



DELAWARE COUNTY HEALTH DEPARTMENT Environmental Health Division

Site Preparation Requirements, Procedures for Site Testing and Absorption Area Requirements for Individual Lots

These requirements of the Delaware County Health Department are in accordance with Act 537, The Pennsylvania Sewage Facilities Act, as amended. It is the responsibility of the property owner or assigned agent to ensure that all of the following requirements are met:

Sewage Application Record and Rider Form

Two (2) completed Sewage Application Record and Rider Forms must be submitted with the required fee prior to scheduling of any site testing. These forms will be checked for completeness when received by this Department. Any forms that are not correct or complete will not be accepted and will be returned to the applicant with an explanation of the deficiencies. Tax parcel identification numbers must be included for all existing lots. Lots being created by subdivision may use the proposed lot number. For repair situations that are the result of unsatisfactory septic certifications a copy of the certification must be attached.

Scheduling Site Testing for Existing Individual Lots

The property owner or assigned agent will contact the Delaware County Health Department SEO William Conrad at conradw@co.delaware.pa.us to schedule test dates. Scheduling may be done at the time of submission of the Sewage Application Record and Rider Forms, or any time soon thereafter. If the Environmental Health Specialist is unavailable, the applicant may leave a contact name and phone number so that the scheduling process can be completed as soon as possible. The testing is usually scheduled by the contractor hired to do the testing.

No site testing will be scheduled until the Sewage Application Record and Rider Forms have been accepted by this Department. All testing for existing individual lots will be scheduled according to the provisions of Act 537, section 8, (5), (i). The applicant will be advised in writing of the scheduled testing dates.

Site testing for existing individual lots will be scheduled for completion within 20 working days of receipt of the Sewage Application Record and Rider Forms, provided that all of the site preparation requirements listed below have been met. The property owner or assigned agent and the Environmental Health Specialist may agree to perform testing on dates which do not meet the 20 day requirement of Act 537. Site testing is considered complete whether the site passes or fails. Other factors that will affect testing are sickness and weather conditions. The property owner or his agent must contact the Department when rescheduling is necessary for any reason. **Rescheduling will be at the earliest, mutually agreeable date.**

One-Call Serial Number

PA ACT 38 is a Law enacted to prevent accidental damage to underground utilities supplying gas, electric, telephone, sewage, water or other services. This law requires any person who intends to conduct **any** earth disturbing activity to call the Pennsylvania One-Call System between three (3) and ten (10) days prior to the start of digging. Call toll free at 1-800-242-1776. Excavations for subdivision site testing and sewage system testing and installations require this call. The applicant must provide evidence of this call to the Health Department in the form of the One-Call serial number as required by Act 537. This number and the date of your call must be given to the Environmental Health Specialist at the time of the scheduled test pit observation. The Health Department **will not** observe test pits without this information.

The Pennsylvania One-Call does not identify the location of home geothermal well heating/cooling systems. If the home utilizes a geothermal well system, the location of the wells and lines running to the house must be identified prior to any machinery entering the property.

Lot Boundaries and References

Each lot to be tested must be pinned or staked so that the Environmental Health Specialist can clearly identify all property corners, lot lines, easements, right of ways or other features considered in the placement of sewage systems. All existing sewage disposal systems and water wells on the property being tested and adjacent properties must be located and identified to insure that isolation distance requirements will be maintained. The Health Department **will not** observe testing on any lot where this is not provided, nor be held responsible as the results of errors made based on this information. **The applicant is responsible for providing accurate data to the Health Department.**

Test Pit Observation

The purpose of a test pit excavation is to analyze the soils beneath the proposed sewage disposal system, to determine effluent renovation capability. In general, any limiting zone must be at a depth of at least four (4) feet below the bottom of the stone aggregate used in a conventional sewage absorption area. A limiting zone is defined as a horizon or condition of the soil or underlying strata which includes:

1. A seasonal high water table, whether perched or regional, determined by direct observation of the water table or soil mottling;
2. Rock with open joints, fractures or solution channels, masses of loose rock fragments including gravel, with insufficient fine soil to fill the voids between the fragments; and
3. Rock formation, other stratum, or soil condition which is so slowly permeable that it effectively limits the downward passage of effluent. (DCHD considers a failed percolation test at 36" with another failed test at a deeper depth as an indication of an experimentally discovered limiting zone)

The applicant or assigned agent is required to have someone on site with the Environmental Health Specialist during the observation of ALL test pits.

