

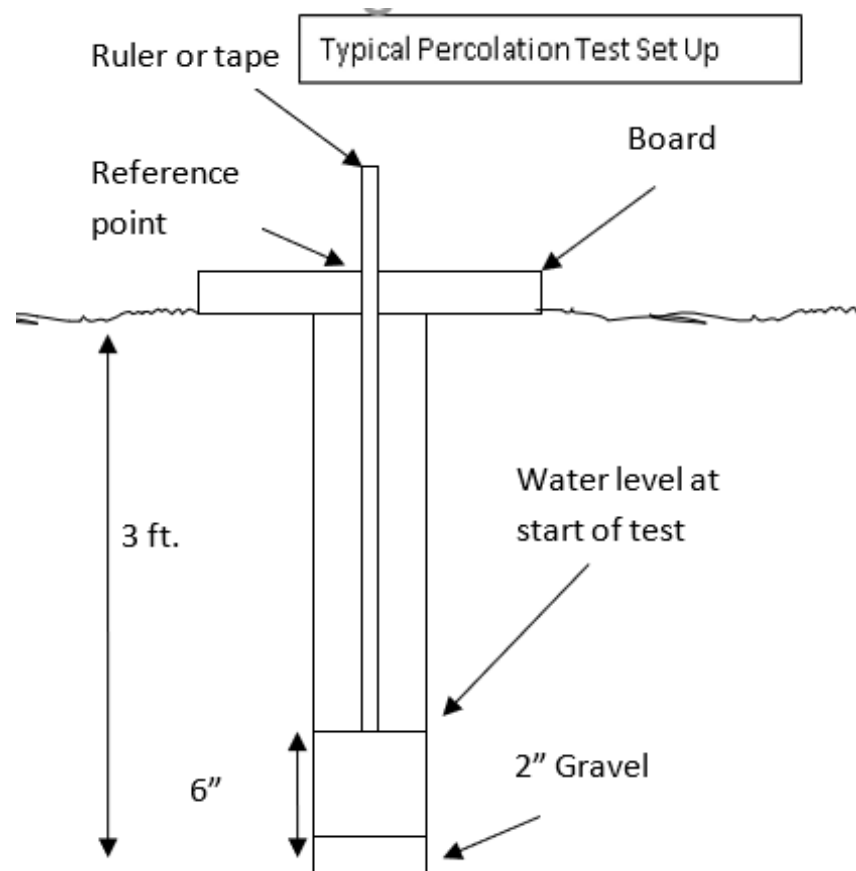
Appendix 1

Percolation Test Procedure

This Appendix is to be used to establish clear direction and methodology for percolation testing in Lassen County. The objective is to size the OWTS with adequate infiltration surface area based on an expected hydraulic conductivity of the soil and the rate of loading, and to provide for a system intended to allow for a long-term expectation of satisfactory performance.

All percolation testing for dispersal systems in Lassen County shall be conducted using the following procedures; any deviation shall be authorized only after receiving written approval by EHD. The testing shall be performed and reviewed by or under the direct supervision of a Qualified Professional. Percolation tests will occur after EHD has approved the location of the proposed leachfield area. The percolation test results are to be submitted with the plot plan to the EHD at the time of the onsite inspection of your property. Soil profiles are required to determine the depth and composition of the soil and the distance to ground water.

Percolation Test Holes



Number of Percolation Test Holes

1. A minimum of three test holes are required.

2. Additional test holes may be necessary on a site-specific basis for reasons that include, but are not limited to the following:
 - a. Unacceptable or failed tests,
 - b. Areas of the disposal field requiring defined limits for exclusion,
 - c. The disposal system is located out of a concentrated area (i.e. limited historical data), and
 - d. Soil conditions are variable or inconsistent.

Depth of Testing

1. Test holes shall be representative of the dispersal system installation depth.
2. Conditions which may require testing deeper than leach line depth:
 - a. Shallow consolidated rock or impervious soil layers,
 - b. Slope exceeds 30%, and
 - c. Other factors as might be determined by sound geotechnical engineering practices.

Soil Classification

1. All test holes and excavations shall have soil types described according to the American Society for Testing and Materials (ASTM) or the USDA Soil Classification System (Unified).
2. All excavations are to be reported, including any which encountered groundwater or refusal. Comments about consolidation and friable characteristics are encouraged.

Location of Percolation Test Holes

Test holes shall be representative of the dispersal area demonstrating site conditions throughout the entire sewage disposal system with equal consideration of primary and reserve leach fields, and at least 30 feet apart.

Identification of Test Holes

1. Staked and flagged so the test holes can be located.
2. Identified with:
 - a. A test hole number or letter
 - b. The depth of the test boring.
 - c. Lot/parcel number or letter if associated with a subdivision or lot line adjustment.

Drilling of Borings for Test Holes

1. Diameter of each test hole shall be a minimum of 6 inches.
2. If a backhoe excavation is used, a test hole at 12–14 inches in depth shall be excavated into the bottom of the trench.

Preparation of Test Holes

1. The sides and bottom of the holes shall be scarified to remove the areas that became smeared by the auger or other tool used to develop the hole.
2. All loose material should be removed from the hole.
3. Two inches of fine gravel should be placed in the hole to prevent bottom scoring.

