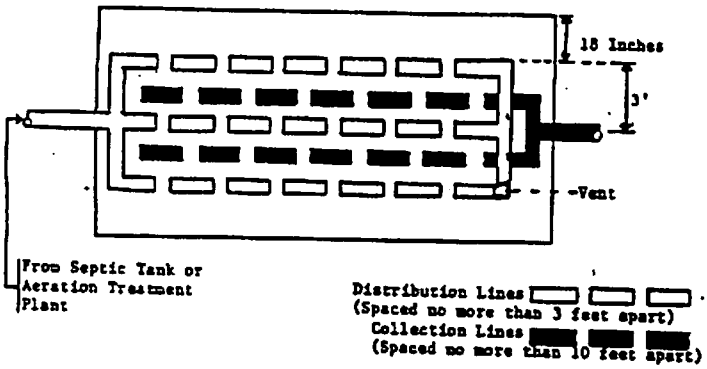
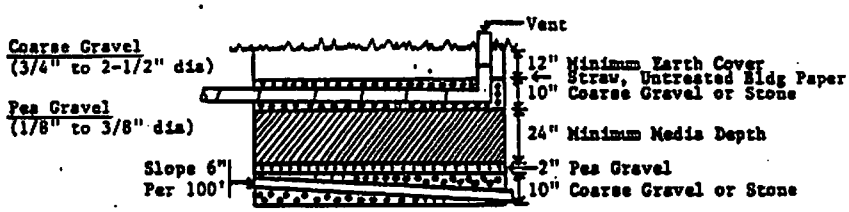


Figure 5- Cross-Sectional, Buried Sand Filter



Materials Needed

The septic tank and piping are the same as for a gravel trench seepage system, so refer to Table 1 and 2 to find available locations. The sand and gravel which meets Illinois State requirements can be found on Table 6 on the back of the seepage field layout sheet. Table 7 lists haulers that are willing to haul sand filter materials.

For More Information Please Contact:

Ford-Iroquois Public Health Department
Division of Environmental Health

114 N. Third St.
Watseka, IL 60970
(815) 432-2483

235 North Taft
Paxton, IL 60957
(217) 379-9281

BURIED SAND FILTERS

A buried sand filter is constructed to contain 200 square feet of surface area per bedroom. The effluent from the septic tank filters through a series of gravel and sand layers. The effluent from a properly functioning sand filter may be discharged to the ground surface, a common tile, or a receiving stream. However, the effluent may require chlorine treatment in some cases.

Advantages:
(1) No electrical or mechanical parts are required in most instances.
(2) System will function regardless of the rate at which the soil absorbs water.
(3) Sand filters are expected to have a long lifetime.

Disadvantages:
(1) More expensive than subsurface seepage systems, because more labor and material are required.
(2) Requires a discharge point below the bottom of the sand filter (58" deep), or a lift pump and alarm must be installed.
(3) There must be enough ground area to install the system.

AEROBIC TREATMENT PLANTS

Aerobic treatment plants are self-contained, concrete or fiber-glass, individual sewage treatment units. These units may be used in any type of soil because they are completely self-contained. The sewage is treated by agitation, by bubbling air through the sewage, and by filtering the liquid. All of the aerobic treatment units use air to treat the sewage. However, there are differences in construction, total filter area, filter type and design. Aerobic units listed by the National Sanitation Foundation as having a class 1 effluent may be discharged to the ground surface, a common tile, or a receiving stream.

Aerobic treatment plants do require maintenance. The first section of the unit (septic tank section) will require pumping periodically. It may be 3 to 5 years before pumping is needed. Filters may need cleaning or replacement, and should be checked each year. Electric motors and components may require repair or replacement. Owners should check with the manufacturer's warranty.

The dealer provides maintenance service for an initial period. After this period, dealers charge for service calls. If the homeowner does not have a service contract, then the homeowner is responsible for the proper operation of the unit. The effluent must meet the requirements of the Illinois Sewage Code. No changes in the design, construction, or operating controls by any person is allowed.

Any change made in the manufacturer's design, any component, or operation of the aerobic unit shall be considered a violation of the Illinois Sewage Code.

Advantages:
(1) Will function regardless of the rate at which the soil absorbs water.
(2) Requires a small amount of ground area.
(3) Inspection and repair may be done without digging or re-construction.

Disadvantages:
(1) Aerobic units have an electric operational cost.
(2) More expensive than subsurface seepage fields.
(3) Units extend above the ground surface and have a slight motor noise.

114 N. Third Street
Watseka, Il. 60970
815-432-2483

FORD - IROQUOIS PUBLIC HEALTH DEPARTMENT

SUBSURFACE SEEPAGE SYSTEM DISTANCE STANDARDS

235 N. Taft
P.O. Box 33
Paxton , Il. 60957
217-379-9281