KERN COUNTY

ONSITE SYSTEMS MANUAL

KERN COUNTY
ONSITE SYSTEMS MANUAL

PART 1

SITING, DESIGN, AND CONSTRUCTION REQUIREMENT FOR OWTS

Onsite Systems Manual – Part 1
Table of Contents

1.1 Introduction

GENERAL

This part of the Onsite Systems Manual provides technical standards and guidelines for the design and construction of various onsite wastewater treatment and disposal technologies and components as authorized for implementation of Kern County Onsite Wastewater Ordinance. General requirements and principles include the following:

1. Where permitted by County Code, the building sewer shall be permitted to be connected to a private sewage disposal system in accordance with the provisions of these technical standards;

2. The type of OWTS shall be determined on the basis of location, soil characteristics, topography, groundwater conditions, and shall be designed to receive all sewage from the building(s) served;

3. The system, except as otherwise approved, shall consist of a septic tank with effluent discharging into a subsurface disposal field, into one or more seepage pits, or into a combination of subsurface disposal field and seepage pits;

4. Provisions are included for the approved use of “engineered” or “alternative systems”, which refers to a type of OWTS that utilizes either a method of wastewater treatment other than a conventional septic tank and/or a method of wastewater dispersal other than conventional drain field trenches or seepage pit(s) for the purpose of producing a higher quality wastewater effluent and improved performance of and siting options for effluent dispersal;

5. No property shall be improved in excess of its capacity to properly treat and absorb sewage effluent by the means provided in County Code and these technical standards;

6. Nothing contained in this section shall be construed to prevent the Director from requiring compliance with additional requirements than those contained herein, where such additional requirements are essential to maintain a safe and sanitary condition.

INSTALLATION PERMIT

A permit must be obtained from the Kern County Environmental Health Division (EHD) to construct, reconstruct, or repair an onsite wastewater treatment and dispersal system. Permits will only be issued in those areas of the County where a sanitary sewer is not available within 200 feet of the structure. OWTS cannot be used if soil conditions, topography, high groundwater or other factors indicate this method of sewage disposal is unsuitable.

LAND DIVISIONS

OWTS requirements for land divisions contained in Part 5 of this Manual – "Standards, Rules and Regulations for Land Development". The standards are intended to safeguard the public health, and are enforced by the County's Environmental Health Division (EHD). They are primarily intended to apply to residential units.

It is the responsibility of the land developer and his/her technical consultants to provide to the EHD any and all data needed to satisfy the content and the intent of these Standards.

For new divisions of land, soil profiles, percolation tests and groundwater determinations will be required on every parcel unless the EHD determines, on a case-by-case basis, that such testing is not necessary due to the availability of sufficient information to demonstrate conformance with applicable siting criteria for all proposed OWTS locations.

OWTS REPAIRS

OWTS that require corrective action to address a current or threatened failure condition shall be repaired in a manner, approved by the EHD that brings the OWTS into substantial conformance with Ordinance requirements to the greatest extent practicable. The repair work shall be implemented as soon as is reasonably possible and in accordance with any time limits issued by the EHD.

The overall goal with all OWTS repairs is to obtain a practical, timely and effective long-term correction to the failure condition. In determining the level of corrective work required, Environmental Health will take into consideration a variety of factors, including:

1. Public health and safety;
2. Soil characteristics and groundwater separation;
3. Setbacks from wells and streams;
4. Ground slope and setback from unstable landforms;
5. OWTS sizing standards;
6. Other setback criteria (e.g., foundations, pipelines, trees).

Submittal requirements for OWTS repairs may vary case-by-case, and will depend on the nature of the failure condition, the property location and type of occupancy, and the type of corrective work needed.

NOTIFICATION TO PUBLIC WATER SUPPLY OWNER(S)

Proposed OWTS. Where EHD staff determines the proposed OWTS dispersal system is closer than 150 feet to a public water well, or closer than 1,200 feet to a public water system surface water intake in a location tributary to the intake, steps will be taken to notify and consider input from the public water supply owner(s) as follows:

1. Notification of the proposed OWTS application will be sent to the water system owner(s). The notification will be accompanied by a copy of the permit application and supporting OWTS design information, including documented soils, topography, groundwater and percolation data.

2. The owner(s) receiving notification of proposed OWTS installations per (1) above will be afforded a 15-day period in which to submit comments on the proposed OWTS application.

3. Prior to issuing an OWTS installation permit for any system per (1) above, EHD will review and consider any comments and recommendations submitted by affected water system owner(s) per (2) above.

4. Upon issuance and/or denial of an OWTS installation permit per (1) above, EHD will provide notification to the affected water system owner(s) of the action taken.

Failing OWTS. Where EHD becomes aware of a failing OWTS located closer than 150 feet to a public water well, or closer than 2,500 feet to a public water system surface water intake in a location tributary to the intake, EHD shall notify the respective owner(s) and the SWRCB Division of Drinking Water as soon as practicable, but no later than 72 hours from the time of discovery of the failing OWTS.

ALTERNATIVE OWTS

General Provisions. Alternative OWTS may be permitted by the EHD for the repair or upgrading of any existing OWTS and for new construction on any legally created parcel where: (a) it is determined that sewage cannot be disposed of in a sanitary manner by a conventional OWTS; (b) EHD determines that an alternative OWTS would provide equal or greater protection to public health and the environment than a conventional OWTS; or (c) necessary to comply with requirements adopted for Mountain and Groundwater Impact Areas.

Alternative OWTS may be used for land divisions, in accordance with conditions and requirements in Part 5 of this Manual as approved by the EHD.

Types of alternative OWTS permitted are limited to those identified in Part 3 of this Manual, and which have been approved by the EHD and the appropriate CRWQCB.

All alternative systems must be installed by a contractor duly licensed by the Contractors State License Board of the State of California to install OWTS.

Specific Requirements

1. **Design and Installation Permit.** Alternative OWTS require design by a licensed professional and completion of site evaluation and installation permitting as required for conventional OWTS. Additional engineering and design requirements applicable to different types of alternative OWTS are contained in Part 3 of this Manual.

2. **Operating Permits.** A County-issued operating permit is required for all alternative systems. Operating permits are intended to serve as the basis for verifying the adequacy of alternative system performance and ensuring on-going maintenance, including requirements for system inspection, monitoring and reporting of results to the EHD, along with the requirement for permit renewal, typically on an annual basis.

3. **Performance Monitoring and Reporting.** Performance monitoring and reporting is required for all alternative OWTS in accordance with conditions established by the EHD at part of the operating permit. Performance monitoring requirements are covered in Parts 3 and Part 4 of this Manual.

4. **Design and Construction Guidelines.** Design and construction guidelines for approved alternative treatment and dispersal technologies are provided in Part 3. of this Manual.

VARIANCES

As provided in Kern County OWTS Ordinance, Article 4, variance from the terms of the Ordinance and requirements as prescribed in this Onsite Systems Manual may be granted by the EHD, under the following conditions:

1. The variance will not harm the public health, safety and welfare of the people of Kern County;

2. Due to special conditions or exceptional characteristics of the property, its location or surroundings, a literal enforcement of this chapter and Onsite Systems Manual would result in unnecessary hardship;

3. The hardship was not caused with the intent to avoid the requirements of the Ordinance or Onsite Systems Manual;

4. The variance will not have any adverse environmental effect on the use of the adjoining property.

1.2 Siting Criteria and Site Evaluation

SITING CRITERIA

Approval of any conventional OWTS shall require compliance with the following minimum siting criteria.

1. **Soil Depth.** For conventional OWTS, minimum depth of soil beneath the bottom of the dispersal field shall be 7 feet for leaching trenches or beds, and 12 feet for seepage pits. For alternative OWTS, minimum soil depth may be reduced to 3 feet for trench systems, and 10 feet for seepage pits.

2. **Vertical separation to ground water.** Minimum vertical separation distance between the bottom of the dispersal field shall be 7 feet for leaching trenches or beds, and 12 feet for seepage pits. For alternative OWTS utilizing supplemental treatment, minimum depth to groundwater may be reduced to 2 feet for trench systems, and 10 feet for seepage pits.

3. **Soil Percolation Rate.** For conventional disposal trenches or beds, the average soil percolation rate in the proposed disposal field area shall not be faster than one minute per inch (1 mpi) nor slower than 60 mpi, determined in accordance with procedures prescribed in this Manual. For seepage pits, percolation rates shall not be slower than 25 mpi. Soils having percolation rates between 60 and 120 mpi will require the use of an alternative OWTS, as provided in Article 3 of the County OWTS Ordinance and in accordance with methods and requirements detailed in Part 3 of this Manual.

4. **Ground Slope.** Maximum ground slope in the disposal field area shall not exceed thirty (30) percent.

5. **Horizontal Setbacks.** Minimum horizontal setback distances from various site features to OWTS components shall be as listed in **Table 1-1**.

6. **Areas of Flooding.** OWTS shall not be located in the primary floodplain or “floodway” as determined or estimated from published floodplain maps or on the basis of historical evidence acceptable to the director. OWTS are not permitted in secondary floodplain areas unless: (1) they are protected by flood control devices approved by the Kern County Water Agency or Kern County Department of Public works; (2) they are constructed with appropriate measures to minimize infiltration of floodwaters into the system and discharges from the system into the floodwater.

7. **OWTS Located on Property Served.** OWTS shall be located on the same property as the building(s) being served. An exception may be granted by the Director for existing

lots of record, where the OWTS may be located on an adjoining property within a non-revocable easement.

Table 1-1. Minimum horizontal setback distances for OWTS

Site Feature	Minimum Setback Distance (feet)			
	To Bldg. Sewer	To Septic Tank[1]	To Disposal Field	To Seepage Pit
Building or structures	2	5	8	8
Property line adjoining private property	Clear	5	5	8
Non-public water supply wells and springs	50	100	100	150
Public water supply wells	50	150	150[2]	200[2]
Streams (perennial or seasonal flow)				
• General (from top of bank)	50	50	100	100
• Between 1,200 to 2,500 ft. from public water system intake[3]	50	100	200	200
• Within 1,200 ft. from public water system intake[3]	50	100	400	400
Lakes and Reservoirs (from high water mark)				
• General	50	200	200	200
• Within 1,200 feet from a public water supply intake[3]	50	400	400	400
Non-classified stream or drainage ditch	25	25	25	25
Cuts or steep embankments (from top of cut/embankment)	-	10	4 X h[4,5]	4 X h[4,5]
Unstable land mass	-	100	100[5]	100[5]
Large trees	-	10	-	10
Seepage pit	-	5	5	12
Disposal field	-	5	4	5
Domestic water line	1	5	5	5
Distribution box	-	-	5	5
Pressure public water main	10	25	25	25

[1] Also applies to supplemental treatment units and pump/dosing tanks;

[2] 200' for trench or seepage pit >10'deep; 2-yr microbial travel study required for seepage pit >20' deep within 600 feet of public water well, per SWRCB Policy section 9.4.10.3.

[3] For areas tributary to and upstream of water supply intake; setback distance measured from high water mark. Exceptions allowed per SWRCB OWTS Policy, as follows: (a) for replacement OWTS, comply to the maximum extent practicable and incorporate supplemental treatment unless director finds no impact or significant threat to water source; (b) for new OWTS on pre-existing lot of record (pre-May 13, 2013), comply to maximum extent practicable and incorporate supplemental treatment for pathogens per sections 10.8 and 10.10 of SWRCB OWTS Policy.

[4] h equals the height of cut or embankment, in feet.

[5] Setback distance may be reduced in accordance with recommendations provided in a geotechnical report prepared by a civil engineer or professional geologist.

SITE EVALUATION

Prior to approving the use of an OWTS, a site evaluation is required in all instances to allow proper system design and to determine compliance with the site suitability criteria specified in this Manual. Site evaluations shall be conducted by qualified professionals, and evaluations shall be made in accordance with the following general requirements and referenced procedures. The EHD shall be notified prior to the site evaluation to coordinate with and allow for verification by department staff.

1. **General Site Features.** Site features to be determined by inspection shall include:
    a. Land area available for treatment components and for primary and reserve dispersal fields;
    b. Ground slope in the primary and reserve dispersal area(s);
    c. Location of cut banks, fills, or evidence of past grading activities, natural bluffs, sharp changes in slope, soil landscape formations, and unstable land forms within 100 feet of the primary and reserve dispersal area(s);
    d. Location of wells, streams, and other bodies of water within 200 feet of the primary and reserve dispersal area(s);
    e. To the extent possible, the location of existing OWTS within 100 feet of the primary and reserve dispersal area(s).

2. Soil Profiles

a. Soil characteristics shall be evaluated by soil profile test pit observations. A minimum of one test pit in the primary dispersal field and one in the reserve area shall be required for this purpose. Additional soil profiles may be required if the initial two profiles show conditions which are dissimilar to the extent that they do not provide sufficient information for design and/or determination of code compliance.

b. An augured test hole may be an acceptable alternative to a test pit where the EHD determines that:
    i. The use of a backhoe/excavator is impractical because of access or because of the fragile nature of the soils; or
    ii. It is necessary only to verify conditions expected on the basis of prior soils investigations; or
    iii. It is done in connection with geotechnical investigations.

c. The following factors shall be observed and reported from the ground surface to a limiting condition, up to a minimum of seven (7) feet below the bottom of the proposed dispersal system, which may be reduced to three (3) feet where an alternative OWTS is proposed.
    i. Thickness and coloring of soil layers, soil structure, and texture according to United States Department of Agriculture (USDA) classification;
    ii. Depth to a limiting condition such as hardpan, rock strata, impermeable soil layer, or saturated soil conditions;

iii. Depth to observed groundwater;
iv. Depth to and description of soil mottling (redoximorphic features);
v. Other prominent soil features which may affect site suitability, such as coarse fragments, consistence, roots and pores, and moisture content.

3. **Depth to Groundwater Determination.** The anticipated highest level of groundwater in the primary and reserve area shall be estimated:
    a. As the highest extent of soil mottling observed in the examination of soil profiles; or
    b. By direct observation of groundwater levels during the time of year when the highest groundwater conditions are expected or known to occur, i.e., wet weather testing period as defined by the EHD.

    Where there is a discrepancy between soil profile indicators (mottling) and direct observations, the direct observations shall govern.

    Where the director has been provided adequate evidence to demonstrate suitable soil conditions and groundwater separation, testing requirements may be waived.

4. **Percolation Testing.** Determination of a site's suitability for dispersal of effluent and for OWTS design shall be made by the completion of percolation testing in accordance with procedures approved by the EHD (Manual Part 2).

5. **Land Divisions.** For new divisions of land, soil profiles, percolation tests, and groundwater determinations will be required on every parcel unless the director determines, on a case-by-case basis, that such testing is not necessary due to the availability of sufficient information to demonstrate conformance with applicable siting criteria for all proposed OWTS locations (See Part 5 of this Manual).

6. **Cumulative Impact Assessment.** Kern County OWTS Ordinance Article 3, authorizes EHD to require the completion of additional technical studies ("cumulative impact assessment") for OWTS proposals, in situations where cumulative impacts on groundwater and/or watershed conditions are of potential concern. Where required, such studies shall be conducted in accordance with the guidelines provided in Part 1.8 of this Manual. The results shall be submitted for review by EHD as part of the project/site evaluation process, and may be the basis for denial, modification, or imposition of specific conditions for the OWTS proposal, in addition to other siting and design criteria.

7. **Reporting.** All site evaluation information, including test results for primary and reserve dispersal areas, shall be submitted to the EHD with the OWTS permit application.

1.3 Wastewater Design Flows

Daily wastewater flow estimates shall be developed for use in design, evaluation and monitoring of all OWTS.

1. **Single Family Residences and Second Units.** Wastewater flows used for design of OWTS for single family residences and second units shall be based on number of bedrooms in accordance with criteria in **Table 1-2.** Design flows for a primary residence and secondary dwelling unit shall be determined independently, regardless of whether the flows are treated separately or in a combined OWTS.

Table 1-2.
Wastewater Design Flows for
Single Family Residences

No. of Bedrooms	Design Flow (gal/day)
1	150
2	300
3	450
4	600
5	675
6	750
>6	+ 75 per bedroom

2. **Multiple Dwelling Units or Apartments.** Wastewater flows used for the design of OWTS for multiunit residences or apartments units shall be based on the number of dwelling units in accordance with criteria in **Table 1-3.**

Table 1-3.
Wastewater Design Flows for
Multi-Unit Residences

No. of Dwelling Units	Design Flow (gal/day)
2	600
3	750
4	1,000
5	1,125
6	1,250
7	1,375
8	1,500
9	1,625
10	1,750
>10	+125 per unit

3. **Non-residential Facilities.** Wastewater flows used for design of OWTS for commercial, institutional, recreational and other non-residential facilities shall be the greater of that estimated from the following two methods:
    a. Facility/Occupancy Method - based on the projected activities, occupancy and facilities, using wastewater generation guidelines provided in **Table 1-4;** and
    b. Fixture Unit Method - based on total drainage fixture unit value, per California Plumbing Code (Table 702.1) or the most recent adopted version of the Kern County Plumbing Code (KCPC), and criteria in **Table 1-5**.

For facilities not listed in **Table 1-4** the wastewater design flow shall be estimated based on either: (a) appropriate literature references (e.g., US EPA Onsite Wastewater Treatment Systems Manual, 2002) for the type of facility proposed; or (b) documented wastewater flow monitoring data for a comparable facility. Additionally, the Director may consider adjustment to the criteria listed in **Table 1-4** for specific facilities based upon documented wastewater flow monitoring data. In all cases, the design proposal shall include sufficient technical information to support the proposed design flow estimate. Notwithstanding the above, minimum design flow for any OWTS shall not be less than 150 gpd.

Table 1-4.
Estimated Wastewater Flow Rates

Type of Occupancy	Design Flow (gallons per day)
Airports	
- Per employee	15
- Per passenger	5
Auto washers	Per equipment mfg.
Bowling alleys, snack bar only (per lane)	75
Camps (per person)	
- With central comfort station	35
- With flush toilets, no showers	25
- Day camps, no meals served	15
- Summer and seasonal	50
Churches, sanctuary, religious halls (per seat)	
- without kitchen	5
- with kitchen waste	7
Dance halls (per person)	5
Day care (per patron, employee)	15
Factories and industrial buildings (per employee)	
- no showers	25
- with showers	35
- cafeteria, add	5
Hospitals	
- per bed	250
- kitchen waste only (per bed)	35
- laundry waste only (per bed)	5

Type of Occupancy	Design Flow (gallons per day)
Hotels, no kitchen waste (per bed x 2)	60
Institutions (per person)	
- resident	75
- nursing home	125
- rest home	125
Laundries, self-service	
- minimum 10 hours per day (per wash cycle)	50
- commercial	Per manufacturer
Motel (per bed space)	
- no kitchen	50
- with kitchen	60
Offices (per employee)	20
Parks	
- mobile homes (per space)	250
- picnic parks, toilets only (per parking space)	20
- Recreational vehicles (per space)	
• without water hook-up	75
• with water and sewer hook-up	100
Restaurants – cafeterias	
- per employee	20
- toilet (per customer)	7
- kitchen waste (per meal	6
- add for cocktail lounge (per customer)	2
- kitchen waste – disposable service (per meal)	2
Schools	
- staff and office (per person)	20
- elementary students (per student)	15
- intermediate and high (per student)	20
• with gym and showers,	5
• with cafeteria, add	3
- boarding, total waste (per person)	100
Service station, toilets	3
- for 1st bay	1000
- add for each additional bay	500
Stores	
- per employee	20
- public restrooms, add per 10 ft^2 of floor space	1
Swimming pools, public (per person)	10
Theaters	
- auditoriums (per seat)	5
- drive-in (per space)	10

Table 1-5.
Estimated Sewage Flow by Fixture Unit Value

Total Fixture Units per CPC Table702.1	Design Flow[1] (gallons per day)
15	375
20	500
25	600
33	750
45	1,000
55	1,112
60	1,250
70	1,375
80	1,500
90	1,625
100[2]	1,750

[1] Equal to 50% of required septic tank volume; assumes 2-day detention time;
[2] Additional fixture units over 100, 12.5 gallons per fixture unit

4. **Flow Equalization.** Flow equalization may be used for non-residential and mixed use facilities that experience significant, regular and predictable fluctuations in wastewater flows. Examples of applicable facilities include, but are not limited to:
    a. religious facilities
    b. schools special event
    c. venues

Flow equalization is the process of controlling the rate of wastewater flow through an OWTS by providing surge capacity storage and timed-dosing of the incoming flow. Installed following the septic tank, it allows peak surges in wastewater flow (e.g., from a weekend event) to be temporarily stored and metered into the treatment system and/or dispersal field at a relatively even ("average") rate over an extended number of days (e.g., during the subsequent week). This generally aids OWTS performance.

Where flow equalization is proposed to be incorporated in an OWTS the following apply:

1. The septic tank capacity shall be sized based on the peak daily flow for the facility;

2. The design flow used for sizing supplemental treatment unit(s) and/or the dispersal field may be based on the equalized ("average") flow rate rather than the peak daily flow rate for the facility;
3. Engineering calculations and specifications must be submitted substantiating the proposed design and operation of the flow equalization system; and

4. An operating permit for the OWTS shall be required and shall include provisions for monitoring and documenting compliance with the flow equalization design parameters.

1.4 Septic Tank Requirements

1. **Capacity.** The liquid capacity of all septic tanks shall conform to Table 1-6 as determined by: (a) the number of bedrooms or apartment units in dwelling occupancies and (b) the estimated waste/sewage design flow rate or the number of plumbing fixture units for non-residential facilities, as determined from the most recent adopted version of the Kern County Plumbing Code, whichever is greater.

Table 1-6.
Septic Tank Capacity

Single Family Dwellings # of Bedrooms	Multi-family or Apartments # of Dwelling Units	Other Uses: Maximum Fixture Units per CPC Table702.1	Minimum Septic Tank Capacity[4,5] (gallons)
1 or 2	-	15	750
3	-	20	1,000
4	2 units	25	1,200
5 or 6[1]	3	33	1,500
-	4	45	2,000
-	5	55	2,225
-	6	60	2,500
-	7	70	2,750
-	8	80	3,000
-	9	90	3,250
-	10[2]	100[3]	3,500

Notes:

[1] Additional bedrooms, 150 gallons each

[2] Additional dwelling units, 250 gallons each

[3] Additional fixture units over 100, 25 gallons per fixture unit

[4] Septic tank sizes in this table include sludge storage capacity and the connection of domestic food waste disposal units without further volume increase.

[5] Minimum capacity determined from estimated wastewater flow shall be equal to at least two (2) days the maximum daily design flow.

2. **Plans.** Plans for septic tanks shall be submitted to the EHD for approval. Such plans shall show dimensions, reinforcing, structural calculations, and such other pertinent data as required.

3. **Design.** Septic tank design shall be such as to produce a clarified effluent consistent with accepted standards and shall provide adequate space for sludge and scum accumulations.

4. **Construction Materials.** Septic tanks shall be constructed of solid durable materials not subject to excessive corrosion or decay and shall be watertight.

5. **Compartments.** Septic tanks shall have not less than two compartments unless otherwise approved by the EHD. The inlet compartment of any septic tank shall be not less than two-thirds of the total capacity of the tank, nor less than 500 gallons liquid capacity, and shall be not less than 3 feet in width and 5 feet in length. Liquid depth shall be not less than 2 feet nor more than 6 feet. The secondary compartment of a septic tank shall have a capacity of not less than 250 gallons and a capacity not exceeding one-third of the total capacity of such tank. In septic tanks having a 1,500 gallon capacity, the secondary compartment shall be not less than 5 feet in length.

6. **Access Manholes**
    a. Access to each septic tank shall be provided by at least two (2) manholes twenty (20) inches in minimum diameter. One (1) access manhole shall be located over the inlet and one (1) access manhole shall be located over the outlet. Wherever a first compartment exceeds twelve (12) feet in length, an additional manhole shall be provided over the baffle wall.
    b. Septic tanks shall have the required manholes accessible by extending the manhole openings to grade, or at most 6 inches below finished grade, in a manner acceptable to the EHD.
    c. Access openings at grade or above shall be locked or secured to prevent unauthorized access.

7. **Pipe Opening Sizes.** The inlet and outlet pipe openings shall not be larger in size than the connecting sewer pipe. The vertical leg of round inlet and outlet fittings shall not be less in size than the connecting sewer pipe nor less than 4 inches. A baffle-type fitting shall have the equivalent cross-sectional area of the connecting sewer pipe and not less than a 4-inch horizontal dimension where measured at the inlet and outlet pipe inverts.

8. **Pipe Extension.** The inlet and outlet pipe or baffle shall extend 4 inches above and not less than 12 inches below the water surface. The invert of the inlet pipe shall be at a level not less than 2 inches above the invert of the outlet pipe.

9. **Free Vent Area.** Inlet and outlet pipe fittings or baffles and compartment partitions shall have a free vent area equal to the required cross-sectional area of the house sewer or private sewer discharging therein to provide free ventilation above the water surface from the disposal field or seepage pit through the septic tank, house sewer, and stack to the outer air.

10. **Sidewalls.** The sidewalls shall extend not less than 9 inches above the liquid depth. The cover of the septic tank shall be not less than 2 inches above the back vent openings.

11. **Partitions and Baffles.** Partitions or baffles between compartments shall be of solid, durable material and shall extend not less than 4 inches above the liquid level. The transfer port between compartments shall be a minimum size equivalent to the tank inlet, but in no case less than 4 inches in size, shall be installed in the inlet compartment side of the baffle

so that the entry into the port is placed 65 percent to 75 percent in the depth of the liquid. Wooden baffles are prohibited.

12. **Effluent Filter.** Septic tanks shall be designed to prevent solids in excess of three-sixteenths (3/16) of an inch in diameter from passing to the dispersal system. Septic tanks that use a NSF/ANSI Standard 46 certified septic tank effluent filter at the final point of effluent discharge from the OWTS and prior to the dispersal system shall be deemed in compliance with this requirement.

13. **Structural Design**. The structural design of septic tanks shall comply with the following requirements:
    a. Each such tank shall be structurally designed to withstand all anticipated earth or other loads. Septic tank covers shall be capable of supporting an earth load of not less than 500 pounds per square foot (lb. /ft^2) where the maximum coverage does not exceed 3 feet.
    b. In flood hazard areas, tanks shall be anchored to counter buoyant forces during conditions of the design flood. The vent termination and service manhole of the tank shall be not less than 2 feet above the design flood elevation or fitted with covers designed to prevent the inflow of floodwater or the outflow of the contents of the tanks during conditions of the design flood.

14. **Materials.** The materials used for constructing a septic tank shall be in accordance with the following:
    a. Materials used in constructing a concrete septic tank shall be in accordance with applicable standards in the most recent adopted version of the Kern County Plumbing Code.
    b. Septic tanks constructed of alternate materials shall be permitted to be approved by the EHD where in accordance with approved applicable standards. Wooden septic tanks are prohibited.

15. **Prefabricated Septic Tanks.** Prefabricated septic tanks shall comply with the following requirements:
    a. Manufactured or prefabricated septic tanks shall comply with approved applicable standards and be approved by the EHD.
    b. Independent laboratory tests and engineering calculations certifying the tank capacity and structural stability shall be provided as required by the EHD.

16. **Septic tanks** shall be limited to those approved by the IAPMO or stamped and certified by a California registered civil engineer as meeting the industry standards, and their installation shall be according to the manufacturer's instructions.

17. **Water-tightness Testing Requirements.** Septic tanks or other primary components shall be filled with water to flow line prior to requesting inspection. Seams or joints shall be left exposed (except the bottom), and the tank shall remain water-tight. All new septic

tank installations and modifications to existing septic tanks shall undergo water-tightness testing as follows:

a. **Tanks Located in Areas of Shallow Groundwater or Flooding.** The testing shall be done with the access risers in place and the inlet and outlet pipes plugged. The tank shall be filled with water to a level extending a minimum of two (2) inche**s** into the risers, and monitored for a 1-hour period, with no measurable drop in the water level.

b. **All Other Tanks.** The tank shall be filled with water to a level even with the invert of the outlet pipe, and monitored for a 1-hour period, with no measurable drop in water level.

Conventional Disposal Trenches and Beds

1. **General**

   The construction dimensions of the subsurface sewage effluent disposal area of an onsite wastewater treatment system shall be based on soils analysis and/or percolation tests.

2. **Sizing**

   a. **Minimum Effective Absorption Area.** The minimum effective absorption area required shall be sufficient for absorption of the daily quantity of liquid waste discharging there into, determined per **Table 1-7**, based on either (1) the required septic tank capacity in gallons (liters), and/or (2) the estimated daily waste/sewage flow, whichever is greater.

   b. **Absorption Capacity.** The absorption capacity of disposal trenches and beds shall be based on the effective absorption area (per below) and the percolation characteristics of the underlying and surrounding soil, as determined from results of field exploration and design criteria in **Table 1-7**.

   c. **Effective Absorption Area.** The effective absorption area of a disposal trench shall normally be calculated as the bottom width. Sidewall area in excess of the required 12 inches and not exceeding 36 inches below the leach line shall be permitted to be added to the trench bottom area where computing absorption areas.

   d. **Leaching Beds.** Where leaching beds are permitted in lieu of trenches, the area of each such bed shall be not less than 50 percent greater than the requirements for trenches. Perimeter sidewall area in excess of the required 12 inches and not exceeding 36 inches below the leach line shall be permitted to be added to the trench bottom area where computing absorption areas.

   e. **Leaching Chambers.** Leaching chambers shall be sized on the bottom absorption area (nominal unit width) in square feet.

Table 1-7
Design Criteria of Five Typical Soils

Type of Soil	Required Square Feet for leaching area per 100 gallons tank capacity	Maximum Absorption Capacity in gal/ft^2 of leaching area for a 24-hour period
Coarse sand or gravel	20	5.0
Fine sand	25	4.0
Sandy loam or sandy clay	40	2.5
Clay with considerable sand or gravel	90	1.1
Clay with small amount of sand or gravel	120	0.8

3. **Construction**
   Disposal fields shall be constructed in accordance with **Table 1-8**.

Table 1-8.
General Disposal Field Requirements

Item	Minimum	Maximum
Number of drain lines per field	1	-
Length of each line	-	100 feet
Bottom width of trench	18 inches	36 inches
Spacing of lines, center-to-center	6 feet	-
Depth of earth cover of lines	12 inches	-
Grade of lines	Level	Inches per 100 ft.
Filter material under drain lines	12 inches	-
Filter material over drain lines	2 inches	

4. **Distribution Lines.** Distribution lines shall be constructed of perforated ABS pipe, perforated PVC pipe, or other materials approved by the Director, provided that sufficient openings are available for distribution of the effluent into the trench area.