Presoaking the Test Holes

Procedure

1. Carefully fill the test hole with 12-14 inches of clear water.
2. Maintain 12-14 inches of clear water for a minimum of four (4) hours. After four hours, allow the water column to drop overnight. Testing must be done within 15-30 hours after the initial four-hour presoak.
3. Overnight Option: If clay soils are present, it is recommended to maintain the 12-14 inches of water overnight. A siphon can be used to maintain the supply at a constant level.
4. In highly permeable sandy soils with no clay and/or silt, the presoak procedure may be modified. If, after filling the hole twice with 12-14 inches of clear water, the water seeps completely away in less than 30 minutes, proceed immediately to Case 2 and refill to 6 inches above the pea gravel. If the test is done the following day, a presoak will be necessary for at least an hour in order to reestablish a wetted boundary.

Saturation and Swelling

1. Saturation means that the void spaces between soil particles are full of water. This can be accomplished in a short period of time.
2. Swelling is caused by the intrusion of water until the individual soil particles are full of water. This is a slow process, especially in clay-type soil and is the reason for requiring a prolonged soaking.

Use of Inserts

1. If sidewalls are not stable or sloughing results in changing depth, the test hole may be abandoned or retested after means are taken to shore up the sides. The holes shall be re-cleaned prior to resuming the test.
2. Options for shoring or maintaining test hole stability:
 - a. Hardware cloth (1/8-inch grid),
 - b. Perforated pipe or containers, and
 - c. Gravel pack.

Determination of Percolation Rates

Depending on the soil type and permeability, and the results of the presoak, variations in the procedures used for determining percolation rates can be allowed. Testing shall proceed based on the conditions outlined in the following cases.

Case 1 – Water remains overnight in the test hole following the four-hour presoak (excluding use of an overnight siphon).

Case 2 – Soil with a fast percolation rate is encountered where two columns of 12-14 inches of water percolates in less than 30 minutes for each column during the presoak.

Case 3 – No water remains in the test hole 15 -30 hours after the four-hour presoak.

Case 1 Procedure

1. Adjust depth of water to 6 inches in the hole.
2. When percolation rate has stabilized, or for a period of 4-hours, take two (2) readings at thirty (30) minute intervals and report percolation rate as the greater (slower) of the two readings.

NOTE: When a minimum amount of water remains due to a damaged hole or silting, the hole may be cleaned out and tested under Case 3, starting with the presoak.

Case 2 Procedure

1. Begin test 15-30 hours after presoak.
2. Fill the hole twice with 12-14 inches of water. Observe to see if each column of water seeps away in less than 30 minutes. If so, proceed with the percolation test. If not, go to Case 3.
3. Refill hole to 6 inches above the bottom.
4. Measure from a fixed reference point at ten (10) minute intervals over a period of one (1) hour to the nearest 1/16th inch. Add water at each 10-minute time interval.

5. Continue 10-minute readings as long as necessary to obtain a stabilized rate with the last 2 rate readings not varying more than 1/16th inch, or for a duration of four (4) hours. The last water level drop will be considered in the percolation rate.

Case 3 Procedure

1. Begin test 15-30 hours after presoak.
2. Clean out the silt and mud and add 2 inches of 3/8-inch pea gravel.
3. Adjust water depth to 6 inch above the pea gravel buffer and measure from a fixed reference point at 30-minute intervals to the nearest 1/16th inch. NOTE: It is not necessary to record data points for the first hour as this is an adjustment period and a reestablishment of a wetted boundary.
4. Refill the hole as necessary between readings to maintain a 6-inch column of water over the pea gravel. If a fall of 1 inch or less is recorded, the test can continue without refilling until the next 30-minute reading interval.
5. Continue recording readings at 30-minute intervals for a minimum of four hours.
6. The last water level drop is used to calculate the percolation rate.

Calculations and Measurements

Calculation Example

The percolation rate is reported in minutes per inch (MPI). For example, a 30-minute time interval with a 3/4-inch fall would be as follows:

$$30 \text{ minutes} \div 3/4 \text{ inch} = 40 \text{ minutes per inch (MPI)}$$

Measurement Principles

1. The time interval for readings are to reflect the actual times and are to be maintained as near as possible to the intervals outlined for the test (10 or 30 minutes).
2. Measurements to the nearest 1/16th inch should be adjusted to the slowest rate (e.g., readings observed between 3/8 inch and 5/16 inch (80 MPI and 96 MPI) would be reported as 96 MPI.)
3. Measurements on an engineering scale (tenths of an inch) should follow the same principle (e.g., a reading observed between 0.4 inch and 0.3 inch (75 MPI and 100 MPI) would be reported as 100 MPI).

Measurements and Special Considerations

1. Measurement from a fixed reference point shall be from a platform that is stable and represents the center of the test hole.
2. Percometer devices are encouraged and required when the depth of a test hole is greater than 60-inches in depth. Accurate measurement is vital and in cases of testing deeper than 60 inches, the report shall include a description of the measurement method and how the borings were cleaned out and prepared for testing.

Reports

1. All test data and required information shall be submitted on forms approved by EHD with appended data or information as needed. A sample template for percolation test data is available from EHD.
2. Reports shall be signed and dated with an original signature by the consultant who either performed or supervised the testing.
3. All percolation testing to be performed by, or under the supervision of, a Qualified Professional. Qualified Professionals who employ technicians are responsible for the work performed by the technician. It is incumbent upon the Qualified Professional to properly train, equip, and supervise anyone performing work under his or her direction and license.

The percolation test is only one critical factor in siting an OWTS. Site considerations may require special evaluation by a Qualified Professional to technically address and report on issues such as high groundwater, steep slope, nitrate impacts, cumulative impacts (mounding and horizontal transmissibility).