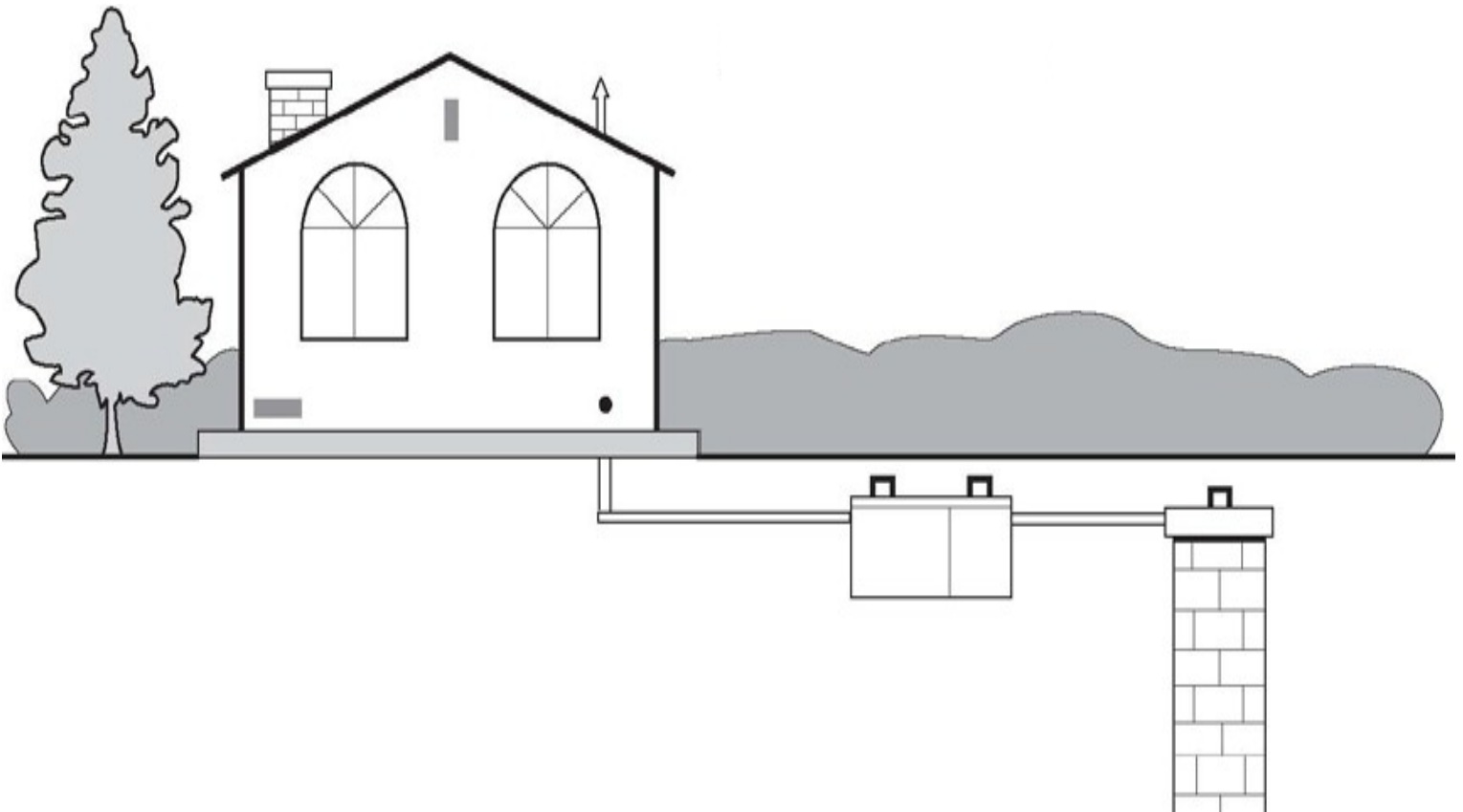


Onsite Wastewater Treatment System Soil
Percolation (PERC) Test Report Standards:
Suitability of Lots and Soils for Use of Leachlines
or Seepage Pits



Foreword

A soil percolation report is a technical document which establishes whether onsite wastewater treatment systems (OWTS) can be used for a specific parcel of land to serve a given type of development (such as single/multiple family dwellings, restaurant, campground, etc.).

The soil's percolation condition is determined by testing at the specific site and topographical, geologic, and hydrologic conditions are determined and described in the report. The OWTS is then designed in accordance with this information and County Standards. A properly installed, operated and maintained OWTS should not be subject to premature failure creating public health nuisances, odors, ground or surface water contamination, or safety hazards.

Complete reports must be submitted, and all appropriate fees paid to the Division of Environmental Health Services (DEHS), prior to the approval of the use of any OWTS and the application of the design rate.

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Soil Percolation (PERC) Test Report Standards
Suitability of Lots and Soils for Use of
Leachlines or Seepage Pits

NOTICE:

At least two working days before conducting routinely scheduled percolation tests, you must contact DEHS. Please provide the following: assessor's parcel number, firm's name and person to contact, date(s) of testing, and telephone number. At the option of the specialist, a field inspection during testing or shortly thereafter may be conducted. The date that the specialist (or DEHS Water/ Wastewater Section) was contacted must be stated in the report.

I. A PERC report is required by DEHS for:

- a) All subdivisions of land, except those for which a waiver has been granted (see page 27 for criteria).
- b) Any parcel or land division.
- c) Any single lot where space or soil conditions for on-site sewage disposal are critical (i.e., very small or steep lots, very slow perc times, shallow groundwater with fast perc times, etc.)
- d) All new on-site septic systems within the San Bernardino or Angeles National Forest boundaries and in other mountain areas.
- e) All onsite systems requiring an exemption from Regional Water Quality Control Board (RWB) wastewater discharge prohibitions (Check with Specialist or RWB for designated areas).
- f) Any commercial or sanitary wastes from industrial developments utilizing onsite wastewater treatment systems (OWTS).
- g) A replacement system where existing data will not allow the county liquid waste specialist to set a design rate.

- II.** Those who prepare perc reports must have professional experience and be knowledgeable in assessing the site's OWTS feasibility. They assume responsibility for the report's contents in accordance with the obligations of their professional registration and may be held liable if false or misleading information is presented.

Preparers must possess one of the following professional registrations from the State of California:

- Registered Civil Engineer,
- Certified Engineering Geologist,
- Registered Environmental Health Specialist,
- Registered Geologist,
- Geo-technical Engineer

Reports must be properly documented with the original signature, stamp, and professional registration number of the preparer. Photo copied signatures are not acceptable. Preparers shall be identified by name, field technicians by initial.

III. Format and other requirements:

1.0 Description of Site and of Proposal

1.1 Date/individual that was notified of testing.

1.2 Prepared for: Name of client, address and phone number.

1.3 Location of land:

Provide a sufficiently detailed vicinity map, township, range, section, assessor's parcel number or subdivision map, and/or legal description of property. Make sure you have the right parcel; state how the property is identified. (Owner's word alone is not acceptable.) Indicate landmarks and street addresses when possible. Specify those survey monuments found and if the property lines were surveyed, by whom. Provide latitude and longitude.

1.4 Proposed Development/Project/Land use:

- a) State the type of project: (e.g., condominium, subdivision tract, lot sale, parcel map, shopping center, etc.).
- b) State the total acreage, the number of lots, and the average and range of the lot sizes.
- c) State the type of sewage disposal system: (e.g., septic tank or supplement treatment system, leachline(s), or seepage pit(s), separate or common system, alternative dispersal system).
- d) State if grading is proposed for the development, and how much.

1.5 Description of site and surroundings: (A photograph is most useful.)

- a) Topography: Include a topographic map prepared by a Registered Civil Engineer or Licensed Land Surveyor, unless the site and the surroundings are flat or have a uniform, constant slope (+ or - 1% variation) of less than 20%. For instance, "slope of 10% downward from north property line to south property line".

% Slope	Maximum Interval of Contours in Feet for Topo Map
0-2	2
>2-10	4
>10	10

Describe the topography in the area of the proposed disposal site(s) and its location relative to the proposed development.

- b) Water courses: Indicate and show on the plot plan any floodway, floodplain, spring(s), stream(s), and drainage course(s) which encroach within a distance of 1 ½ times the required minimum setback from the disposal area(s).