5. **Filter Material.** Before placing filter material or drain lines in a prepared excavation, all smeared or compacted surfaces shall be removed by raking to a depth of one (1) inch and the loose material removed. Clean stone, gravel, slag, or similar material acceptable to the Director, varying in size from three fourths (3/4) inch to two and one-half (2-1/2) inches shall be placed in the trench to the depth and grade required by this section. Drain pipe shall be placed on the filter material in an approved manner. The drain lines shall then be covered with filter material to the minimum depth required by this section and this covered with material approved by the Director to prevent closure of voids with earth backfill. No earth backfill shall be placed over the filter material until after inspection and acceptance.

   Exception: Plastic leaching chambers approved by the EHD may be used in lieu of pipe and filter material. Chamber installations shall follow the rules for disposal fields, where applicable, and shall conform to manufacturer's installation instructions.

6. **Capped Inspection Riser.** A capped inspection riser, typically consisting of 3” or 4” perforated pipe, shall be installed within each trench to provide a means of observing the effluent level in the trench.

7. **Grade Board.** A grade board staked in the trench to the depth of filter material shall be utilized when the distribution line is constructed of material which will not maintain alignment without continuous support.

8. **Distribution Boxes**. Where two or more drain lines are installed, an approved distribution box of sufficient size to receive lateral lines shall be installed at the head of each disposal field. The inverts of outlets shall be level, and the invert of the inlet shall be not less than

1 inch above the outlets. Distribution boxes shall be designed to ensure equal flow and shall be installed on a level concrete slab in natural or compacted soil.

9. **Laterals.** Laterals from a distribution box to the disposal field shall be approved pipe with watertight joints. Multiple disposal field laterals, where practicable, shall be of uniform length.

10. **Connections.** Connections between a septic tank and a distribution box shall be laid with approved pipe with watertight joints on natural ground or compacted fill.

11. **Spacing**
    a. Minimum spacing between trenches or leaching beds shall be not less than 4 feet plus 2 feet for each additional foot of depth in excess of 1 foot below the bottom of the drain line.

    b. Distribution drain lines in leaching beds shall be not more than 6 feet apart on centers, and no part of the perimeter of the leaching bed shall exceed 3 feet from a distribution drain line.
    c. When seepage pits are used in combination with disposal fields, the filter material in the trenches shall terminate at least five (5) feet from the seepage pit excavation.

12. **Surface Covering.** Disposal fields, trenches, and leaching beds shall not be paved over or covered by concrete or a material that is capable of reducing or inhibiting a possible evaporation of sewer effluent.

    Exceptions: Exceptions may be granted under the following conditions:
    a. for soil Types 2 or 3: disposal trench sizing shall be increased by 25% or disposal trenches shall be constructed using traffic-rated chambers with no sizing reduction credit as normally given for chambers;
    b. for soil Types 4 or 5: disposal trench sizing shall be increased by 25% and the trenches shall be constructed using traffic-rated chambers, with no sizing reduction credit;
    c. for soil Types 2 through 5: no sizing increase or chamber construction requirement would apply if supplemental treatment is provided;
    d. for any large flow OWTS (>1,500 gpd design flow), supplemental treatment is required except where the portion of trench installed under paved area amounts to less than 25% of the total system capacity.

13. **Joints.** Where necessary on sloping ground to prevent excessive line slope, leach lines or leach beds shall be stepped. The lines between each horizontal section shall be made with watertight joints and shall be designed so each horizontal leaching trench or bed shall be utilized to the maximum capacity before the effluent shall pass to the next lower leach line or bed. The lines between each horizontal leaching section shall be made with approved water-tight joints and installed on natural or unfilled ground.

14. **Dosing Tanks.** Automatic siphon or dosing tanks shall be installed when required or as permitted by the EHD. Minimum requirements include the following:
    a. Horizontal setbacks for dosing siphon tanks shall be the same as for septic tanks; and
    b. Designer submittal requirements shall be the same as for pump systems, including hydraulic design calculations, selection of dosing siphon and dosing tank, copy of manufacturer data sheet(s), operation and maintenance guidelines.

1.6 Seepage Pit Requirements

1. **Sizing**
    a. **Effective Absorption Area.** The effective absorption area of any seepage pit shall be calculated as the excavation sidewall area in square feet (m^2) below the inlet, excluding impermeable soil zones where identified during field exploration.
    b. **Absorption Capacity.** The absorption capacity of seepage pits shall be based on the effective absorption area per (a) and the percolation characteristics of the surrounding soil, as determined from results of field exploration and design criteria in **Table 1-7**.
    c. **Minimum Effective Absorption Area.** The minimum effective absorption area required shall be sufficient for absorption of the daily quantity of liquid waste discharging there into, determined per **Table 1-7**, based on either (1) the required septic tank capacity in gallons (liters), and/or (2) the estimated daily waste/sewage flow, whichever is greater.
    d. **Multiple Pits and Disposal Combinations.** The minimum required absorption area may be provided in one or more seepage pits or in combination with other dispersal methods, e.g., trenches, beds.

2. **Multiple Installations**
    a. **Level Sites**. Multiple seepage pit installations on level sites (where the inlet pipe elevations are the same) shall be served through an approved distribution box. Distribution boxes shall have their locations permanently marked with a steel post, concrete marker or other durable material. Additionally, each distribution box shall have an inspection riser of white PVC or concrete of at least eight (8) inches in diameter. The inspection riser shall allow inspection access to the distribution box. Each riser shall terminate with an approved screw type cap.
    b. **Sloping Sites.** For multiple seepage pit installations on sloping sites where the inlet pipe elevations differ, the distribution piping shall be designed to provide serial overflow from one pit to another (highest to lowest elevation).

3. **Construction**
    a. Each seepage pit shall be circular in shape and shall have an excavated diameter of not less than four (4) feet. Approval shall be obtained prior to construction for any pit having an excavated diameter greater than six (6) feet.

4. **Spacing**
    a. Minimum horizontal spacing between seepage pits shall be 12 feet, measured from sidewall to sidewall.
    b. When seepage pits are used in combination with disposal fields, the filter material in the trenches shall terminate at least five (5) feet from the seepage pit excavation.

5. **Lining**

Seepage pits may be constructed in one of two ways, as follows:

a. An eight (8) inch (204 mm) white, or other similar approved color, sewer pipe of approved material shall be installed true and plumb in the center of the seepage pit excavation extending from the bottom of the seepage pit excavation to the inlet depth. The sewer pipe shall have one (1) inch holes drill each 120 degrees of the sewer pipe circumference at twelve (12) inch intervals on center minimum for the entire length of the sewer pipe to the inlet depth. The sewer pipe shall then extend watertight to grade and shall be capped with an approved screw type, accessible cap. The void between the sewer pipe and the seepage pit excavation shall then be filled with clean stone, gravel, or similar filter material acceptable to the EHD, varying in size from the three fourths (3/4) inch to two and one-half (2-1/2) inches.

b. Pre-cast concrete circular sections approved by the EHD may be used. The void between the pre-cast circular sections and the seepage pit excavation shall have a minimum of six (6) inches of clean three-fourths (3/4) inch gravel or rock filter material. An approved type one or two piece reinforced concrete slab cover shall be installed on top of the pre-cast concrete circular sections. Each such cover shall have twenty- five hundred (2,500) pounds per square inch minimum compressive strength shall be not less than five (5) inches thick and shall be designed to support an earth load of not less than four hundred (400) pounds per square foot. Each such cover shall be provided with an eight (8) inch minimum inspection hole and shall be coated on the underside with an approved bituminous or other nonpermeable protective compound. An eight (8) inch white, or similar approved color, sewer pipe of approved material shall be installed true and plumb extending watertight from the cover inspection hole to grade and shall be capped with an approved accessible cap.

6. **Sidewall.**

A seepage pit shall have a minimum sidewall of 10 feet below the inlet.

7. **Cover**

The cover of a seepage pit shall be constructed and located as follows:

a. Approved-type one or two-piece reinforced concrete slabs of not less than 2,500 lb./in^2 minimum compressive strength, not less than 5 inches thick, and designed to support an earth load of not less than 400 pounds per square foot (lb./ft^2). Each such cover shall be provided with a 9 inch minimum inspection hole with plug or cover and shall be coated on the underside with an approved bituminous or other non-permeable protective compound.

b. The top of the arch or cover shall be not less than 18 inches but not exceed 4 feet below the surface of the ground.

8. **Inlet Fitting**

An approved vented inlet fitting shall be provided in the seepage pit so arranged as to prevent the inflow from damaging the sidewall.

Exception: Where using a one- or two-piece concrete slab cover inlet, fitting shall be permitted to be a one-fourth bend fitting discharging through an opening in the top of the slab cover. On multiple seepage pit installations, the outlet fittings shall comply with paragraph 2 above.

1.7 Construction Inspection and Testing

At a minimum, inspection of conventional OWTS installation should include the items listed below.

1. Pre-construction inspection where the construction staking or marking of the various system components is provided and construction procedures discussed;

2. Open trench inspection of dispersal trench dimensions and conditions;

3. Drain rock and perforated pipe materials and placement;

4. Location and proper installation of diversion valve(s);

5. Location, size, materials, and water-tightness testing of septic tank per Section 1.4.16 of this Manual; and

Final Inspection to verify that all construction elements are in conformance with the approved plans and specifications, and final trench backfill/cover and erosion control has been completed.

Any field changes to the approved OWTS design shall be documented in a set of "as-built" drawings supplied to EHD by the system designer, which shall be required before final written notice of installation approval is issued by EHD.
Additional requirements pertaining to inspection and testing of Alternative OWTS installations are detailed in Part 3 of this Manual.

1.8 Cumulative Impact Assessment Guidelines

1. **General Provisions.** County OWTS Ordinance Article 3 authorizes EHD to require the completion of additional technical studies ("cumulative impact assessment") for OWTS proposals in situations where cumulative impacts on groundwater and/or watershed conditions are of potential concern. Cumulative impacts from OWTS may occur due to such factors as the constituent levels in the wastewater (e.g., nitrogen content), the volume of wastewater flow, the density of OWTS discharges in a given area, and/or the sensitivity and beneficial uses of water resources.

   Cumulative impact assessments to address potential concerns shall be conducted in accordance with the requirements outlined in these guidelines. The results of the assessment shall be submitted for review by EHD and may be the basis for denial, modification or imposition of specific conditions for the OWTS proposal, in addition to other siting and design criteria.

2. **Cumulative Impact Issues.** The primary issues to be addressed in cumulative impact assessments will normally include the following:
   a. Groundwater Mounding. A rise in the water table, referred to as "groundwater mounding", may occur beneath or down-gradient of OWTS as a result of the concentrated or high volume of hydraulic loading from one or more systems in a limited area.
   b. Groundwater Nitrate Loading. Discharges from OWTS contain high concentrations of nitrogen that may contribute to rises in the nitrate level of local and regional aquifers.

   For individual cases, EHD may identify and require analysis of cumulative impact issues other than those listed above which could pose potential water quality, public health, or safety risks.

3. **Qualifications.** Cumulative impact assessments required for alternative system proposals shall be performed by or under the supervision of one of the following licensed professionals:
   a. Registered Civil Engineer
   b. Registered Environmental Health Specialist
   c. Registered Geologist

Additionally, the licensed professional assuming responsibility for the cumulative impact assessment should have training and experience in the fields of water quality and hydrology acceptable to the EHD.

4. **Cases Requiring Cumulative Impact Assessment.** All new development proposed within the Lahontan Regional Water Quality Control Board basin shall require a cumulative impact assessment. Other cases where cumulative impact assessments shall be required are listed in **Table A.** Additionally, EHD reserves the right to require the completion of a cumulative impact assessment in any case where special circumstances related to the size, type, or location of the OWTS warrant such analysis.

Table A.
Projects Requiring Cumulative Impact Assessment*

Type of Project	Lot Size (acres)	Design Wastewater Flow (gpd)	Groundwater Mounding Analysis	Nitrate Loading Analysis
Residence, including 2nd dwelling unit(s)	-	< 750	No	No
Residence, including 2nd dwelling unit(s)	< 1	750 +	No	Yes
Multiunit and Non-residential	< 1	750 +	No	Yes
	< 2	**1,500+**	**Yes**	**Yes**
	< 3	**2,000+**	**Yes**	**Yes**
		1,500+	Yes	Per lot size criteria
	-	2,500+	Yes	Yes
Subdivisions	2.5+	-	No	No
	<2.5	-	No	Yes

*Note: EHD may also require cumulative impact assessment based on project or site specific conditions.

** The hydrological and water quality analysis requirements may be modified depending on site specific conditions and the extent to which the OWTS discharge contributes flow to catchment area supporting the vernal pool.

5. Methods

a. Groundwater Mounding Analysis

i. Analysis of groundwater mounding effects shall be conducted using accepted principles of groundwater hydraulics. The specific methodology shall be described and supported with accompanying literature references, as appropriate.

ii. Assumptions and data used for the groundwater mounding analysis shall be stated along with supporting information. A map of the project site showing the location and dimensions of the proposed system(s) and the location of other nearby OWTS, wells and relevant hydrogeologic features

(e.g., site topography, streams, drainage channels, subsurface drains, etc.) shall be provided.

iii. The wastewater flow used for groundwater mounding analyses shall be the design sewage flow, unless supported adequately by other documentation or rationale.

iv. Groundwater mounding analyses shall be used to predict the highest rise of the water table and shall account for background groundwater conditions during the wet weather season.

v. All relevant calculations necessary for reviewing the groundwater mounding analysis shall accompany the submittal.

vi. Any measures proposed to mitigate or reduce the groundwater mounding effects shall be presented and described as to their documented effectiveness elsewhere, special maintenance, monitoring requirements, or other relevant factors.

6. Nitrate Loading

a. Analysis of nitrate loading effects shall, at a minimum, be based upon construction of an annual chemical-water mass balance. The specific methodology shall be described and supported with accompanied literature references as appropriate.

b. Assumptions and data for the mass balance analysis shall be stated, along with supporting information. Such supporting information should include, at a minimum:
   i. climatic data (e.g., precipitation, evapotranspiration rates);
   ii. groundwater occurrence, depth and flow direction(s);
   iii. background groundwater quality data, if available;
   iv. soil conditions and runoff factors;
   v. wastewater characteristics (i.e., flow and nitrogen content); and,
   vi. other significant nitrogen sources in the impact area (e.g., livestock, other waste discharges, etc.).

c. A map of the project siting showing the location and dimensions of the proposed system(s) and the location of other nearby OWTS, wells and relevant hydrogeologic features (e.g., site topography, streams, drainage channels, subsurface drains, etc.) shall be provided.

d. The wastewater flow (average) used for nitrate loading analyses shall be as follows, unless adequately supported by other documentation or rationale:
   i. For individual residential systems: 50 gpd/bedroom;
   ii. For multi-family residential systems and other non-residential systems: average monthly wastewater flow for the proposed OWTS;

e. Minimum values used for the total nitrogen concentration of septic tank effluent shall be as follows, unless supported adequately by other documentation or rationale:
   i. Residential wastewater: 70 mg/l
   ii. Non-residential wastewater: as determined from sampling of comparable system(s) or from literature values.

EHD may require the use of more conservative values than cited above if the values are judged (by EHD) not likely to be representative of the proposed system(s).

f. All relevant calculations necessary for reviewing the nitrate loading analysis shall accompany the submittal.
g. Any measures proposed to mitigate or reduce the nitrate loading effects shall be presented and described as to their documented effectiveness elsewhere, special maintenance or monitoring requirements or other relevant factors.

7. Evaluation Criteria

a. **Groundwater Mounding.** The maximum acceptable rise of the water table for short periods of time (e.g., one to two weeks) during the wet weather season, as estimated from groundwater mounding analyses, shall be as follows:
    i. General Requirement for all OWTS. Groundwater mounding shall not result in more than a 50-percent reduction in the required minimum depth to seasonally high groundwater per Part 2.2 of this Manual, as applicable, for the type of OWTS and site conditions. For example, where a 5-foot vertical separation to the native groundwater level is required, a short-term "mounding" rise of the water table to within 2.5 feet of trench bottom would be acceptable during peak wet weather conditions. At no time shall groundwater rise to within 2 feet of trench bottom.
    ii. Requirement for Large Systems. Notwithstanding (a) above, for all OWTS with design flows of 2,500 gpd or more (i.e., "large systems"), the groundwater mounding analysis shall demonstrate that the minimum required groundwater separation, per Part 2.2 of this Manual, will be maintained beneath the system during peak wet weather conditions.

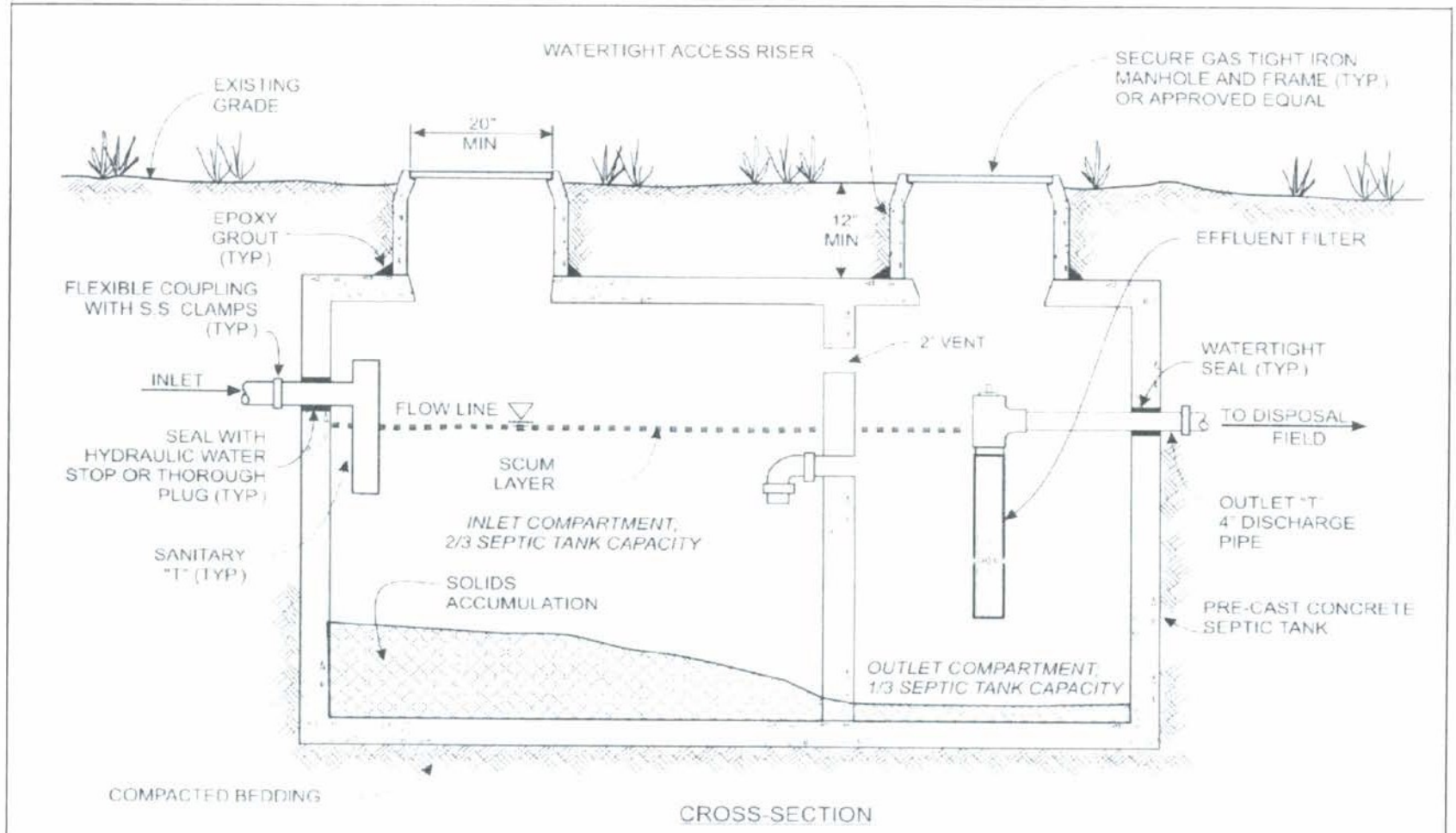
EHD may require, in any individual case or in specific geographical areas, a minimum of 2 feet of groundwater clearance ("mounded" conditions) where deemed necessary for protection of public health, or based upon specific requirements or recommendations of the Regional Water Board.

b. **Nitrate Loading.** Minimum criteria for evaluating the cumulative nitrate loading from proposed OWTS shall be as follows:
    i. For Areas Served By Individual Water Wells.
        (a) Existing Lots of Record: New OWTS on existing lots of record shall not cause the groundwater nitrate-nitrogen concentration to exceed 7.5 mg-N/L at the nearest existing or potential point of groundwater withdrawal (e.g., water well location);
        (b) New Subdivisions: The total loading of nitrate from new subdivisions shall not result in an average groundwater nitrate-nitrogen concentration over the geographical extent of the subdivision that exceeds 7.5 mg-N/L.
c. For Areas Not Served by Individual Water Wells.

i. Existing Lots of Record: OWTS installed on existing lots of record shall not cause the groundwater nitrate-nitrogen concentration to exceed 10 mg-N/L at the nearest existing or potential point of groundwater withdrawal (e.g., water well location); and

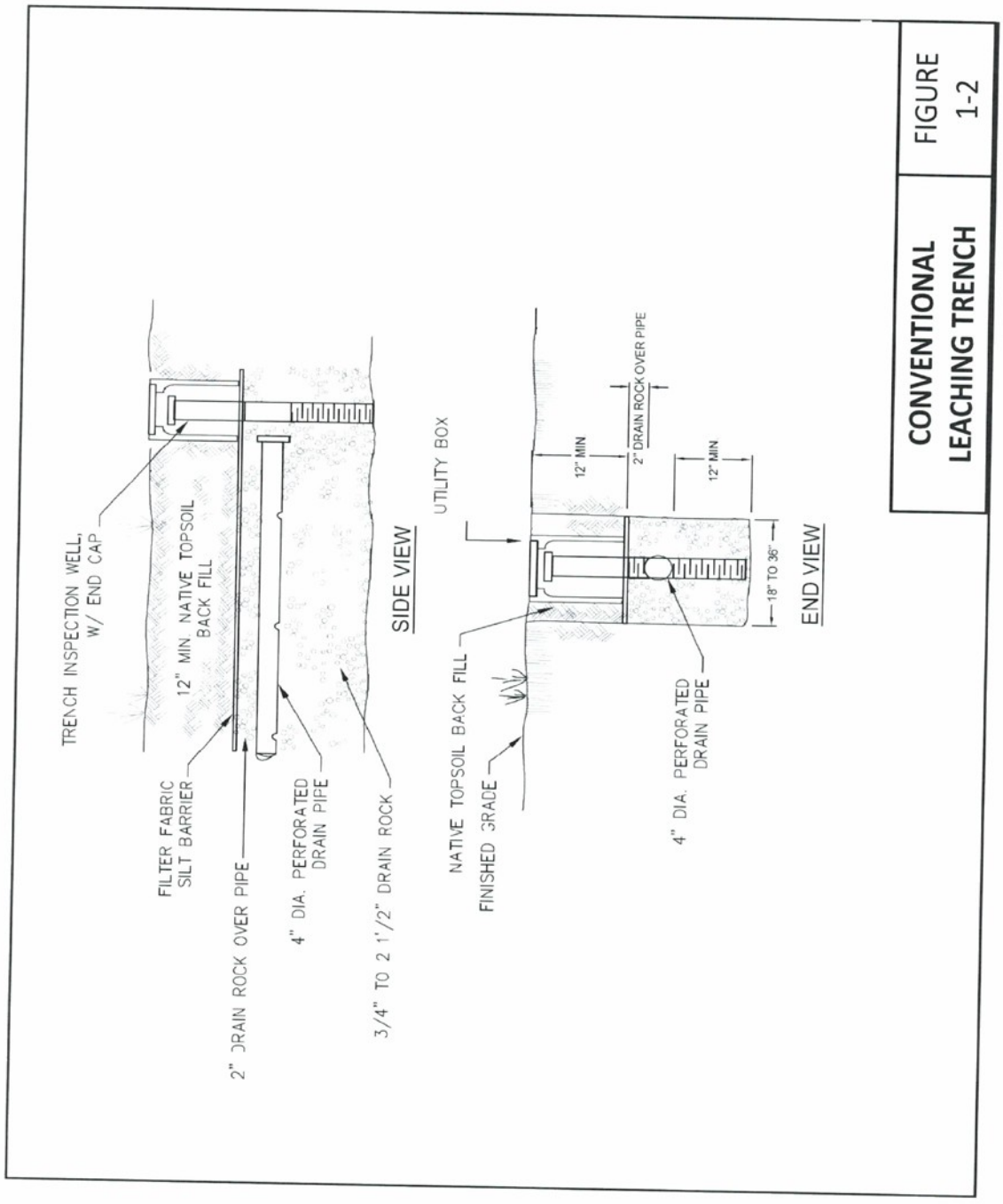
ii. New Subdivisions. The total loading of nitrate from new subdivisions shall not result in an average groundwater nitrate-nitrogen concentration over the geographical extent of the subdivision that exceeds 10 mg-N/L.

EHD may require, in any individual case or specific geographical areas, more stringent nitrate-nitrogen compliance criteria when deemed necessary for protection of public health, or based on specific requirements or recommendations of the RWQCB.



TYPICAL SEPTIC TANK

FIGURE 1-1



TYPICAL SEEPAGE PIT DESIGN

KERN COUNTY
ONSITE SYSTEMS MANUAL

PART 2

DESIGN GUIDELINES, POLICIES, AND PROCEDURES

Leach Line Requirements

Site plans for leach lines do not have to be done by an engineer unless they are required to be fully engineered. All commercial systems must be fully engineered. In general, residential systems do not require full engineering unless otherwise required by EHD. Factors such as rock outcroppings, high ground water concerns, high slopes, area history, etc., may require a residential project to be fully engineered as determined by EH.

Engineered leach line plans shall be prepared by a **Qualified Professional (QP)** or by an individual under the supervision of a QP. The following are considered QP: A California Professional Geologist, a California Certified Engineering Geologist, a California Registered Professional Engineer, California Registered Professional Soil/ Geotechnical Engineer, or a California Registered Environmental Health Specialist (REHS).

The following are requirements for a leach line application: *(Please address these points on the site plan and report.)*

1. A percolation test is required for all leach line applications; (Please refer to the information sheet titled “Percolation Test Requirements” for specifics.)

2. A site plan shall be included labeling the location of the following:
    a. Location of and size of septic tank;
    b. Location and type of leach lines (standard, special, or infiltrator);
    c. 100% expansion area;
    d. Location of distribution box;
    e. Location of residence(s) and number of bedrooms;
    f. Commercial systems will require a floor plan showing the location of all fixture; units along with a drainage fixture unit list;
    g. Location of water well(s), if any, within 100 feet of septic system;
    h. Location of any geological features (i.e. large streams, trees, rock outcroppings, rivers, etc.);
    i. All setbacks;
    j. Location of percolation testing;
    k. Cutout diagram of leach line;
    l. Proof that 15 feet to daylight principle can be met in sloping areas.

3. Three copies of site plan. If site plans are engineered, they shall be signed and wet stamped by the engineer;

4. Indicate soil type on report;

5. Location of septic system shall be staked out prior to initial site inspection;

6. Leach systems installed under concrete or asphalt require 25% additional leaching area;

7. Minimum 150 square feet of trench bottom shall be provided for each leach system (min. 50 ft. of line);

8. Maximum leach line length is 100 feet per line;

9. Show calculations used to size leach system.
    a. Ryon method may be used for systems that are fully engineered.

NOTES:

- Leach systems are not allowed in Type 1 soil.

- Mound system or systems requiring import of soil will have to be engineered and a percolation test conducted on imported material.

- Engineered plans require verification of no adverse geologic conditions (i.e. bedrock, groundwater) 7 feet below the bottom of the proposed trench.

- Advanced systems which require pumps, dosing chambers, timers, mechanical parts, etc. shall be engineered.

- Plans are valid one year from the date of approval.

Engineered Seepage Pit Feasibility Report Requirements

A feasibility report shall be prepared by a **Qualified Professional (QP)** or by an individual under the supervision of a QP. The following are considered QP: A California Professional Geologist, a California Certified Engineering Geologist, a California Registered Professional Engineer, California Registered Professional Soil/ Geotechnical Engineer or a California Registered Environmental Health Specialist.

The following are requirements for an engineered seepage pit: *(Please address these points in the feasibility report.)*

1. A log of the soils encountered in 5 ft. increments;

2. Description of the soil and soil type listed using California Plumbing Code (CPC)(type 1-4);

3. Soil boring shall be performed within 35 feet of the proposed seepage pit(s);

4. The location for soil boring shall be selected so as to provide a good representation of the entire leach system;

5. Verification of no adverse geologic conditions (i.e. bedrock, ground water) 12 feet below the bottom of the proposed pit;

6. A site plan shall be included labeling the location of the following:
    a. Location of and size of septic tank Location of seepage pits;
    b. 100% expansion area Location of distribution box;
    c. Location of residence(s) and number of bedrooms;
    d. Commercial systems will require a floor plan showing the location of all fixture units along with a drainage fixture unit list;
    e. Location of water well(s), if any, within 150 feet of septic system;
    f. Location of any geological features (i.e. large streams, trees, rock outcroppings, rivers, etc.);
    g. All setbacks;
    h. Location of soil borings.

7. Diagram of the proposed seepage pit including pit diameter, depth of inlet, and total depth;

8. Location of septic system shall be staked out prior to initial site inspection;

9. Diagram of the proposed septic tank;

10. Absorption capacity shall be calculated based on the quantity of liquid waste discharging and the character and porosity of the surrounding soil using CPC design criteria:
    a. Soil type **SHALL NOT** be averaged;

b. Total capacity shall be shown in gallons;
c. Show calculations.

11. Each report and site plan shall be wet stamped and signed with an original signature by the QP who either performed or supervised the testing.

NOTES:

- Seepage pits are not allowed in Type 1 or Type 5 soil. If either soil type is encountered, it shall not be counted in total absorption capacity. Excessive layers of Type 1 or 5 soil will necessitate installation of leach lines

- Properties with adequate space to install leach lines will not be allowed to install seepage pits.

- Commercial projects shall size their septic tank based on drainage fixture units or the estimated flow rate, whichever is greater. Provide list of fixtures and their drainage fixture units or show how the estimated flow rate was determined. Show location of fixtures on site plan.

- Plans are valid one year from the date of approval.