Delaware County Health Department requires a minimum of two (2) test pits for each test site. Additional test pits may be required to either relocate a proposed sewage disposal system or to locate a replacement area. These test pits will be placed **approximately 50 feet apart** so that one test pit will be near each end of the proposed absorption area. The depth of the test pit excavation must be to the top of the limiting zone, or a maximum of 7 feet. The contractor will locate the test pits.

Test Pit Excavations

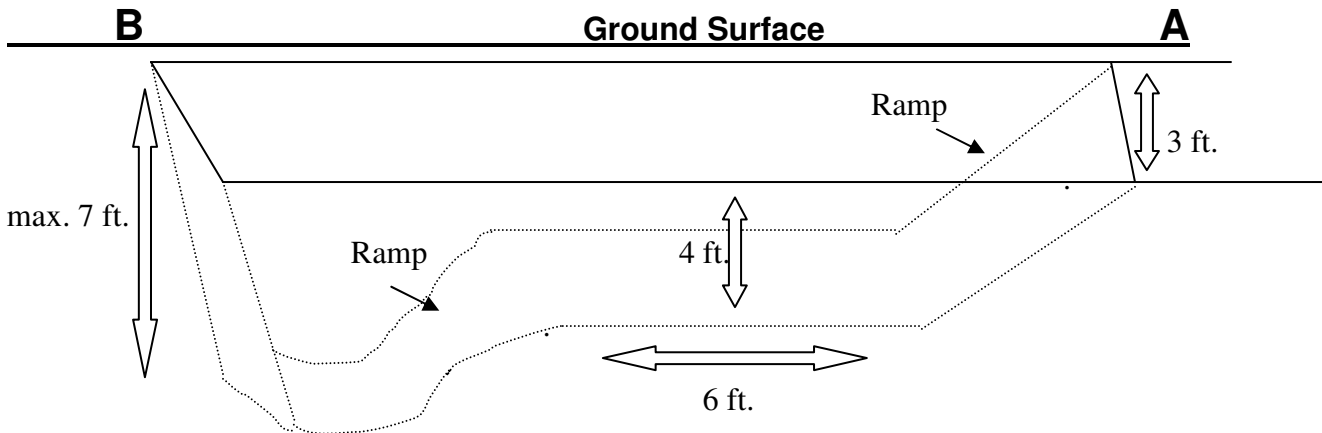
Test pit excavations must be dug in an area that will ensure that the isolation distance requirements of Chapter 73, section 73.13 will be maintained by the sewage disposal system to be installed. Test pits are normally dug with a backhoe. All test pits are to be identified by placing a labeled stake at the surface by the deep end of the test pit.

For the safety of all individuals, the following test pit excavation requirements *must* be adhered to at all times:

1. Test pits must be excavated according to one of the two options listed on the next 2 pages.
2. Excavate all test pits so that the test pit is parallel to the direction of the slope of the land. This will reduce the pressure from the soil mass against the open wall of the test pit.
3. Dig test pits on the same day they will be observed. Test pits must be backfilled within 3 days of observation.
4. **Test pits will not be evaluated if it is raining, snowing or the soil is saturated.** The stability of saturated soil may be weakened and open test pits tend to slump and cave in. Observations will be rescheduled at the earliest available date. Contact the SEO William Conrad at conradw@co.delaware.pa.us prior to digging test pits in adverse weather conditions.
5. If test pits will be dug in pasture areas, all livestock must be confined in barns or other fenced areas during the time test pits are open.
6. The SEO will make the final decision as to whether a test pit is safe to enter. The SEO may refuse to enter any test pit that he/she considers to be unsafe.