- c) Vegetation type and density (especially groundwater indicators such as willows, reed grasses, cattails, and smoke trees) as well as trees in general, area(s) of proposed system(s).
- d) Existing structures: (1) General description of proximity, density, probable kind and number of neighboring OWTS. (2) Indicate whether the proposed system could adversely impact any existing structure's disposal system(s) or replacement area on or in the vicinity of the parcel being tested where known. (3) Indicate location of nearest sewer, and any sewer manholes observed.
- e) Indicate the location of any active or inactive well(s) (and their construction details where known) located within 600 feet of the proposed disposal area. Indicate proposed source of domestic water. Identify future well sites, when appropriate. Provide groundwater quality data if available from existing well(s) on parcel.
- f) Rock outcroppings: Specify the type of rock (shale, slate, schist, granite).
- g) Indicate the depth to historic groundwater and how it was determined. Provide the date and source of information used (Flood Control Agency, local water companies, California Department of Water Resources Bulletin, United States Geological Survey (USGS), DEHS Water/ Wastewater Section, State Water Board Groundwater Ambient Monitoring and Assessment Program).
- h) Any other feature that may affect sewage disposal: fill material, spots of vegetation, obvious signs of slope instability, fractured bedrock, root channels, cracks in the soil profile, suspected infiltration galleries or old mine tunnels, proposed grading over the system, etc.

2.0 Equipment

Describe in detail equipment used to perform PERC test - backhoe with 12" bucket, rig with 8" diameter, screw-type auger (identify type), 6" posthole digger, shovel, fork and spoon, measuring tape with 1/8" divisions, wire-on float sliding on 1/10" gradation scale, etc.

3.0 Methodology and Procedures

3.1 Location of borings and trenchings. Under most circumstances, the random grid method should be utilized. In the event that other methods are used, explain the method and state the specific reason(s) it was used in lieu of the grid method. It is the report preparer's responsibility to ensure that tests were conducted where described in the report. Indicate locations on the plot plan. For easy identification leave three-foot laths marked with your initials, hole/trench number, and the date the test was conducted at each backfilled hole.

Estimate theoretical cuts and fills and perform the tests and borings at the depths at which percolation will occur when the system is installed. When final grading is unknown, indicate that leachlines will be located in natural soil \pm two (2) feet of cut or fill (\pm five (5) feet if pits) or at tested depths. If the final system design is not located within the stated range, additional testing will be required prior to final recordation or issuance of a building permit.

3.2 Soil characteristics to determine number of borings or trenchings and tests.

Unless deviations are permitted in advance by the county liquid waste specialist, the minimum number of explorations and tests in Tables 3.3, 3.4, and 3.5 is determined based on the following soil characteristics:

a. **Favorable** is defined by the following:

1. Ideal soil conditions are anticipated.
2. There is no visual evidence of shallow groundwater, bedrock, impervious materials, etc. Tests and borings performed agree with the visual evidence. Natural or finished slope of the disposal area is 20% or less.

b. **Moderate** is defined by the following:

1. Only isolated areas of the property are suspected to encounter problems due to groundwater, bedrock, impervious materials, etc.
2. No more than 10% of the tests and deep borings fail to meet standards.
3. The minimum number of tests and borings should be spaced in a random grid, the additional tests describe the limits of the problem area(s).
4. Natural or finished slope of the disposal area is 21% - 30%.

c. **Severe** is defined by the following:

1. Obvious surface features indicating site conditions that will hinder subsurface disposal are present.
2. Through random testing, more than 10% of the tests and borings do not meet standards.
3. Acceptable testing rates approach the upper limit of approval, or a non-uniform pattern of test rates develop.
4. Natural or finished slopes of the disposal area exceeds 30%.

3.3 Minimum number of exploratory borings

Gross Lot Size		Soil Conditions	
		Favorable to Moderate	Severe
Subdivisions and individual lot sales	<1 acre	3 borings first 10 lots 1 borings every 10 thereafter	8 borings first 10 lots 5 borings every 10 thereafter
	1-5 acres	5 borings first 10 lots 3 borings every 10 thereafter	2 per lot*
	>5 acres	1 boring per lot*	2 per lot*
Residential lot		1 boring*	2 per lot*
Commercial lot, confluent systems under one ownership		1 boring per 4,000 gallons septic tank capacity*	1 boring per 2,000 gallons septic tank capacity*
Parcel Map	5 acres or less	1 boring in the center of the undivided parcel	2 borings evenly spaced in the undivided parcel

*In the area of the disposal system, if known.

- 3.3.1** Boring/Trenching Results - Number each hole or excavation. Graphically describe soil strata at each hole or excavation.
- 3.3.1.1 Soil profile descriptions shall be written under the supervision of the registrant for all of the excavations. The thickness (in inches or tenths of a foot) of the different soil horizons observed shall be indicated. Soil horizons shall be described on the basis of color, field texture analyses, soil mottles, bedrock, structure, roots, and pores. Depths shall be measured from the existing ground surface.
- 3.3.1.2 Where the soil lithology is stratified and low-permeability layers such as sandy silts and clays, or caliche could affect the OWTS performance (leachlines and seepage pits bottomed less than 20 feet below grade), the soil profile shall be described by direct visual observation: i.e., in a backhoed trench, road cut, suitable large (> two (2) feet diameter) boring, or split spoon sampling.
- 3.3.1.3 Textures - Use any of the classifications. State the approximate percentage of cobbles, gravel, sand, silt, and clay.
- 3.3.1.4 Colors (dry/moist), reduction-oxidation mottling. The Munsell soil color chart shall be the descriptive tool utilized to determine the background soil color.
- 3.3.1.5 Presence and extent of small/large roots.
- 3.3.1.6 Ease of excavating/drilling, depth to bedrock and rock competency (soft, firm, hard, refusal).
- 3.3.1.7 Moisture - If soil at or near the point of saturation is encountered in the exploratory boring, observe the borehole after 24 hours to determine the presence of free water.
- 3.3.1.8 Free water - The depth to groundwater, if present, shall be reported. Observed groundwater shall be reported at the level groundwater reaches in the excavation, or at the highest level of sidewall seepage into the excavation after 24 hours. Measurements shall be made from the ground level. Soil above the water level in the excavation shall be checked for conditions associated with saturation (mottles). If a soil foundation study is performed and groundwater is discovered, provide that information in the perc report. Incomplete information may be cause for revocation of an OWTS approval.
- 3.3.1.9 Structural characteristics, stratigraphy, and geologic origin shall be described when determined necessary by the consultant for severe sites only.
- 3.3.1.10 Indicate method of boring abandonment.

3.4 Minimum Number of Tests for Leachlines:

Gross Lot Size		Soil Conditions		
		<i>Favorable</i>	<i>Moderate</i>	<i>Severe</i>
(Note: Individual lot sales requires 100% lot testing)	<2.5 acres	6 tests first 10 lots, 1 test every 10 thereafter	9 first 10, 6 next 10	1/lot
	2.5 acres to 5 acres	8 tests first 10 lots, 3 tests every 10 thereafter	10 first 10, 7 next 10	1/lot
	>5 acres	1/lot	1/lot	1/lot
Residential lot		Minimum 4 tests*	4*	6*
Commercial lot, confluent systems under one ownership		4 tests/3,000 gallons tank capacity*, 1 test for each additional 2,000 gallons tank capacity	5/3,000* 2/2,000	6/3,000* 3/2,000
Parcel Map		Minimum one test for each lot in the area of the disposal system or County assigned rate per waiver criteria (minimum 4 tests)	2 tests per lot* (minimum 6 tests)	3/lot* (minimum 8 tests)

*In the general area of the disposal systems (primary and expansion); if known or where proposed.

3.4.1 Standard Percolation Test Procedure for Leachlines

Excavation:

Test holes shall be augured or excavated to within 13 inches of the actual test depth which corresponds to the anticipated depth of the leachline or the bed trench bottom. Vary depths to include testing of side wall if the disposal system will be more than three feet below the ground surface. In addition, perform one test in the least permeable soil stratum found during the deep excavation if the soil type changes within 5 feet of the proposed trench bottom.

Test Hole:

1. A hole of diameter 5.5" - 8" (D) or square 5" - 7" (S) should normally be used.
2. Larger holes than stipulated in coarse soils with a rate of less than 8 minutes/inch (mpi) will require a correction factor using the formula:

$$\frac{\text{mpi (test)} \times 6}{\text{actual "D" or "S" dimension}} = \text{mpi corrected}$$

Note: Rates greater than 8 mpi do not need to be corrected.

3. Depth - The minimum test hole depth is 13". All sides to be vertical. (Below the test excavation bottom or at least 5 feet horizontal distance to daylight in a trench bench.)
4. All loose material must be removed from the test hole and the bottom of the hole should be in natural, undisturbed soil.
5. Place two (2) inches of 1/4" to 3/4" gravel over the bottom of the test hole. A

perforated can may be placed over the gravel.

Note: If the can has a bottom, gravel may not be necessary.

Pre-Soak:

Fill the hole with 12" of clear water (10" above the gravel or the bottom of the perforated can.)