APPLICATION FOR SEPTIC SYSTEM PERMIT

Type of Septic System: ☐ Construct New ☐ Repair ☐ Engineered ☐	Permit #

MARK ONE OF THE BOXES BELOW FOR THE PARTY RESPONSIBLE FOR PAYMENT OF FEES

SITE INFORMATION			OWNER'S INFORMATION		
Site Address:			☐ **Name:**		
City: State: Zip:			Address:		
Source of Water ☐ **WELL** ☐ **PUBLIC**			City: State: Zip:		
APN:			Phone:		
Lot Size:			e-mail:		
ENGINEER / CONTRACTOR or CONTACT PERSON					
☐ **Engineer:**			☐ **Contractor:**		
Address:			Address:		
City:	State:	Zip:	City:	State:	Zip
Contact :	Phone:		Contact:	Phone:	
e-mail:			e-mail:		
Propose septic location has been staked/marked ☐ **YES** ☐ **NO**					

Description of work to be done_____

- **SEPTIC SYSTEM LOCATION MUST BE MARKED/STAKED OR RE-INSPECTION FEES WILL APPLY**
- PROVIDE THREE (3) SETS OF SEPTIC PLANS (Plans will be no larger than 11 X 17)
- REVIEW FEE OF $100 PER HOUR FOR ENGINEERED PLANS
- SITE INSPECTION FEE; $100 PER HOUR (When possible inspections are combined to minimize costs)

OFFICE USE ONLY

Site Inspection Approved By:_____
Printed Name Signature Date

Plans Approved By:_____
Printed Name Signature Date

Plans Rejected By:_____
Printed Name Signature Date

Billed:_____ **Site in Mountain/Groundwater Area** ☐ **YES** ☐ **NO**
Date

PERCOLATION TEST DATA LOG

COMPLETE THE FOLLOWING SHEET AND SUBMIT WITH PERCOLATION REPORT

SITE ADDRESS: _____

APN:_____ TEST PERFORMED BY: _____

TEST DATE: _____ TEST HOLES WERE PRESATURATED FOR_____HOURS

HOLE #	1				2				3			
DEPTH												
	TIME (MIN)		WATER LEVEL DROP (IN)	PERC RATE (MIN/IN)	TIME (MIN)		WATER LEVEL DROP (IN)	PERC RATE (MIN/IN)	TIME (MIN)		WATER LEVEL DROP (IN)	PERC RATE (MIN/IN)
	INITIAL	FINAL			INITIAL	FINAL			INITIAL	FINAL		

MINIMUM OF 2 TEST HOLES REQUIRED; MINIMUM OF 3 TEST PER HOLE REQUIRED; AVERAGE PERC RATE MAY BE USED IF 5 OR MORE TEST PER HOLE ARE PERFORMED, OTHERWISE SLOWEST PERC RATE SHALL BE USED.

NUMBER OF TESTS PER HOLE: ____

FINAL RATE TO BE USED IN DESIGN:_____MINUTES PER INCH. SOIL TYPE ☐☐☐☐☐

SIGNATURE OF QUALIFIED PROFESSIONAL: _____

TYPICAL SEWAGE DISPOSAL DESIGN CALCULATIONS

Minimum Horizontal Distance In Clear Required From:	Building Sewer	Septic Tank	Disposal Field	Seepage Pit
Buildings or structures	2 Feet	5 Feet	8 Feet	8 Feet
Property line adjoining private property	Clear	5 Feet	5 Feet	8 Feet
Water Supply Wells	50 Feet	100 Feet	100 Feet	150 Feet
Streams	50 Feet	*50 Feet	*100 Feet	100 Feet
Non-classified Streams	*25 Feet	*25 Feet	*25 Feet	* 25 Feet
Large Trees	-----	10 Feet	-----	10 Feet
Seepage Pits or Cesspools	-----	5 Feet	5 Feet	12 Feet
Disposal Field	-----	5 Feet	4 Feet	5 Feet
Domestic Water Line	1 Foot	5 Feet	5 Feet	5 Feet
Distribution Box	-----	-----	5 Feet	5 Feet
Pressure Public Water Main	25 Feet	25 Feet	25 Feet	25 Feet

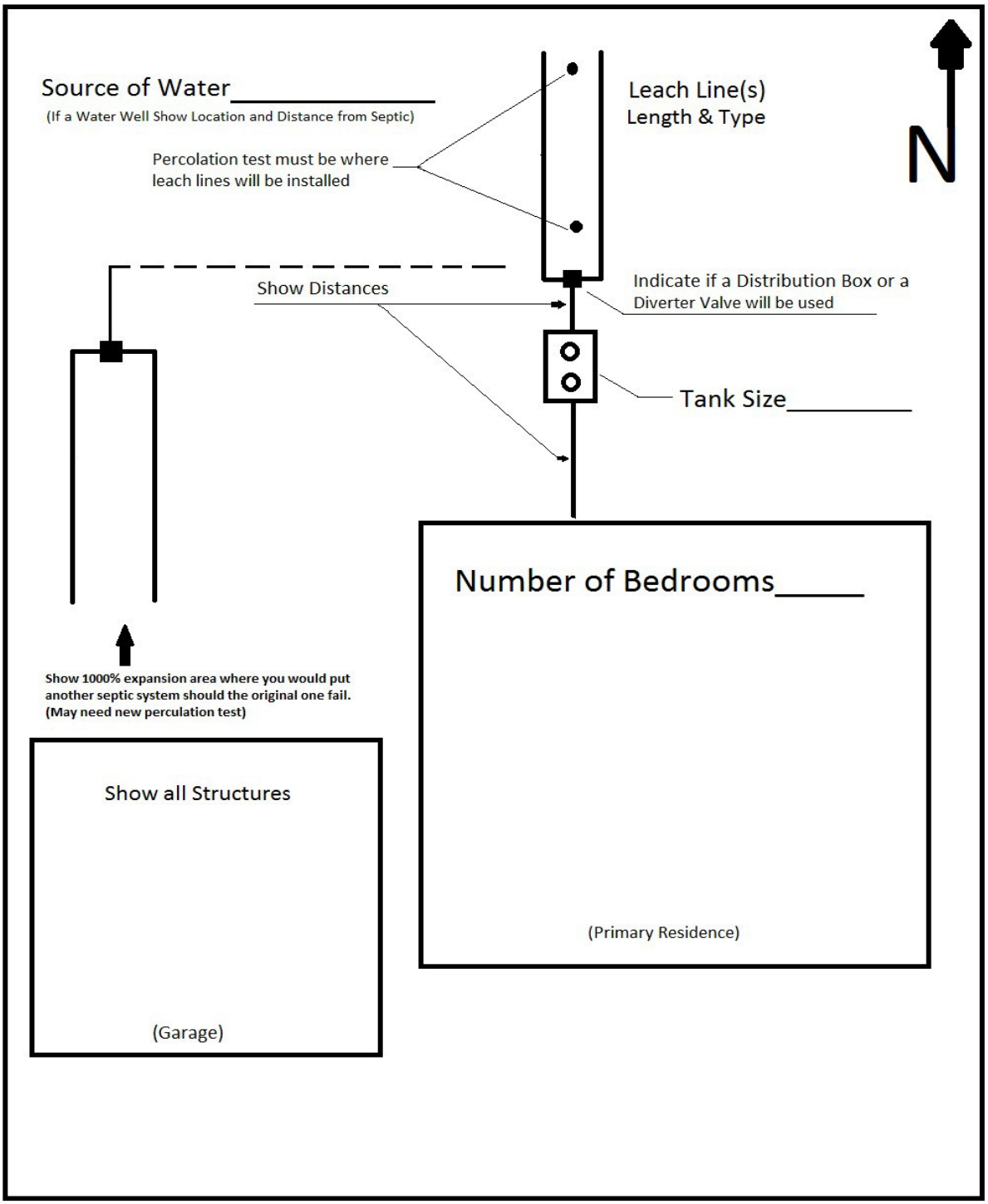
*** Per County Ordinance and Kern County Environmental Health Services Division**.

TABLE 11 - 4
AREA OF DISPOSAL FIELD
Required absorption area on square feet per one hundred (100) gallons of septic tank liquid capacity for five (5) types of soil.

Type of Soil	Square feet per 100 gallons
1. Coarse sand or gravel	20
2. Fine sand	25
3. Sandy loam or sandy clay	40
4. Clay with considerable sand or gravel	90
5. Clay with small amount of sand or gravel	120

*** Minimum Absorption Area is 150 Square Feet.**
Maximum Leach Line Length is 100 Feet.

EXAMPLE SEPTIC SITE PLAN



APN_____ Site Address_____

Show Street Location and Cross Streets

TYPICAL SEPTIC TANK SIZE DETAIL	KERN COUNTY ENVIRONMENTAL HEALTH DIVISION 2700 "M" STREET, SUITE 300 BAKERSFIELD, CA 93301 PHONE: (661) 862-8740

SINGLE-FAMILY DWELLING NUMBER OF BEDROOMS		MINIMUM SEPTIC TANK CAPACITY IN GALLONS
1 OR 2	SIZE OF TANK REQUIRED	750
3	SIZE OF TANK REQUIRED	1000
4	SIZE OF TANK REQUIRED	1200
5 OR 6	SIZE OF TANK REQUIRED	1500

EXAMPLE

GIVEN: 4-BEDROOM HOUSE OR MOBILE HOME - SILTY SOIL - U.P.C. TYPE 3

REQUIRED: 1200-GALLON SEPTIC TANK, SIZED FOR LEACHING AREA FOR SOIL TYPE 3, WHICH REQUIRES 40 SQ. FT. LEACHING PER 100 GALLONS OF TANK SIZE.

$\frac{1200}{100} \times 40 = 480$ SQ. FT. LEACHING AREA.

STANDARD LEACH TRENCH 480/3 SQ. FT. /FT. = 160 FT. USE TWO 80-FOOT-LONG LEACH LINES.

SPECIAL LEACH TRENCH $\frac{480}{7} = 68.6$ FT.

USE ONE 69-FOOT-LONG LEACH LINE.

Maximum length of any leach line is 100 feet. If over 100 feet is needed, then a distribution box is required with multiple lines 100 feet or less in length.

NOTE: The above drawing is intended as a guide for those desiring to prepare plans. Because of varying conditions from one project to another, details as shown may not meet the requirements of the Uniform Plumbing Code. A representative of the Kern County Department of Environmental Health Division will be happy to answer questions upon request.

TRENCH BOTTOM AREA OF DISPOSAL FIELDS

(Per Appendix I, Sections 13 and 16(i), Uniform Plumbing Code)

LEACH LINES

BOTTOM WIDTH OF TRENCHES

Length of Leach Lines in Feet	18 Inches Sq. Ft.	24 Inches Sq. Ft.	30 Inches Sq. Ft.	36 Inches Sq. Ft.
1	1.5	2	2.5	3
2	3	4	5	6
3	5	6	8	9
4	6	8	10	12
5	8	10	13	15
10	15	20	25	30
20	30	40	50	60
30	45	60	75	90
40	60	80	100	120
50	75	100	125	150
60	90	120	150	180
70	105	140	175	210
80	120	160	200	240
90	135	180	225	270
100	150	200	250	300

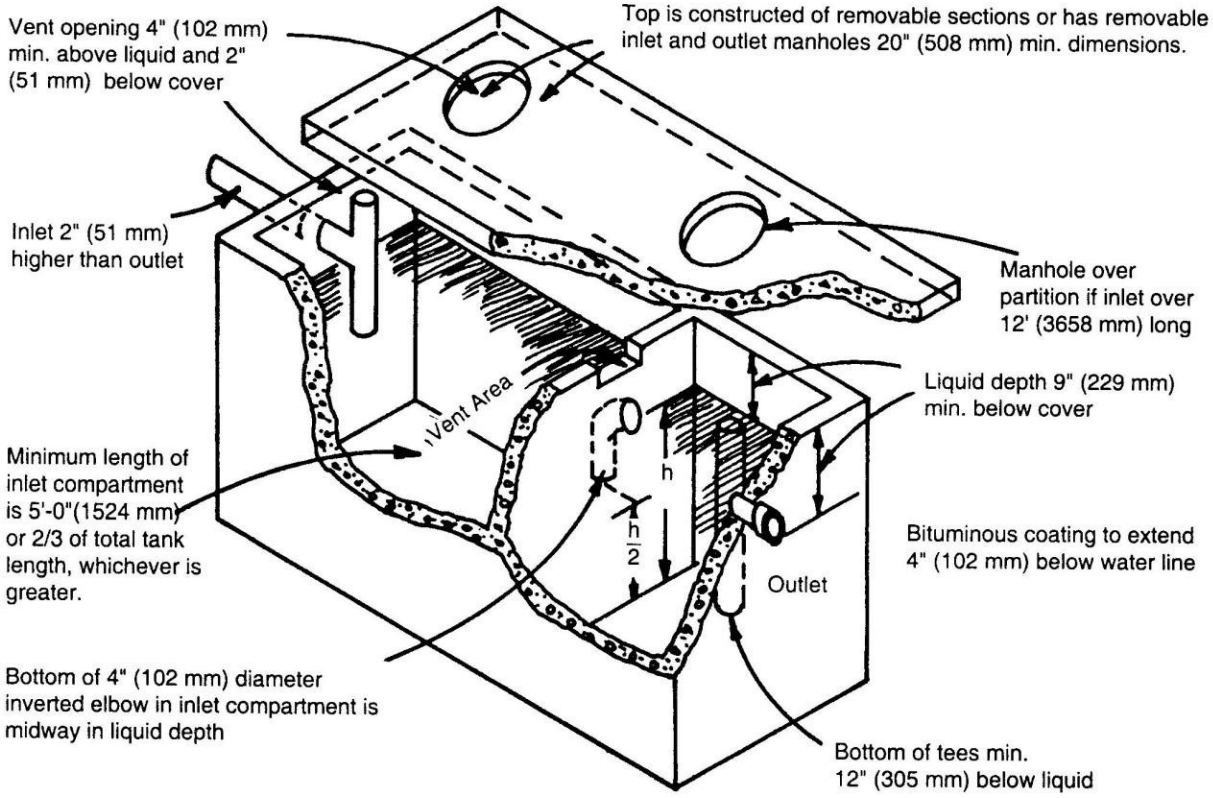
(04/28/99)

Effective sidewall absorption areas of seepage pits (per Appendix I, Sections 13 + 17, Uniform Plumbing Code). The effective absorption area should be exclusive of bedrock or impervious soils. Minimum of 12 feet to groundwater - diameters greater than 6 feet requires prior approval of the Administrative Authority.

Seepage Pit Sidewall Area			
Depth Feet Below Inlet	**3' Diameter**	**4' Diameter**	**5' Diameter**
	SQ. FT.	SQ. FT.	SQ. FT.
1	9	13	16
2	19	25	31
3	28	38	47
4	38	50	63
5	47	63	79
6	56	75	94
7	66	88	110
8	75	101	126
9	85	113	141
10	94	126	157
11	104	138	173
12	113	151	189
13	122	163	204
14	132	176	220
15	141	189	236
16	150	201	251
17	160	214	267
18	169	226	283
19	179	239	299
20	188	251	314
21	198	264	330
22	207	277	346
23	217	289	361
24	226	302	377
25	236	314	393
26	245	327	408
27	254	339	424
28	264	352	440
29	273	364	456
30	283	377	471
31	292	390	487
32	301	402	503
33	310	415	518
34	320	427	534
35	330	440	550
36	339	452	566
37	348	465	581
38	358	478	597
39	367	490	613
40	377	503	628
41	386	515	644
42	395	528	660
43	405	540	675
44	415	553	691
45	424	566	707
46	433	578	723
47	442	591	738
48	452	603	754
49	462	616	770
50	471	628	785

ENVIRONMENTAL HEALTH SERVICES DIVISION L31 (05/31/96)

Septic Tank Detail



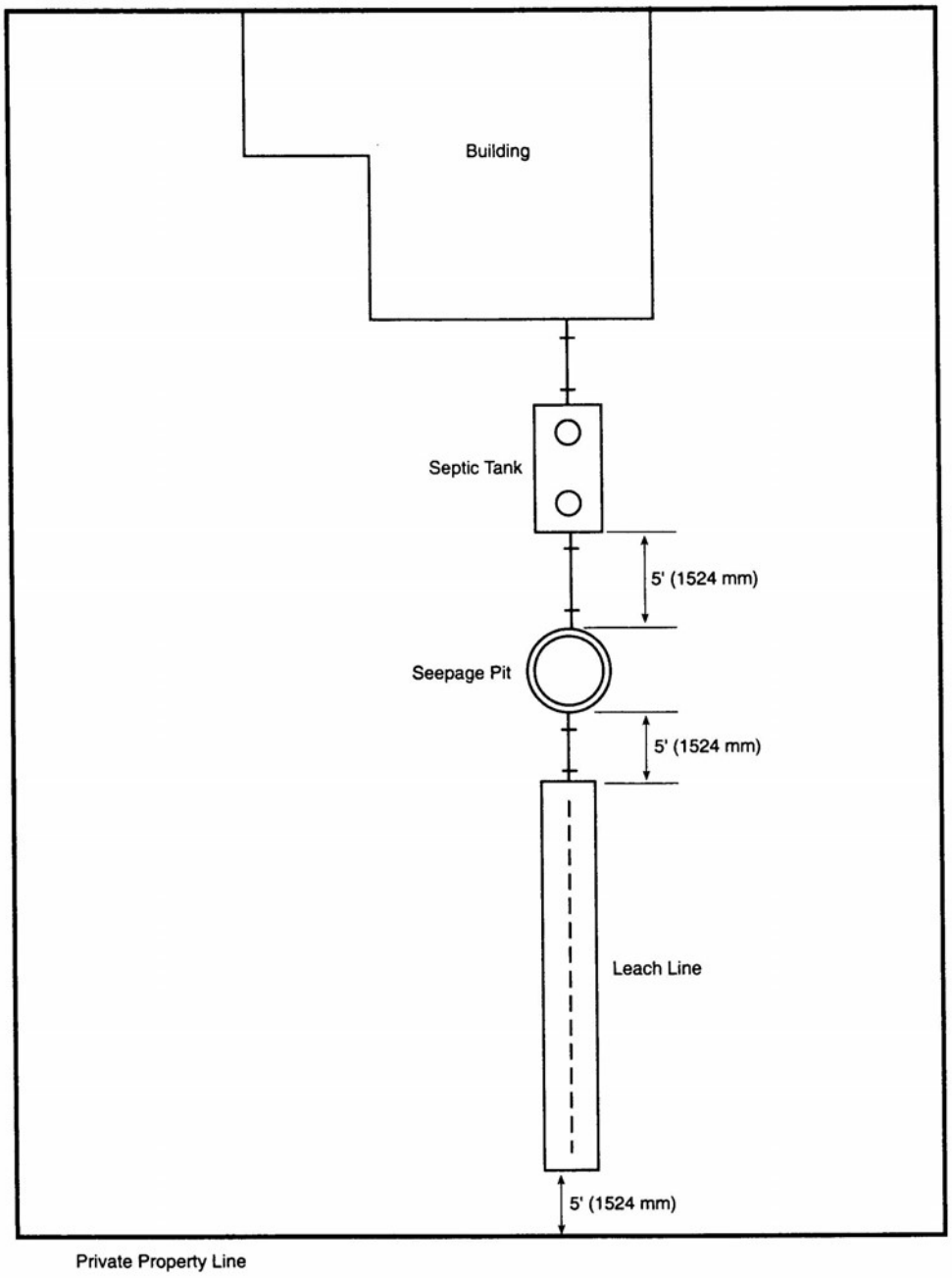
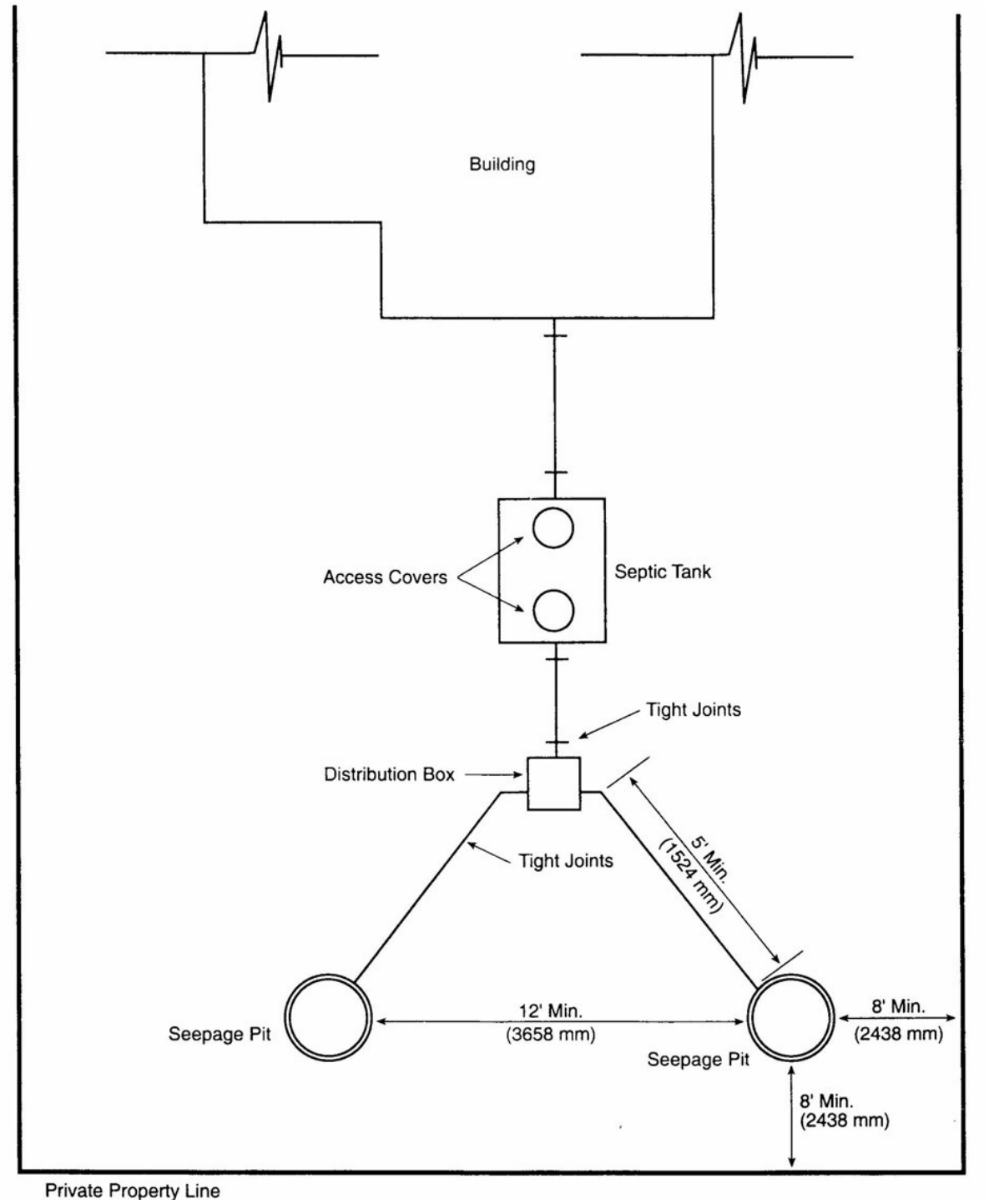


Figure K-4
Septic Tank System with a Combination Seepage Pit and Leach Line

App. K, Pg. 5

SEPTIC TANK WITH SEEPAGE PITS



SEPTIC SYSTEM LOCATED IN SLOPED TERRAIN

KERN COUNTY
ONSITE SYSTEMS MANUAL

PART 3

REQUIREMENTS FOR ALTERNATIVE OWTS

3.0 Introduction

GENERAL

"Alternative OWTS" is a type of OWTS that utilizes either a method of wastewater treatment other than a conventional septic tank for the purpose of producing a higher quality wastewater effluent and/or a method of wastewater dispersal other than a gravity-fed disposal trench or seepage pit for effluent dispersal.

As provided in the Kern County Code (Article 3), Alternative OWTS may be used for system repairs, existing lots of record, and for land divisions, in accordance with conditions and requirements in Part 5 of this Manual as approved by the Director.

This section of the Onsite Systems Manual provides technical guidance and requirements for the application, design, construction and management of various alternative onsite wastewater treatment and dispersal technologies suited to the conditions and constraints in Kern County.

ALTERNATIVE TREATMENT SYSTEMS

Requirements are provided for the following alternative treatment systems:

1. Intermittent Sand Filters

2. Proprietary Treatment Units

County Code allows for the future addition of other alternative treatment systems, as may be approved by the Director and the appropriate California Regional Water Quality Control Board(s). Upon approval, such other alternative treatment systems will be incorporated into this Manual, including a listing of applicable requirements, similar to the information provided for intermittent sand filters and proprietary treatment units.

Dispersal systems receiving effluent from an alternative treatment system shall be sited, designed and constructed in accordance with the respective design and construction requirements for the particular type of dispersal system (e.g., conventional trenches, pressure distribution, mound system, at-grade or drip dispersal), as specified in this Manual.

ALTERNATIVE DISPERSAL SYSTEMS

Requirements are provided for the following types of alternative dispersal systems.

1. Pressure Distribution Trenches

2. Mound Systems

3. At-grade Systems

4. Raised Sand Filter Bed (aka Open-bottom Sand Filter)

5. Subsurface Drip Dispersal

County Code allows for the future addition of other alternative dispersal systems, as may be approved by the Director and the appropriate California Regional Water Quality Control Board(s). Upon approval, such other alternative dispersal systems will be incorporated into this Manual, including a listing of applicable requirements, similar to the information provided for pressure distribution trench systems and subsurface drip dispersal.

DEPTH TO GROUNDWATER REQUIREMENTS

A primary basis for using alternative OWTS is to compensate for reduced vertical separation distance to groundwater below the dispersal system. **Table 3-1** summarizes the depth to groundwater requirements that apply to conventional OWTS and various types of alternative OWTS. Seepage pits (not displayed in the table) normally require 12-ft vertical separation to groundwater, which can be reduced to 10-ft separation where supplemental treatment is used.

Table 3-1.
Depth to Groundwater Requirements for Conventional and Alternative OWTS
(feet, below trench bottom)

Type of OWTS	Percolation Rate (MPI)	Min. Depth to Groundwater (feet)		
		2	3	7
Conventional Septic Tank & Dispersal Trench	1-60			X
Conventional Trench w/Supplemental Treatment Pressure Distribution (PD) Trench At-grade (1-60 mpi only)	1-120		X	
Pressure Distribution w/Supplemental Treatment Mound At-grade w/Supplemental Treatment Raised Sand Filter Bed Drip Dispersal w/Supplemental Treatment	1-120	X		

OPERATION AND MAINTENANCE GUIDELINES

Operation and maintenance guidelines for each alternative OWTS installation shall be supplied to the system owner by the designer, with a copy also provided to EHD. Final approval of system installation shall be contingent upon confirmation by EHD that required operation and maintenance guidelines have been provided.

Minimum items expected to be contained in the operation and maintenance guidelines include the following:

1. General description of the OWTS, design capacity, and any special permit or operating conditions;

2. Brief description of the key components and their function;

3. For each component, describe recommended inspection and maintenance activities, including frequency; provide copies of manufacturer operation and maintenance instructions and “trouble-shooting” guides, as applicable;

4. General preventative measures for proper use and maintenance of the OWTS (e.g., “Dos and Don’ts”);

5. Copy of system plans or “as-built” drawings, as applicable.

6. Contact information for the following:
    a. Designer
    b. Installer
    c. Maintenance contractor
    d. Environmental Health Division

7. Other information, references or documents, as appropriate.

3.1 Requirements for Intermittent Sand Filters

DESCRIPTION

Intermittent sand filters (ISF) are used to provide supplemental treatment of septic tank effluent prior to discharge to the dispersal system. They are used to improve or restore the capacity of the dispersal field, reduce pathogenic bacteria and can provide additional nitrogen removal.

Sand filtration is well established in sanitary engineering practice for more than 100 years as a passive, reliable "biofilm" treatment process. An ISF consists of a packed-bed filter of medium-grained sand, designed for single pass-through treatment of septic tank effluent; it is sometimes referred to as a "single pass filter".

Effluent from sand filters may be discharged to conventional leach fields and to any type of alternative dispersal system identified in this Manual. Effluent from an ISF designed and operated in accordance with these requirements will be considered to meet the criteria for "supplemental treatment".

SITING CRITERIA

1. **Sand Filter Treatment Unit**. All siting criteria for septic tanks as specified Part 1 of this Manual shall also apply to intermittent sand filters and associated tanks and pumping units.

2. **Dispersal Systems Receiving Sand Filter Effluent**. Dispersal systems receiving sand filter effluent are subject to all siting criteria for conventional septic tank-dispersal trench systems, with certain exceptions as noted. Exceptions allowed for supplemental treatment may include reduction in vertical separation distance to groundwater from standard 7 feet to minimum of 3 feet or 2 feet (measured from bottom of dispersal trench), depending upon the type of dispersal system. Refer to the adopted requirements for the specific type of dispersal system for applicable requirements and supplemental treatment allowances.

DESIGN CRITERIA

1. **Septic Tank Pretreatment**. Sand filter treatment units shall be preceded by a septic tank, sized for the projected wastewater flow for the structure or facility being served, determined in accordance with wastewater flow estimation requirements in Part 1 of this Manual.

2. **Pressure Dosing**. Septic tank effluent shall be applied to the sand filter treatment unit by pressure dosing (i.e., pump system). The pressure distribution system shall be designed in accordance with accepted engineering practices to achieve, at a minimum:
    b. Uniform dosing of effluent over the surface application area of the sand filter

distribution bed;

c. Adequate flow rate, screening of effluent and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;
d. Suitable access provisions for inspection, testing and adjustment of the pressure distribution system;
e. Dosing volume set to achieve a minimum of 3 to 5 doses per day at design flow conditions; and
f. At least one distribution lateral for every 36 inches of bed width.

Additional requirements for the design and construction of pressure distribution systems contained in "Requirements for Pressure Distribution Systems" shall also apply.

Also, where a sand filter is used in conjunction with a gravity-fed dispersal system, the dosing pump system for the sand filter shall provide emergency storage capacity equal to at least one full day of wastewater flow at design conditions.

3. **Wastewater Application Rate**. The wastewater application rate used for sizing the surface area of the sand filter shall be as follows:
   a. 1.2 gpd/ft.^{2} for individual residential OWTS
   b. 1.0 gpd/ft.^{2} for all commercial, industrial, institutional, and multi-residential OWTS

   Reduction in the above wastewater loading rates or other provisions to insure the long-term integrity and performance of the sand filter may be required for high strength waste flows, such as those from restaurants.