In 1979, PA DEP met with representatives of the Department of Labor and Industry (L & I) and Occupation Safety & Hazard Agency (OSHA) to develop a statewide policy for compliance with the safety regulations of those agencies regarding entry into soil test probes (test pits). PA DEP requires evaluation of probes up to seven feet in depth, thereby placing the SEO under the jurisdiction of L & I and OSHA. The diagram below is the result of the variance granted by L & I and OSHA for evaluation of test pits.

Excavation Option 1

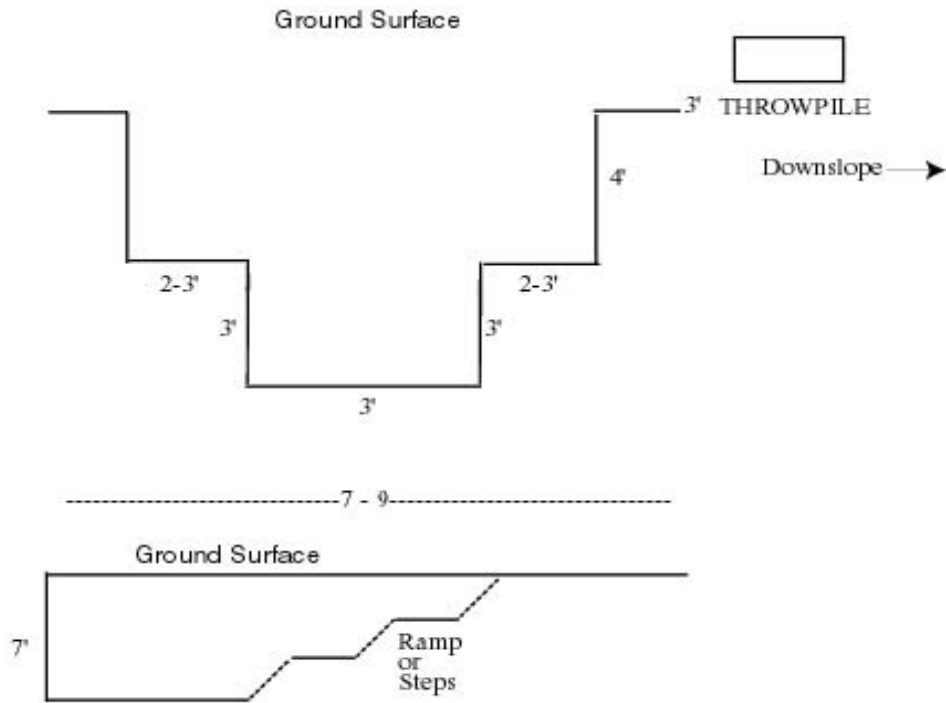


There are 2 ways to perform the above excavation:

1. Backhoe at Point A: Excavate steep 7' probe first, followed by leveling off a shelf at a depth of 4'. This type of excavation is rated easy to perform.
2. Backhoe at Point B: Excavate 10-12' long trench at 4' level; move back slightly and excavated a steep 7' probe, closest to the backhoe. This type of excavation is considered more difficult than the preceding one but a more level and cleanly excavated pit can be achieved.

- The entire test pit should be at least 3 feet wide.
- The spill pile must be at least 3 feet from the downslope side of the test pit.
- A gradual ramp is excavated from ground surface to a maximum depth of 4 feet.
- The 4-foot depth is extended for a length of 6 feet.
- Another gradual ramp is excavated down to a maximum depth of 7 feet.
- All machine engines must be off near the excavation while it is occupied.

Excavation Option 2



1. Test pit is dug to a total depth of 7 feet with a length of 7-9 feet.
2. Two opposite sides of the test pit are dug back to 4 feet to reduce occurrence of cave in.
3. The two benches are to be a minimum of 2 feet in width.
4. The spill pile should be a minimum of 3 feet from the downslope side of the pit.