1. If ten (10) inches of clear water seeps away in two consecutive readings in less than ten (10) minutes each and the soil is of coarse texture, testing can be conducted immediately. Otherwise:
2. Pre-soak by:
 - a. Maintain the water level in the test hole at ten (10) inches above the gravel, for at least four (4) hours, or;
 - b. For augured test holes with a total depth over four (4) feet from the surface to the gravel, fill the entire hole to the surface. This pre-soak method may require recleaning of the hole and new gravel placement prior to testing, or;
 - c. For augured test holes of less than four (4) feet total depth, fill the test hole to the surface and invert a five (5) gallon bottle of water in the hole. This pre-soak method may require recleaning of the hole and new gravel placement prior to testing.

Note: All of the above procedures are designed to allow a minimum of five (5) gallons of water to percolate and saturate the lower 12 inches of the test hole. Other pre-soak methods that also accomplish this may be used, but should be fully described in the final report.

Testing:

1. Begin testing 15-26 hours after the beginning of soaking (except for sandy soils as noted), to allow time for swelling of clays but prevent soil from drying out.
2. Fill or refill the hole with clear water to eight (8) inches from the bottom of the hole, (6) six inches over the gravel.

Readings:

1. If more than five (5) inches of water is gone in 30 minutes, take readings every 10 minutes for one hour minimum. Refill after each reading. All final time intervals shall provide a minimum of a one (1) inch drop and not more than a three (3) inch drop.
2. If less than one (1) inch is gone in 30 minutes, take 60 minute readings for three (3) hours minimum. Do not refill until at least a one (1) inch drop has occurred.
3. For all other cases, take 30 minute readings for three (3) hours minimum. Refill after each reading. All readings shall provide a minimum 1 inch drop, and a maximum 3 inch drop.

Accuracy:

All measurements will be read to the closest 1/8". If the difference between the last two readings is greater than 10%, additional measurements shall be made.

Results:

The reported results shall be the most conservative reading in minutes/inch drop.

3.4.2 Continuous Pre-Soak Percolation Test Procedure-Leachlines

Description:

This method requires the use of a water reservoir to provide a continuous volume of water in the hole during the pre-soak period. After a predetermined volume of water has seeped through the test hole, the measurement of the percolation rates may commence. The method described in the following procedure utilizes a 5-gallon water bottle inverted in the test hole. This procedure can be modified to use a reservoir and a float device to control the water level as described:

Procedure:

Excavation:

The test excavation shall be constructed so as to facilitate the placement of the 5-gallon reservoir of water over the test hole. The excavation shall reach to within 13 inches of the actual test depth which corresponds to the approximate depth of the leachline trench bottom. Vary the depths in order to include testing of the sidewall if the disposal system is to be more than three feet below the ground surface. In addition, perform one test if the soil type changes within 5 feet of the proposed trench bottom.

Test Hole:

1. Auger or hand excavation.
2. A hole of diameter 5.5" - 8" (D) or square 5" - 7" (S) shall normally be used.
3. Larger holes than stipulated in coarse soils with a rate of less than 8 minutes/inch (mpi) will require a correction factor using the formula:

$$\text{mpi corrected} = \frac{\text{mpi (test)} \times 6}{\text{Actual "D" or "S" dimension}}$$

4. The minimum test hole depth is 13 inches.
5. All loose material must be removed from the test hole and the bottom of the hole should be in natural, undisturbed soil.
6. Place 2 inches of 1/4" to 3/4" gravel over the bottom of the test hole. A perforated pipe is then placed in the hole to prevent caving and to support the water bottle. The pipe length shall be approximately the same as the test hole depth.

Pre-Soaking:

To start, fill the test hole with water to 8 inches above the gravel. Invert a full 5- gallon bottle of clear water over the hole (in a bottle support) so that the hole is filled continuously to approximately 8 inches over the gravel.

When the 5 gallons of water has percolated through the test hole, or after 15 hours but before 26 hours from initiating pre-soak, testing may commence.

Testing:

- a. Same day testing - When the 5 gallons has percolated while the tester is present, the test may proceed the same day as the pre-soak.
 1. Remove the bottle and adjust the water level to 6 inches above the gravel.
 2. Take a minimum of four (4) consecutive measurements at timed intervals that provide not less than a one (1) inch nor more than a 3 inch drop. Refill the water level to 6 inches above the gravel after each measurement.
- b. Next day testing - (15-26 hours after starting pre-soak)
 1. If water is still present in the test hole, the test shall not start less than 15 hours from initiating the pre-soak.
 - a. Remove the bottle and adjust the water level to 6 inches above the gravel.
 - b. Take a minimum of two (2) consecutive measurements at time intervals that provide not less than a 1 inch nor more than a 3 inch drop in the water level. Refill the water level to 6 inches above the gravel after each measurement.
 2. If no water is left in the test hole, the test shall begin within 26 hours from starting the pre-soak. (Repeat the pre-soak procedure if more than 26 hours have passed.)
 - a. Remove the bottle and adjust the water level to 6 inches above the gravel.
 - b. Take a series of readings for a minimum of two hours, or four consecutive readings at time intervals that provide not less than a 1 inch nor more than a 3 inch drop in the water level. Refill the water level to 6 inches above the gravel after each measurement.

Accuracy:

All measurements shall be read to 1/8". If the difference between the last two readings is greater than 10%, additional measurements shall be made.

Results:

The reported results shall be the most conservative reading in minutes/inch drop.

3.4.3 Leachline Test Results

3.4.3.1 Tabulate all the results, including all tests that failed to meet the minimum acceptable standards.

3.4.3.2 Provide copies of all the field data and calculations using the following format:

Leachline Test:

1. Hole No:
2. Diameter in inches:
3. Hours presaturation; gallons used, time presoak initiated:
4. Depth (of bottom) below grade:
5. Types of strata tested:
6. Condition of hole: caving or siltation?
7. Any method used to prevent sidewall caving?
8. Name of tester:
9. Date tested:

Provide numerical values for each of these parameters

t_1 | depth₁ | t_2 | depth₂ | Δt | Δd | $\frac{\Delta t}{\Delta d}$ mpi (or mpc)

Where:

t_1 = initial time when filling or refilling is completed-minutes

d_1 = initial depth of water in hole

t_2 = final time in minutes

d_2 = final depth of water in hole

Δt = change in time - minutes

Δd = change in depth - inches

Figure 3.4.4: Application Rates as Determined from Stabilized Percolation Rate

Percolation Rate (minutes per inch)	Application Rate (gallons per day per square foot)	Ft ² /g/d	Percolation Rate (minutes per inch)	Application Rate (gallons per day per square foot)	Ft ² /g/d	Percolation Rate (minutes per inch)	Application Rate (gallons per day per square foot)	Ft ² /g/d
<1	Requires Local Management Program	.83	31	0.522	1.92	61	0.197	5.08
1	1.2	.83	32	0.511	1.96	62	0.194	5.15
2	1.2	.83	33	0.5	2.0	63	0.19	5.26
3	1.2	.83	34	0.489	2.04	64	0.187	5.35
4	1.2	.83	35	0.478	2.09	65	0.184	5.43
5	1.2	.83	36	0.467	2.14	66	0.18	5.56
6	0.8	1.25	37	0.456	2.19	67	0.177	5.65
7	0.8	1.25	38	0.445	2.25	68	0.174	5.75
8	0.8	1.25	39	0.434	2.3	69	0.17	5.88
9	0.8	1.25	40	0.422	2.37	70	0.167	5.99
10	0.8	1.25	41	0.411	2.43	71	0.164	6.10
11	0.786	1.27	42	0.4	2.5	72	0.16	6.25
12	0.771	1.3	43	0.389	2.57	73	0.157	6.40
13	0.757	1.32	44	0.378	2.65	74	0.154	6.49
14	0.743	1.35	45	0.367	2.72	75	0.15	6.67
15	0.729	1.37	46	0.356	2.80	76	0.147	6.80
16	0.714	1.4	47	0.345	2.90	77	0.144	6.94
17	0.7	1.43	48	0.334	2.99	78	0.14	7.14
18	0.686	1.46	49	0.323	3.10	79	0.137	7.30
19	0.671	1.49	50	0.311	3.22	80	0.133	7.52
20	0.657	1.52	51	0.3	3.33	81	0.13	7.69
21	0.643	1.56	52	0.289	3.46	82	0.127	7.87
22	0.629	1.59	53	0.278	3.60	83	0.123	8.13
23	0.614	1.63	54	0.267	3.75	84	0.12	8.33
24	0.6	1.67	55	0.256	3.91	85	0.117	8.55
25	0.589	1.7	56	0.245	4.08	86	0.113	8.85
26	0.578	1.73	57	0.234	4.27	87	0.11	9.09
27	0.567	1.76	58	0.223	4.48	88	0.107	9.35
28	0.556	1.8	59	0.212	4.72	89	0.103	9.71
29	0.545	1.83	60	0.2	5.0	90	0.1	10
30	0.533	1.88				>90-120	0.1	10

3.5 Minimum Number of Tests for Seepage Pits

Gross Lot Size		Soil Conditions		
		<i>Favorable</i>	<i>Moderate</i>	<i>Severe</i>
Subdivisions (Note: Individual lot sales require 100% testing)	<1 acre	3 tests first 10 lots; 2 tests for every 10 lots thereafter	6 first 10 3 next 10	1/lot*
	1 acre to 2.5 acres	4 tests first 10 lots; 2 tests for every 10 lots thereafter	7 first 10 4 next 10	1/lot*
	>2.5 acres to 5 acres	5 tests first 10 lots; 3 tests for every 10 lots thereafter	8 first 10 5 next 10	1/lot*
	>5 acres	6 tests for first 10 lots; 4 tests for every 10 lots thereafter	1/lot*	2/lot*
Residential lot		2 tests*	3 tests*	
Commercial lot, confluent systems under one ownership		2 tests/4,000* gallons tank capacity in sewage disposal area. 1 additional test per 2,000 gallons of tank capacity or fractional part thereof.	2/3,000* 1/2,000	2/3,000* 2/2,000
Parcel Map		2 tests evenly spaced on the undivided parcel	3 tests evenly spaced on the undivided parcel	4 tests evenly spaced

*In the general area of the disposal systems (primary and expansion); if known or where proposed.