4. **Containment Liner**. The sand filter shall be provided with an impermeable containment liner to prevent leakage out of or into the filter. The liner shall consist of either: (a) 30 mil plastic; (b) reinforced poured-in-placed concrete; or (c) an equivalent impermeable structure or barrier.

5. **Finished Grade**. The finished grade of the sand filter shall be at or above the surrounding ground elevation. Above-ground installation shall be structurally supported with retaining wall(s), as required.

6. **Shape**. The sand filter shall not be restricted as to its shape in plain view; i.e., it may be square, rectangular or an irregular shape.

7. **Multiple Units**. The sand filter may be divided into compartments or multiple units.

8. **Sand Filter Media**
   a. **Sand Specification**. The sand media shall be a medium to coarse sand that meets the gradation specifications in **Table SF-1**:
   b. **Sand Depth**. The minimum sand depth below the gravel distribution bed shall be 24 inches.

Table SF-1. Sand Media Specifications

Sieve Size	Percent Passing
3/8	100
#4	90-100
#10	62-100
#16	45-62
#30	25-55
#50	5-20
#60	0-10
#100	0-4
#200	0-2

Documentation of laboratory sieve analysis results for the proposed sand fill material shall be supplied to EHD to verify conformance with the above specifications.

9. **Gravel Distribution Bed**
    a. **Material**. The distribution bed shall consist of 3/8-inch double-washed pea gravel, substantially free of fines.
    b. **Depth**. Pea gravel shall extend a minimum of 6 inches below the invert and 2 inches above the top of the distribution piping. If the distribution piping is installed with chambers, the pea gravel depth below the distribution pipe may be reduced from 6 inches to 4 inches, and the 2-inch pea gravel cover may be eliminated.

10. **Silt Barrier**. The gravel distribution bed shall be covered in its entirety with a geotextile ("filter fabric") silt barrier. Filter fabric shall be either polyester, nylon or polypropylene, or any combination thereof, and shall be similar to that used for under-drain applications. Filter fabric shall be non-woven, shall not act as a wicking agent and shall be permeable.

11. **Cover**
    a. **Material**. A soil cover shall be placed over the distribution bed, consisting of a medium, loamy-textured soil.
    b. **Depth**. Soil cover depth shall be a minimum of 12 inches and a maximum of 18 inches over the top of the distribution bed. Soil cover shall be crowned or sloped to promote rainfall runoff.

12. **Under-drain**
    a. **Material**. The under-drain beneath the sand media shall consist of 3/8" washed pea gravel with 4-inch diameter perforated drain pipe, installed with perforations oriented down.
    b. **Depth**. The pea gravel under-drain shall have a minimum depth of 9 inches.
    c. **Grade**. The under-drain shall be constructed and the drain pipe set with a minimum grade of 1% toward the outlet point.

d. **Watertight Outlet "Boot"**. The sand filter under-drain shall be equipped with a watertight outlet "boot" for connection of piping to the dosing tank. An exception to this is for intermittent sand filters that are equipped with an internal pump system for direct dosing to the disposal field (see paragraph #15 below).
e. **Clean-out Riser**. For clean-out and inspection purposes the upslope end of the perforated drain pipe in the under-drain shall be equipped with a vertical riser constructed of non-perforated pipe of equal diameter. The riser shall extend to finished grade of the sand filter.

13. **Air Manifold.** An air manifold shall be installed within the pea gravel under-drain for the purpose of introducing forced air to into the sand filter media, as needed, for maintenance or drainage rehabilitation. The air manifold shall consist of small diameter PVC piping, with drilled perforations (pointed down), and positioned above the perforated under-drain pipe. The manifold shall be connected to a vertical leader pipe that extends to the surface of the sand filter, fitted with a threaded pipe cap or plug at the top where a portable airline can be connected. Alternate manifold designs (e.g., using drip tubing) that achieve the same objectives may be considered and approved by EHD.

14. **Inspection Standpipes**. A vertical inspection standpipe shall be installed in the gravel distribution bed of each sand filter compartment. The pipe shall extend from finished grade to the pea gravel-sand interface of the distribution bed and shall be perforated in the pea gravel zone only. Inspection standpipes shall be 2-inch to 4-inch diameter plastic pipe and fitted with a wrench-tight cap or pipe plug. Perforations shall consist of hacksaw slots at nominal 1" spacing; alternatively, commercially slotted pipe may be used. Inspection pipes shall be sealed against surface infiltration with a bentonite or concrete annular seal through the soil backfill zone.

15. **Internal Pump System**. In lieu of gravity flow from the sand filter to the dispersal field (or dispersal field dosing system), an internal pump system may be installed within the intermittent sand filter for dosing directly to the dispersal field. In such applications:
    a. pump chamber shall be seated at or below the bottom of the under-drain;
    b. pump operating depth shall be entirely within the depth of the under-drain; and,
    c. storage volume equal to at least 50 percent of the disposal field dose volume shall be provided in the network of perforated drain pipe within the under-drain.

ENGINEERING PLANS AND CONSTRUCTION

1. **Reference Guidelines**. In addition to the requirements set forth herein, design and construction of sand filter systems shall utilize applicable guidelines contained in the following references:
    a. "Onsite Wastewater Treatment Systems Manual", U.S. Environmental Protection Agency, February 2002 and as amended.
    b. “Design Manual – Onsite Wastewater Treatment and Disposal Systems”, U.S. Environmental Protection Agency, October 1980.

2. **Engineering Plans.** Engineering plans for sand filter systems shall include:
    a. All relevant elevation data and hydraulic calculations;
    b. Specific step-by-step construction guidelines and notes for use by the installer;
    c. Recommended make and model of all components;
    d. Recommended pump system components, with cut-sheet depicting float settings;
    e. Control panel programming;
    f. Inspection schedule listing critical control points; and
    g. Operation and maintenance guidelines.

3. **Construction Inspection.** At a minimum, inspection of the sand filter system installation should include the items listed below. Joint inspection by the designer, contractor, and EHD may be required.
    a. Pre-construction inspection where the construction staking or marking of the sand filter is provided and construction procedures discussed;
    b. Water tightness of septic tank and dosing (pump) tank;
    c. Sand filter dimensions, structure and liner;
    d. Under-drain piping and filter rock;
    e. Sand quality and placement;
    f. Piping installation and hydraulic ("squirt") test of the distribution system;
    g. Functioning and setting of all control devices; and
    h. Final inspection to verify that all construction elements are in conformance with the approved plans and specifications, all inspection wells are installed, erosion control has been completed, and operation and maintenance guidelines provided for owner.

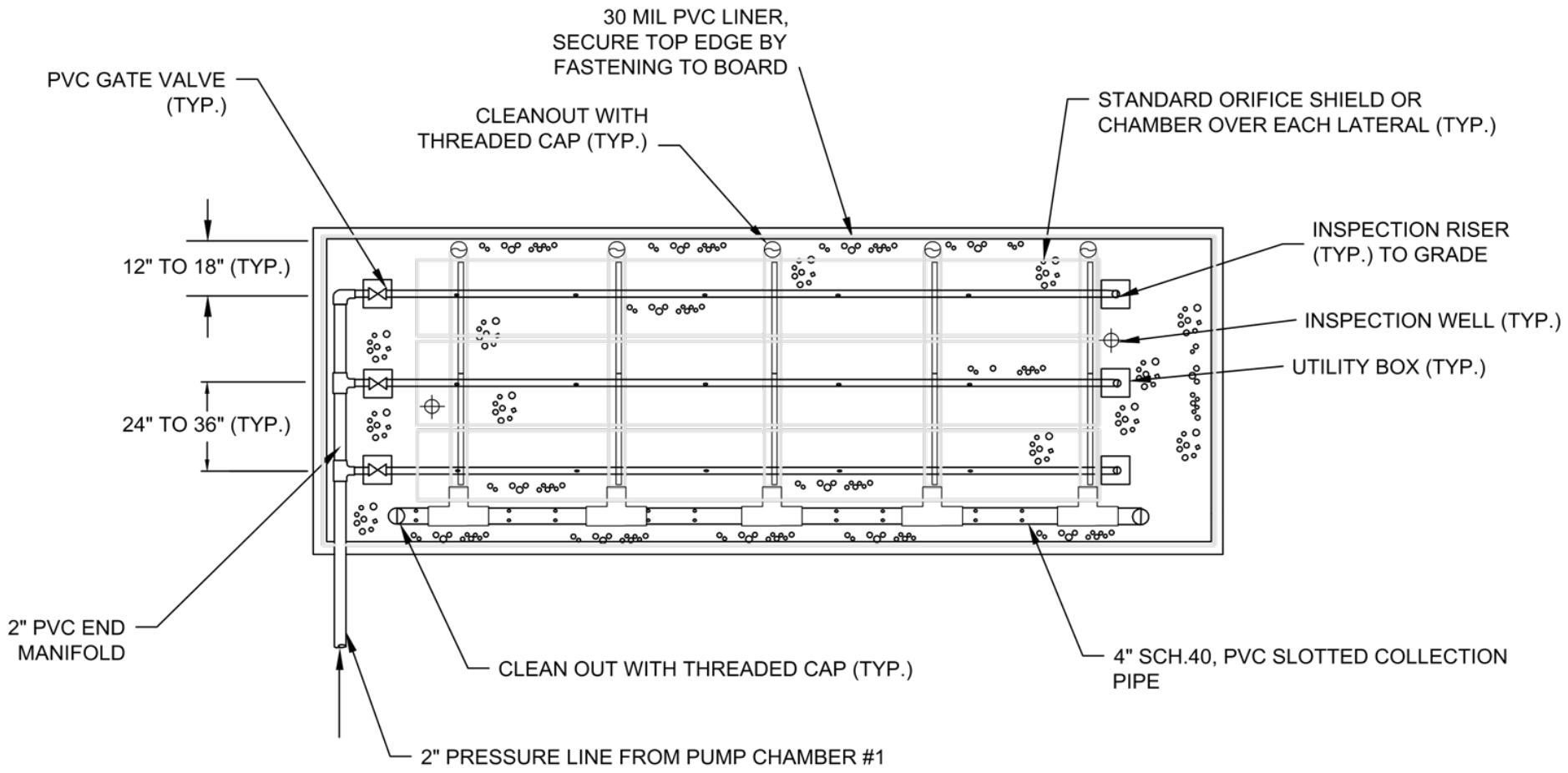
MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring and reporting activities for intermittent sand filter system are outlined in Table SF-2 below.

Table SF-2. Intermittent Sand Filter System Management Requirements

	Work	Minimum Frequency
Inspection	• Observe surface conditions on and around filter for effluent leakage, drainage/infiltration, erosion or other problems. • Check/measure water level in inspection standpipes in filter bed. • Perform all inspection work as recommended by designer or equipment manufacturer. • Perform inspection protocol for pump systems (per O&M Guidelines and Performance Evaluation Guidelines, Part 4 of this Manual). • Record observations.	• According to permit conditions, typically every 6 to 12 months, depending on system size, usage, and history.

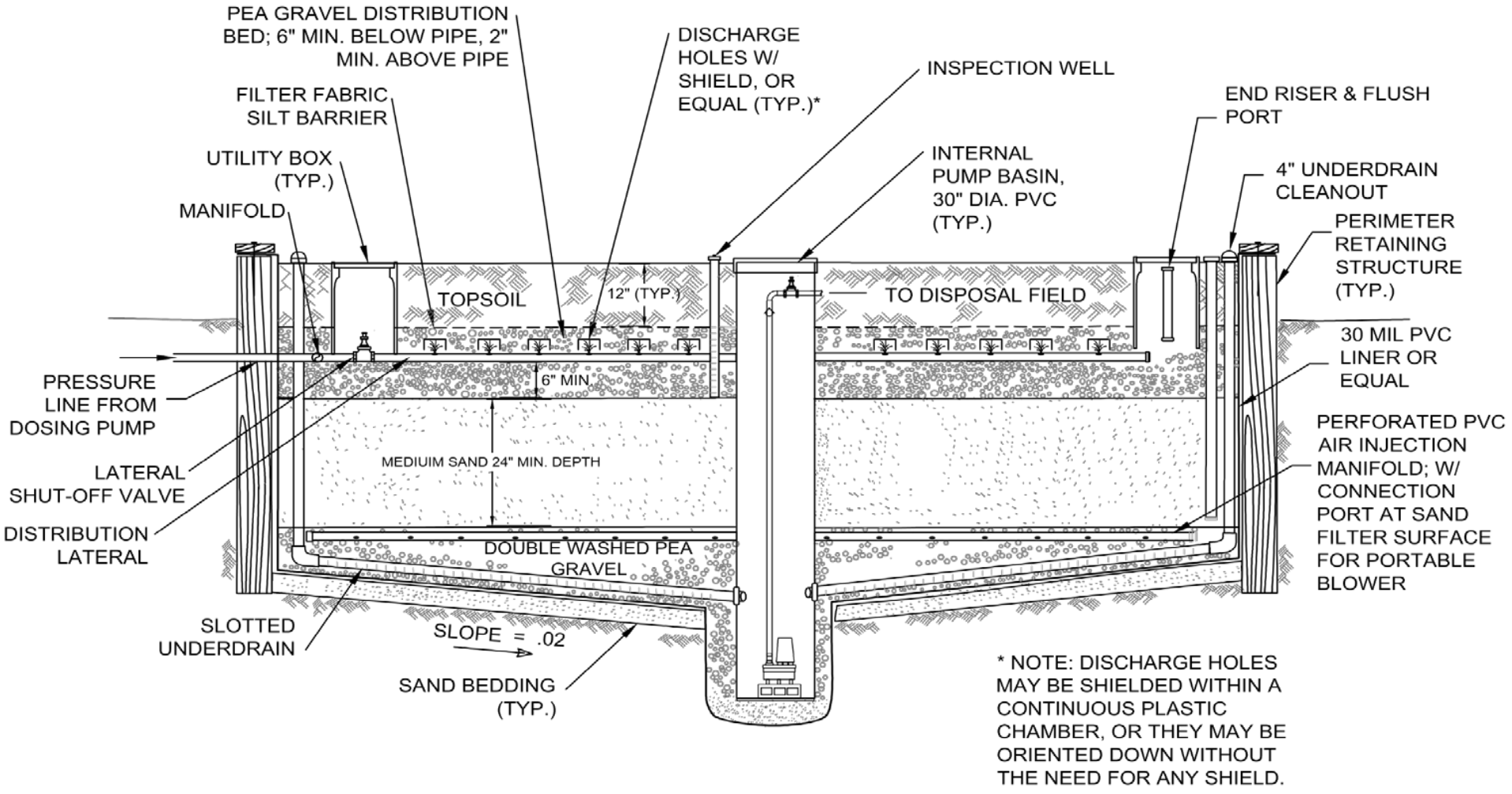
Maintenance	• Purge laterals. • Perform squirt and balance laterals. • Exercise valves to ensure functionality. • Perform all maintenance work as recommended by designer or equipment manufacturer. • Record work done.	• According to permit conditions, typically every 6 to 12 months, depending on system size, usage, and history. • Responsive maintenance as necessary.
Water Monitoring & Sampling	• Report observation findings and maintenance actions, including notation of problems and corrective actions. • Record dose counter and elapsed time meter readings from control panel.	• According to permit conditions, if applicable.
Reporting	• Report findings to EHD per permit requirements. • Standard report to describe findings, analyze performance, and detail actions taken. • Report emergency or failure conditions to EHD immediately.	• According to permit conditions, typically every year, depending on system size, usage, history, location.

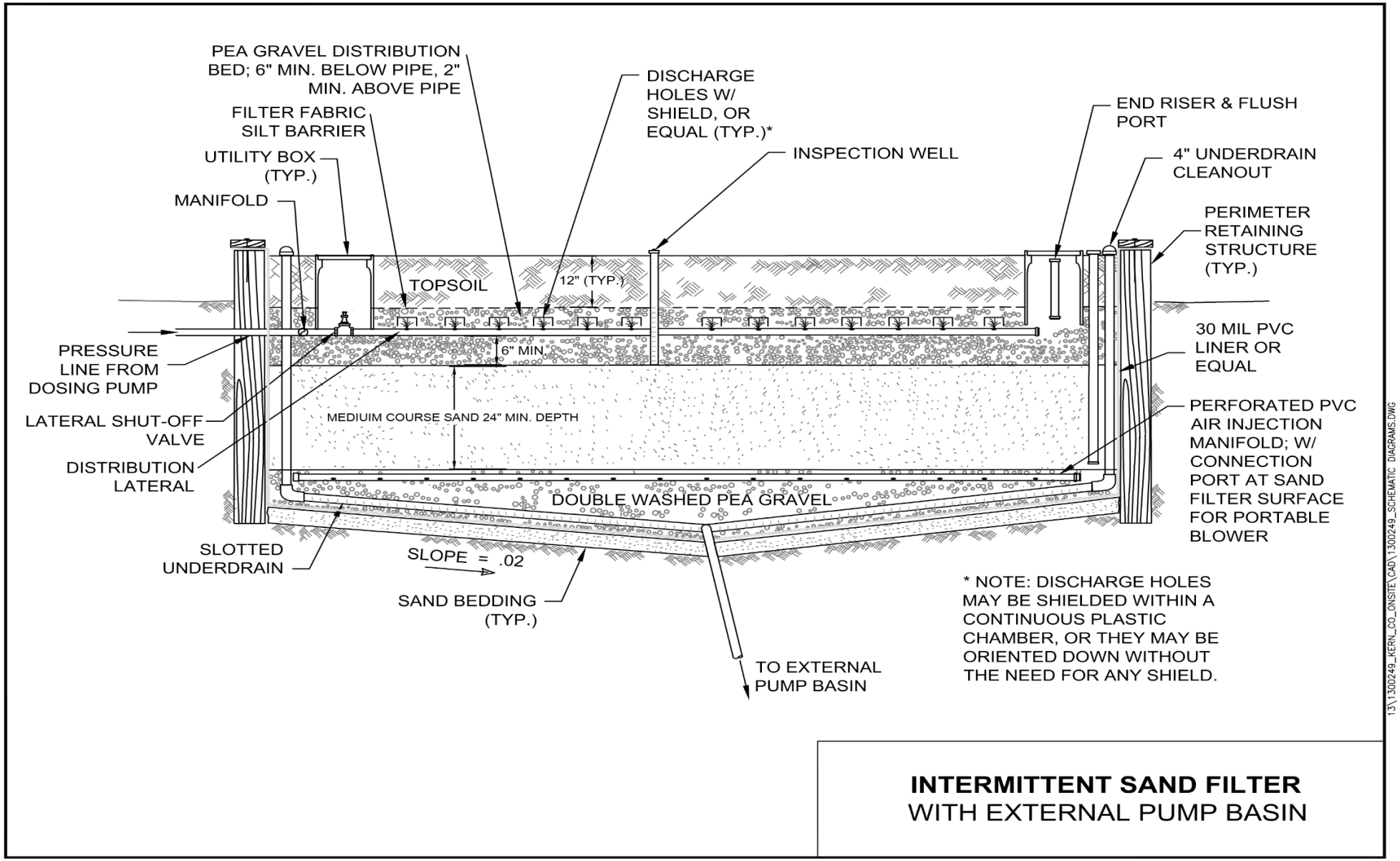


PLAN VIEW

13\1300249_KERN_CO_ONSITE\CAD\1300249_SCHEMATIC DIAGRAMS.DWG

INTERMITTENT SAND FILTER
PLAN VIEW


PEA GRAVEL DISTRIBUTION BED; 6" MIN. BELOW PIPE, 2" MIN. ABOVE PIPE
FILTER FABRIC SILT BARRIER
UTILITY BOX (TYP.)
MANIFOLD
DISCHARGE HOLES W/ SHIELD, OR EQUAL (TYP.)*
INSPECTION WELL
INTERNAL PUMP BASIN, 30" DIA. PVC (TYP.)
END RISER & FLUSH PORT
4" UNDERDRAIN CLEANOUT
PERIMETER RETAINING STRUCTURE (TYP.)
TOPSOIL
12" (TYP.)
TO DISPOSAL FIELD
30 MIL PVC LINER OR EQUAL
6" MIN.
PRESSURE LINE FROM DOSING PUMP
MEDIUIM SAND 24" MIN. DEPTH
LATERAL SHUT-OFF VALVE
DISTRIBUTION LATERAL
PERFORATED PVC AIR INJECTION MANIFOLD; W/ CONNECTION PORT AT SAND FILTER SURFACE FOR PORTABLE BLOWER
DOUBLE WASHED PEA GRAVEL
SLOTTED UNDERDRAIN
SLOPE = .02
SAND BEDDING (TYP.)
* NOTE: DISCHARGE HOLES MAY BE SHIELDED WITHIN A CONTINUOUS PLASTIC CHAMBER, OR THEY MAY BE ORIENTED DOWN WITHOUT THE NEED FOR ANY SHIELD.
INTERMITTENT SAND FILTER
WITH INTERNAL PUMP BASIN
131\1300249_KERN_CO_ONSITE\CAD\1300249_SCHEMATIC DIAGRAMS.DWG


PEA GRAVEL DISTRIBUTION BED; 6" MIN. BELOW PIPE, 2" MIN. ABOVE PIPE
FILTER FABRIC SILT BARRIER
UTILITY BOX (TYP.)
MANIFOLD
DISCHARGE HOLES W/ SHIELD, OR EQUAL (TYP.)*
INSPECTION WELL
END RISER & FLUSH PORT
4" UNDERDRAIN CLEANOUT
PERIMETER RETAINING STRUCTURE (TYP.)
TOPSOIL
12" (TYP.)
6" MIN.
30 MIL PVC LINER OR EQUAL
PRESSURE LINE FROM DOSING PUMP
LATERAL SHUT-OFF VALVE
DISTRIBUTION LATERAL
MEDIUIM COURSE SAND 24" MIN. DEPTH
PERFORATED PVC AIR INJECTION MANIFOLD; W/ CONNECTION PORT AT SAND FILTER SURFACE FOR PORTABLE BLOWER
DOUBLE WASHED PEA GRAVEL
SLOTTED UNDERDRAIN
SLOPE = .02
SAND BEDDING (TYP.)
TO EXTERNAL PUMP BASIN
* NOTE: DISCHARGE HOLES MAY BE SHIELDED WITHIN A CONTINUOUS PLASTIC CHAMBER, OR THEY MAY BE ORIENTED DOWN WITHOUT THE NEED FOR ANY SHIELD.
13\13002249_KERN_CO_ONSITE\CAD\13002249_SCHEMATIC DIAGRAMS.DWG
INTERMITTENT SAND FILTER
WITH EXTERNAL PUMP BASIN

3.2 Requirements for Proprietary Treatment Units

DESCRIPTION

Propriety treatment units cover a category of manufactured or "package" systems specifically developed for residential and other small-scale sewage treatment applications. Most proprietary designs currently available fall into two general categories: (1) aerobic treatment units (ATUs); and (2) media filters.

1. **Aerobic Treatment Units (ATUs).** ATUs utilize forced air to oxidize the wastewater, promoting aerobic decomposition of the wastewater solids. These systems provide supplemental treatment of wastewater for improvement in dispersal field performance; they also provide varying degrees of nitrogen removal. In general, ATUs can be relied on to produce secondary quality effluent, better than 30 mg/L BOD and TSS. ATUs are generally not as effective in reducing pathogen levels as are systems that incorporate media filtration. However, some ATUs provide reduction in nitrogen levels equal to or greater than that provided by sand filters and other media filters.

2. **Media Filters.** This includes proprietary designs that function similar to sand filters. In these systems the sand is replaced with an alternate media; peat, gravel or textile are a few examples. Textile and other media filters have been found to produce effluent quality reasonably similar to recirculating sand filters, and provide similar capabilities in overcoming various soil and site constraints.

Effluent from proprietary treatment units may be discharged to conventional dispersal trenches and to any type of alternative dispersal system identified in this Manual. Effluent from proprietary treatment units designed and operated in accordance with these guidelines will be considered to meet the criteria for "supplemental treatment".

SITING CRITERIA

1. **Treatment Unit**. All siting criteria for septic tanks, as specified in Part 1 of this Manual shall also apply to proprietary treatment units and associated tanks and pumping units.

2. **Dispersal Systems Receiving Proprietary Treatment Effluent**. Dispersal systems receiving effluent from a proprietary treatment unit are subject to all siting criteria for conventional septic tank-dispersal trench systems, except as modified in accordance with adopted requirements for the specific type of alternative dispersal system proposed, including any allowances for the incorporation of supplemental treatment. Allowances for supplemental treatment may include reduced vertical separation distances. Refer to the adopted guidelines for the specific type of dispersal system for applicable requirements and supplemental treatment allowances.

DESIGN AND CONSTRUCTION REQUIREMENTS

1. **NSF Standards 40 and 245.** The proprietary treatment unit shall be listed by the National Sanitation Foundation (NSF) as meeting the **NSF Standard 40**, Class 1 performance evaluation, or have certification by a third-party listing agency as complying with NSF Standard 40 performance requirements. The treatment unit shall be manufactured and installed in accordance with the design specifications used to determine compliance to NSF Standard 40. This specification is applicable to treatment units for wastewater flows of up to 1,500 gpd and is based on compliance with US EPA standards for secondary treatment of municipal wastewater, including 30-day average effluent limits of 25 mg/L for $CBOD_5$ and 30 mg/L for TSS. Treatment units for flows in excess of 1,500 gpd will require either (a) certification by a third-party listing agency of equivalent performance; or (b) third-party engineering review of the design proposal.

Where the OWTS is required to provide nitrogen reduction, in addition to complying with **NSF Standard 40** above, the treatment unit shall also be compliant with **NSF Standard 245** – demonstrating a minimum 50% reduction of total nitrogen (effluent vs influent concentration).

2. **Design Wastewater Flow**. Sizing and design of proprietary treatment units shall be based on the projected wastewater flow for the structure or facility being served, determined in accordance with wastewater flow estimation guidelines in Part 1 of this Manual.

3. **Tanks.** All tanks housing a proprietary treatment unit shall be structurally sound, water-tight and capable of withstanding 1,000 pounds of weight.

4. **Controls.** Control panels shall be designed and configured in such a manner that, in the event of a treatment unit malfunction, an alarm system will be triggered and discharge from the treatment system to the dispersal field will be interrupted until the treatment unit malfunction is rectified. At a minimum, the alarm system shall include an audible and visual alarm located within the building served by the system.

5. **Emergency Storage Provisions.** Where a proprietary treatment unit is used in conjunction with a gravity-fed dispersal system, the system shall provide emergency storage capacity equal to at least one full day of wastewater flow at design conditions.

6. **Compliance with Manufacturer Requirements.** The designer and installer shall follow the proprietary manufacturer's design, installation, construction, and operations procedures.

7. **Engineering Plans.** Engineering plan submittals for proprietary treatment units shall provide documentation of compliance with manufacturer requirements and sufficient design analysis to verify the appropriateness of the treatment unit for the proposed

application. Engineering plans shall contain specific step-by-step construction guidelines and notes for use by the installer, including any manufacturer instructions.

8. **Installer Requirements.** Anyone installing a proprietary treatment unit shall be trained and certified by the system manufacturer. Documentation verifying conformance to this requirement shall be provided to EHD prior to system installation.

9. **Maintenance Contract**. The applicant must demonstrate that a written maintenance agreement with a qualified service provider has been obtained for the proposed proprietary treatment unit to ensure satisfactory post-construction operation and maintenance. A maintenance agreement must be maintained valid for the life of the treatment unit.

10. **Construction Inspection.** The following minimum inspections prior to commencing construction or covering any elements of the system shall be required. Joint inspection by the designer, installer, and KCEHD may be required.
    a. Pre-construction inspection where the construction staking or marking of the treatment unit is to be placed and installation procedures are discussed;
    b. Testing of the treatment unit:
        i. Function and setting of all control devices and alarms.
        ii. Water-tightness of septic tank, treatment tank(s), and dosing tank, as applicable.
    c. Final Inspection:
        i. A letter from the designer that the treatment unit has been installed and is operating in conformance with design specifications shall be provided.
        ii. A valid, signed maintenance agreement between the applicant/property owner and service provider shall be provided.
        iii. Copies of operation and maintenance guidelines provided for system owner and service provider.

MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring and reporting activities for proprietary treatment systems are outlined in **Table P-1** below.

Table P-1. Proprietary Treatment System Management Requirements

	Work	Minimum Frequency
Inspection	• Inspection to be in accordance with manufacturer specifications.	• According to permit conditions, typically every 6 to 12 months, depending on system size, usage, and history.
Maintenance	• Perform all maintenance as required and in accordance with equipment manufacturer specifications.	• According to permit conditions, typically every 6 to 12 months, depending on system size, usage, and history.
Water Monitoring & Sampling	• Monitoring to be in accordance with manufacturer specifications.	• If required, according to permit conditions, typically every 6 to 12 months, depending on system size, usage, and history.
Reporting	• Report findings to EHD per permit requirements. • Standard report to describe findings, analyze performance, and detail actions taken. • Report crisis or failure conditions to EHD immediately.	• According to permit conditions, typically every year, depending on system size, usage, history, location.

3.3 Requirements for Pressure Distribution Trenches

DESCRIPTION

Pressure distribution (PD) trench systems are a variation of a conventional gravity drain field system that use a pump and small-diameter pressure piping to achieve broad, uniform distribution of wastewater throughout the dispersal field for improved soil absorption and better treatment of percolating effluent. Pressure distribution can be used in conjunction with standard or special dispersal trench designs, and with chamber systems; and can be used in conjunction with either septic tank effluent or with supplemental treatment. This section covers requirements for PD trench systems.

Pressure distribution trench systems are permitted and/or required for the following situations:

1. To allow reduction of vertical separation to groundwater or soil depth below trench bottom from 7 feet to 3 feet; where PD trenches are used in combination with supplemental treatment, the depth to groundwater may be reduced to 2 feet;

2. For large flow systems, e.g., with dispersal field lengths (primary) exceeding 500 lineal feet; and

3. Others as may be determined necessary due to site-specific soil, geology or other conditions.

SITING CRITERIA

1. **Setbacks**. Horizontal setback requirements for PD trench systems shall be those applicable to conventional dispersal fields, as specified in Part 1 of this Manual.

2. **Vertical Separation Requirements.**
    a. **Depth to Groundwater.** Minimum depth to seasonal high groundwater for PD trench systems receiving septic tank effluent, as measured from trench bottom, shall be three (3) feet; where used in combination with supplemental treatment, the minimum depth to groundwater shall be two (2) feet.
    b. **Soil Depth**. Minimum depth of soil, as measured from trench bottom to impermeable soil or rock, for PD trench systems shall be three (3) feet.

