SOIL REQUIREMENTS

Suitability of Soils

The first step in the design of subsurface wastewater system is to determine whether the soil is suitable for the absorption of septic tank effluent and, if so, how much area is required.

The soil must have an acceptable percolation rate, without interference from ground water or impervious strata below the level of the absorption system. The following conditions shall be met:

1. There shall be at least 4 feet of suitable soil between the bottom of the absorption field and bedrock or the maximum seasonal groundwater table.

2. There shall be a ground slope of no more than 25 percent.

3. The soil percolation rate shall be between 5 and 60 minutes per inch. If the rate is slower than 60 min. per inch innovative or alternative systems or a wastewater pond should be considered. If the soil is of a sandy texture and the percolation rate is faster than 5 mins. per inch, the percolation rate may be slowed by soil treatment.

Profile

A soil profile is recommended to a depth of at least four feet below the bottom of the absorption field or to a minimum of 8 feet. (See Figure 1 Soil Profile Record). A soil profile maybe obtained during the excavation of the system by using the backhoe to dig to the required depth. Another alternative is to use a coring tool to determine the types of soil for the profile. (See Table 1. Textural Properties Of Soils for general information on soils).

Falling Head Percolation Test Procedures

1. Number and Location of Tests: Commonly a minimum of three percolation tests are performed within the area proposed for an absorption system. They are spaced uniformly throughout the area. If soil conditions are highly variable, more tests may be required.

2. Preparation of Test Hole: Each test hole should be the same size whether it is 4, 6, or 8 inch in diameter bored or rectangular hand dug to the proposed depths of the absorption systems or to the most limiting soil horizon. To expose a natural soil surface, the sides of the hole are scratched with a sharp pointed instrument and the loose material is removed from the bottom of the test hole. Two inches of 1/2 to 3/4 in. gravel are placed in the hole to protect the bottom from scouring action when the water is added.

3. Soaking Period: The hole is carefully filled with at least 12 inches of clear water. This depth of water should be maintained for at least 4 hours and preferably overnight if clay soils are present. A funnel with an attached hose or similar device may be used to prevent water from washing down the sides of the hole. Automatic siphons or float valves may be employed to automatically maintain the water level during the soaking period. It is extremely important that the soil be allowed to soak for a sufficiently long period of time to allow the soil to swell if accurate results are to be obtained.

In sandy soils with little or no clay, soaking is not necessary. If, after filling the hole twice with 12 inches of water, the water seeps completely away in less than ten minutes, the test can proceed immediately.

4. Measurement of the Percolation Rate: Except for sandy soils, percolation rate measurements are made 15 hours but no more than 30 hours after the soaking period began. Any soil that sloughed into the hole during the soaking period is removed and the water level is adjusted to 6 inches above the gravel (or 8 inches above the bottom of the hole). At no time during the test is the water level allowed to rise more than 6 inches above the gravel.

   Immediately after adjustment, the water level is measured from a fixed reference point to the nearest 1/16 in. at 30 min. intervals. At least three measurements are made.

   After each measurement, the water level is readjusted to the 6 in. level. The test is continued until two successive water level drops do not vary by more than 1/16 in. The last water level drop is used to calculate the percolation rate.

   In sandy soils or soils in which the first 6 in. of water added after the soaking period seeps away in less than 30 min., water level measurements are made at 10 min. intervals for a 1 hr. period. The last water level drop is used to calculate the percolation rate.

5. Calculation of the Percolation Rate: The percolation rate is calculated for each test hole by dividing the time interval used between measurements by the magnitude of the last water level drop. This calculation results in a percolation rate in terms of min. per in. To determine the percolation rate for the area, the rates obtained from each hole are averaged.

Note: If tests in the proposed area vary by more than 20 min. per in., it indicates variations in soil type and percolation rates should not be averaged. Under these circumstances, relocation of the proposed site should be considered and additional percolation tests done until a more uniform soil type can be located. If relocation is not an option, then size the absorption field using the highest percolation rate.

Example: If the last measured drop in water level after 30 min. is $1\ ^{3}/_{16}$ in. then;

A. Convert fractions to decimals $1\ ^{3}/_{16}$ (3 divided by 16 = 0.19) = 1.19 inches.

B. Divide the number of minutes by the number of inches.
   30 min. divided by 1.19 inches = 25 min. per inch

C. Determine the average percolation rate by adding the results of the last reading from each hole and dividing by the number of holes.

   Example: $\frac{26 + 30 + 28 + 32}{4}$ = 29 min. per in. (average)

SAMPLE-PERCOLATION TEST DATA FORM

Percolation test number: 2 Date: Jan. 1, 1900

Location Lot 105, High Point Heights Subdivision, Mung City, Ks. 23456

Test hole number 2 of 3

Depth to bottom of hole 28 inches. Diameter of hole 6 inches.

Depth, inches	Soil texture
0-4	Black-Top Soil (Loam)
4-12	Brown-Sandy Clay
12-28	Yellow-Brown-Loamy Clay

Time	Time Interval, minutes	Measurement, inches	Drop in water level, inches	Percolation rate, minutes per inch	Remarks
9:30	-	44			
10:00	30	43	1		
10:20	20	43	1		
10:50	30	43 1/4	3/4		
11:20	30	43 1/16	15/16		
12:00	40	43 1/4	3/4		
12:30	30	43 3/16	13/16		
1:00	30	43 5/16	11/16		$30 \div \frac{11}{16} = 43.6$
1:30	30	43 5/16	11/16		

Percolation rate = 44 minutes per inch.

This percolation test was performed in accordance with the requirements and procedures established by the County and the NWLEPG.

Signature: John Doe Date: Jan. 1, 1900