3.5.1 Seepage Pit, Weighted Average Percolation Test Procedure

Test each stratum as for leachlines, in Section 3.4.1. Multiply the thickness of each stratum by its PERC time; add the results. Divide the total by the sum of all the thicknesses. The result is the average mpi for the given total depth. Exclude all strata with $p_i > 30$. This is not an easy procedure to perform without very accurate instruments.

3.5.2 Sewage Pit, Falling Head Percolation Test Procedure

Test Holes:

- a) Holes are 6" to 8" in diameter. Exploratory borings (6"-8") may be backfilled at least 10 feet and used for testing. When backfilling, if soils are too coarse (less than 20% fines) mix top of backfill with driller's mud or other material approved by the DEHS; cover with one (1) foot of gravel.
- b) Depth - Same as the depth estimated for the pit based on the soil log. If distinctly lower permeable stratum (strata) are found with higher permeable stratum within the test boring, the lower permeable stratum should be tested separately. Vary depths when unsure.
- c) Because caving may invalidate the results in anticipated adverse areas of percolation, precautions, such as gravel packing, should be used.

Measurements

- a) Carefully fill the hole with clear water until the water level is even with the surface of the ground. Refill to the surface for all but the last two (2) readings. The final refills shall be to the proposed depth of the inlet or a minimum of 4 feet below the ground surface.
- b) In very sandy soils, where the water on two consecutive readings seeps faster than half the initial wetted depth in 30 minutes, the time intervals shall be 10 minutes or shorter and measurements shall be taken for at least one additional hour until three consecutive readings do not vary by more than 10%. Gravel packed holes must have four (4) consecutive readings where the water seeps faster than half the initial wetted depth in 30 minute intervals to compensate for the reduced water volume of each pre-soak.
- c) In soils with fines, soak the hole and let it set overnight. The perc rate measurements shall be made on the day following the soaking, not more than 26 hours after the pre-soak. From the reference point, measure the drop in water level over thirty minute periods for at least six hours. For the final two readings, read every 30 minutes without refilling and check for possible non uniform absorption; measure how fast the water level keeps on falling until it gets down to the bottom or slows down. The consultant must determine if the minimum six hour testing should be extended for another 30-60 minutes.
- d) Re-measure the depth of the hole with each reading to see if caving has occurred. Caving in excess of 15% of total depth may invalidate the results of shallow test holes.

3.5.3 Seepage Pit Test Results

3.5.3.1 Tabulate all the final results, including all tests that failed to meet the standards.

3.5.3.2 Provide copies of all the field data and calculations using the following format:

a) Seepage Pit Test (Falling Head)

1. Boring number
2. Diameter of hole in feet
3. Hours presaturation, time presoak initiated
4. Depth (of bottom) below grade
5. Strata peculiarities
6. Name of tester
7. Date tested
8. Method to prevent sidewall caving: Gravel Packed

Provide numerical values for each of these parameters

$$t_i \mid t_f \mid \Delta t \mid d_b \mid d_i \mid d_f \mid F = \frac{d_f - d_i}{\Delta t} \mid Lave = \mid Q = \frac{FD9}{Lave \Delta t} \mid \text{pit mpi} = \frac{180}{Q}$$

Where:

t_i = initial time when filling or refilling is completed, hour: minute

t_f = final, end-time of fall, hour: minute

Δt = usually .5 or .166 hour

d_b = depth to water bottom, feet

d_i = depth to water surface at t_i , feet

d_f = depth to water surface at t_f , feet

$Lave$ = average length of water column $d_b - (d_i + d_f)/2$

D = diameter of hole in feet

Q = gallons of sewage (or septic tank capacity, whichever is greater) per square foot per day (g/sf/d).

Note: Remember to show your work.

b) Seepage pit-weighted average method - use format per 3.4.3.2

4.0 Discussion of Results

- 4.1 Discuss the uniformity of the soils in regards to the soil classification (favorable, moderate or severe) and percolation times obtained. (Uniform is defined as 4 test results falling within $\pm 1/4$ of their mean percolation time.) Based on boring/trenching data, discuss how the most restrictive layer below the disposal area was tested, or can be avoided by proper separation or design. For a given system, at least $3/4$ of tests must show acceptable results. For example, if there is a failing test on a lot in a proposed tract/minor subdivision, three additional acceptable tests must be shown on that lot.

- 4.2 Discuss possible sources of error or variability of results such as: measurement accuracy, cavings, one atypical location, etc. Siltation or caving of test holes may require special construction measures to prevent the soil absorption system from suffering the same fate. Discuss in #7 under Recommendations.
- 4.3 Especially if seepage pit testing was done by procedure 3.5.2, interpret the results in light of the soils profile and the final readings. Do not rely only on the formula results. The falling head test is not a suitable test procedure for markedly different strata, unless the strata are tested separately, or mounding analyses performed. Discuss under 7.3.

5.0 Design

5.1 General Criteria

- 5.0.1 For uniform soil units, use an mpi between mean and most conservative mpi(s), i.e., average mpi = 7, most conservative mpi = 9, design mpi = 8. If there are no uniform soil units, use the most conservative mpi for the entire area (See 4.1 - **Note**: Use pit mpi, not Q, for averaging).
- 5.0.2 Unless an area has been determined to have degraded groundwater by the RWB, there shall be a minimum of 5 feet (leachlines) or 10 feet (seepage pits) of original soil between the bottom of the soil absorption system and groundwater. If a soil has a perc time less than 5 mpi, then the soil for a total thickness of five (5) feet below the bottom of a leachline to groundwater shall contain at least 15% of material passing the #200 U.S. standard sieve (and less than one fourth (1/4) of the representative soil cross-section shall be occupied by stones larger than 6"). Where this requirement is not met, a 40-foot separation shall be maintained below the bottom of the leachline and the highest historic groundwater level based on recorded data or on observed mottling. Fairly uniform coarse-textured soils (SM or more coarse) shall not be used for seepage pits when a "pit mpi" is less than 10 and where a sieve analysis shows less than 15% fines passing the #200 U.S. standard sieve for a thickness of 10 feet and the separation to groundwater is less than 40 feet. Discuss the two year travel time evaluation for microbial contaminants for seepage pits greater than 20 feet below grade and the 600 foot separation from a municipal well. See footnote 6 on setbacks, page 24. Basis for 100% passing - 3/8" sieve.
- 5.0.3 The design Q for seepage pits must be > 1.1 g/sf/day of sewage, but < 4 g/sf/day. Q's greater than 4 g/sf/d will not be credited. Caving seepage pit test holes in coarse textured soils shall not be credited with rates greater than 3 g/sf/day.
- 5.0.4 Gallons per day are calculated per the most current addition of the CPC.

5.2 Convert Percolation Times to Leachline Design Rates

- 5.2.1 Leachline application rates for domestic sewage (Source: OWTS Policy 2012) minimum square feet of absorption area per gallon of effluent per day

Utilize Chart for Application Rate, page 11. For single homes you may use:

Number of Bedrooms	Gallons of Effluent Per Day	Gallons of Septic Tank Capacity
1-2	500	750
3	670	1,000
4	800	1,200
5-6	1,000	1,500

5.3 Convert Q to Seepage Pit Design Rates

5.3.1 Seepage Pit Design - Falling Head Method Square feet/ gallons septic tank capacity (sf/gstc) $1/Q \times 100 = \text{sf}/100 \text{ gstc}$ Design depth below inlet = septic tank capacity $Q \times D \div D = \text{Diameter of pit in feet}$; $\pi = 3.14$ Depth below inlet shall be limited to tested depth or by groundwater.