3. **Reserve Area/Dual System**. A reserve area having suitable site conditions and sufficient area for full, 100% replacement of the primary PD trench dispersal field shall be provided or a complete dual primary and secondary PD trench system shall be installed initially, including, including an approved flow diversion device (pressure-rated), intended to allow alternate use of the two fields.

DESIGN CRITERIA

1. **Treatment**. Pressure distribution may be used with either septic tank effluent or with supplemental treatment.

2. **Design Wastewater Flow.** PD trench systems shall be designed on the basis of the projected wastewater flow for the structure or facility being served, determined in accordance with wastewater flow estimation requirements in Part 1 of this Manual.

3. **Pressure Dosing**. Septic tank effluent shall be applied to the PD trench system by pressure dosing, utilizing a pump system or dosing siphon. The pressure distribution system shall be designed in accordance with accepted engineering practices to achieve, at a minimum:
    a. Uniform dosing of septic tank effluent throughout the system of PD trenches;
    b. Adequate flow rate, screening of effluent and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;
    c. Suitable access provisions for inspection, testing and adjustment of the pressure distribution system; and
    d. Dosing volume to achieve minimum of 3 to 5 doses per day at design flow conditions.

4. **Dispersal Trenches.** PD trenches shall conform to the same design and construction requirements as standard or special trenches, per Part 1 of this Manual, with the exception that the piping system shall consist of pressure piping rather than gravity piping.

5. **Pressure Distribution Piping**.
    a. **Pressure-Rated Pipe Material**. All pipe, fittings and valves shall be pressure-rated PVC pipe, minimum 150 psi.
    b. **Solvent Welded.** All joints in the pressure piping system shall be solvent welded.
    c. **Pipe Sizing**. All pressure distribution pipes and fittings, including transport lines, manifolds, laterals and valves, must be adequately sized for the design flow, and shall be designed to minimize frictional losses to the maximum extent practicable.
    d. **Thrust Blocks.** Concrete thrust blocks, or equivalent restraint, shall be provided at sharp changes in piping directions.
    e. **Shut-off Valves.** The distribution lateral for each trench shall be fitted with a shut-off valve to adjust or terminate the flow to individual trenches. This valve may be either a ball or gate valve, and shall be located in a utility/valve box.
    f. **Lateral End Riser.** The end of each lateral shall be fitted with a 90^{o} long sweep to facilitate line cleaning and hydraulic testing. The end riser pipe shall also be fitted with a ball valve and/or threaded end cap or plug, housed in a valve box.

6. **Pump System.** The pump system shall be: (a) appropriate for sewage applications; (b) of the size and type to meet the hydraulic design requirements; and (c) designed and constructed in accordance with pump system requirements provided in this Manual.

7. **Trench Sizing**. PD trench sizing shall conform to the same sizing requirements as standard or special trenches, as applicable, per Part 1 of this Manual.

ENGINEERING PLANS AND CONSTRUCTION

1. **Reference Guidelines**. In addition to the requirements set forth herein, design and construction of PD trench systems shall utilize applicable guidelines contained in the following references:
    a. "Onsite Wastewater Treatment Systems Manual", U.S. Environmental Protection Agency, February 2002 and as amended.
    b. “Design Manual – Onsite Wastewater Treatment and Disposal Systems”, U.S. Environmental Protection Agency, October 1980.

2. **Engineering Plans.** Engineering plans for PD trench systems shall include:
    a. All relevant elevation data and hydraulic calculations;
    b. Specific step-by-step construction guidelines and notes for use by the installer;
    c. Erosion control plans for any site over 20% slope;
    d. Recommended make and model of all components;
    e. Recommended pump system components, with cut-sheet depicting float settings;
    f. Control panel programming;
    g. An inspection schedule listing critical control points; and
    h. Operation and maintenance guidelines.

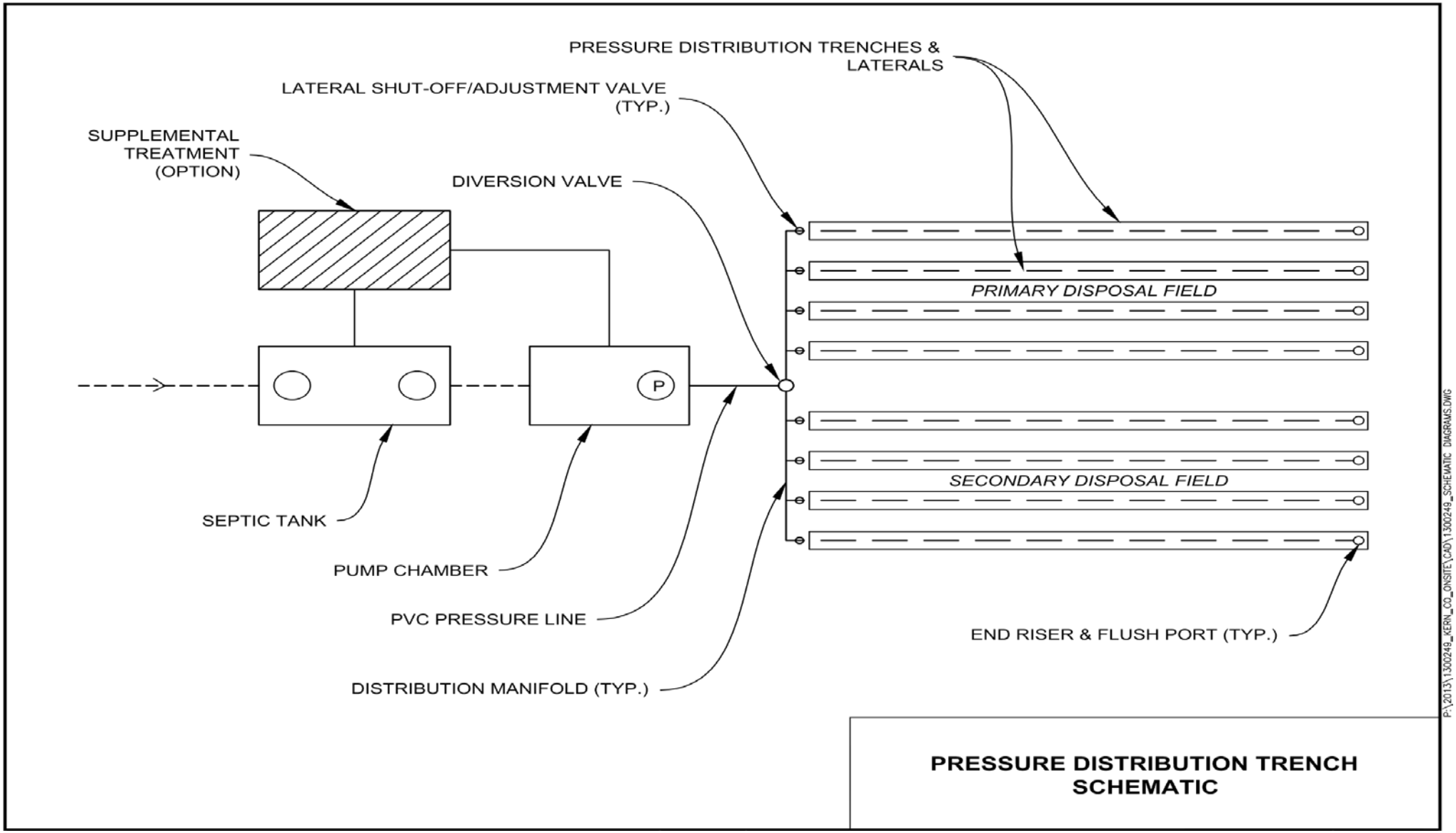
3. **Construction Inspection.** At a minimum, inspection of the PD trench system installation should include the items listed below. This is in addition to inspection work required for a supplemental treatment system, if used. Joint inspection by the designer, contractor, and EHD may be required.
    a. Pre-construction inspection where the construction staking or marking of the various system components is provided and construction procedures discussed;
    b. Water tightness of septic tank and dosing (pump) tank;
    c. Layout and excavation of dispersal trenches and piping;
    d. Drain rock material and placement;
    e. Piping installation and hydraulic (“squirt”) test of the distribution system;
    f. Functioning and setting of all control devices; and
    g. Final Inspection to verify that all construction elements are in conformance with the approved plans and specifications, the system is fully operational, erosion control has been completed and operation and maintenance guidelines are provided for owner.

MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring and reporting activities for pressure distribution trench systems are outlined in **Table PD-1.**

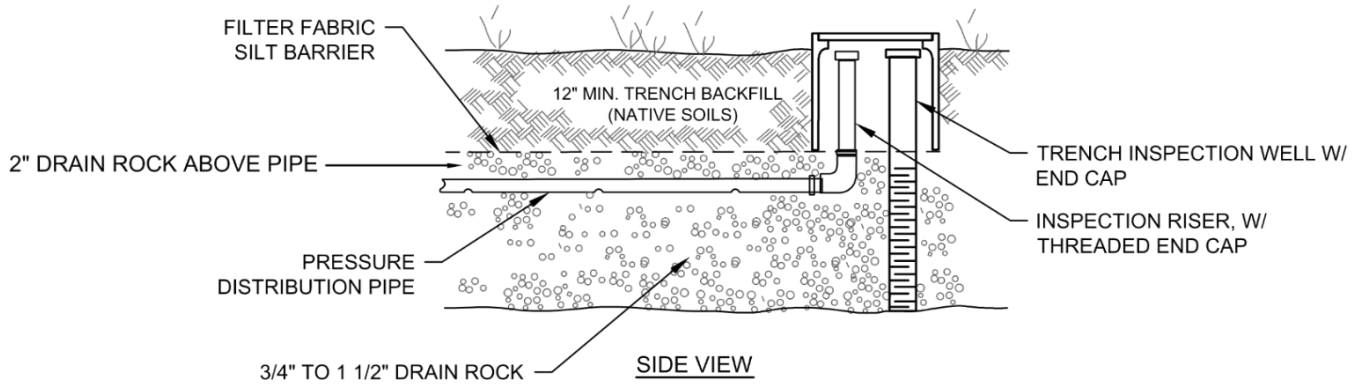
Table PD-1. Pressure Distribution Trench System Management Requirements

	Work	Minimum Frequency
Inspection	• Conduct routine visual observations of disposal field and downslope area and surroundings for wet areas, pipe leaks or damage, soil erosion, drainage issues, abnormal vegetation, or other problems. • Perform all inspections of pump and appurtenances (per O&M manual and Performance Evaluation Guidelines, Part 4 of this Manual).	• Every 6 to 12 months.
Maintenance	• Purge laterals, squirt and balance. • Exercise valves to ensure functionality. • Perform all maintenance work as recommended by equipment manufacturer for any special valves or other components. • Investigate and repair erosion, drainage or other disposal field problems, as needed. • Investigate and perform distribution system corrective work, as required. • Record work done.	• Distribution system maintenance annually. • Other maintenance as required.
Water Monitoring & Sampling	• Measure and record water levels in trench observation wells... • Obtain and analyze water samples from any monitoring wells, as applicable, per permit requirements.	• Measure trench water levels annually. • Other monitoring according to permit conditions, as applicable.
Reporting	• Report findings to EHD per permit requirements. • Standard report to include dates, observation well and monitoring well readings and other data collected, work performed, corrective actions taken, and performance summary. • Report public health/water quality emergency to EHD immediately.	• According to permit conditions, typically every year, depending on system size, usage, history, location.

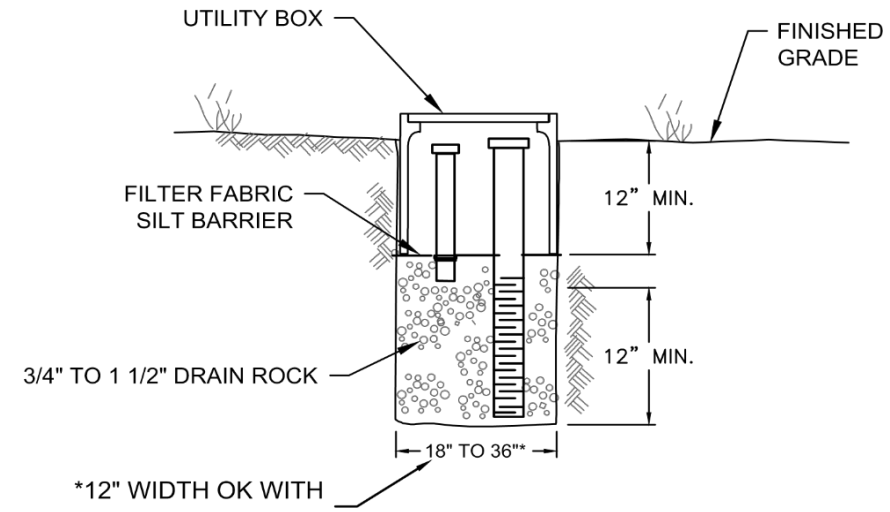

PRESSURE DISTRIBUTION TRENCHES & LATERALS
LATERAL SHUT-OFF/ADJUSTMENT VALVE (TYP.)
SUPPLEMENTAL TREATMENT (OPTION)
DIVERSION VALVE
PRIMARY DISPOSAL FIELD
P
SECONDARY DISPOSAL FIELD
SEPTIC TANK
PUMP CHAMBER
PVC PRESSURE LINE
DISTRIBUTION MANIFOLD (TYP.)
END RISER & FLUSH PORT (TYP.)
P:\2013\13002249_KERN_CO_ONSITE\CAD\13002249_SCHEMATIC DIAGRAMS.DWG
PRESSURE DISTRIBUTION TRENCH SCHEMATIC

SUPPLEMENTAL TREATMENT

END VIEW



SIDE VIEW



PRESSURE DISTRIBUTION TRENCH

3.4 Requirements for Mound Systems

DESCRIPTION

A mound system consists of an elevated sand bed with a gravel distribution bed covered by soil fill. Mound systems are intended to raise the soil absorption system above grade and provide further treatment (sand filtration) of effluent before it reaches native soils. Mounds utilize the shallow surface soils for broad distribution of effluent, and are used to mitigate high water table and shallow soil conditions on flat or gently sloping terrain. Mound systems can be used where there are at least two feet of permeable surface soils (above the water table or restrictive soils) on slopes up to 20 percent, depending upon percolation characteristics.

SITIING CRITERIA

1. **Setbacks**. Horizontal setback requirements for mound systems shall be those applicable to conventional disposal fields, as specified in Part 1 of this Manual.

2. **Soil Depth**. Minimum depth of soil, as measured from ground surface to impermeable soil or rock, for mound systems shall be two (2) feet. This soil depth requirement shall apply within the mound fill area and in the adjacent area extending a distance of 25 feet down-slope of the mound system.

3. **Depth to Groundwater.** Minimum depth to seasonal high groundwater, as measured from ground surface, shall be two (2) feet.

4. **Percolation Rate**. Average percolation rate for mound systems shall be within the range of 1 to 120 minutes per inch (MPI), as determined from testing at depths of 1 to 2 feet below ground surface. These percolation requirements shall apply within the mound fill area and in the adjacent area extending a distance of 25 feet down-slope of the mound system.

5. **Ground Slope**. Maximum ground slope for mound systems shall be 20% where the percolation rate is in the range of 1 to 60 MPI. For soils with a percolation rate greater than 60 MPI, maximum ground slope for mound systems shall be 15%.

6. **Reserve Area/Dual System.** A reserve area having suitable site conditions and sufficient area for full, 100% replacement of the primary mound shall be provided or a complete dual primary and secondary mound system shall be installed initially.

DESIGN CRITERIA

1. **Treatment**. The mound system shall be preceded by a septic tank sized for the design wastewater flow and constructed in accordance with requirements contained in Part 1 of this Manual.

2. **Design Wastewater Flow**. The mound system shall be designed on the basis of the projected wastewater flow for the structure or facility being served, determined in accordance with wastewater flow estimation requirements in Part 1 of this Manual.

3. **Pressure Dosing**. Septic tank effluent shall be applied to the mound system by pressure dosing, utilizing a pump system. The pressure distribution system shall be designed in accordance with accepted engineering practices to achieve, at a minimum:
    a. Uniform dosing of septic tank effluent over the surface application area of the mound distribution bed;
    b. Adequate flow rate, screening of effluent and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;
    c. Suitable access provisions for inspection, testing and adjustment of the pressure distribution system;
    d. Dosing volume to achieve a minimum of 3 to 5 doses per day at design flow conditions; and
    e. At least one distribution lateral for every 36 inches of bed width.

Additional requirements for design and construction of pressure distribution piping systems contained in "Requirements for Pressure Distribution Trenches" shall also apply.

4. **Pump System.** The pump system shall be: (a) appropriate for sewage applications; (b) of the size and type to meet the hydraulic design requirements; and (c) designed and constructed in accordance with pump system requirements provided in this Manual.

5. **Sand Fill**.
    a. **Sand Specifications**. The sand media shall be a medium to coarse sand which meets the following gradation specifications:

Sieve Size	Percent Passing
3/8	100
#4	90 – 100
#10	62 – 100
#16	45 – 82
#30	25 – 55
#50	5 – 20
#60	0 – 10
#100	0 – 4
#200	0 – 2

Documentation of laboratory sieve analysis results for the proposed sand fill material shall be supplied to EHD to verify conformance with the above specifications.

b. **Sand Depth**. The minimum depth of sand fill, below the gravel distribution bed, shall be 12 inches. The minimum depth of sand fill shall be increased to 24 inches for sites where the average percolation rate is between 1 and 5 MPI.
c. **Lateral Dimensions**. The sand shall be placed as a continuous fill extending in lateral dimensions as necessary to meet the following minimum requirements:
    i. Top of the sand fill shall extend horizontally beyond the gravel distribution bed:
        a) 1 foot in the upslope direction
        b) 2 feet in the down-slope direction
        c) 2 feet in the longitudinal (side) direction
    ii. Maximum slope of the top of the sand surface shall be 3 horizontal to 1 vertical.
    iii. Bottom of the sand fill shall be large enough to meet minimum mound sizing requirements based on basal area and linear loading rate criteria per D.9 below.

6. Gravel Distribution

a. **Bed Material.** The distribution bed shall consist of 3/8-inch double-washed pea gravel, substantially free of fines.
b. **Depth.** Pea gravel shall extend a minimum of 6 inches below the invert and 2 inches above the top of the distribution piping.
c. **Width.** Maximum width of the distribution bed shall be 10 feet.
d. **Level.** The bottom of the distribution bed shall be level; and the down-slope side shall be parallel to the slope contour.

7. **Silt Barrier**. The gravel distribution bed shall be covered in its entirety with a geotextile ("filter fabric") silt barrier. Filter fabric shall either be polyester, nylon or polypropylene, or any combination thereof, and shall be suitable for under-drain applications. Filter fabric shall be non-woven, shall not act as a wicking agent and shall be permeable.

8. **Soil Cover**.
    a. **Material**. A continuous soil cover shall be placed over the entire distribution bed and sand fill. The soil cover shall consist of a medium, loamy-textured soil.
    b. **Depth**. Soil cover depth shall be a minimum of 12 inches and a maximum of 18 inches over the top of the distribution bed, and 12 inches minimum over the sand fill portion of the mound. Soil cover over the distribution bed shall be crowned to promote rainfall runoff, and compacted by track-rolling, minimum two passes.
    c. **Lateral Extension**. The soil cover shall extend a minimum of 4 feet beyond the perimeter edge of the sand fill in all directions.

9. **Wastewater Application Rate**. The wastewater application rates used for sizing the surface area of the distribution bed and the basal area of the sand fill shall be as follows:
    a. **Distribution Bed**.
        i. 1.2 gpd/ft.^{2} for individual residential OWTS; and

ii. Gpd/ft.2 for commercial, industrial, institutional and multi-residential OWTS.

Reduction in the above wastewater loading rates or other provisions to insure the long-term integrity and performance of the mound distribution bed may be required for high strength waste flows, such as from restaurants.

b. **Sand Basal Area**. The basal area of the sand fill shall be sized to meet maximum basal wastewater application rates and linear loading requirements as follows:

i. **Basal Wastewater Application Rates**.

a) Effective Application Area.

- For level sites (0 - 2% slope) the effective basal wastewater application area includes the entire sand fill basal area.
- For sloping sites (>2% slope) the effective basal wastewater application area includes the sand basal area immediately below and directly down-slope (at right angles to the natural slope contours) of the distribution bed.

ii. **Wastewater Flow.** The wastewater flow used for sizing the basal area shall be the design wastewater flow for the system.

iii. Application Rates. The maximum basal application rate shall be based on the demonstrated percolation rate of the upper 12 to 24 inches of soil depth as shown in **Table M-1.**

Table M-1. Basal Wastewater Application Rates[1]

Percolation Rate (MPI)	Wastewater Application Rate (gpd/ft^2)
1-5	1.2
10	1.2
24	1.2
30	1.12
45	0.68
60	0.53
90	0.25
91-120	0.2

[1] Interpolate between reference values for other percolation rates; see end of Part 3 for expanded table listing interpolated values.

10. Linear Loading Requirements

a. **Linear Loading Rate Definition.** Linear loading rate is defined as the volume of wastewater flow (in gpd) divided by the effective length of the disposal system measured along the slope contour.

b. **Effective Length**. The effective length (L) of the mound system for determining the linear loading rate shall be the length of the gravel distribution bed along the down-slope edge. Separate linear loading rate calculations shall be made for the primary and secondary (reserve) systems. The effective length of each mound may overlap for purposes of determining compliance with linear loading rate criteria, since only one system would be in operation at a given time.

c. **Wastewater Flow**. The wastewater flow used for determining the linear loading rate shall be as follows:

   i. 100 gpd/bedroom for residential systems; (note: this is 2/3 of the 150 gpd/bedroom used for system design);

   ii. Design wastewater flow rate for commercial, institutional, industrial and multi-residential systems.

d. **Loading Rate Criteria**. Maximum linear loading rates for mound systems vary according to ground slope and percolation rate as indicated in **Table M-2.** If a variance from these criteria is proposed, it must be supported by detailed groundwater mounding analysis carried out in accordance with accepted methodology and/or scientific references dealing with water movement in soils and utilizing site specific hydraulic conductivity (permeability) data.

Table M-2. Maximum Linear Loading Rates (gpd/lineal foot)

Soil Depth (ft.)	Ground Slope (%)	Percolation Rate (MPI)		
		1-30	31-60	61-120
2 to 2.5	0-10	5	4	3
	11-20	6	5	4
2.5 to 3.0	0-10	7	6	5
	11-20	8	7	6
3.0 to 4.0	0-10	9	8	7
	11-20	10	9	8
> 4.0	0-10	11	10	9
	11-20	12	11	10

11. **Dual Mound Systems**.

a. **Dual System Requirement**. Dual mound systems shall be required for any system where, due to space constraints, the sand fill run-out of the primary mound overlaps the sand fill run-out area of the secondary mound.

b. **Distribution Bed Placement**. Dual mound systems shall have at least two distinctly separate distribution beds. The beds may be placed within one continuous mound or in separate mounds. The distribution beds may be placed

end-to-end or upslope/down-slope of one another subject to meeting minimum sizing requirements for basal and linear loading rates per D.9.b above.

c. **Distribution Bed Separation**. The minimum lateral (i.e., end-to-end) separation between distribution beds in a dual mound system shall be six feet.
d. **Effective Basal Area**. For dual mound systems the effective basal area for sizing the two systems shall not overlap.
e. **Alternate Dosing**. The distribution beds for dual mound systems shall be designed and operated to provide alternate dosing and resting of the beds.

12. **Inspection Standpipes**. A minimum of six inspection standpipes shall be installed within and around mound systems as follows:
    a. One shall be located near the center of the mound, extending from the mound surface to the bottom of the gravel distribution bed;
    b. One shall be located within the effective basal area (outside of the distribution bed), extending from the mound surface to 6 inches into the native soil;
    c. Four shall be located, respectively, midway along each of the four sides of the mound, near the toe of the slope, extending from ground surface to a depth of 5 feet or to the depth of impermeable materials, whichever is less;
    d. Inspection standpipes shall be constructed of 2" to 4" diameter pipe, equipped with a wrench-tight cap or pipe plug and a bottom cap. All standpipes shall be perforated beginning at a depth of 18 inches below grade and extending to the bottom of the pipe. Perforations shall consist of hacksaw slots at nominal 1" spacing, or equivalent commercially-slotted pipe. To prevent surface water infiltration, inspection standpipes shall be sealed with a bentonite or concrete annular seal (or equivalent) to a depth of 12 inches, minimum.

ENGINEERING PLANS AND CONSTRUCTION

1. **Reference guidelines**. Construction of mound systems shall be in accordance with guidelines contained in the following references:
    a. "Design and Construction Manual for Wisconsin Mounds", Small Scale Waste Management Project, University of Wisconsin, Madison, January 2000, including any amendments.
    b. "Onsite Wastewater Treatment Systems Manual", U.S. Environmental Protection Agency, February 2002.

2. **Engineering Plans**. Engineering plans for mound systems shall include:
    a. All relevant elevation data and hydraulic calculations;
    b. Specific step-by-step construction guidelines and notes for use by the installer;
    c. Erosion control plan;
    d. Recommended make and model of all components;
    e. Recommended pump system components, with cut-sheet depicting float settings;
    f. Control panel programming;

g. An inspection schedule listing critical control points; and
h. Operation and maintenance guidelines.

3. **Construction Inspection.** At a minimum, inspection of the mound system installation should include the following. Joint inspection by the designer, contractor, and EHD may be required.
   a. Pre-construction inspection where the construction staking or marking of the mound system is provided and construction procedures discussed;
   b. Water tightness of septic tank and dosing (pump) tank;
   c. Clearing and ripping/plowing of the mound basal area soils;
   d. Sand material and placement;
   e. Pea gravel distribution bed and piping installation;
   f. Hydraulic ("squirt") test of the distribution system;
   g. Functioning and setting of all control devices;
   h. Placement of filter fabric silt barrier and soil cover;
   i. Final Inspection to verify that all construction elements are in conformance with the approved plans and specifications, all inspection wells are installed, erosion control has been completed, and operation and maintenance guidelines provided for owner.

MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring and reporting activities for mound systems are outlined in Table M-3 below.

Table M-3. Mound System Management Requirements

	Work	Frequency
Inspection	▪ Conduct routine visual observations of mound and downslope area and surroundings for wet areas, pipe leaks or damage, soil erosion, drainage issues, abnormal vegetation, gophers or other problems. ▪ Perform all inspections of pump and appurtenances (per O&M Manual and Performance Evaluation Guidelines, Part 4 of this Manual). ▪ Record observations.	▪ Every 6 to 12 months.

Maintenance	▪ Purge laterals, squirt and balance. ▪ Exercise valves to ensure functionality. ▪ Perform all maintenance work as recommended by equipment manufacturer for any special valves or other components. ▪ Maintain mound area landscape vegetation, as req'd ▪ Investigate and repair erosion, drainage or other disposal field problems, as needed. ▪ Investigate and perform distribution system corrective work, as required ▪ Record work done.	▪ Distribution system maintenance annually. ▪ Other maintenance as required.
Water Monitoring & Sampling	▪ Measure and record water levels in observation standpipes in distribution bed, sand fill and around mound perimeter. ▪ Obtain and analyze water samples from monitoring wells, as applicable, per permit requirements.	▪ Measure mound system water levels annually. ▪ Other monitoring according to permit conditions, as applicable.
Reporting	▪ Report findings to EHD per permit requirements. ▪ Standard report to include dates, inspection standpipe and monitoring well readings and other data collected, work performed, corrective actions taken, and performance summary. ▪ Report public health/water quality emergency to EHD immediately.	▪ According to permit conditions, typically every 1 to 2 years, depending on system size, usage, history, location.

3.5 Requirements for At-Grade Systems

DESCRIPTION

At-grade systems are similar to mound systems, except that they do not include the sand bed; the gravel distribution bed is placed directly on the scarified (i.e., plowed) soil surface. They are often used in conjunction with a supplemental treatment system. They can be used in the same types of situations as mound systems to overcome shallow soil depths and high groundwater.

SITING CRITERIA

1. **Setbacks**. Horizontal setback requirements for At-grade systems shall be those applicable to conventional disposal fields, as specified in Part 1 of this Manual.

2. **Vertical Separation Requirements.**
   a. **Soil Depth**. Minimum depth of soil, as measured from ground surface to impermeable soil or rock, for At-grade systems shall be three feet. This shall apply within the dispersal field and in the adjacent area extending a distance of 25 feet down-slope of the At-grade system on sloping sites, and a distance of 15 feet on all sides on level sites.
   b. **Depth to Groundwater.** Minimum depth to seasonal high groundwater for At-grade systems, as measured from ground surface, shall be 3 feet for systems receiving septic tank effluent, and 2 feet where used in combination with supplemental treatment.

3. **Percolation Rate**. Average percolation rate for At-grade systems shall be within the range of 1 to 120 minutes per inch (MPI), as determined from testing at 2 to 3 feet depth below ground surface. Where the percolation rate is in the range of 60 to 120 MPI supplemental treatment shall be required. These percolation requirements shall apply within the dispersal field and in the adjacent area extending a distance of 25 feet down-slope of the At-grade system on sloping sites, and a distance of 15 feet on all sides on level sites.

4. **Ground Slope**. Maximum ground slope for At-grade systems shall be 20%.

5. **Reserve Area/Dual System**. A reserve area having suitable site conditions and sufficient area for full, 100% replacement of the primary At-grade system shall be provided or a complete dual primary and secondary At-grade system shall be installed initially. See D.7 for circumstances requiring the installation of a dual system (and applicable requirements). In determining the necessary space for the primary and secondary (reserve) field, the required gravel distribution bed area (per D.4) of the primary and secondary At-grade shall not overlap. The surplus soil fill run-out may also not overlap unless the primary and secondary At-grades are both installed (i.e., as a dual system).

DESIGN CRITERIA

1. **Treatment**. The following treatment requirements shall apply in connection with the use of At-grade systems:
    a. Primary (septic tank) treatment shall be the minimum level of treatment, and shall be acceptable where the average percolation rate is in the range of 1 to 60 MPI and the vertical separation to groundwater is at least 3 feet.
    b. Supplemental treatment, using an approved alternative treatment system identified in this Manual, shall be required where the average percolation rate is between 61 to 120 MPI, and/or to allow reduction in the vertical separation to groundwater to a minimum of 2 feet.

2. **Design Wastewater Flow**. At-grade systems shall be designed on the basis of the projected wastewater flow for the structure or facility being served, determined in accordance with wastewater flow estimation guidelines in Part 1 of this Manual.