Percolation Testing

The percolation test is an attempt to determine the absorption capacity of saturated soil. The percolation test results are used in conjunction with the proposed daily sewage flow to calculate the size of the absorption area. Since the percolation rate can vary across any given property, the percolation test must always be conducted within the proposed boundaries of the absorption area, and within 10' of one of the test pits.

Percolation Test Holes

1. **Number and Location** - Six or more tests shall be made in separate test holes spaced uniformly over the proposed absorption area. These test holes shall be oriented parallel to the contours of the ground. For lots with slopes up to 5% the percolation test holes shall be placed a minimum of 20 feet apart in a square grid pattern. For lots with slopes over 5% the percolation test holes shall be placed a minimum of 20 feet apart parallel to the contours and 15 feet apart perpendicular to the slope. Verify the number and general location of the percolation test holes with the Environmental Health Specialist.
2. **Results** - All percolation test holes located within the proposed absorption area shall be used in the calculation of the average percolation rate.
3. **Type of Hole** - Holes having a uniform diameter shall be bored or dug:
 - a. To the depth of the proposed absorption area, where the limiting zone is 60 inches or more from the mineral soil surface. (NOTE- if the **limiting zone* is between 60 - 65 inches, consult the Environmental Health Specialist before conducting the test.**) For bed systems, the down slope holes may be at a shallower depth than the up slope holes based on the ground slope across the proposed absorption area. Discuss this with the Environmental Health Specialist prior to preparing the test.
 - b. To a depth of 20 inches if the limiting zone is identified as a seasonal high water table, whether perched or regional; rock formation; other stratum; or other soil condition which is so slowly permeable that it effectively limits the downward passage of effluent, occurring at less than 60 inches from the mineral soil surface.
 - c. To a depth 8 inches above the limiting zone or 20 inches, whichever is less, if the limiting zone is identified as rock with open joints or with fractures or solution channels, or as masses of loose rock fragments, including gravel, with insufficient fine soil to fill the voids between the fragments, occurring less than 60 inches from the mineral soil surface.
4. **Preparation** The bottom and sides of each percolation test hole shall be scarified with a knife blade or other sharp pointed instrument in order to completely remove any smeared soil surface and to provide a natural soil interface through which water may percolate. All loose material shall be removed from the hole. Two (2) inches of coarse sand or fine gravel shall be placed in the bottom of the hole to protect the soil from scouring and possibly clogging the pores.
5. **Measuring Equipment** – All percolation test measurements shall be made using a float/tube device. These devices are accurate and allow easy reading by the tester and the Environmental Health Specialist. One of these devices shall be placed in each percolation test hole and shall remain there throughout the test. No device shall be moved from hole to hole.

6. **Percolation Test Sequence** - A percolation test is conducted in 3 stages.

- a. **The Initial Pre-Soak** - normally conducted right after the percolation test holes have been prepared. The initial pre-soak must be witnessed 8-24 hours before the percolation test by an Environmental Health Specialist.
- b. **Final Pre-Soak** - the first 60 minutes after water has been placed into the test holes on the day of the percolation test. The readings of the final pre-soak are not considered in the calculation of the average percolation rate.
- c. **Percolation Test Measurements** – see below.

Figure II illustrates the percolation test hole preparation and initial presoak.

No Percolation Test will be conducted if holes have not been properly prepared and pre-soaked. All holes must be backfilled within 3 days of test completion.