5.3.2 Seepage Pit Design - Weighted Average Method. Use Chart for square feet of pit sidewall.

5.4 Special Criteria

5.4.1 If leachlines or pits serve a common OWTS for two or more units, add 30% more square footage.

5.4.2 For laundromats, restaurants, and confluent systems serving mobile home parks or shopping centers (three or more retail shops), or if septic tank volume is calculated for flows > 2000 gpd with $\text{Vol} = .75 \text{ f ow} + 1125$, multiply square footage by 2.5. Supplemental Treatment Systems are exempt from this requirement.

5.4.3 Credit for Alternating Fields:

A credit of 10% reduction in square footage may be given for installation of alternating leach fields or seepage pits (unless the consultant specifies otherwise).

Single houses on lots less than 10,000 square feet in area or with leach fields on ground naturally sloping >30% with slope stability report may require alternating leach fields. The 100% expansion area can be used for one of the alternating leach fields.

The report preparer must recommend that adequate future access to install the replacement system be maintained. Alternating systems, as well as standard systems, are not recommended in areas where mechanical obstruction of the system(s) may occur due to root intrusion.

Alternating systems may be considered when future access, or critical soils are limiting factors.

5.4.4 Special considerations: See pg. 29.

6.0 Plot System Per Currently Adopted California Plumbing Code

Draw tested property to scale:

Single Family Home, Small Commercial..... Minimum 1" = 30'

Parcel Map, Subdivision, Large Commercial..... Minimum 1" = 40'

- 6.0 Plot system and 100% expansion area, show existing and potential structures, wells, streams, etc. Include contours, significant vegetation (including trees), rock outcropping, location of all borings and tests, and the proposed building pad.
- 6.1 For lot sales zoned for single family homes (lot sale subdivisions) show a hypothetical system for a five (5) bedroom home on each and every lot; if zoned for multi-unit development, show a hypothetical system sufficient for the effluent discharged by an average of three bedrooms per unit. If wells are proposed for each lot, show that every lot can be built meeting all set-back requirements.
- 6.2 Where grading is expected, include original and finished elevations. If the grading plan was prepared by others, comment as it regards the recommendations set forth in the report. If grading is unknown, include qualifying statements in area(s) for the primary and expansion systems (see 3.1), or title the report "Preliminary". (Preliminary reports must still be adequate for purposes of recordation with recommendations to be followed for building permit purposes.)
- 6.3 The proposed dwelling/development shall be located so that the initial subsurface sewage disposal system and the required 100% expansion area shall function by gravity flow unless otherwise approved.
- 6.4 A pump system will be considered only under the following hardship conditions:
 - a. To salvage an existing structure when an adequate disposal area cannot be reached by gravity flow.
 - b. To allow new house construction on an existing lot when there is absolutely no other alternative to pumping. This hardship consideration will be based on reasonable site development.
 - c. See page 26 for additional information.
- 6.5 All designed system's construction details are subject to review by DEHS and approval by Building & Safety. Minimum conventional construction details are to be found in the currently adopted California Plumbing Code.

7.0 General Discussion and Conclusions or Recommendations

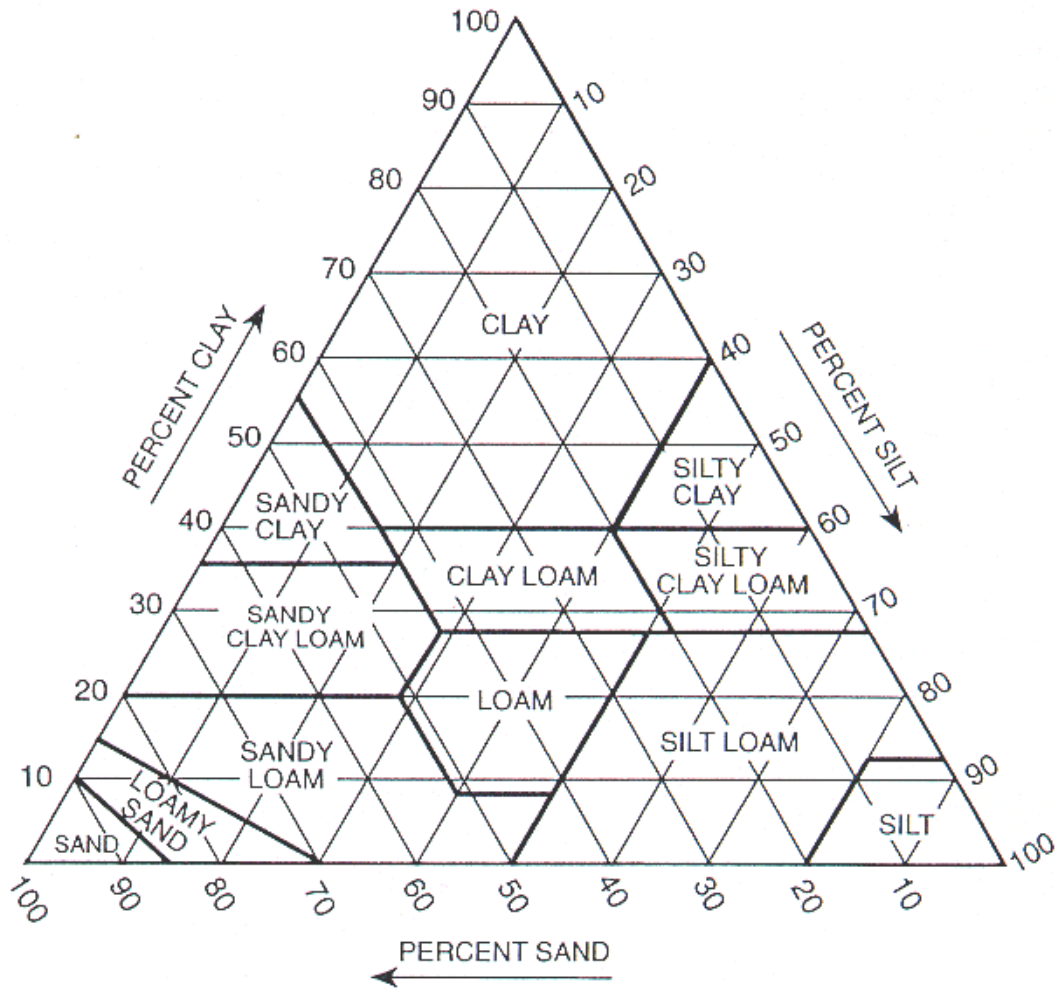
- 7.1 State whether each lot has sufficient area to support an individual sewage disposal system that will meet DEHS standards for the use intended. Include a qualifying statement if swimming pools, building expansions, etc. are or may be allowed; also if grading must be restricted, or if grading plans must be reviewed prior to grading, and installation inspected after grading by soils consultant, or if special construction techniques are required.

- 7.2** Discuss sewage mounding if lots are to be developed commercially or industrially with flows of 1500 g/d or greater and/or as determined necessary under 4.3. In addition, for commercial and industrial discharges, discuss the OWTS ability to adequately treat harmful waste constituents prior to entering the groundwater if other than sanitary wastes may be discharged. Indicate if a special treatment process study should be done after the exact nature of the discharge(s) has been determined.
- 7.3** Recommend that a copy of the DEHS septic system handout *Taking Care of Your Septic System* be obtained by the owner/developer, or provide a copy in report Appendix.

APPENDIX

Appendix Figure A

Textural Triangle Defining Twelve Textural Classes of the USDA
(Illustrated For A Sample Containing 37% Sand, 45% Silt, And 18% Clay)



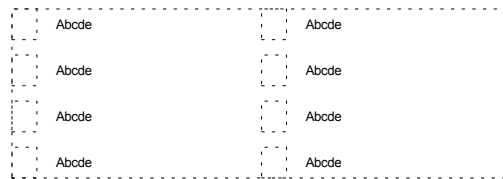
Appendix Figure B

UNIFIED SOIL CLASSIFICATION (ASTM D-2487-98)