3. **Pressure Dosing**. Wastewater effluent, from the septic tank or supplemental treatment system, shall be applied to the At-grade system by pressure dosing, utilizing a pump system. The pressure distribution system shall be designed in accordance with accepted engineering practices to achieve, at a minimum:
    a. Uniform dosing of effluent over the surface application area of the At-grade distribution bed;
    b. Adequate flow rate, screening of effluent and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;
    c. Suitable access provisions for inspection, testing and adjustment of the pressure distribution system;
    d. Dosing volume to achieve a minimum of 3 to 5 doses per day at design flow conditions; and
    e. At least one distribution lateral for every 36 inches of distribution bed width.

    Additional requirements for design and construction of pressure distribution piping systems contained in “Requirements for Pressure Distribution Trenches” shall also apply.

4. **Pump System.** The pump system shall be: (a) appropriate for sewage applications; (b) of the size and type to meet the hydraulic design requirements; and (c) designed and constructed in accordance with pump system requirements provided in this Manual.

5. **Gravel Distribution Bed**
    a. **Material.** The distribution bed shall consist of 3/8-inch double-washed pea gravel, substantially free of fines.
    b. **Depth.** Pea gravel shall extend a minimum of 6 inches below the invert and 2 inches above the top of the distribution piping.
    c. **Width.** Maximum width of the distribution bed shall be 10 feet. Long, narrow distribution bed configurations are preferred.

d. **Wastewater Application Rate**. The wastewater application rate used for sizing the basal surface area of the distribution bed (i.e., soil infiltrative surface) shall vary according to the soil percolation rate of the native soil and the level of wastewater treatment provided as indicated in **Table AG-1**.

Table AG-1.
Wastewater Application Rates for At-grade System[1]

Percolation Rate (MPI)	Septic Tank Treatment (gpd/ft^2)	Supplemental Treatment (gpd/ft^2)
1-5	1.2	1.2
10	0.8	0.8
24	0.60	0.60
30	0.56	0.56
45	0.45	0.45
60	0.35	0.35
90	NA	0.20
91-120	NA	0.20

[1] Interpolate between reference values for other percolation rates; see end of Part 3 for an

Reduction in the above wastewater loading rates or other provisions to insure the long-term integrity and performance of the At-grade distribution bed may be required for high strength waste flows, such as from restaurants.

e. **Minimum Basal Area Sizing.** At a minimum, sizing of the distribution bed basal area shall be determined by dividing the design wastewater flow (in gpd) by the applicable wastewater application rate per **Table AG-1**.
f. **Linear Loading Rate Requirements.** The length of the distribution bed shall be sized to meet maximum linear loading rate criteria as follows:
g. **Linear Loading Rate Definition.** Linear loading rate is defined as the volume of wastewater flow (in gpd) divided by the effective length of the dispersal system measured along the slope contour.
h. **Effective Length**. The effective length (L) of the At-grade system for determining the linear loading rate shall be the length of the gravel distribution bed measured along the down-slope edge. Separate linear loading rate calculations shall be made for the primary and secondary (reserve) systems; however, the effective length of each field may overlap for purposes of determining compliance with linear loading rate criteria.
i. **Wastewater Flow**. The wastewater flow used for determining the linear loading rate shall be as follows:
    i. 100 gpd/bedroom for residential systems; (note: this is 2/3 of the 150 gpd/bedroom used for system design);
    ii. Design wastewater flow rate for commercial, institutional, industrial and multi-residential systems.

j. **Loading Rate Criteria**. Maximum linear loading rates for At-grade systems vary according to ground slope and percolation rate as indicated in **Table AG-2.** If a variance from these criteria is proposed, it must be supported by detailed groundwater mounding analysis carried out in accordance with accepted methodology and/or scientific references dealing with water movement in soils and utilizing site specific hydraulic conductivity data.

Table AG-2. Maximum Linear Loading Rates* gpd/lineal foot

Soil Depth (ft.)	Ground Slope (%)	Percolation Rate (MPI)		
		1-30	31-60	61-120
2.0 to 3.0	0-10	5	4	3
	11-20	6	5	4
3.0 to 4.0	0-10	7	6	5
	11-20	8	7	6
4.0 to 5.0	0-10	9	8	7
	11-20	10	9	8
>5.0	0-10	11	10	9
	11-20	12	11	10

6. **Silt Barrier**. The gravel distribution bed shall be covered in its entirety with a geotextile ("filter fabric") silt barrier. Filter fabric shall either be polyester, nylon or polypropylene, or any combination thereof, and shall be suitable for underdrain applications. Filter fabric shall be non-woven, shall not act as a wicking agent and shall be permeable.

7. Soil Cover

a. **Material**. A continuous soil cover shall be placed over the entire distribution bed. The soil cover shall consist of a medium, loamy-textured soil.

b. **Depth**. Soil cover depth shall be a minimum of 12 inches and a maximum of 18 inches over the top of the distribution bed. Soil cover over the distribution bed shall be crowned to promote rainfall runoff, and compacted by track-rolling, minimum two passes.

c. **Lateral Extension**. The soil cover shall extend a minimum of 4 feet beyond the perimeter edge of the gravel bed in the upslope and side slope directions. In the down-slope direction, the soil cover extension beyond the down-slope edge of the gravel bed shall vary according to slope as follows:

Ground Slope (%)	Soil Fill Extension (ft.)
0-2	4
3-4	6
5-6	8
7-8	10
9-10	12
11-12	14
13-14	16
15-16	18
17-20	20

8. **Dual At-Grade Systems**
    a. **Dual System Requirement**. Dual At-grade systems shall be required for any system where, due to space constraints, the soil cover run-out of the primary At-grade overlaps the soil cover run-out area of the secondary At-grade.
    b. **Distribution Bed Placement**. Dual At-grade systems shall have at least two distinctly separate distribution beds. The beds may be placed with one continuous soil cover fill or with independent soil cover fill. The distribution beds may be placed end-to-end or upslope/down-slope of one another, subject to meeting minimum sizing requirements determined from basal area and linear loading criteria per D.5 (f) above.
    c. **Distribution Bed Separation**. The minimum lateral (i.e., end-to-end) separation between distribution beds for dual At-grade systems shall be six feet.
    d. **Alternate Dosing**. The distribution beds for At-grade systems shall be designed and operated to provide alternate dosing and resting of the beds.

9. **Inspection Wells**. A minimum of three (3) inspection wells shall be installed within and around At-grade systems as follows:
    a. One shall be located near the center of the At-grade system, extending from the fill surface to the bottom of the gravel distribution bed.
    b. One shall be located 5 to 10 feet upslope of the At-grade system, midway along the length of the At-grade, extending from the ground surface to a depth of 5 feet or to contact with an impermeable substratum, whichever is less.
    c. One shall be located midway along the down-slope length of the At-grade, within 5 to 10 feet from the toe of the fill slope, extending from ground surface to a depth of 5 feet or to contact with an impermeable substratum, whichever is less.
    d. Inspection wells shall be constructed of 2" to 4" diameter pipe, equipped with a wrench-tight cap or pipe plug and a bottom cap. All wells shall be perforated beginning at a depth of 18 inches below grade and extending to the bottom of the pipe. Perforations shall consist of hacksaw slots at nominal 1" spacing, or equivalent commercially-slotted pipe. To prevent surface water infiltration, inspection wells shall be sealed with a bentonite or concrete annular seal (or equivalent), extending from the ground surface to depth of 12 inches, minimum.

ENGINEERING PLANS AND CONSTRUCTION

1. **Reference Guidelines**. Construction of At-grade systems shall be in accordance with guidelines contained in the following references:
    a. "Wisconsin At-grade Soil Absorption System Siting, Design and Construction Manual", Small Scale Waste Management Project, University of Wisconsin-Madison, 1990.
    b. "Onsite Wastewater Treatment Systems Manual", U.S. Environmental Protection Agency, February 2002.

c. “At-grade Component Using Pressure Distribution Manual for Private Onsite Wastewater Treatment Systems”, State of Wisconsin, Department of Commerce, 1999.

2. **Engineering Plans.** Engineering plans for At-grade systems shall include:
    a. All relevant elevation data and hydraulic calculations;
    b. Specific step-by-step construction guidelines and notes for use by the installer;
    c. Erosion control plan;
    d. Recommended make and model of all components;
    e. Recommended pump system components, with cut-sheet depicting float settings;
    f. Control panel programming; and
    g. An inspection schedule listing critical control points.

3. **Construction Inspection.** At a minimum, inspection of the At-grade system installation should include the following. This is in addition to inspection work required for a supplemental treatment system, if used. Joint inspection by the designer, contractor, and EHD may be required.
    a. Pre-construction inspection where the construction staking or marking of the At-grade system is provided and construction procedures discussed;
    b. Water tightness of septic tank and dosing (pump) tank;
    c. Clearing and ripping/plowing of the At-grade basal area soils;
    d. Pea gravel distribution bed and piping installation;
    e. Hydraulic (“squirt”) test of the distribution system;
    f. Functioning and setting of all control devices;
    g. Placement of filter fabric silt barrier and soil cover;
    h. Final Inspection to verify that all construction elements are in conformance with the approved plans and specifications, all inspection wells are installed, erosion control has been completed, and operation and maintenance guidelines provided for owner.

MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring and reporting activities for At-grade systems are outlined in **Table AG-3**.

Table AG-3. At-grade System Management Requirements

	Work	Frequency
Inspection	• Conduct routine visual observations of At-Grade fill and downslope area and surroundings for wet areas, pipe leaks or damage, soil erosion, drainage issues, abnormal vegetation, gophers or other problems. • Perform all inspections of pump and appurtenances (per O&M manual and Performance Evaluation Guidelines, Part 4 of this Manual). • Record observations.	• Every 6 to 12 months.
Maintenance	• Purge laterals, squirt and balance • Exercise valves to ensure functionality. • Perform all maintenance work as recommended by equipment manufacturer for any special valves or other components. • Maintain fill area landscape vegetation, as applicable and as needed. • Investigate and repair erosion, drainage or other disposal field problems, as needed. • Investigate and perform distribution system corrective work, as needed. • Record work done.	• Distribution system maintenance annually. • Other maintenance as required.
Water Monitoring & Sampling	• Measure and record water levels in observation wells in distribution bed and around system perimeter. • Obtain and analyze water samples from monitoring wells, as applicable, per permit requirements.	• Measure dispersal system water levels annually. • Other monitoring according to permit conditions, as applicable.
Reporting	• Report findings to EHD per permit requirements. • Standard report to include dates, observation and monitoring well readings and other data collected, work performed, corrective actions taken, and performance summary. • Report public health/water quality emergency to EHD immediately.	• According to permit conditions, typically every 1 to 2 years, depending on system size, usage, history, location.

3.6 Requirements for Raised Sand Filter Bed Systems

DESCRIPTION

A raised sand filter bed, sometimes referred to as a bottomless sand filter, combines features of an intermittent sand filter and a mound system. It consists of a raised or terraced sand bed, commonly supported by a low retaining wall or bulkhead, where the bottom surface is even with or slightly below ground surface and forms the absorption surface. The system may be designed for use with or without supplemental treatment ahead of the raised sand bed. The raised sand filter bed provides additional polishing treatment and final dispersal of water into the ground.

SITIING CRITERIA

1. **Setbacks**. Horizontal setback requirements for raised sand filter bed systems shall be those applicable to conventional disposal fields, as specified in Part 1 of this Manual.

2. **Depth to Groundwater.** Minimum depth to seasonal high groundwater, as measured from ground surface, shall be 2 feet.

3. **Soil Depth**. Minimum depth of soil, as measured from ground surface to impermeable soil or rock, for raised sand filter bed systems shall be 2 feet. This soil depth requirement shall apply within the sand bed area and in the adjacent area extending a distance of 25 feet down-slope of the system.

4. **Percolation Rate**. Average percolation rate for raised sand filter bed systems shall be within the range of 1 to 120 minutes per inch (MPI), as determined from testing at depths of 1 to 2 feet below ground surface. These percolation requirements shall apply within the sand bed area and in the adjacent area extending a distance of 25 feet down-slope of the system.

5. **Ground Slope**. Maximum ground slope for raised sand filter bed systems shall be 20% where the percolation rate is in the range of 1 to 60 MPI. For soils with a percolation rate greater than 60 MPI, maximum ground slope shall be 15%.

6. **Reserve Area/Dual System.** A reserve area having suitable site conditions and sufficient area for full, 100% replacement of the primary raised sand filter bed shall be provided or a complete dual primary and secondary raised sand filter bed system shall be installed initially.

DESIGN CRITERIA

1. **Treatment**. The following treatment requirements shall apply in connection with the use of raised sand filter bed systems:
    a. Primary (septic tank) treatment shall be the minimum level of treatment, and shall be acceptable where the design includes sand fill depth of 24 inches.
    b. Supplemental treatment, using an approved alternative treatment system identified in this Manual, may be used to allow reduction of the sand fill depth to 12 inches.

2. **Design Wastewater Flow**. Raised sand filter bed systems shall be designed on the basis of the projected wastewater flow, determined in accordance with requirements in Part 1 of this Manual.

3. **Pressure Dosing**. Wastewater effluent from the supplemental treatment system shall be applied to the raised sand filter bed system by pressure dosing, utilizing a pump system. The pressure distribution system shall be designed in accordance with accepted engineering practices to achieve, at a minimum:
    a. Uniform dosing of effluent over the surface application area of the raised sand filter bed;
    b. Adequate flow rate, screening of effluent and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices;
    c. Suitable access provisions for inspection, testing and adjustment of the pressure distribution system;
    d. Dosing volume to achieve a minimum of 3 to 5 doses per day at design flow conditions; and
    e. At least one distribution lateral for every 36 inches of distribution bed width.

    Additional requirements for design and construction of pressure distribution piping systems contained in “Requirements for Pressure Distribution Trenches” shall also apply.

4. **Pump System.** The pump system shall be: (a) appropriate for sewage applications; (b) of the size and type to meet the hydraulic design requirements; and (c) designed and constructed in accordance with pump system requirements provided in this Manual.

5. **Containment Liner.** The raised sand filter bed shall be provided with an impermeable containment liner along all sides of the filter bed to prevent lateral leakage out of or into the filter. The liner shall extend a minimum of 12 inches below native grade. The liner shall consist of either: (a) 30 mil plastic; (b) reinforced poured-in-placed concrete; or (c) an equivalent impermeable structure.

6. **Finished Grade**. The finished grade of the raised sand filter bed shall be above the surrounding ground elevation. Above-ground installation shall be structurally supported with retaining wall(s), as required.

7. **Bed Width**. Maximum width of the sand bed shall be 10 feet.

8. **Shape**. The raised sand filter bed shall not be restricted as to its shape in plain view.

9. **Multiple Units**. The raised sand filter bed may be divided into compartments or multiple units.

10. **Sand Filter Media.**
    a. **Sand Specification**. The sand media shall be a medium to coarse sand that meets the following gradation specifications:

Sieve Size	Percent Passing
3/8	100
#4	90 – 100
#10	62 – 100
#16	45-62
#30	25-55
#50	5 – 20
#60	0 – 10
#100	0 – 4
#200	0 – 2

Documentation of laboratory sieve analysis results for the proposed sand fill material shall be supplied to EHD to verify conformance with the above specifications.

    b. **Sand Depth**. The minimum depth of sand fill, below the gravel distribution bed, shall be 24 inches for septic tank effluent, and 12 inches for supplemental treatment.

11. **Wastewater Application Rate**. The wastewater application rate used for sizing the basal area of the sand filter bed (i.e., sand-soil interface) shall vary according to soil percolation rate of the native soil as follows:

Table RB-1
Basal Wastewater Application Rates for Raised Sand Filter Beds[1]

Percolation Rate (MPI)	Wastewater Application Rate (gpd/ft^2)
1-5	1.2
10	1.2
24	1.2
30	1.12
45	0.68
60	0.53
90	0.25
91-120	0.2

[1] Interpolate between reference values for other percolation rates;
See end of Part 3 for an expanded table listing interpolated values.

Reduction in the above wastewater loading rates or other provisions to insure the long-term integrity and performance of the raised sand filter bed may be required for high strength waste flows, such as from restaurants.

12. **Minimum Basal Area Sizing.** Minimum size (ft^2) of the basal area of the raised sand filter bed shall be determined by dividing the design wastewater flow (in gpd) by the applicable wastewater loading rate per **Table RB-1**.

13. **Linear Loading Rate.** The length of the raised bed shall be sized to meet maximum linear loading rate criterion as follows:
    a. **Effective Length**. The effective length (L) of the raised bed for determining the linear loading rate shall be the total length of the raised bed along the downslope edge.
    b. **Wastewater Flow**. The wastewater flow used for determining the linear loading rate shall be as follows:
        i. 100 gpd/bedroom for residential septic systems (note: this is 2/3 of the 150 gpd/bedroom used for system design);
        ii. Design wastewater flow rate for commercial, institutional, industrial and multi-residential septic systems.
    c. **Loading Rate**. Maximum linear loading rates for raised sand filter bed systems sizing shall vary according to soil depth, ground slope, and percolation rate as indicated in **Table RB-2.** If a variance from these criteria is proposed, it must be supported by detailed groundwater mounding analysis carried out in accordance with accepted methodology and/or scientific references dealing with water movement in soils and utilizing site specific hydraulic conductivity data.

Table RB-2. Maximum Linear Loading Rates (gpd/lineal foot)

Soil Depth (ft.)	Ground Slope (%)	Percolation Rate (MPI)		
		1-30	31-60	61-120
2 to 2.5	0-10	5	4	3
	11-20	6	5	4
2.5 to 3	0-10	7	6	5
	11-20	8	7	6
3 to 4	0-10	9	8	7
	11-20	10	9	8
> 4	0-10	11	10	9
	11-20	12	11	10

14. **Gravel Distribution Bed.**
    a. **Material**. The distribution bed shall consist of 3/8-inch double-washed pea gravel, substantially free of fines.
    b. **Depth**. Pea gravel shall extend a minimum of 6 inches below the invert and 2 inches above the top of the distribution piping. If the distribution piping is installed with chambers, the pea gravel depth below the distribution pipe may be reduced from 6 inches to 4 inches, and the 2-inch pea gravel cover may be eliminated.

15. **Silt Barrier**. The gravel distribution bed shall be either polyester, nylon or polypropylene, or any combination thereof, and shall be suitable for under-drain applications. Filter fabric shall be non-woven, shall not act as a wicking agent and shall be permeable.

16. **Soil Cover**.
    a. **Material**. A soil cover shall be placed over the distribution bed, consisting of a medium, loamy-textured soil.
    b. **Depth**. Soil cover depth shall be a minimum of 12 inches and a maximum of 18 inches over the top of the distribution bed. Soil cover shall be crowned or sloped to promote rainfall runoff.

17. **Inspection Wells**. A minimum of four (4) inspection wells shall be installed within and around raised sand filter bed as follows:
    a. One shall be located near the center of the raised bed, extending from the fill surface to the bottom of the gravel distribution bed.
    b. One shall be located near the center of the raised bed, extending from the fill surface to the sand-soil interface.
    c. One shall be located 5 to 10 feet upslope of the raised bed system, midway along the length of the at-grade, extending from the ground surface to a depth of 5 feet or to contact with impermeable materials, whichever is less.
    d. One shall be located midway along the downslope length of the raised bed, within 10 to 15 feet from the edge of the bed, extending from ground surface to a depth of 5 feet or to the depth of impermeable materials, whichever is less.
    e. Inspection wells shall be constructed of 2" to 4" diameter pipe (or equivalent), equipped with a wrench-tight cap or pipe plug and a bottom cap. All wells shall be perforated beginning at a depth of 18 inches below grade and extending to the bottom of the pipe. Perforations shall consist of hacksaw slots at nominal 1" spacing or commercially-slotted pipe. Inspection wells shall be sealed with a bentonite or concrete annular seal (or equivalent) to prevent surface infiltration.

ENGINEERING PLANS AND CONSTRUCTION

1. **Engineering Plans.** Engineering plans for raised sand filter bed systems shall include:
    a. All relevant elevation data and hydraulic calculations;
    b. Design layout and details for sand filter bed construction;
    c. Specific step-by-step construction guidelines and notes for use by the installer;
    d. Erosion control plan;
    e. Recommended make and model of all components;
    f. Recommended pump system components with cut-sheet depicting float settings;
    g. Control panel programming; and
    h. An inspection schedule listing critical control points.

2. **Construction Inspection.** At a minimum, inspection of the raised sand filter bed system installation should include the following. This is in addition to inspection work required for a supplemental treatment system, if used. Joint inspection by the designer, contractor, and EHD may be required.
    a. Pre-construction inspection where the construction staking or marking of the raised sand filter bed is provided and construction procedures discussed;
    b. Water tightness of dosing (pump) tank;
    c. Raised sand bed dimensions, structure and liner;
    d. Sand material and placement;
    e. Piping installation and hydraulic (“squirt”) test of the distribution system;
    f. Function and setting of all control devices.
    g. Final Inspection to verify that all construction elements are in conformance with the approved plans and specifications, all inspection wells are installed, erosion control has been completed, and operation and maintenance guidelines provided for owner.

MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring and reporting activities for pressure-dosed sand trench systems are outlined in **Table RB-3.**

Table RB-3. Raised Sand Filter Bed System Management Requirements

	Work	Frequency
Inspection	• Conduct routine visual observations of sand filter bed system and perimeter area and surroundings for wet areas, pipe leaks or damage, structural condition of filter bed, soil erosion, drainage issues, abnormal vegetation, gophers or other absorption field problems. • Perform all inspections of pump and appurtenances (per O&M manual and Performance Evaluation Guidelines, Part 4 of this Manual). • Record observations.	• Every 6 to 12 months.
Maintenance	• Purge laterals, squirt and balance. • Exercise valves to ensure functionality. • Perform all maintenance work as recommended by equipment manufacturer for any special valves or other components. • Maintain sand filter bed surface landscape vegetation, as required. • Investigate and repair erosion, drainage, structural problems or other problems, as needed. • Investigate and perform distribution system corrective work, as required. • Record work done.	• Distribution system maintenance annually. • Other maintenance as required.
Water Monitoring & Sampling	• Measure and record water levels in observation wells in distribution bed, sand fill and around system perimeter. • Obtain and analyze water samples from monitoring wells, as applicable, per permit requirements.	• Measure system water levels annually. • Other monitoring according to permit conditions, as applicable.
Reporting	• Report findings to EHD per permit requirements. • Standard report to include dates, observation well and monitoring well readings and other data collected, work performed, corrective actions taken, and performance summary. • Report public health/water quality emergency to EHD immediately.	• According to permit conditions, typically every 1 to 2 years, depending on system size, usage, history, location.

3.7 Requirements for Sub-surface Drip Dispersal

DESCRIPTION

Subsurface drip dispersal is a method for disposal of treated wastewater that uses special drip tubing designed for use with wastewater. The dripline is placed normally 9 to 12 inches below ground surface and makes use of the most biologically active soil zone for distribution, nutrient uptake and evapotranspiration of the wastewater. A drip dispersal system is comprised of small-diameter (½" to 1") laterals ("driplines"), usually spaced about 24 inches apart, with small-diameter emitters (1/8") located at 12 to 24 inches on-center along the dripline. Effluent is conveyed under pressure to the laterals, normally with timed doses. Prior to dispersal the effluent requires supplemental treatment.

Drip dispersal has several advantages, including: (a) it can be effective in very shallow soil conditions since it distributes the wastewater very uniformly to substantially all of the available soil in the field; (b) it can be installed in multiple small discontinuous "zones", allowing the hydraulic load to be spread widely rather than concentrated in one main area; (c) installation on steeper slopes causes less soil disturbance and erosion or slope stability hazards; and (d) water movement away from the drip emitters is substantially by unsaturated/capillary flow, which maximizes contact with and treatment by the soil.

SITING CRITERIA

1. **Setbacks**. Horizontal setback requirements for subsurface drip dispersal systems shall be those applicable to conventional disposal fields, as specified in Part 1 of this Manual.

2. **Depth to Groundwater.** Minimum depth to seasonal high groundwater, as measured from the bottom of the dripline shall be two (2) feet.

3. **Soil Depth**. Minimum depth of soil, as measured from the bottom of the dripline to impermeable soil or rock, shall be two (2) feet.

4. **Percolation Rate**. The average soil percolation rate in the proposed subsurface drip dispersal field area shall be within the range of 1 to 120 minutes per inch (MPI), as determined at depths of 1 to 2 feet below ground surface.

5. **Ground Slope**. Ground slope in areas used for drip dispersal shall be less than 30 percent.

6. **Dual System**. Two drip dispersal fields, each one hundred percent of the total size required for the design wastewater flow, shall be installed and interconnected with an approved flow diversion device (pressure-rated), to allow alternate or combined use of the two fields.

7. **Dual System Replacement Area**. Sufficient area meeting all applicable siting criteria shall be provided for full replacement of the original dual drip dispersal field.

DESIGN CRITERIA

1. **Treatment**: The following treatment requirements shall apply in connection with the use of subsurface drip dispersal systems:
    a. Wastewater effluent discharged to any drip dispersal system shall be treated to at least a secondary level through an approved supplemental treatment system, in accordance with applicable guidelines provided in this Manual.
    b. All drip dispersal systems shall include a filtering device capable of filtering particles larger than 100 microns; this device shall be located downstream of the supplemental treatment system.

2. **Design Wastewater Flow**: Subsurface drip dispersal systems shall be designed on the basis of the projected wastewater flow for the structure or facility being served, determined in accordance with wastewater flow estimation guidelines in Part 1 of this Manual.

3. **Wastewater Application Rates:** Wastewater application rates used for sizing drip dispersal fields shall be based on soil percolation rate in accordance with the criteria in **Table DD-1.** In applying these criteria, the wastewater application area refers to the ground surface area encompassed by the drip dispersal field.

Table DD-1. Wastewater Application Rates for Subsurface Drip Dispersal Fields

Soil Percolation Rate (MPI)	Soil Type* (information only)	Wastewater Application Rate (gpd/ft^2)
5-10	Fine Sand	1.2
11-20	Sandy Loam	1.0
21-30	Loam	0.7
31-45	Clay Loam	0.6
46-60	Silt-Clay Loam	0.4
61-120	Clay, non-swell	0.2

*Soil types listed for reference information only; design shall be based on site-specific percolation data.

4. **Drip field Sizing.**
    a. Minimum sizing of the drip field area shall be equal to the design wastewater flow divided by the applicable wastewater application rate from **Table DD-1.** As an example, for a design flow of 450 gpd in soils having an average percolation rate between 46 and 60 MPI, the minimum required drip field area for a single (100%) would be:

$$450 \text{ gpd} / 0.4 \text{ gpd/ft}^2 = 1{,}125 \text{ ft}^2$$

b. For sizing purposes, effective ground surface area used for drip field sizing calculations shall be limited to no more than 4.0 square feet per drip emitter. For example, 200 lineal feet of dripline with emitters at 2-foot spacing would provide a total of 100 emitters (200/2) and could be used for dispersal to an effective area of up to 400 ft^2 (100 emitters x 4 ft^2/emitter). Conversely, if wastewater flow and percolation design information indicate the need for an effective area of 1,000 ft^2, the dripline design and layout would have to be configured to provide a minimum of 250 emitters spaced over the required 1,000 ft^2 of dispersal area.
c. Drip fields may be divided into multiple zones which may be located in different areas of a site, as desired or needed to provide the required drip field size. A single continuous drip field area is not required. However, any areas proposed for drip dispersal shall be supported by field observations and measurements to verify conformance with soil suitability and other site requirements. Differences in soil conditions and percolation characteristics from one zone to another may require the use of correspondingly different wastewater application rates and drip field sizing for each zone.

5. **Pressure Dosing.** Secondary-treated effluent shall be delivered to the drip field by pressure, employing a pump system and timed dosing. The pressure distribution system shall be designed in accordance with accepted engineering practices and manufacturer recommendations for drip dispersal systems to achieve, at a minimum:
    a. Uniform dosing of treated effluent;
    b. An adequate dosing volume and pressure per manufacturer's guidelines;
    c. Adequate flow rate, final filtering of effluent and suitable piping network to preclude solids accumulation in the pipes and driplines or clogging of discharge emitters;
    d. A means of automatically flushing the filter and driplines at regular intervals; and
    e. Suitable access provisions for inspection, testing and adjustment of the drip field and components.

   Additional requirements for design and construction of pressure distribution piping systems contained in "Requirements for Pressure Distribution Trenches" shall also apply.

6. **Pump System:** The pump system shall be: (a) appropriate for sewage applications; (b) of the size and type to meet the hydraulic design requirements; and (c) designed and constructed in accordance with pump system requirements provided in this Manual.

7. **Dripline Material:** Dripline shall be manufactured and intended for use with secondary quality wastewater, with minimum 45 mil tubing wall thickness, bacterial growth inhibitor(s), and means of protection against root intrusion.

8. **Drip field Layout:** The bottom of each dripline row shall be level and parallel to the slope contour.

9. **Dripline Depth: The** dripline depth shall be installed at a depth between nine (9) and twelve (12) inches below native grade. Deeper placement of driplines may be considered by EHD on a case-by-case basis.

10. **Length of Individual Driplines**: The maximum dripline length shall be designed in accordance with accepted engineering practices and in accordance with the manufacturer's criteria and recommendations.

11. **Line and Emitter Spacing:** Line and emitter spacing shall be designed as appropriate for soil conditions, slope, and contour. There shall be a minimum spacing of 12 inches between emitters and no emitter shall be located less than 12 inches from the supply and return manifolds.

12. **Dual System Operation.** Unless exempted by EHD, all drip dispersal systems shall be installed as dual (200% capacity) drip fields, and shall normally be operated with both fields in use. Doses may be alternated among different zones in both the primary and secondary fields, or all zones may be dosed simultaneously. Secondary drip fields should not be left dormant for long periods of time (e.g., more than a few weeks at a time).

13. **Inspection Standpipes**. A minimum of three (3) inspection standpipes, minimum 3 feet in depth, shall be installed for the purpose of monitoring groundwater levels or for water quality sampling within and around subsurface drip dispersal fields as follows:
    a. One standpipe shall be located within the drip field area.
    b. One standpipe shall be located 10 to 15 feet up-gradient of the drip field.
    c. One standpipe shall be located 10 to 15 feet down-gradient of the drip field.
    d. Inspection standpipes shall be constructed of 2" to 4" diameter pipe (or equivalent), equipped with a wrench-tight cap or pipe plug and a bottom cap. All standpipes shall be perforated beginning at a depth of 12 inches below grade and extending to the bottom of the pipe. Perforations shall consist of hacksaw (nickel) slots at nominal 1" spacing, or equivalent commercially-slotted pipe. Inspection standpipes shall be sealed with a concrete annular seal (or equivalent) for stability and to prevent surface infiltration.