Percolation Test Hole Preparation

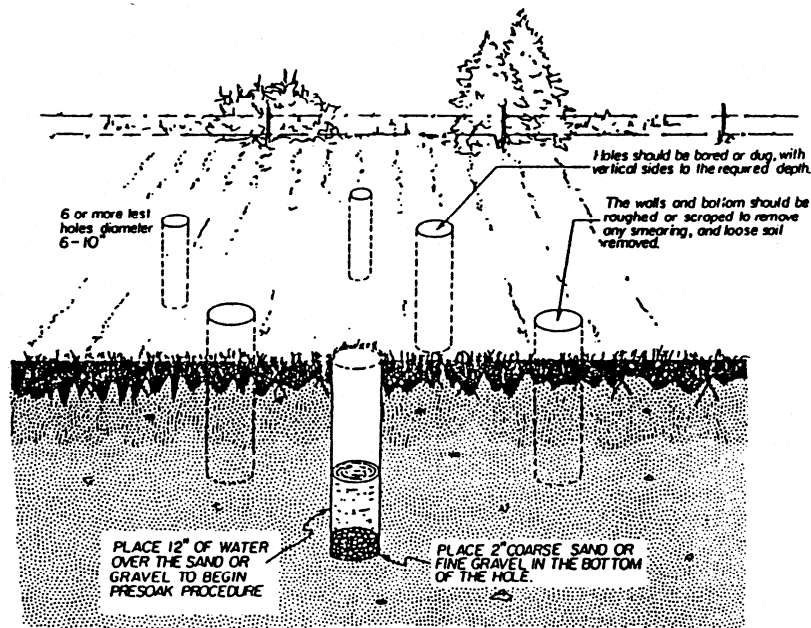


FIGURE II

Initial Presoak Period

STEP 1	STEP 2	STEP 3
Prepare percolation holes (see fig. II).	Place a minimum of 12" of water over the gravel.	Allow test holes to stand undisturbed for 8 to 24 hours (overnight).

Final PreSoak Period

STEP 4	STEP 5	STEP 6
Clear hole of filter material. Re-scarify & refill with fine gravel or coarse sand. Adjust water level to 6" over gravel.	Allow the holes to stand undisturbed for another 30 minutes. Measure and record change in water level.	Adjust water level to 6" over the gravel.

STEP 7	STEP 8	STEP 9
Allow the holes to stand undisturbed for another 30 minutes. Measure and record the change in water level.	Answer this question: Was there water remaining in the holes after Step 7.	Follow the percolation test procedure that corresponds to your answer to Step 8.

Percolation Test Procedure

Your answer to Step 8 was:

Water remaining	No water remaining
Use 30 minute interval between readings	May use 10 minute interval between readings with the option to revert to 30 minute intervals if rate slows
Test begins immediately.	Test begins immediately
Re-adjust water level to 6" over the gravel	Re-adjust water level to 6" over the gravel
Record drop every 30 min. and re-adjust water level	Record drop every 10 min. and re-adjust water level

For both types of timed-interval holes
Continue until 8 readings are completed or until a stabilized* rate of drop is established in <u>each hole</u> .
The final reading for each hole is used to calculate the percolation rate.

*A stabilized rate of drop shall mean a difference of 1/4" or less of drop between the highest and lowest of 4 consecutive readings.

DELAWARE COUNTY HEALTH DEPARTMENT

Environmental Health Division

Example of a Percolation Test Report



Pre-Soak and Perc Form

Name _____ Application # _____

Subdivision _____ Municipality _____

Location _____ Contractor _____

Test Pit _____ Lot # _____ Slope % _____

Initial Presoak was checked on: _____ Holes were dug at depth(s) of: _____ inches

and appeared to be properly prepared and presoaked. _____

Enforcement Officer Signature

Hole Depth	Remaining Water	PS1	PS2	1	2	3	4	5	6	7	8	Time Interval	
1	36"	0	1 3/4	1 1/2	1	7/8	5/8	1/2	5/8	1/2	—	30/10 min	
2	↓	↓	4 1/2	4	3 1/2	3 1/4	3	2 7/8	2 5/8	2 5/8	2 1/2	2 1/4	30/10 min
3	↓	↓	6	6	4	3	2 1/2	2 1/2	2 5/8	2 3/8	—	—	30/10 min
4	24"	↓	1 1/2	1 1/4	1	1	1	3/4	—	—	—	—	30/10 min
5	↓	↓	4 1/2	3 3/4	3	2 1/2	2	2 1/8	2 1/8	2	—	—	30/10 min
6	↓	↓	1/4	1/8	0	1/8	0	1/8	—	—	—	—	30/10 min
7													30/10 min
8													30/10 min
9													30/10 min