MATERIAL TYPES	CRITERIA FOR ASSIGNING SOIL GROUP NAMES		GROUP SYMBOL	SOIL GROUP NAMES & LEGEND	
COARSE-GRAINED SOILS >50% RETAINED ON NO. 200 SIEVE	GRAVELS >50% OF COARSE FRACTION RETAINED ON NO. 4. SIEVE	CLEAN GRAVELS <5% FINES	$C_u \geq 4$ AND $1 \leq C_c \leq 3$	GW	WELL-GRADED GRAVEL
			$C_u \geq 4$ AND/OR $1 \geq C_c \geq 3$	GP	POORLY-GRADED GRAVEL
		GRAVELS WITH FINES >12% FINES	FINES CLASSIFY AS ML OR CL	GM	SILTY GRAVEL
			FINES CLASSIFY AS CL OR CH	GC	CLAYEY GRAVEL
	SANDS >50% OF COARSE FRACTION PASSES ON NO. 4. SIEVE	CLEAN SANDS <5% FINES	$C_u \geq 6$ AND $1 \leq C_c \leq 3$	SW	WELL-GRADED SAND
			$C_u \geq 6$ AND/OR $1 \geq C_c \geq 3$	SP	POORLY-GRADED SAND
		SANDS AND FINES >12% FINES	FINES CLASSIFY AS ML OR MH	SM	SILTY SAND
			FINES CLASSIFY AS CL OR CH	SC	CLAYEY SAND
FINE-GRAINED SOILS >50% PASSES NO. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT <50	INORGANIC	$P_i > 7$ AND PLOTS > "A" LINE	CL	LEAN CLAY
			$P_i > 4$ AND PLOTS < "A" LINE	ML	SILT
		ORGANIC	LL (oven dried)/LL (not dried) < 0.75	OL	ORGANIC CLAY OR SILT
	SILTS AND CLAYS LIQUID LIMIT >50	INORGANIC	PI PLOTS > "A" LINE	CH	FAT CLAY
			PI PLOTS < "A" LINE	MH	ELASTIC SILT
		ORGANIC	LL (oven dried)/LL (not dried) < 0.75	OH	ORGANIC CLAY OR SILT
HIGHLY ORGANIC SOILS	PRIMARILY ORGANIC MATTER, DARK IN COLOR, AND ORGANIC ODOR		PT	PEAT	

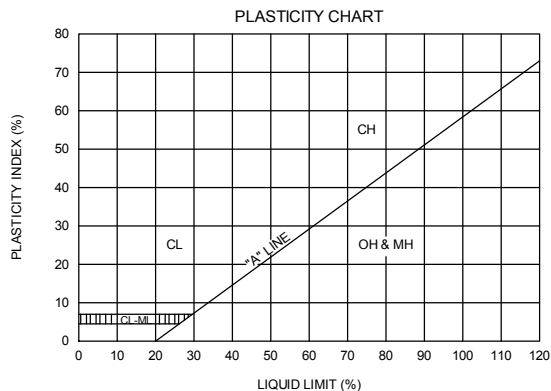
OTHER MATERIAL SYMBOLS	
Poorly Graded Sand with Clay	Sand
Clayey Sand	Silt
Sandy Silt	Well Graded Gravelly Sand
Low to High Plasticity Clay	Gravelly Silt
Poorly Graded Gravelly Sand	Asphalt
Topsoil	Boulders and Cobble
Well Graded Gravel with Clay	
Well Graded Gravel with Silt	

SAMPLE TYPES



ADDITIONAL TESTS

- | | | |
|---|--|---|
| CA - CHEMICAL ANALYSIS (CORROSIVITY) | (200) - (WITH % PASSING NO. 200 SIEVE) | SW - SWELL TEST |
| CD - CONSOLIDATED DRAINED TRIAXIAL | | TC - CYCLIC TRIAXIAL |
| CN - CONSOLIDATION | | TV - TORVANE SHEAR |
| CU - CONSOLIDATED UNDRAINED TRIAXIAL | | UC - UNCONFINED COMPRESSION |
| DS - DIRECT SHEAR | | (1.5) - (WITH SHEAR STRENGTH IN KSF) |
| PP - POCKET PENETROMETER (TSF) | | UU - UNCONSOLIDATED UNDRAINED TRIAXIAL |
| (3.0) - (WITH SHEAR STRENGTH IN KSF) | | WA - WASH ANALYSIS |
| RV - R-VALUE | | (200%) - (WITH % PASSING NO. 200 SIEVE) |
| SA - SIEVE ANALYSIS: % PASSING #200 SIEVE | | |
| - WATER LEVEL (WITH DATE OF MEASUREMENT) | | |



PENETRATION RESISTANCE (RECORDED AS BLOWS / 0.5 FT)				
SAND & GRAVEL		SILT & CLAY		
RELATIVE DENSITY	BLOWS/FOOT*	CONSISTENCY	BLOWS/FOOT*	COMPRESSIVE STRENGTH (TSF)
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 0.25
LOOSE	4 - 10	SOFT	2 - 4	0.25 - 0.50
MEDIUM DENSE	10 - 30	FIRM	4 - 8	0.50 - 1.0
DENSE	30 - 50	STIFF	8 - 15	1.0 - 2.0
VERY DENSE	OVER 50	VERY STIFF	15 - 30	2.0 - 4.0
		HARD	OVER 30	OVER 4.0

* NUMBER OF BLOWS OF 140 LB HAMMER FALLING 30 INCHES TO DRIVE A 2 INCH O.D. (1-3/8 INCH I.D.) SPLIT-BARREL SAMPLER THE LAST 12 INCHES OF AN 18-INCH DRIVE (ASTM-1586 STANDARD PENETRATION TEST).

company name	LEGEND TO SOIL DESCRIPTIONS	Figure Number *
Job No. *		

Appendix Figure B cont.

Major Divisions (1) (2)		Letter (3)	Symbol		Name (6)
			Hatching (4)	Color (5)	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	GW		Red	Well-graded gravels or gravel-sand mixtures, little or no fines
		GP			Poorly-graded gravels or gravel-sand mixtures, little or no fines
		GM		Yellow	Silty gravels, gravel-sand-silt mixtures
		GC			Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS	SW		Red	Well-graded sands or gravelly sands, little or no fines
		SP			Poorly-graded sands or gravelly sands, little or no fines
		SM		Yellow	Silty sands, sand-silt mixtures
		SC			Clayey sands, sand-silt mixtures
FINE GRAINED SOILS	SILTS AND CLAYS LL < 50	ML		Green	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL			Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL			Organic silts and organic silt-clays of low plasticity
	SILTS AND CLAYS LL > 50	MH		Blue	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH			Inorganic clays of high plasticity, fat clays
		OH			Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	Pt		Orange	Peat and other highly organic soils	

Appendix Figure C

Table: 7.7 Design Soil Application Rates

(Source: USEPA Onsite Wastewater Treatment Systems Manual, February 2002)

Soil Texture (per the USDA soil classification system)	Soil Structure Shape	Grade	Maximum Soil Application Rate (gallons per day per square foot) ¹
Coarse Sand, Sand, Loamy Coarse Sand, Loamy Sand	Single Grain	Structureless	0.8
Fine Sand, Very Fine Sand, Loamy Fine Sand, Loamy Very Fine Sand	Single Grain	Structureless	0.4
Coarse Sandy Loam, Sandy Loam	Massive	Structureless	0.2
	Platy	Weak	0.2
		Moderate, Strong	Prohibited
	Prismatic Blocky Granular	Weak	0.4
Moderate, Strong		0.6	
Fine Sandy Loam, Very Fine Sandy Loam	Massive	Structureless	0.2
	Platy	Weak, Moderate	Prohibited
		Strong	
	Prismatic, Blocky, Granular	Weak	0.2
Moderate, Strong		0.4	
Loam	Massive	Structureless	0.2
	Platy	Weak, Moderate	Prohibited
		Strong	
	Prismatic, Blocky, Granular	Weak	0.4
Moderate, Strong		0.6	
Silt Loam	Massive	Structureless	Prohibited
	Platy	Weak, Moderate	Prohibited
		Strong	
	Prismatic, Blocky, Granular	Weak	0.4
Moderate, Strong		0.6	
Sandy Clay Loam, Clay Loam, Silty Clay Loam	Massive	Structureless	Prohibited
	Platy	Weak, Moderate	Prohibited
		Strong	
	Prismatic, Blocky, Granular	Weak	0.2
Moderate, Strong		0.4	
Sandy Clay, Clay, or Silty Clay	Massive	Structureless	Prohibited
	Platy	Weak, Moderate	Prohibited
		Strong	
	Prismatic, Block, Granular	Weak	Prohibited
Moderate, Strong		0.2	

Appendix D - Liquid Waste Disposal Systems

The minimum requirements for the installation of new sewage disposal systems for either new or existing structures shall generally be as follows:

A. Minimum Separations

1. Septic tank to:

Septic Tank to:	Feet
Water Supply well	100 feet
Buildings or structures	5 feet
Property line adjoining private property	5 feet
Perennial streams ²	50 feet
Ephemeral streams ³	50 feet
Large trees ⁴	10 feet
Seepage pits or disposal fields	5 feet
Private domestic water lines (building service lines)	5 feet
Public domestic water lines (water purveyor's line)	25 feet
Groundwater	5 feet

2. Soil absorption system to:

Soil Absorption System to:	Feet
Domestic supply well - 100, 150, or 200 ft. depending on whether system has a:	
• Leaching field	100 feet
• Seepage pit	150 feet
• Any system discharging 5,000 gallons/day or more	200 feet
Municipal Wells- Dispersal system:	
• Does not exceed 10 feet	150 feet
• Exceeds 10 to 20 feet	200 feet
• Exceeds 20 feet ⁶	600 feet
Building or structures	8 feet
Property line adjoining private property (leachlines)	5 feet
Property line adjoining private property (seepage pits)	8 feet
Large trees ⁴ (seepage pits)	10 feet
Perennial streams ²	100 feet
Colorado River/Mojave River	200 feet
Ephemeral streams/ Drainage Courses ³	50 feet
Septic tank	5 feet
Distribution box	5 feet
Private domestic water line (building service line)	5 feet
Public domestic water line (water purveyor's line)	25 feet
High groundwater table level ⁵ leachline	5 feet
Seepage pit	10 feet
Ground surface on sloping ground (When disposal fields and/or seepage pits are installed in sloping ground, the minimum horizontal distance between any part of the leaching system and ground surface shall be 15 feet.) Also see page 29.	15 feet
Lakes, water reservoirs	200 feet

3. The minimum separations listed herein are largely derived from the California Plumbing Code. In some cases, additions or changes have been made in order to adequately protect water quality and the public health. Where differences exist, the greater separation prevails unless specifically waived for cause by DEHS.