ENGINEERING PLANS AND CONSTRUCTION

1. **Reference Guidelines.** Installation of subsurface drip dispersal systems shall be in accordance with applicable manufacturer guidelines and recommendations.

2. **Engineering Plans.** Engineering plans for subsurface drip dispersal systems shall include:
    a. All relevant elevation data and hydraulic calculations;
    b. Specific step-by-step construction guidelines and notes for use by the installer;
    c. Erosion control plan for any site over 20%;
    d. Recommended make and model of all components;

e. Recommended pump system components, with cut-sheet depicting float settings;
f. Control panel programming;
g. An inspection schedule listing critical control points; and
h. Operation and maintenance guidelines.

3. **Construction Inspection.** At a minimum, inspection of the drip dispersal system installation should include the following. This is in addition to inspection work required for the treatment system. Joint inspection by the designer, contractor, and EHD may be required.
    a. Pre-construction inspection where the construction staking or marking of the drip lines, supply and return piping, pump system and appurtenances is provided and construction procedures discussed;
    b. Water tightness of effluent dosing (pump) tank;
    c. Drip field layout, piping materials and installation, and all associated valves and connections;
    d. Hydraulic testing of the drip system;
    e. Functioning and setting of all control devices; and
    f. Final Inspection to verify that all construction elements are in conformance with the approved plans, specifications, and manufacturer recommendations, all inspection standpipes are installed, erosion control has been completed, and operation and maintenance guidelines provided for owner and service provider.

MANAGEMENT REQUIREMENTS

Recommended minimum procedures and frequency for inspection, maintenance, monitoring and reporting activities for subsurface drip dispersal systems are outlined in **Table DD-2.**

Table DD-2. Drip Dispersal System Management Requirements

	Work	Minimum Frequency
Inspection	• Conduct routine visual observations of drip field, downslope area and surroundings for wet areas, pipe leaks or damage, soil erosion, drainage issues, abnormal vegetation, gophers or other problems. • Conduct routine physical inspections of system components, including valves, filters, and headworks box(es). • Perform special inspections of drip field at time of any landscaping work or other digging in drip field area. • Perform inspections of dosing pump(s) and appurtenances (per O&M manual and Performance Evaluation Guidelines, Part 4 of this Manual). • Record observations.	• Every 6 to 12 months.
Maintenance	• Manually remove and clean filter. • Clean and check operation of pressure reducing valves. • Clean flush valves and vacuum release valves.	• Clean filter every 6 months. • Other maintenance annually.
Water Monitoring & Sampling	• Measure and record water levels in dispersal field monitoring wells, as applicable, per permit requirements. • Obtain and analyze water samples from dispersal field monitoring wells, as applicable, per permit requirements.	• According to permit conditions, if applicable.
Reporting	• Report findings to EHD per permit requirements. • Standard report to include dates, monitoring well and other data collected, work performed, corrective actions taken, and performance summary. • Report public health/water quality emergency to EHD immediately.	• According to permit conditions, typically every year, depending on system size, usage, history, location.

KERN COUNTY
ONSITE SYSTEMS MANUAL

PART 4

OWTS PERFORMANCE
AND
MONITORING REQUIREMENTS

4.1 OWTS PERFORMANCE REQUIREMENTS

GENERAL

1. All onsite wastewater treatment systems (OWTS) shall function in such a manner as to**:**

a. Be sanitary and not create a health hazard or nuisance;
b. Prevent backup or release of wastewater or wastewater effluent into the structure(s) being served by the OWTS; and
c. Not discharge wastewater or wastewater effluent onto the ground surface or into surface water, or in such a manner that groundwater may be adversely impacted.

2. All OWTS and the individual components shall meet the performance requirements for the specific site conditions and application for which they are approved.

3. All OWTS shall be operated in compliance with applicable performance requirements particular to the type of system, the facility served, and the site conditions.

CONVENTIONAL SYSTEMS

1. All septic tanks shall be structurally sound, watertight, provide clarified effluent, have adequate space available for sludge and scum storage, and operate in such a manner as to not create odors or vector attraction, be properly vented, and have a functional baffle.

2. Dispersal systems shall: (a) have adequate dispersal capacity for the structures and/or uses served; (b) not result in seepage or saturated soil conditions within 12 inches of ground surface in or adjacent to the dispersal field; and (c) be free from soil erosion or instability.

3. Effluent shall not continuously pond at a level above the invert (bottom) of the perforated distribution pipe in the dispersal trench or serial distribution overflow line, as applicable.

4. All components of the OWTS shall be functional and in proper working order.

SUPPLEMENTAL TREATMENT

In addition to meeting criteria in A and B above, supplemental treatment systems shall comply with the following performance requirements.

1. **Effluent Quality**. Effluent produced by all supplemental treatment systems shall comply with the following minimum 30-day average constituent limitations:

Constituent	(1) Where required for reduced separation to GW	(2) Where Pathogen or Nitrogen treatment Required
Biochemical Oxygen Demand (BOD), mg/L	30	30
Total Suspended Solids (TSS), mg/L	30	30
Fecal Coliform, MPN/100 ml	N/A	200*
Total Nitrogen, % reduction (effluent/influent)	N/A	50%**

*Due to proximity to public water supply well or surface water intake per SWRCB OWTS Policy; where applicable, additional requirements for pathogens include: (a) minimum 3-ft separation to groundwater below dispersal field; and (b) minimum 12 inches of soil cover over dispersal piping.

** Per results or recommendation of cumulative impact assessment, Kern County OWTS.

2. **Sand Filters.** Sand filters shall:
    a. be operated to maintain uniform effluent distribution throughout the sand filter bed;
    b. not result in ponded effluent on the distribution bed infiltrative surface;
    c. be operated and maintained to prevent channeling of flow, erosion of the sand media or other conditions that allow short-circuiting of effluent through the system;
    d. not result in leakage of effluent through the sand filter liner or supporting structure; and
    e. conform to applicable requirements for pressure distribution in D.1 below.

3. **Proprietary Treatment Units.** Proprietary treatment units shall comply with the following:
    a. The unit and its components shall be structurally sound, free from defects, be watertight, and not create odor or vector attraction nuisance.
    b. The unit shall be operated in accordance with the approved manufacturer and certification/listing organization standards.

ALTERNATIVE DISPERSAL SYSTEMS

In addition to the requirements in A and B above, alternative dispersal systems shall also comply with the following.

1. **Pressure Distribution Systems.**
    a. Pump tanks, risers and lids shall be structurally sound, watertight and store wastewater effluent in such a manner as to not create odors or vector attraction;
    b. Pumps, floats, alarms and associated controls shall be in good condition and operate in accordance with design specifications; and

c. Dispersal field and components shall:
    i be operable and in good condition;
    ii maintain uniform distribution of effluent throughout the dispersal field;
    iii not result in continuously ponded effluent in the dispersal trench (or bed) to a level above the invert (bottom) of the distribution pipe; and
    iv in the case of pressure-dosed sand trenches, not result in continuously ponded effluent above the sand interface.

2. **Mound, At-Grade and Raised Sand Bed Systems**. Mound, at-grade and raised sand bed systems shall:
    a. not result in seepage or saturated soil conditions within 12 inches of ground surface anywhere along the perimeter toe or edge of the system;
    b. be free from erosion, slumping or damage to the soil cover;
    c. not result in ponded effluent within the gravel distribution bed or in the sand fill (for mounds); and
    d. conform to applicable requirements for pressure distribution in D.1 above.

3. **Subsurface Drip Dispersal Systems**. Subsurface drip dispersal systems and components shall:
    a. not result in seepage or saturated soil conditions above the depth of the dripline within or anywhere along the perimeter of the drip field;
    b. be free from erosion, slumping or other soil disturbance that threatens to expose or cause damage to drip dispersal tubing or appurtenances;
    c. conform to applicable requirements for pressure distribution in D.1 above; and
    d. be operated and maintained in accordance with manufacturer recommendations.

4.2 OWTS MONITORING REQUIREMENTS

GENERAL

A monitoring program will be established for each alternative OWTS as a condition of the operating permit at the time of permit issuance, and may be amended at the time of permit renewal. Said monitoring shall be performed to ensure that the alternative OWTS is functioning satisfactorily to protect water quality and public health and safety.

MONITORING ELEMENTS

The monitoring requirements will vary depending on the specific type of alternative system, typically including the following:

1. Recoding of wastewater flow based on water meter readings, pump event counter, elapsed time meter, in-line flow meter, or other approved methods;

2. Measurement and recording of water levels in inspection/monitoring wells in the dispersal field;

3. Inspection and observation of pump operation and other mechanical equipment;

4. Water quality of selected water samples taken from points in the treatment process, from groundwater monitoring wells, or from surface streams or drainages; typical water quality parameters include total and fecal coliform, nitrate, BOD, and suspended solids;

5. General review and inspection of treatment and dispersal area for evidence of seepage, effluent surfacing, erosion or other indicators of system malfunction; and

6. Other monitoring as recommended by the system designer or equipment manufacturer.

MONITORING FREQUENCY

The required frequency of monitoring for each installation will be established in the operation permit, generally in accordance with the following minimum schedule:

- Years 1 through 4 of operation: semi-annual monitoring
- Years 5 and beyond: annual monitoring

Monitoring frequency may be increased for larger flow OWTS (e.g., >2,500 gpd) or where warranted because of the complexity of the design or sensitive nature of the site. Monitoring frequency may be increased for any system if problems are experienced.

MONITORING RESPONSIBILITY

Monitoring of alternative OWTS shall be conducted by or under the supervision of one of the following:

1. Registered Civil Engineer;

2. Professional Geologist;

3. Registered Environmental Health Specialist; or

4. Other onsite wastewater maintenance provider registered with the EHD and meeting qualifications as established in this Manual. Registration shall entail: (a) documentation of required qualifications; (b) participation in annual training/review conducted by the EHD; and (c) payment of an annual fee established by the Board of Supervisors.

Additionally, the EHD may require third-party or County inspection and monitoring of any alternative OWTS where deemed necessary because of special circumstances, such as the complexity of the system or the sensitive nature of the site. The costs for such additional monitoring would be the responsibility of the owner.

REPORTING

Monitoring results shall be submitted to the EHD in accordance with reporting guidelines provided in this Manual and as specified in the operating permit. The monitoring report shall be signed by the party responsible for the monitoring. Notwithstanding formal monitoring reports, the Director shall be notified immediately of any system problems observed during system inspection and monitoring that threaten public health or water quality.

DATA REVIEW

The Director will, from time-to-time, compile and review monitoring and inspection results for alternative OWTS and will provide a summary of results to the applicable Regional Water Quality Control Board at least once every five (5) years. Based on this review, the Director may require corrective action for specific properties or certain types of alternative OWTS, or general changes in monitoring and inspection requirements.

4.3 OWTS PERFORMANCE EVALUATION GUIDELINES

PURPOSE AND PERFORMANCE CRITERIA

Inspection and performance evaluation of an OWTS may be required in connection with certain types or level of changes or additions to an existing building served by an OWTS. The guidelines to be followed for such inspections are prescribed below. These guidelines may also be useful and employed for other circumstances, such as OWTS inspections in connection with property transfers, for lending institutions, etc.

The purpose of these inspections is to determine, on an individual basis, whether an existing OWTS is functional and meets minimum standards of performance established by the KCEHD. The following performance criteria are established as minimum requirements:

1. There is no surfacing effluent at any time;

2. The effluent is not discharged directly to groundwater; i.e., the dispersal trenches do not extend to or below the seasonal high groundwater level;

3. There is always positive flow to the dispersal field from the septic tank, with no backup to the tank or house plumbing during high groundwater conditions;

4. There is an adequately sized septic tank for the structure being served and it must be serviceable - e.g. access risers for maintenance. The septic tank must be water tight and constructed of approved materials;

5. There is no indication that the existing OWTS is adversely affecting any beneficial uses of surface water or groundwater.

The following sets forth procedures for conducting performance evaluations, to assure consistency and thoroughness in verifying the functioning status of existing OWTS.

INSPECTION RESPONSIBILITY

The inspections shall be carried out by any of the following:

1. Registered Civil Engineer

2. Professional Geologist

3. Registered Environmental Health Specialist

4. Other onsite wastewater maintenance providers having experience in the construction and/or operation of OWTS as evidenced by either of the following:
    a. possession of a valid contractor's license (A, C-36 or C-42);
    b. completion of an onsite wastewater certification training course by a third party entity, such as the California Onsite Wastewater Association (COWA), National Association of Waste Transporters (NAWT), National Sanitation Foundation (NSF), or other acceptable training program as determined by the Director.

The individual conducting the field inspection work shall be qualified in the operation and maintenance of OWTS and trained specifically in the testing and inspection procedures outlined in this document.

BACKGROUND DATA

Prior to conducting the onsite performance inspection available background information pertaining to the property, structures and septic system should be compiled and reviewed. This should include permit information, site plan, "As Built" drawings of the OWTS, prior inspection results, etc.

The site plan should show the location of the septic tank and dispersal field, the locations of all buildings, decks, cut banks, creeks, wells, reserve or failsafe area, direction and percentage of slope, or any other items which may affect the OWTS. The reserve dispersal field area(s) should be identified and evaluated for any conflicting encroachment by buildings or other site development.

INITIAL SITE RECONNAISSANCE

Initially, the inspector should walk the property to confirm the location of the septic tank, dispersal field, and other pertinent features of the system. In verifying the dispersal field location, the length of each line and the depth of the drainpipe (below ground surface) should also be determined for comparison with observed groundwater conditions. This may require probing with a metal rod or actual excavation to locate the pipe.

Site reconnaissance should also include a check of setbacks between the existing dispersal field and expansion areas and any man-made structures, e.g., to confirm no building foundations recently added within or too close to the existing dispersal field or expansion areas.

The septic tank and dispersal field areas should be checked for any obvious signs of existing system problems such a surfacing effluent, odors, greywater bypasses, selective fertility (i.e., lush vegetation in the dispersal field area) or any other condition that may suggest an existing or impending problem. The inspector should determine if the system has dual dispersal fields and,

if so, locate and check the diversion valve: (a) to see that it is functional; and (b) to determine which field is in service. All observations should be noted.

As part of the initial site reconnaissance a hand-augured boring (3-inch minimum) should also be made within or adjacent to the dispersal field for observation of soils and groundwater conditions.

An initial reading (i.e., depth to groundwater from ground surface) should be taken when the boring is made. The boring should then be left open for the remainder of the performance inspection so that a final reading may be taken after the water level has been allowed to stabilize for about 1 hour. The boring should be backfilled before leaving the site. If a hand-auger boring is not feasible and the area is known or estimated to have high groundwater conditions, a motorized drill rig or excavator may be necessary.

SEPTIC TANK INSPECTION

After the initial site reconnaissance has been conducted, the detailed inspection of the system should commence.

1. **Access Risers**: First, locate the septic tank and determine if permanent access risers have been installed on the septic tank. If the tank is equipped with risers, check their general condition. Ideally, the risers should be properly grouted or sealed to the top of the septic tank to prevent groundwater and/or surface water intrusion. The lids of the risers should also be properly sealed to prevent odors or the entry of insects, (e.g., flies, mosquitoes, etc.). Any observed defects in the access risers should be noted. If the tank lacks access risers, this information should be so noted; and the property owner should be provided information about access risers and advised to have them installed.

2. **Opening the Tank:** After inspecting the access risers the septic tank lids should be carefully removed. Care must be taken if gardens and shrubs are near to prevent damage and to disturb the yard area as little as possible. Concrete lids are heavy and may be "cemented" in place by silt. A steel bar or other suitable tool may be needed to assist in opening the lids. During the tank inspection process, personnel should wear protective boots and gloves (neoprene) to guard against infection from pathogenic organisms.

3. **Structural Condition:** Once the tank is open, the inspector should observe and probe the structural condition of the septic tank to check for any obvious signs of cracking or other structural defects in the tank. A steel rod is used to probe the walls and bottom of the tank. Normally, the tank will not need to be pumped-out to perform this procedure. The inlet and outlet sanitary "tees" should also be inspected to assure that they are in satisfactory condition, properly positioned, and free of scum accumulation, rocks, root matter or other obstructions. Any problems should be noted and the inspector should assess whether or not additional tests or observations are necessary to verify the structural integrity of the septic tank.

4. **Liquid Level:** The liquid level in the tank should be measured with respect to the outlet pipe. In a properly functioning system, the level in the tank should be even with the invert (i.e., bottom) of the outlet pipe. If the liquid level is below the outlet pipe, the tank is probably leaking. If the liquid is above the pipe, the dispersal field is either flooded or the line to the field is obstructed or possibly set with an improper grade. The depth of water above or below the outlet pipe should be measured and noted.

5. **Tank Capacity:** The capacity of the septic tank (in gallons) should be determined from as-built plans or from measurements of the width, length and depth (below outlet pipe) of the tank. The capacity can then be compared with the established water use/wastewater flow rates for the property.

HYDRAULIC LOAD TEST

1. **General:** The inspector should then proceed with the hydraulic load test of the septic tank and dispersal field. The test, as described here, is conducted only for conventional gravity-fed dispersal trench systems, and does not apply if the system utilizes a pump. A separate test to be conducted for pump systems is described in the next section. The hydraulic load test is conducted by surcharging the septic tank with about 150 gallons of water over a 20 to 30- minute period, and then observing the rise of water in the tank and the subsequent draining process. Although not always conclusive, tracer dye, added to the tank, may be used to assist in investigating the possible contribution of effluent where surface wetness/seepage is suspected or observed. A garden hose discharging into the outlet side of the tank can be used to surcharge the tank. The hose outlet should remain at least 12 inches above the water level in the tank to prevent cross-contamination. Before starting the test, the flow rate from the hose should be determined (i.e., with 5-gallon bucket and stop watch) to properly gauge the amount of surcharge water added to the tank. Alternatively, a portable water meter can be installed between the house faucet and the hose to directly measure the water volume added.

2. **Test procedures:** The step-by step procedures for the hydraulic load test are then as follows:
    a. Measure the location of the static water line in the septic tank (at the outlet side)
    b. Begin surcharging the tank with water to start the hydraulic load test.
    c. Observe any rise in the liquid level at the outlet pipe and measure the final level at the end of filling. Typically, the liquid level will rise from an inch or two, at which point the liquid level should stabilize for the reminder of filling, and then return to the initial level in a matter of minutes after filling is stopped.
    d. After the filling cycle is finished, the water level decline in the septic tank is observed until the initial level is reached; and the time to achieve this is recorded. If the initial level is not attained within 30 minutes, the test is terminated and the final water level is noted.

3. **System Rating:** Based upon the water level readings during the test, a hydraulic performance rating is then assigned to the system in accordance with the guidelines provided in table 1. It should be emphasized that these are guidelines only; and special circumstances may be cause for modifying the evaluation and rating of a particular system. A system receiving a "failed" rating will likely require upgrading and/or additional investigation to determine the underlying cause(s).

FINAL LEACH FIELD INSPECTION

At the completion of the hydraulic load test, the dispersal field area and downslope areas should be checked again for indications of surfacing effluent, wetness, or odors. If any of these conditions exist as a result of the hydraulic load test, this would likely be considered evidence of system failure. If the field observations of wetness are not obviously the result of the hydraulic load test, further investigation may be necessary to determine if the dispersal field is failing and the cause of the failure. Additional investigative work may include water quality sampling (for total and fecal coliform, ammonia and nitrate) or dye testing. The cause of seepage could be related to gopher holes, site drainage or erosion problems, excessive water use or simply the age of the system.

TABLE 1
HYDRAULIC LOAD TEST RATING GUIDELINES

RATING	SEPTIC TANK RESPONSE TO HYDRAULIC LOADING
EXCELLENT	No noticeable rise in water level during filling.
SATISFACTORY	Maximum water level rise of about 2 inches, with decline to initial level within about 15 minutes after end of filling.
MARGINAL	Maximum water level rise of about 3 inches, with decline to initial level within about 30 minutes after end of filling.
POOR	Water level rise of more than 3 inches, with decline not reaching initial level within 30 minutes after end of filling.
FAILED	Water level rise of more than 3 inches, with no noticeable decline within 30 minutes after end of filling.

PUMP SYSTEMS

For systems equipped with an effluent pump, the following inspection procedures should be followed. This is in addition to inspection of the septic tank as described under “E. Septic Tank Inspection”.

1. **General:** Remove the pump access cover and basin lid, taking care that no soil or other material enters the basin. Note any signs of scum or sludge buildup, indications of previous pump failure (such as scum line above the high water alarm switch), or evidence of soil or roots entering the basin. Look for any signs of groundwater infiltration or surface water inflow to the basin. Also, inspect the float controls to see that they have free movement, and check the electrical junction box (if located in the basin or access riser) for any obvious signs of corrosion. Measure the dimensions of the pump basin and determine the amount of emergency storage capacity for comparison with the system design and county guidelines (1.5 times the daily sewage flow volume). If the water level in the basin is normal (i.e., between the high and low water controls) proceed with testing of the pump system.

2. **Pump test:** The pump test is conducted by adding sufficient water to the basin to activate the pump "on" control, and observing the performance of the system over at least one pumping cycle. The total amount of water added should be about 150 gallons, to approximate the same hydraulic loading of the dispersal field as for gravity systems. Using a garden hose, the water may be added to the outlet side of the septic tank, or directly to the pump basin. If filling the basin directly, care should be taken to minimize turbulence and disturbance of sediment or sludge that may have collected in the basin. This can be best accomplished by directing the stream of water against the interior side of the chamber, rather than directly toward the bottom of the pump chamber.

Observe the filling of the basin, and note and measure the point at which the pump is activated. Immediately stop the filling operation and observe the pumping cycle until the pump shuts off. While the pump is discharging, examine the piping system (where exposed) for any leaks. Even small leaks could be a forewarning of possible breaks in the pressure line at some point in the future; and these should be corrected as soon as possible. Note and measure the depth at which the pump shuts off, and calculate the volume of water between the "ON" and “OFF” measurements. Compare this dose with the design dose volume specified for the system. If the dose is too high or too low, float controls should be readjusted to correct the dose. Any adjustments to the pump system should be done by a licensed and properly qualified contractor (not by the inspector, unless so qualified).

The pumping cycle (from "ON" to "OFF') level should be timed and the results recorded on the inspection form. Typically, if the pump is sized and operating properly, pump operation lasts about 1 to 5 minutes per dose. Pump cycles lasting longer than this may indicate a flooded dispersal field and/or pump or piping deficiencies. If this is observed, it should be noted and further investigation of the pump and dispersal field should be conducted to determine the specific cause. Dividing the pump volume (in gallons) by the pump cycle time (in minutes) will give an

approximate pump discharge rate (in gpm). The observed pump rate should be checked against the design requirement for the system, and any discrepancy noted.

If during filling of the pump basin, the pump does not activate when the water reaches the high liquid level control (i.e., "ON" float), discontinue the pump test. This indicates a pump failure, defective float switch or wiring problems and will require the repair service of a competent contractor familiar with these types of systems. The pump system failure should be noted, communicated immediately to the resident/owner, and followed up with prompt corrective action.

3. **Dispersal Field Inspection:** At the completion of the pump test, the dispersal field area should be checked for signs of seepage in the same manner as previously described for gravity-fed systems following hydraulic loading.

4. **Audio and Visual Alarm:** Test the pump system audio and visual alarm to confirm that it can be heard at the house if mounted at the pump tank.

CLEAN UP

At the completion of the OWTS inspection and testing, replace all access lids and clean all tools before leaving the site. All tools and equipment that come into contact with wastewater should be cleaned and disinfected with a 1:5 bleach solution, then rinsed with fresh water; and all contaminated rinse water should be disposed of in the septic tank.

KERN COUNTY
ONSITE SYSTEMS MANUAL

PART 5

STANDARDS,
RULES, AND REGULATIONS
FOR LAND DIVISIONS

Sewage Disposal, Water Supply, And Preservation of Environmental Health

DEFINITIONS

The definitions set forth in the following section shall apply throughout these standards.

Alluvium

Sediment deposited by a river.

Disposal field

The required absorption area on square feet per one hundred (100) gallons of septic tank liquid capacity.

Domestic Water

Water plumbed to a dwelling or structure which is intended to be used for, but not limited to, drinking, food preparation, dish washing, and bathing. Domestic water must also be potable.

Easement

A grant of one (1) or more of the property rights by the owner to or for the use by the public, a corporation, or another person or entity.

Effluent

The liquid outflow of any facility designed to treat, convey, or retain wastewater.

Expansion Area

Additional seepage pits or subsurface drain fields, equivalent to at least one hundred (100) percent of the required original system that may be installed if the original system cannot absorb all the sewage.

Floodplain

A land area adjoining a river, stream, watercourse, or lake which is likely to be flooded, including alluvial cones, wherein streams may change their course. “Primary” floodplain refers to the channel and adjacent areas where the bulk of the flood flow occurs, also commonly known as the “floodway”. “Secondary” floodplain refers to areas outside the primary floodplain that are subject to inundation, but where there is no significant flood flow or current.

Groundwater

Water stored underground in the spaces between rocks or sediments.

Leach bed

The joining of leach line trenches into one large square area.

Leach line

A series of horizontal trenches that hold a level perforated pipe that is used to distribute the wastewater throughout a rock absorption system where it eventually soaks into the soil particles.

Percolation Test

A method of testing water absorption of the soil. The test is conducted with clean water and test results can be used to establish the dispersal system design. Test must be accomplished by registered civil engineers, certified engineering geologists, or approved Registered Environmental Health Specialist.

Potable Water

Water safe for drinking, culinary and domestic purposes, and meets all requirements of the health officer.

Public Entity

A local agency which is empowered to plan, design, finance, construct, operate, maintain, and to abandon, if necessary, any sewerage system, the expansion of any sewerage system and the sewage treatment facilities serving a land development.

In addition, the entity may, per Health and Safety Code (Sections 6950-6982),be empowered to provide permits and to have supervision over the location, design, construction, operation, maintenance, abandonment of individual OWTS, and to conduct any monitoring or surveillance programs required for water quality control purposes.

Seepage Pit

A covered pit with an open-jointed or perforated lining through which wastewater effluent seeps into the surrounding soil, sometimes called a leaching pit or leaching pool.

Septic Tank

A water tight, covered receptacle designed and constructed to receive the discharge of sewage from a building sewer, to separate solids from the liquid, to digest organic matter, to store digested solids through a period of detention, and to allow the clarified anaerobic liquids to discharge for final disposal or additional (supplemental) treatment.

Setback

The required minimum distance between a proposed OWTS and various building, landscape, and water features as specified under Siting Criteria in the Kern County Onsite Systems Manual, Part 1.

Sewage

Any combination of water-carried waste, discharged from buildings.

Sewage system

A network of wastewater collection, conveyance, treatment, and disposal facilities interconnected by sewers.

Private system: a private sewerage disposal system or any part thereof, or the building sewer to the point of connection to a public sewer main which typically parallels the center line of the roadway. A private system is sometimes referred to as private disposal system.

Public system: a common sewerage system or any part thereof which is operated by the county, or by a county service area, or by any political subdivision or public entity.

Streams

Surface: a continual or seasonal flow of water in channel having a definite bed and banks.

Non-classified: a flow of water within a well-defined course only during a period of storm runoff.

Chapter I General

Section 601-1

The Environmental Health Division's "Standards for Land Development" include the aspects of sewage, water supply, and preservation of environmental health. The standards are intended to safeguard the public health, and are enforced by the County's EHD. They are primarily intended to apply to residential units. The applicant may request a variance from the requirements of these Standards.

The Director of the Public Health Services Department may grant exceptions. He is authorized to approve a variance if it is determined that the granting of such variance will not result in any nuisance or menace to the public health, and may conditionally approve a variance if it is determined to be necessary to meet the goals and objectives of these Standards.

Section 601-2

It is the responsibility of the land developer and his technical consultants to provide to the EHD any and all data needed to satisfy the content and the intent of these Standards.

Section 601-3

Regulations of the State of California or other governmental agencies that are more restrictive in nature have precedence over these Standards.

Section 601-4

All references herein to the California Plumbing Code relate to the current edition as adopted by the County of Kern.

Chapter II Sewage Disposal by Individual Onsite Wastewater Treatment Systems

Section 602-1

Consideration should be given to the construction of a community sewerage system and treatment plant if connection to a public sewer is not possible. Where sewage disposal by individual onsite wastewater treatment systems (OWTS) such as septic tanks with disposal fields or seepage pits is proposed, the following standards shall apply:

1. A soils report regarding the feasibility of using individual OWTS in accordance with the standards of good public health and engineering practice is required. Three copies of the report must be submitted. The report must be prepared by a registered civil engineer, qualified in the field of soils engineering, or by some other

specialist acceptable to the EHD. The report is subject to the review and approval of the Division.

2. The report must include the results of soil percolation tests. Percolation tests shall be made in accordance with the U.S. Public Health Service test procedure (Manual of Septic Tank Practice, Part I). Any departure from that procedure must first be approved by the EHD. The submittal of soil test hole logs is also required, with soils classified in accordance with the Kern County Onsite Systems Manual and by either the U.S.D.A. Soil Classification System or Unified Soil Classification System.

   Where soil and bedrock conditions permit, the test pits or borings shall extend to minimum depths of seven (7) feet below the bottoms of proposed disposal trenches or twelve (12) feet below the bottoms of pits. The Engineer must specify whether disposal trenches and/or pits are to be used. The number of test holes and percolation tests is ordinarily at the discretion of the engineer, but they are required to state whether or not the soil in each lot in a development is capable of satisfactorily absorbing sewage effluent.

   Soil and percolation test hole locations must be accurately plotted on the map which accompanies the report. If the soil types vary within the development, the map shall indicate limits of the different types, and a lot-by-lot list of soil types shall be submitted.

3. For purposes of standardization, Appendix Tables 1 and 2 shall be used to correlate percolation rates with soil types.

Section 602-2.1

Individual OWTS may be used only where sufficient area for them is provided and where the density of such systems and of the resulting sewage effluent will not have an adverse effect upon water quality or public health.

1. The minimum allowable lot size where individual OWTS are used is considered to be a function of soil properties, climate, geology, and topography. The required minimum lot size where individual OWTS are used is 10,000 square feet net, except as follows:
   a. In desert, valley, or foothill areas, lots may be less than 10,000 square feet net but no less than 7,200 square feet net, where individual systems are used, provided that the following criteria, over and above those contained elsewhere in these Standards, are satisfied:

i. A functioning public entity providing potable water exists or is provided.
ii. The site is shown on the Geologic Map of California as “Recent Alluvium”, as published by the California Division of Mines and Geology.
iii. The soils for septic tank purposes are Type 2 (Fine sand) per Appendix Table 2.
iv. The natural slope of the surface of the ground throughout the site does not exceed ten (10%) percent.
v. Other pertinent environmental quality control factors, in the discretion of the Director of the Public Health Services Department, allow the smaller lot size.