Calculating the Average Percolation Rate

The stabilized rate of drop reading is used to calculate the percolation rate. A stabilized rate of drop is defined as a difference of 1/4" or less of drop between the highest and lowest of 4 consecutive readings. The stabilized reading is the last reading on each line of the Example of a *Percolation Test Report Sheet* above. For each hole there is a stabilized reading.

Table 1 – *Conversion Table for Drop of Water Level in Standard Percolation Holes* is located on Page 14.

The first column of Table 1 lists the 1/8" incremental rates of drop in water level for a test hole.

The second column lists the conversion factor for 30-minute interval readings.

The third column lists the conversion factor for 10-minute interval readings.

As an example, using the stabilized rate of drop reading for each hole in the *Percolation Test Report Sheet* above, read across to the column for the 30-min. (Holes 1, 2, 4, 5, & 6) or 10-min. (Hole 3) interval between readings to find the percolation rate for that test hole.

*NOTE: All test holes located within the proposed absorption area must be used to calculate the average percolation rate.

Then find those numbers in the table below.

Hole	Interval	Final Drop	Min./In.
1	30	1/2"	60.0
2	30	2-1/4"	13.3
3	10	2-3/8"	4.2
4	30	3/4"	40.0
5	30	2"	15.0
6	30	1/8"	240.0
Total			372.5

1. Add the individual percolation rates from all test holes and divide by the number of holes.
 $372.5 \div 6 = 62.08 \text{ min/in}$
2. This number is the Average Percolation Rate.

Calculation of Absorption Area

Single Family Residences

The following calculations are needed to determine the absorption area square footage.

- Average Percolation Rate.
- Daily flow in gallons per day

Table A from Chapter 73 of Pennsylvania Code Title 25 is illustrated below.

Minimum Aggregate Absorption Area Requirements for Treatment Tank Effluent:

Average Percolation Rate Expressed as Minutes Per Inch	Square Feet of Aggregate Area Per Gallon Per Day	
	All Systems Except Elevated Sand Mounds and Subsurface Sand Filters or At-Grade Bed Systems	Subsurface Sand Filters and Elevated Sand Mounds or At-Grade Bed Systems
Less than 3.0 ^D	Unsuitable	Unsuitable
3-5 ^C	Unsuitable	1.50 ^{AB}
6-15 ^C	1.19 ^B	1.50 ^{AB}
16-30 ^C	$(\text{Avg. Perc. Rate} - 15) \times (0.040) + 1.19^B$	1.50 ^{AB}
31-45 ^C	$(\text{Avg. Perc. Rate} - 30) \times (0.030) + 1.79^B$	$(\text{Avg. Perc. Rate} - 30) \times (0.026) + 1.50^{AB}$
46-60 ^C	$(\text{Avg. Perc. Rate} - 45) \times (0.028) + 2.24^B$	$(\text{Avg. Perc. Rate} - 45) \times (0.022) + 1.89^A$
61-90 ^C	$(\text{Avg. Perc. Rate} - 60) \times (0.023) + 2.66^A$	$(\text{Avg. Perc. Rate} - 60) \times (0.020) + 2.22^A$
91-120 ^{ACD}	Unsuitable	$(\text{Avg. Perc. Rate} - 90) \times (0.017) + 2.82^A$
121-150 ^{CD}	Unsuitable	$((\text{Avg. Perc. Rate} - 120) \times (0.015) + 3.33) (1.05)^A$
151-180 ^{CD}	Unsuitable	$((\text{Avg. Perc. Rate} - 150) \times (0.014) + 3.78) (1.10)^A$
Greater than 181 ^{CD}	Unsuitable	Unsuitable

A Pressure dosing required.