Footnotes:

¹ Includes porches and steps whether covered or uncovered, breezeways, roofed porte-cocheres, roofed patios, carports, covered walls, covered driveway, and similar structures or appurtenances.

² A listing of perennial streams will be maintained by the Division of Environmental Health Services. See pages 31-33.

³ An ephemeral stream/drainage course is any stream not listed as a perennial stream by the DEHS (see Footnote 2). To determine where the setback restrictions should be applied, the USGS Maps are used as a guide. If a stream is designated on the USGS Map by a blue dash/dotted line, the setback requirements must be met. If not shown, but there is obvious visual evidence of water flow, the setback is determined by the topography and the geology of the proposed site, but is not less than 25'. **Distances are measured from the edge of the channel or assumed 0-100 year flow.**

⁴ Any tree with a trunk diameter of one foot or more within 5' of the system that will not be removed during construction.

⁵ The highest known level to which groundwater is known to have occurred rather than the level at the time when testing occurred.

⁶ Dispersal systems which exceed 20 feet in depth and are located within 600 feet of a municipal well will be required to have the consultant evaluate the two year travel time for microbial contaminants to determine required setback. In no case will the setback to less than 200 feet.

B. Other Factors

1. Special Soil Conditions

- a. Special soil conditions may require special consideration by the DEHS and must be considered on a case-by-case basis, particularly in areas of high rainfall or in proximity to water sources.
- b. San Bernardino County is known to be crisscrossed with flood control channels, water infiltration basins, perc ponds, tunnels and pipelines which supply water to water districts. Special care must be taken in siting the disposal systems. Check with county liquid waste specialist during notification.
- c. Mottled soil - A mottled soil is a soil that is marked with spots or blotches of contrasting color which is usually caused by saturation for some period during a normal year.

If this process has prevailed for significant periods over the recent geologic past, the resulting mottled soil colors can be readily observed.

Zones of seasonal or periodic soil saturation shall be estimated at the highest level of soil mottles. However, soil mottles can occur that are not due to zones of seasonal or period soil saturation; therefore, consult with County Specialist. Monitoring wells may be required to verify lack of groundwater. The abundance, size, contrast and color of the soil mottles shall be described in the following manner: (except frozen soils and soils with rapid permeability).

Abundance shall be described as “few” if the mottled color occupies less than 2% of the exposed surface; “common” if the mottled color occupies from 2% to 20% of the exposed surface; or “many” if the mottled color occupies more than 20% of the exposed surface.

Size refers to the length of the mottle measured along the longest dimension and shall be described as fine if the mottle is less than 5 millimeters (mm); medium if the mottle is from 5-15 mm; or coarse if the mottle is greater than 15 mm.

Contrast refers to the difference in color between the soil mottle and the background color of the soil and is described as faint if the mottle is evident, but recognizable with close examination; distinct if the mottle is readily seen but not striking; or prominent if the mottle is obvious and one of the outstanding features of the horizon. The color(s) of the mottle(s) shall be indicated.

- d. A leachline test hole 12 inches (30.5 cm) in diameter is used only when the soil is so stoney or coarse-textured that it is not feasible to dig or bore a standard diameter test hole. The results obtained with this larger diameter hole in minutes per inch or minutes per centimeter are multiplied by the correction factor contained in the leachline formula.
- e. Technical Modifications where sidewall soil materials may slough into the test hole during soaking, two techniques are applied: gravel packing and manual removal. For gravel packing, a perforated open-top cylinder is placed over the 2 inch (5.1 cm) layer of gravel at the bottom of the test hole. The cylinder is centered in the test hole. The 1 to 2 inch (2.5 to 5.1 cm) space between the whole sidewall and the cylinder is filled with loose, uncompacted, pea-sized gravel. The cylinder may be made out of a perforated piece of pipe, tin can, or hardware cloth. The measured water level drops must be corrected after

calculating the effect of the gravel volume.

2 Special discharge conditions:

- a. Local hydrogeological conditions may necessitate more separation of the sewage disposal system for protection of special resources (drinking water supply, recreation areas, water storage reservoirs, lakes, etc.). See LAMP.
- b. Fractured bedrock (decomposed granite is not included) and impervious strata are not suitable for sewage disposal. Impervious is defined for design purposes as a stratum with perc times of >120 mpi.
- c. The discharge of surface, rain or other clear water into a sewage disposal system is prohibited.
- d. Water softener and iron filter discharge to a sewage disposal system or on the ground surface is prohibited. Discharge shall be by physical or manual removal to an approved disposal site.
- e. Discharge of toxic or hazardous chemicals to a domestic system is prohibited. Industrial developments shall have individual monitoring ports for each unit connected to a confluent sewage disposal system if there is a single owner of the development. Multi-owner industrial units (condo type) shall have a separate system for each unit.
- f. Other (Sand and grease interceptors and traps will be considered on a case-by-case basis). High strength waste shall require supplement treatment and RWB approval.

Appendix E

3. Alternative Onsite Sewage Disposal Options

- a. Pump systems - All proposals for pumping shall be detailed in the perc report and shall be subject to DEHS and Building & Safety approval. A pump system may be approved when it is determined that the proposal is a hardship as defined. The following information is required for review:
 - 1) Percolation data
 - 2) Pump data
 - 3) Design of the pump chamber, to include a storage volume equal to 24 hours design flow, in the event of a power outage or a pump failure, or make provision for overflow to an adequately sized back-up gravity disposal area.
 - 4) Alarm system design
 - 5) Force main and backflow prevention design certified by American Water Works Association (AWWA) Grade II cross-connection specialist.
 - 6) Design of a receiving chamber at the disposal site which allows the simulation of gravity flow to the disposal system. In all cases, gravity flow to the septic tank is required, such that only settled effluent is pumped from the pump chamber. All components shall comply with the latest edition of the California Plumbing Code (CPC) and California Building Code (CBC) standards.
- b. Where site conditions are such that individual septic systems are not feasible for

the proposed development, the use of a multiple ownership septic system may be used, complying with the San Bernardino County Code, Title 3, Chapter 8, Article 7, and may require RWB Water Discharge Requirements.

- c. Utilization of supplemental treatment systems and/or alternative dispersal systems may be utilized on or off site for those developments which do not meet the OWTS Policy guidelines. A percolation report will be required for all developments. Siting of the system and the design of the disposal system shall meet DEHS and Building & Safety standards. The alternative treatment system shall be under the control of: 1) a public entity or 2) serviced on a regular basis by qualified, certified service provider. The conditions of approval and any required monitoring shall be part of the property's recorded deed. An annual permit to operate will be required.
- d. The use of sewage holding tanks shall not be approved for subdivision purposes except if there is documented evidence that a sewer connection will be available within 24 months and the use of the sewage holding tanks complies with San Bernardino County Code, Title 3, Chapter 8, Article 4.

Appendix F

4. Percolation Report Waiver Criteria

The percolation report requirement for non-critical area development may be waived by the DEHS upon presentation of the following:

- a. The person or consultant requesting the waiver shall refer to actual approved percolation tests performed on the land in question, or a contiguous parcel, and submit copies of the percolation reports (with the property owner's and consultant's written permission), or,
- b. The consultant shall provide a soil horizon identification study per the following criteria.
 1. The study shall be performed by a qualified professional: a Registered Civil Engineer, Certified Engineering Geologist, Registered Environmental Health Specialist, Registered Geologist, or Geotechnical Engineer.
 2. The site evaluation shall include soil descriptions, properties and expected permeability's per 3.3.1, depth to zones of soil saturation, depth to impermeable material (s), slope, potential for flooding and type(s) of vegetation. Use design soil application rates chart for gallons per square foot per day and convert to square foot per gallon per day.
 3. The depth of the soil profile shall be a minimum 8 feet below the proposed depth of the leachline and 10 feet below the proposed depth of a seepage pit, and shall be of sufficient dimension to be accessible for soil evaluation: in addition, a minimum of two excavations for each lot will be required. Use a backhoe for leachlines, use a bucket rig for seepage pits (or sample in place the soils).
- c. The consultant shall provide a statement that there are no factors (list mitigation measures) which would adversely affect the installation of an OWTS. These would include: water table levels (historic, source of information), drainage channels, cuts and fills, rock ledges and outcrops, steep slopes, and the location of any wells.
- d. The document shall include the assessor parcel number, size of the parcel in

acres or square feet, location of the property, proposed development on the property, and a plot plan showing building pad, OWTS and 100% expansion.