B One-third reduction may be permitted for use of an aerobic tank.

C May be considered for experimental or alternate proposals.

D Unsuitable for subsurface sand filters.

For Example: Using a 4-bedroom dwelling and the average percolation rate calculated above:

Avg. Percolation Rate: 62.08 min/in

4-bedroom dwelling: 500 GPD

Use one of the following formulas based on the information given to you by the Environmental Health Specialist: $(\text{Avg. Perc. Rate} - 60) \times (0.023) + 2.66^A$ or $(\text{Avg. Perc. Rate} - 60) \times (0.020) + 2.22^A$

For instance, if the test pit results indicate that an Elevated Sand Mound is required, and then use the following formula:

$$(62.08 - 60) \times (0.020) + 2.22 =$$

$$0.0416 + 2.22 = 2.26 \text{ sq. foot/gallon}$$

$$2.26 \times 500 \text{ GPD} = 1130 \text{ sqft minimum square footage of absorption area}$$

Community or Non-Residential/Commercial

Contact the Environmental Health Specialist assigned to your area to help calculate the sewage flow (GPD) for your specific project. Once the sewage flow is known, the absorption area square footage requirements are calculated as follows:

$$\begin{array}{l} \text{Sewage Flow (GPM)} \times \text{Square Foot/Gallon} = \text{Square Foot of Absorption Area} \\ \text{(based on perc. rate)} \qquad \qquad \qquad \text{(minimum amount required)} \end{array}$$

Minimum Isolation Distances for Septic Tanks and Aerobic Tanks to:

Property Line, Easement, or Right-of-Way	10'
Occupied Buildings, Swimming Pool, and Driveways	10'
Individual Water Supply or Water Supply Suction Line	50'
Water Supply Line Under Pressure	10'
Streams, Lakes, or Other Surface Waters	25'
Cisterns used as a Water Supply	25'

Minimum Isolation Distances for Absorption Areas to:

Property Line, Easement, or Right-of-Way	10'
Occupied Buildings, Swimming Pools, and Driveways	10'
Individual Water Supply or Water Supply Suction Line	100'
Water Supply Line Under Pressure	10'
Streams, Lakes, or Other Surface Waters	50'
Other Active On-Lot Systems	5'
Surface Drainageways, Stormwater Basins, Rain Water Pits	10'
Mine Subsidence Areas, Mine Bore Holes, or Sink Holes	100'
Rock Outcrop or Identified Shallow Pinnacle	10'
Natural or Manmade Slope Greater Than 25%	10'
Cisterns used as a Water Supply	25'

The following is a sample of the plot plan required on Part III of the Sewage Application:

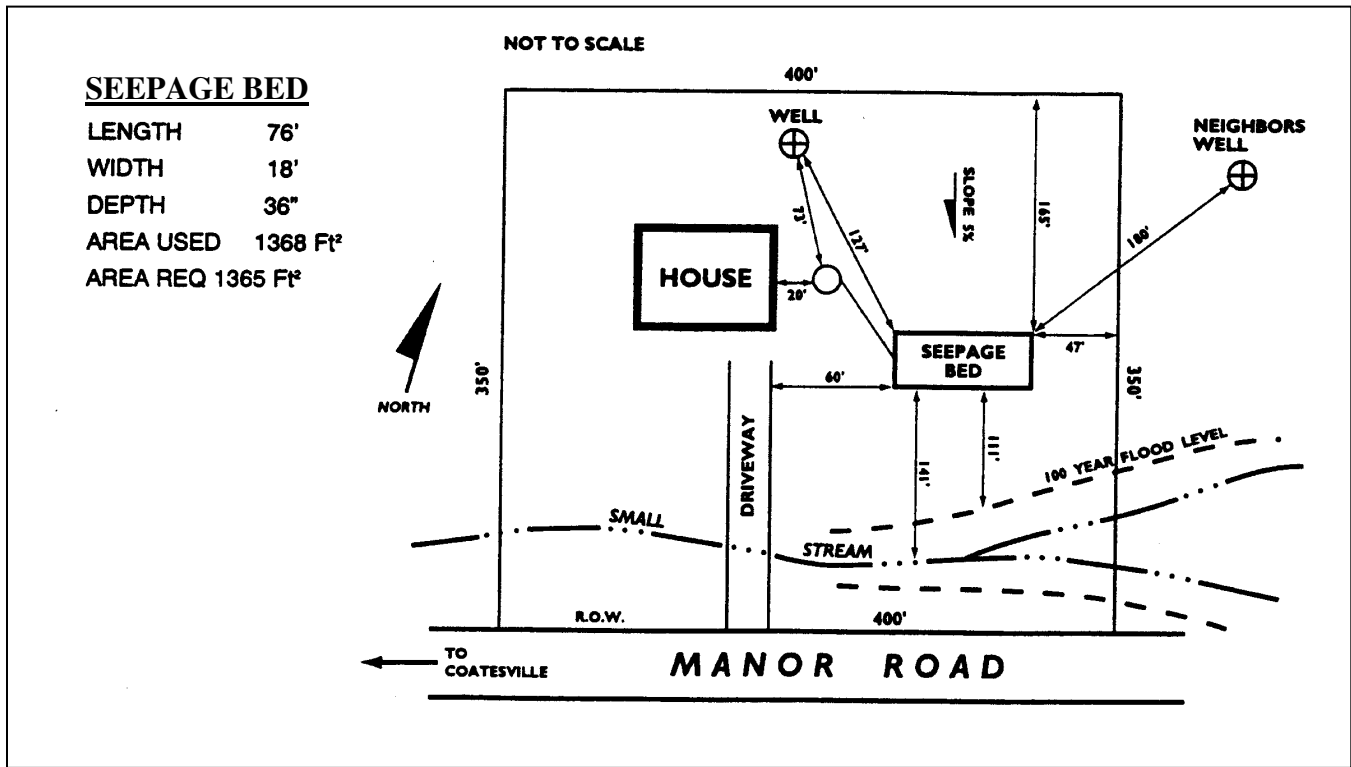


TABLE 1: Conversion Table for Drop of Water Level in Standard Percolation Holes

Drop in 1/8" Increments	30 Minute Interval between Readings - Minutes/Inch	10 Minute Interval between Readings - Minutes/Inch
Less than 1/8	240	*
1/8	240	*
1/4	120	*
3/8	80	26.7
1/2	60	20
5/8	48	16
3/4	40	13.3
7/8	34.3	11.4
1	30	10
1 1/8	26.7	8.9
1 1/4	24	8.0
1 3/8	21.8	7.3
1 1/2	20	6.7
1 5/8	18.5	6.2
1 3/4	17.1	5.7
1 7/8	16	5.3
2	15	5
2 1/8	14.1	4.7
2 1/4	13.3	4.4
2 3/8	12.6	4.2
2 1/2	12	4
2 5/8	11.4	3.8
2 3/4	10.9	3.6
2 7/8	10.4	3.5
3	10	3.3
3 1/8	9.6	3.2
3 1/4	9.2	3.1
3 3/8	8.9	3.0
3 1/2	8.6	2.9
3 5/8	8.3	2.8
3 3/4	8.0	2.7
3 7/8	7.7	2.6
4	7.5	2.5
4 1/8	7.3	2.4
4 1/4	7.1	2.4
4 3/8	6.9	2.3
4 1/2	6.7	2.2
4 5/8	6.5	2.2
4 3/4	6.3	2.1
4 7/8	6.2	2.1
5	6.0	2.0
5 1/8	5.9	2.0
5 1/4	5.7	1.9
5 3/8	5.6	1.9
5 1/2	5.5	1.8
5 5/8	5.3	1.8
5 3/4	5.2	1.7
5 7/8	5.1	1.7
6	use 10 min interval	1.7

Use 30 minutes interval for accuracy

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