- e. The consultant shall state that the proposed OWTS meets DEHS standards and shall not cause a public health nuisance nor contaminate surface and/or groundwater. The consultant shall sign the document and include his/her stamp with registration number.
- f. A fee shall be paid to the DEHS as determined by the current fee schedule for review.

Appendix G - Daylight Requirements

Any portion of the disposal field located to the top of a cut or on sloping ground shall maintain a 15 foot horizontal distance from daylight to any portion of the leachline or leach bed. The table gives the minimum cover required versus the percent of slope in the area of the disposal field to meet the 15 foot requirement. This table also gives a factor “f” by which to increase the length of the trench due to the assumed loss in evapotranspiration caused by the added cover.

Slope of the Ground in the Area of the Disposal System	Minimum Cover Over the Drain Lines	f
5%	1.00 ft	1.0
10%	1.50 ft.	1.0
15%	2.25 ft	1.0
20%	3.00 ft.	1.0
25%	3.75 ft.	1.1
30%	4.50 ft.	1.2
35%	5.25 ft.	1.3
40%	6.00 ft.	1.4
45%	7.00 ft.	1.5

Slopes greater than 30% require a slope stability report.

Note: If, for design purposes, additional cover is required over drain lines (e.g.; below fill), the cover factor is still applicable.

Appendix H - Special Considerations for Absorption Field Placement in Sloping Ground

1. If ground slope is > 30%, any portion of an absorption field (except solid pipe) shall be a minimum of 10 feet (horizontally) from the downslope property line(s). It is the report preparer’s responsibility to certify that this minimum is applied or expanded if the slope is less than or equal to 30%, but the soil conditions are such that a basement or curtain drain already built 5 feet downslope from the lower property line(s) may be affected by sewage effluent. Show setback on plot.
2. The minimum horizontal distance between any portion of an absorption field (except solid pipe) and an exposed downward sloping impermeable stratum or bedrock in “cut” slope shall be 50 feet. It is the report preparer’s responsibility to make recommendations so that systems do not daylight. It is the owner/contractor(s) responsibility to install systems per the recommendations. The consultant may wish to inspect installations to be assured that recommendations are followed. If so desired by consultant, make it a requirement of approval. Upon presentation of pertinent engineering data, the County Specialist may stipulate this requirement.

Appendix I - Gravel Packing Corrections

If gravel packing was used, correct rates for the effect of the gravel volume. Show in detail measurements of the gravel volume and the calculations. The easiest way to calculate per cent gravel voids in the field is as follows:

Fill a 23½ oz. cylindrical tin can "A" with gravel. The gravel should be loose, uncompacted, just like in the test hole. Don't shake the can.* If the gravel is fine (pea size), fill with water and then drain thoroughly. Fill another identical can "B" with water; pour this water into can "A" until water barely drips out of its rim. (No spillages.) Percent gravel void is equal to height of water missing in B divided by total height of can, times 100. Add formula correction factor to seepage pit or leachline design as a multiplier.

$$\text{Correction Factor Formula} = [1 + P (C^2 - 1)] / C^2$$

$$C = r_2 / r_1$$

r_2 = radius of hole

r_1 = radius of pipe

P = % of voids

Another method for gravel packing corrections is by weighing the can with gravel, with gravel + water and with water using the formula below. By using this method, you do not have to assume to have two identical cans.

1. Weigh the can = A
2. Fill can with water to top; weigh = B
3. Empty can and fill with gravel (wet or dry as in other method); weigh = C
4. Fill gravel-packed can with water to top; weigh = D
5. Calculate the gravel correction factor using the following equation:

$$\underline{D-C} = \text{Gravel Correction Factor } B - A \text{ (i.e. - \% voids)}$$

* If during field testing the gravel in the test hole is observed to compact, shake the can.

Appendix J - Perennial Streams of San Bernardino County

The following list of streams has been provided to the RWB. These are the streams which they consider to be wholly or in part perennial. The list may be amended from time to time in order to reflect better or more complete information as it becomes known to the Department.

- A. California Regional Water Quality Control Board, Lahontan Region (Regional Board # 6)
 - 1. East Fork of the West Fork of the Mojave River
 - 2. Seeley Canyon Creek
 - 3. Houston Creek
 - 4. Deep Creek
 - 5. Holcomb Creek
 - 6. Hooks Creek
 - 7. Shale Creek
 - 8. Crab Creek
 - 9. Little Bear Creek (Lake Arrowhead Dam to confluence with Deer Creek)
 - 10. Salt Creek (North of Baker, California)
 - 11. Heath Canyon Creek
 - 12. Swarthout Creek
 - 13. Sheep Creek (North of Highway 2)

- B. California Regional Water Quality Control Board Colorado River Basin Region (Regional Board # 7)
 - 1. Colorado River
 - 2. Whitewater River
 - 3. San Gorgonio River
 - 4. Pinto Creek
 - 5. Copper Basin Creek
 - 6. Arrastre Creek

- C. California Regional Water Quality Control Board, Santa Ana Region (Regional Board # 8)
 - 1. Santa Ana River - Reach 6 (Above confluence with Bear Creek)
 - a. Deer Creek
 - b. Hamilton Creek
 - c. Wildhorse Creek
 - d. Cienaga Seca Creek
 - e. Coon Creek
 - f. Fish Creek
 - g. Lost Creek
 - h. South Fork - Santa Ana River
 - i. Frog Creek
 - j. Barton Creek (east and west forks)
 - k. Forsee Creek
 - l. Schneider Creek
 - m. Gold Creek

2. Mill Creek (above upper powerhouse)
 - a. Mountain Home Creek
 - b. Monkey Face Creek
 - c. Alger Creek
 - d. Falls Creek
 - e. Vivian Creek
3. Oak Glen Creek (above Oak Glen)
Birch Creek
4. Bear Creek
 - a. North Fork - Bear Creek
 - b. Grout Creek
 - c. Caribou Creek
 - d. Rathbone Creek
 - e. Metcalf Creek
 - f. Kidd Creek
 - g. Siberia Creek
5. Lytle Creek (above upper powerhouse)
Middle Fork - Lytle Creek
6. Devil Canyon Creek (east and west forks above power plant)
7. Cajon Creek (above Keenbrook)
8. Waterman Canyon Creek
9. City Creek (above gaging stations)
 - a. West Fork - City Creek
 - b. East Fork - City Creek
 - c. Middle Fork - City Creek
10. Plunge Creek (above gaging stations)
 - a. Little Mill Creek
 - b. Fredalba Creek
11. Alder Creek (tributary to Santa Ana Reach 5)
 - a. Middle Fork - Alder Creek
 - b. Hemlock Creek
 - c. Keller Creek
12. East Twin Creek (above gaging stations)
Strawberry Creek
13. East Etiwanda Creek (within National Forest)
14. Day Canyon Creek (above gaging station)
15. Cucamonga Creek (above gaging station)

16. San Antonio Creek (1 mile above community of Mt. Baldy)
Ice House Canyon Creek
17. Chino Creek (from confluence with Santa Ana River to Pine Avenue)
18. Carbon Canyon

Appendix K - Suggested References

EHS - Current "Standards" Booklet

[California Plumbing Code - Current Edition and Uniform Plumbing Code Training Manual Current Edition](#)

[United States Environmental Protection Agency - \(1980, 2002\) Design Manuals, Onsite Wastewater Treatment and Disposal Systems.](#)

Canter & Knox - (1985) Septic Tank Systems Effects on Ground Water Quality - Lewis Publishers

Kaplan - (1987) Septic Systems Handbook - Lewis Publishers

Winneberger, J.T. - (1984 Septic Tank Systems, Ann Arbor Science (Butterworth Publ.) Boston

American Society of Agricultural Engineers, ASAE- On-Site Wastewater Treatment Proceedings, 2950 Niles Road, St. Joseph, Michigan 49085-9659

Perkins - (1989) On-site Wastewater Disposal, Lewis Publishers

[OWTS Policy June 19, 2012 Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems. State Water Resources Control Board](#)

[San Bernardino County Local Agency Management Program, May 2017](#)