2. In all areas, each lot shall be provided with an adequate site for subsurface disposal of sewage effluent within the boundaries of the lot. The site must have a natural slope of thirty (30%) percent or less; it must be located to allow disposal by gravity flow, and its size for single family residential use, whether leaching trenches or disposal pits are used, shall be in accordance with Appendix Table 3.

3. The required minimum size of the effluent disposal field area for multiple dwelling lots, in which leaching trenches or seepage pits are used, shall be determined by the following information:
    a. The required area in square feet and the required septic tank capacity in gallons, in accordance with requirements in the Kern County Onsite Systems Manual (Part 1).
    b. The proposed number of dwelling units, the number of bedrooms in each unit, and the soil type in the future effluent disposal area must be known in order to derive the required area.
    c. Also, the use of dual disposal systems, which entails alternate, periodic use and resting of trenches or pits, is required on multiple dwelling lots.

Section 602-2.2

In designing lots and sewage disposal sites prior to the filing of a tentative map, the following factors shall be considered:

1. Space shall be allowed on the lot for expansion of the original disposal field. The square footages given in Appendix Table 3 are intended to satisfy initial expansion area requirements for disposal fields. The use of dual disposal systems, which entails alternate, periodic use and resting of trenches and pits, may be required at the reasonable discretion of the Director of the Public Health Services Department.

Where dual disposal systems are to be used, each one-half of the system shall have an absorption area equal to at least two-thirds of that required by the current Kern County OWTS design standards, per Onsite Systems Manual, Part 1, an expansion area capable of accommodating at least 50% of the original installation is required in Types 1, 2, and 3 soils; at least 87% in Type 4 soil; and 125% in Type 5 soil.

2. The design of the lot should be easily accessible for future maintenance, repair, reconstruction, or connection to future public sewers.

3. The installation of sewage disposal systems within easements is not permitted without prior approval of the easement holder. Slope easements are included in this prohibition.

4. The disposal system must be located so that sewage effluent will not percolate out through the surface of the embankment. As a guideline, disposal systems should be set back at a ratio of 4 to 1 from embankments; for example, for each vertical foot of embankment height, the disposal system should be located four feet horizontally from the top of the embankment. Setbacks should be adjusted to suit local geologic conditions.

5. The following minimum setbacks from water wells are required:

System	All Water Wells	Public Water Supply Wells
Sewer or water-tight septic tank	100 feet	150 feet
Leaching Field	100 feet	150 feet*
Seepage Pit	150 feet	150 feet*

*200 feet for any trench or seepage pit >10' deep; 2-yr microbial travel study required for seepage >20' deep within 600 feet of public water supply well.

These setback distances may be increased where deemed necessary by the Director of the Public Health Services Department.

6. Disposal systems should not have to be installed underneath pavement or other impervious ground surface coverings. If it is necessary to install disposal fields beneath impervious surface coverings, the disposal system and required areas shall: (1) be increased by 25%; and (2) be installed using traffic-rated chambers in place of standard pipe and drain rock, with no reduction credit for chambers.

7. The use of aerobic or other supplemental treatment equipment in place of or in addition to conventional septic tanks is not acceptable as a basis for reduction of the subsurface disposal area. The installation of electro-mechanical sewage disposal devices must have a provision for periodic professional maintenance, and is subject to approval by the EHD as an “alternative OWTS” in accordance with provisions of Kern County OWTS Ordinance Article 3.

8. A lot is not suitable for residential use if the sewage disposal system cannot be installed within its boundaries.

9. Bedrock, other impervious formations, and the maximum seasonal elevation of the ground water level shall be at least seven (7) feet below the bottoms of disposal trenches or twelve (12) feet below the bottoms of seepage pits.

   In very pervious soils, for example, Types 1 and 2, the required separation between ground water level and the bottoms of disposal trenches or pits may be increased at the discretion of the Director of the Public Health Services Department.

10. The installation of sewage disposal systems in areas underlain by carbonate rocks or by fractured bedrock is not permitted unless evidence indicates that solution cavities or open fractures will not serve as conduits for the passage of improperly filtered sewage effluent into ground waters, springs, or surface streams.

Professional findings or opinions in this regard shall be submitted where applicable.

11. No sewage or sewage effluent may be discharged within 100 feet (horizontally) of any water source or the high water mark of a river, stream, canal, lake, or other surface body of water.

    Sewage disposal systems shall be located as far as possible from a non-classified stream or its established easement and in no case closer than 25 feet thereto unless certified by a qualified engineer that is safe to do so without creating a nuisance or endangering the watershed.

Section 602-3

The engineer is required to submit a statement that all lots have been designed in compliance with these standards. For “alternative OWTS” and other specially engineered systems, the engineer shall certify that the system(s) have been installed according to the approved plans when required by the EHD.

Section 602-4

One copy of a topographical analysis map on the tentative map base (or on a larger scale map) may be required at the Director of the Public Health Services Department's discretion. Slope percentage categories shall be depicted in accordance with the following color code:

Slope Range	Color
0 to 30%	Uncolored
Greater than 30 %	Colored

Additionally, the map shall show all easements and locations of rock out-crop, high groundwater, and spring discharge. The portions of lots allocated for the subsurface disposal of sewage effluent shall be delineated, and their approximate areas in square feet indicated. The approximate size of irregularly-shaped lots must also be shown.

Section 602-5

Where watercourses, significant drainage channels, or bodies of water traverse or adjoin a lot, a predevelopment plan, showing how OWTS can be installed and still remain at the necessary distance from the high water mark, may be required.

Lines depicting the required setbacks from such watercourses, drainage channels, or bodies of water shall be indicated on a copy of the tentative map.

Section 602-6

The use of disposal fields, wherever conditions permit, is preferred to that of pits. Seepage pits are prohibited where percolation rates for them exceed 25 minutes per inch (U.S. Public Health Service test procedure). In lieu of seepage pits, the engineer may consider the use of "alternative OWTS" or "specially designed", deeper disposal trenches in accordance with applicable provisions and requirements of Kern County OWTS Ordinance, Article 3 and Onsite Systems Manual.

Section 602-7

If the engineer determines that the building of fill pads for the installation of disposal fields is necessary, he/she must submit design criteria for such pads and fields. Where any fill pad is to be built in sloping terrain, the EHD shall require the sub-divider to furnish findings of an engineer or engineering geologists qualified in such matters regarding the possibility of soil slippage or landslide of the pad area, along with recommended design measures to mitigate such hazards. The engineer shall

certify that the fills are constructed in accordance with the design recommendations.

Section 602-8

If lot-grading adversely changes the engineer's initial report on percolation characteristics of the soil in a proposed sewage disposal area, the system installed therein shall be designed in accordance with specific recommendations of a soils engineer or other specialist acceptable to the EHD.

Section 602-9

If underground irrigation lines or other pipelines, either abandoned or proposed for abandonment, exist within a proposed land development, their locations must be shown on the tentative map, and they must be removed or destroyed as part of the subdivision improvements.

Section 602-10

When a geological hazards report for land development is prepared (either at the developer's will or as a requirement of any governmental agency), it shall include findings and recommendations concerning probable adverse effects of such hazards on the integrity of water supply and sewage disposal facilities. A copy of the report shall be furnished to the EHD.

Section 602-11

When a flood hazard is found to exist, the engineer shall define it and shall submit his recommendations for protecting the integrity of water wells, water quality, and OWTS. Where applicable, the limits of the 100-year flood line shall be indicated on the tentative map.

The installation of public or private sewage disposal systems in a primary floodplain is prohibited.

In a secondary floodplain, individual sewage disposal systems are not permitted unless protected by flood control devices approved by the Water Agency or the Department of Engineering and Survey Services and constructed in accordance with the requirements of the EHD so as to minimize infiltration of floodwaters into the systems and discharges from the systems into the floodwater.

Section 602-12

EHD acceptance of proposed water supply and sewage disposal methods is contingent upon clearance of those proposals through the State Regional Water Quality Control Board and/or the State Department of Public Health.

Section 602-13

If a private domestic water well and individual OWTS are to be constructed on a lot, the minimum lot size shall be 2 ½ acres gross. In order to preclude interference with neighboring installations, water wells shall be located with consideration of required setback distances from existing or future neighboring OWTS.

Where demonstrated by a qualified civil engineer or geologist to be practical from the public health and engineering viewpoints, an exception may be granted to allow lot design of one (1) acre net minimum size where the construction of a private domestic water well and individual OWTS is proposed. This will normally entail completion of a cumulative impact assessment per Kern County OWTS Ordinance, Article 3 and applicable guidelines contained in the Onsite Systems Manual, Part 1.

Section 602-14

In accordance with the Kern County Onsite Wastewater Treatment Systems Ordinance, all individual OWTS must be installed under permit with the EHD of the Public Health Services Department...

Section 602-15

In areas which are determined by the EHD to be unsafe for installation of individual sewage disposal systems, and where it is considered likely that a nuisance or health hazard might be created, said areas shall be served by an approved public or community sanitary sewer system.

Section 602-16

If a “package treatment plant” is proposed as a means of community sewage disposal, the engineer must submit design criteria for the plant to the EHD and receive approval from the appropriate Regional Water Quality Control Board.

Section 602-17

In larger land developments, consideration should be given to setting aside easements and areas for possible future use for sewage collector lines and treatment plant sites. In some cases, the EHD may require such provisions.

Section 602-18

If a proposed land development is to be served by a public or community sewerage system, a letter from the appropriate agency or company signifying its capability and its intention to furnish its sewerage facilities to the property must be submitted to the EHD. If construction has not begun within one year of the date the “will serve” letter is issued, an updated letter will be required.

Section 602-19

The sewerage statement on the tentative map for a land development for which individual sewage disposal systems are proposed should be worded: “Sewerage: Individual septic tank systems to be furnished by each subsequent lot owner”, or similar.

Section 602-20

The findings and comments of the EHD regarding a proposed land development are ordinarily based upon the most recent of available tentative map. If the design is later changed significantly, a reappraisal of the development by this Department may be necessary.

Chapter III Water Supply

Section 603-1

There must be an adequate supply of potable domestic water for the needs of the development.

Section 603-2

The quality of the domestic water supply shall meet the current U.S. Environmental Protection Agency Drinking Water Standards. Should those standards be replaced by those of some Federal or State agency, the newer standards shall apply.

Section 603-3

Where domestic water supply by private wells is proposed, a report prepared by a qualified engineer or geologist outlining findings and opinions concerning the adequacy of the quantity and quality of groundwater is required. The report shall include, but not be limited to data on the chemical and bacteriological qualities of the groundwater (chemical and bacteriological analysis must be made by a State-approved laboratory).

Section 603-4

Tank-truck hauling of domestic water for land developments or lots within new land developments is not permitted.

Section 603-5

Domestic water supply wells shall be drilled and constructed in accordance with the Kern County Ordinance Code. The installation of private water wells within easements or in building setback areas is not permitted.

Section 603-6

All domestic water supply systems must be under EHD or State Department of Public Health permit. A permit to construct a new water system for a subdivision must be obtained prior to recordation of the final map. If an existing system is to be expanded, its permit must be updated prior to recordation of the final map.

Construction of any water supply facilities shall be in compliance with the Kern County Zoning Ordinance, and any Variance, Conditional Use Permit, Modification, or other requirement shall be obtained prior to recordation of the final map.

Section 603-7

Existing water wells which have been, or are proposed to be abandoned shall be destroyed in accordance with the Kern County Ordinance Code prior to recordation of final map.

Section 603-8

If the proposed land development is to be served by a public domestic water supply, a letter from the appropriate agency or company signifying its capability and its intention to furnish domestic water to the property must be submitted to the EHD. If construction has not begun within one year of the date the “will serve” letter is issued, an updated letter will be required.

Section 603-9

Sources of domestic water supply are not permitted in floodplains unless protected by flood control devices approved by the Water Agency or the Engineering and Survey Services Department and constructed in accordance with the requirements of the EHD so as to minimize infiltration of floodwaters there into.

Chapter IV Preservation of Environmental Health

Section 604-1

Any aspect of the design of a proposed development which in the opinion of the Director of the Public Health Services Department is likely or highly possible to cause serious public health problems; or likely to cause degradation of

environmental quality by pollution or contamination shall be cause for a recommendation from the EHD for disapproval of the development.

EHD activities in this regard will be coordinated with the appropriate State agencies.

Section 604-2

Violations of health and safety laws within a proposed land development must be abated prior to EHD acceptance of the development.

Uncovered or abandoned shafts, pits, wells, and any other possible hazards, shall be properly destroyed, filled, or otherwise corrected.

Section 604-3

Land developments are subject to review and regulation with regard to all aspects pertinent to the EHD.

Appendix

Table 1. Percolation rates correlated with soil types.

Percolation Rate Minutes/Inch	Soil Type
Less than one	1
1 to 3	2
3+ to 10	3
10+ to 25	4
25+ to 60	5
Greater than 60	Unacceptable

Table 2. Design criteria of five typical soils.

	Type of Soil	Required sq. ft. Of leaching area/ 100 gal. (m^2/L)	Maximum absorption capacity in gals./sq. ft. of leaching area for a 24 hr. period (L/m^2)
1	Coarse sand or gravel	20 (0.005)	5.0 (203.7)
2	Fine Sand	25 (0.006)	4.0 (162.9)
3	Sandy loam or sandy clay	40 (0.010)	2.5 (101.8)
4	Clay with considerable sand or gravel	90 (0.022)	1.1 (44.8)
5	Clay with small amount of sand or gravel	120 (0.030)	0.8 (32.6)

Table 3. Minimum size of disposal site (square feet) required according to soil type in disposal area.

Soil Type in Disposal Area	Required minimum size of disposal site (square feet) *
1	2,000
2	2,500
3	4,500
4	13,000
5	21,000

* Exclusive of any areas occupied by structures, setbacks, and easements on the lot and in accordance with the requirements of the Kern County Onsite Systems Manual (Part) and these standards.

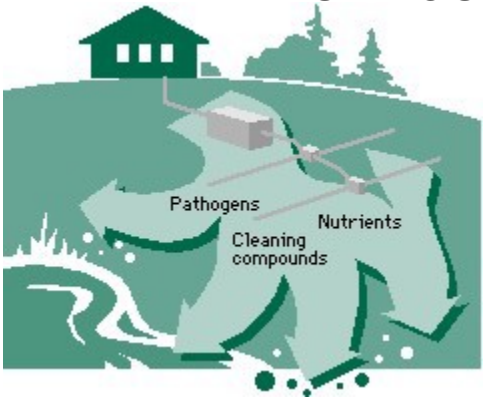
The minimum disposal area required by the table above (which includes expansion area) is for standard leaching trenches which provide three (3) square feet of leaching area per lineal foot, or special leaching trenches which provide seven (7) square feet of leaching area per lineal foot.

KERN COUNTY
ONSITE SYSTEMS MANUAL

PART 6

OWTS USER INFORMATION

SEPTIC SYSTEM OWNER'S GUIDE



Safety and Health

Why You Need Good Wastewater Treatment

The septic system is designed to treat wastewater for a specific site. Proper treatment of wastewater reduces health risks to humans and animals and prevents surface and groundwater contamination.

Risks to Human and Animal Health

It is unhealthy for humans, pets, and wildlife to drink or come in contact with surface or ground water contaminated with wastewater.

Inadequate treatment of wastewater allows bacteria, viruses, and other disease-causing pathogens to enter groundwater and surface water. Hepatitis, dysentery, and other diseases may result from bacteria and viruses in drinking water. Disease-causing organisms may make lakes or streams unsafe for recreation. Flies and mosquitoes that are attracted to and breed in wet areas where wastewater reaches the surface may also spread disease.

Inadequate treatment of wastewater can raise the nitrate levels in groundwater. High concentrations of nitrate in drinking water are a special risk to infants. Nitrate affects the ability of an infant's blood to carry oxygen, a condition called methemoglobinemia (blue-baby syndrome).

Risk of Contaminating Water

A septic system that fails to treat sewage can also allow excess nutrients to reach nearby lakes and streams promoting algae and weed growth. Algal blooms and abundant weeds may make the lake unpleasant for swimming and boating, and can affect water quality for fish and wildlife habitat. As plants die, settle to the bottom, and decompose, they use oxygen that fish need to survive.

Many synthetic cleaning products and other chemicals used in the house can be toxic to humans, pets, and wildlife. If allowed to enter a failing septic system, these products may reach groundwater, nearby surface water, or the ground surface.

In the soil treatment portion of the septic system (drain field or mound), bacteria and viruses in the sewage are destroyed by the soil and naturally-occurring microscopic organisms. Nutrients are absorbed by soil particles or taken up by plants. However, these processes only work in soil that has air in it. The soil cannot be saturated with water. Near lakes, streams, and wetlands soil conditions may be saturated. When the

soil is saturated, biological breakdown will be incomplete and nutrients will move much greater distances, sometimes hundreds of feet from the drain field or mound, and possibly into surface water. **Even systems that appear to be working well or that are in compliance with local design and installation codes may allow nutrients or bacteria to reach the ground or surface water.**

Safety Checklist

- ✓ **Never enter the septic tank**. The tank has a manhole for cleaning and inspection from the outside only. The tank contains very little oxygen and has high levels of hydrogen sulfide, methane, carbon dioxide, and other life-threatening gases.

- ✓ **Never use electrical** lights, appliances, or tools in or close to the water or wet ground near the septic tank or drain field. This can result in explosion or electrical shock.

- ✓ **Always remember** that the liquid and solid contents of the septic system are **capable of causing infectious diseases**. After working on any part of the septic system, always wash hands thoroughly before eating, drinking, or smoking. Change clothes before coming into contact with food or other people.

- ✓ **Keep vehicles and other heavy equipment away,** from the septic system. The tank and other components may collapse due to weakness from corrosion.

- ✓ **Never smoke near septic tank openings**. Gases such as methane that may be present are potentially combustible.

- ✓ **Keep children and other spectators away** from the septic system when it is being cleaned or excavated.

- ✓ If there is a **smell of sewer gases** in your home, **immediately call** a plumber or other qualified person to identify the source and correct it. If the gas smell is very strong, **evacuate the building** until the problem is corrected and the gases are removed.

Troubleshooting

Finding an Existing System

Finding the septic system may not be an easy task, but is necessary for proper maintenance of the septic tank, troubleshooting problems, and making future plans for the property. Many counties and cities with permit and inspection programs for septic systems will have this information on file. If no plans exist, the following steps can be taken.

First, locate the septic tank. If the access manhole or inspection pipes are at ground level, they will be easy to find. Unfortunately, they are often buried several inches or even several feet, below the ground surface.

With a metal rod as a probe, start poking around in the soil 10 to 15 feet from the foundation of the house. A metal detector may be of assistance in finding the tank since most concrete septic tanks contain metal reinforcing rods.

Next, locate the drain field. Mounds are easy to find, but a drain field system in the ground may be more difficult. Try looking around the yard in the general direction where the sewer pipe left the house for an area where the grass grows differently. These clues may help locate the drain field:

- An area where the grass isn't growing well, or where the grass is greener or grows faster;
- An area where there is a slight depression or mound; and
- An area where the soil is soggy when the rest of the yard is dry.

Often, a licensed contractor or inspector has tools to locate the tank. Once the tank is located, be sure to make a map of its location. If the soil treatment system cannot be found, there may not be one or it may be discharging into ground or surface water.

Common Problems

Existing septic systems may fail for a number of reasons. For the owner, the system is failing if it is not treating the wastewater effectively. The most common causes of system failure are excessive water, improper maintenance, or an inadequately designed system. ***Diagnosing the specific causes may be difficult for the owner and often requires the skills of a professional***. The following chart shows common problems and their possible causes and remedies.

Septic System Troubleshooting Guide for Homeowners

Problem	Risks	Potential Causes	Potential Remedies
Sewage backs up into house and/or plumbing fixtures don't drain or are sluggish.	Human contact with sewage is a serious public health risk. Many waterborne diseases exist in household sewage. AVOID CONTACT.	• Excess water entering system • Improper plumbing • Blockage in plumbing • Improper operation • Pump failure • Improper system design • Roots clogging pipes	• Fix leaks • Install water-saving fixtures • Stop using garbage disposal • Clean septic tank and check pumps • Replace broken or cracked pipes and remove roots • Seal pipe connections • Avoid willow trees near system
Sewage surfacing in yard	Human contact with sewage is a serious public health risk. Many water-borne diseases exist in household sewage.	• Excess water use • System blockages • Improper system elevations • Undersized soil treatment system • Pump failure or improper operation	• Fix leaks • Install water-saving fixtures • Clean septic tank and check pumps • Consult professionals • Fence off area until problem is fixed
Sewage odors — indoors	Toxic gases can cause discomfort and illness.	• Sewage surfacing in yard • Improper plumbing • Sewage backup in house • Unsealed ejector sump pump • Roof vent pipe frozen closed	• Repair plumbing • Clean septic tank and check pumps • Replace water in drain traps

Problem	Risks	Potential Causes	Potential Remedies
Sewage odors — outdoors	Major nuisance, but no serious health risk	• Source other than owner's system • Sewage surfacing in yard • Inspection pipe caps damaged or removed	• Clean tank and check pumps • Replace damaged caps • Repair or replace drain field
Contaminated drinking or surface waters	The above public health risks are magnified by possible ingestion of contaminated water. Drinking contaminated water can cause health problems such as dysentery, hepatitis, and, for infants, methemoglobinemia.	• System too close to well, water table, or fractured bedrock • Cesspool or drywell in use • Sewage discharges to surface or groundwater • Improper well construction • Broken water supply pipe • Source other than homeowner's system • Broken sewage lines	• Replace your well and/or septic system • Contact a local unit of government to investigate other potential sources
Lift station alarm activated	Tank effluent may back up into the house.	• Pump failed • Fuse breaker tripped • Pump unplugged • Controls malfunctioning	• Check breaker and plugs • Check controls and pump Make sure professional replaces pump with proper size unit
Distribution pipes and/or soil treatment system freezes in winter	The system may be inoperable.	• Improper construction • Check valve in lift station not working' • Foot or vehicle traffic over piping • Low flow rate • Lack of use Undersized	• Check construction • Examine check valve and/or replace it • Keep people and vehicles off area • Increase water use • Have someone use water in house if you are away • Increase frequency of pump cycling • Operate septic tank as a holding tank • Pump system in fall and use carefully over winter months • Don't use antifreeze

Use and Operation

The effectiveness of a septic system in treating sewage depends on how the homeowner uses and operates the system. Water-use habits, fixtures and appliances, product selection, and septic additives and cleaners all affect how well a septic system works. The septic system operates every time wastewater enters the system.

Water Use

The total amount of water and the pattern of water use affects how the septic system works. For complete and uniform treatment of wastes, the system needs time to work. The ideal situation would be to have wastewater enter the system as evenly as possible throughout the day and week. Every time water is used, waste-water enters the septic tank and an equal amount of water leaves the tank for the drain field. Large volumes of water entering the system in a short period of time may agitate and re-suspend sludge and scum into the liquid contents. If this happens, suspended solids are carried into the soil treatment system, clogging soil pores and preventing adequate treatment. Excessive water use puts an unnecessary load on the septic system. Allowing faucets to drip, fixtures to leak, and using running water to wash and rinse dishes, shave, and brush teeth are wasteful water habits. In most households, toilet flushing is the largest user of water, followed by bathing, laundry, and dishwashing.

One of the best ways to reduce the amount of water treated by the septic system is to replace old water-using appliances. If a major remodeling is planned, regulations may require upgrades to low water use appliances. For example, local government units may have adapted the new state building codes requiring low-flush toilets in new construction or when replaced by a plumber. Whether remodeling or not, consumers may choose low-flow showerheads, hand-held showers with pause control, and temperature control valves to reduce water use, save energy, and save money. The way appliances are used affects how much water passes through the septic system, as shown in the chart.

Typical Ranges of Water Used (in gallons)

ACTION	TYPICAL USE	CONSERVATIVE USE	ULTRA-CONSERVATIVE USE
Toilet-flushing	6 (old standard)	1.5-3 (low-flow)	Composting toilet
Tub bath	30 (1/2 filled)	15 (1/4 filled)	Sponge bath
Shower			
10 min	50 (5 gal/min)	25 (2.5 gal/min)	3 (camper style)
3 min	15 (5 gal/min)	7.5 (2.5 gal/min)	
Laundry – full load			
Top loading	50-60 (older models)	40 (newer models)	
Front loading	33 (older models)	17-28 (newer models)	Laundromat
(suds-saver reuses most of the "wash fill" for the 2nd load)			
Dishwashing			
Machine	12-15 (old-reg. cycle)	6-9 (new-reg. cycle)	
(Pre-rinsing before loading ads 3-5 gal.)			
Hand	16 (faucet rinse)	6 (basin rinse)	
Teeth-brushing	2 (faucet running)	1/8 (wet brush; brief rinse)	
Hand-washing	2 (faucet running)	1 (basin; brief rinse)	
Shaving	3-5 (faucet running)	1 (basin; brief rinse)	

Improving Septic System Performance: Room by Room

By controlling water use, selecting appropriate products, and making wise disposal decisions, the homeowner can improve performance of the septic system and avoid major problems!

A typical Minnesotan uses about 110 gallons of water per day. About 60 percent of that water is used in the bathroom. Reducing water use conserves the water resources and helps the septic system.

In the course of daily living, many materials used in the home enter the waste-water system for disposal and treatment. Some are obvious and others much less obvious.

Home Management Ideas to Improve Septic System Performance:

Bathroom

- Install a new low-flow toilet. New units give a complete flush with 1 1/2 gallons per flush. Caution: displacing water with bricks or water bottles in old toilet tanks often gives less than a total flush.
- Repair leaky faucets and toilets immediately.
- Flush toilets less often. In many cases, the toilet can be used several times for liquid waste before flushing.
- Do not use "every flush" toilet bowl disinfectants that are placed in the tank or bowl.
- Do not flush facial tissues, paper towels, or personal hygiene products down the toilet.
- Do not flush cigarette butts or unwanted prescription or over the counter medications down the toilet.
- Use moderate amounts of white toilet paper. Toilet paper should break up easily in water. Some dyes used for toilet paper are difficult for bacteria to break down.
- Take showers instead of tub baths. Showers use less water than tub baths (about 5 gallons per inch in tub). Take shorter showers.
- Install low-flow shower heads, hand held showers with pause control, and temperature balance valve controls.
- Shut off water in the shower while lathering and shampooing.
- Do not run the hot water in the shower to warm the bathroom.
- Reduce use of drain cleaners by minimizing the amount of hair that goes down the drain.
- Shut off water while shaving and brushing teeth (save up to 5 gallons per minute).
- Fill basin to wash hands instead of washing under running water.
- Reduce use of cleaners by doing more scrubbing with less cleanser.

Kitchen

- Install low-flow faucets.
- Repair leaky faucets.
- Keep a pitcher of drinking water in the refrigerator instead of running the tap every time to get cool water.
- Hand wash dishes in the basin instead of under running water.
- Wash only full loads in the dishwasher.

- Install low-water-use dishwasher; use liquid detergent in the dishwasher.
- Use low-phosphate (0 to 5%) dishwasher soaps.
- Use the minimum amount of soap necessary to do the job. This is often less than suggested by manufacturers.
- Do not use a garbage disposal or dispose of vegetables, meat, fat, oil, coffee grounds and other undigested food products in the septic system. (Use composting or garbage service.)
- Reduce the use of drain cleaners by minimizing the amount of grease and food particles that go down the drain
- Use minimal amounts of mild cleaners, as needed only.
- When using drinking water treatment devices, be sure there is a shutoff valve so the system doesn't run continuously when the reservoir is full. Some units may reject up to 8 gallons for every 1 gallon retained.

Laundry

- Select a front-loading washing machine that uses 40% less water.
- Use suds-saving top-loading washing machine to reduce water and detergent use.
- Wash only full loads. Adjust load level settings for small loads.
- Distribute wash loads evenly throughout the week to avoid overloading the system with large volumes of water.
- Install filter on washer to remove lint.
- Use no-phosphate laundry detergents.
- Use the minimum amount of detergent or bleach necessary to do the job. This is often less than suggested by manufacturers.
- Use liquid detergents (powdered detergents add fine particles to the sludge accumulation).
- Use highly biodegradable powdered detergents if liquid detergents are undesirable.

Basement and Utility Rooms

- Recharge the water softener as infrequently as possible to reduce water use.
- Reroute the water softener recharge water outside the septic system. It does not need to be treated.
- Route chlorine-treated water from swimming pools and hot tubs outside of septic system to a ditch or separate dry well.

- Route roof drains and basement drainage tile water (sump pumps) outside of septic system and away from the drain field.
- Dispose of all solvents, paints, antifreeze, and chemicals through local recycling and hazardous waste channels. Consult local solid waste officials for proper methods. These materials kill valuable bacteria in the system and may pass through to contaminate drinking water.
- Never let wash water from latex paint on brushes or rollers go down the drain and into the septic system.

Septic Starters, Feeders, Cleaners, and Other Additives

There is no quick fix or substitute for proper operation and regular maintenance. Do not use starters, feeders, cleaners, and other additives.

! There's no such thing as a safe AND effective septic system additive. !

Starters: A starter is not needed to get the bacterial action going in the septic tank. There are naturally occurring bacteria present in wastewater.

Feeders: It is not necessary to "feed" the system additional bacteria, yeast preparations, or other home remedies. There are millions of bacteria entering the system in normal sewage. If the bacterial activity level is low, figure out what is killing them (for example, cleaners) and correct it. High levels of activity will return after the correction.

Cleaners: Additives effective in removing solids from the septic tank will probably damage the soil treatment system. Many additives suspend the solids that would normally float to the top or settle to the bottom of the tank. This allows them to be flushed into the soil treatment system, where they clog pipes and soil pores leading to partial or complete failure of the system.

Other Additives: Additives, particularly degreasers, may contain carcinogens (cancer-causing agents) that flow directly into the groundwater along with the treated sewage.

! Additives and cleaners are heavily promoted to homeowners through direct mail and telephone. Don't be misled !

KERN COUNTY
ONSITE SYSTEMS MANUAL

PART 7

REQUIREMENTS FOR SEWAGE PUMPING, GREASE TRAPS, AND TOILET RENTAL BUSINESS

TERMS AND CONDITIONS OF OPERATION OF SEWAGE PUMPING, GREASE PUMPING, AND TOILET RENTAL AGENCIES IN KERN COUNTY

Environmental Health Division
2700 “M” Street, Suite 300
Bakersfield, CA 93301
Office: (661)862-8740
Fax: (661)862-8701
E-Mail: eh@kerncounty.com
http://kernpublichealth.com/solid-waste/

TABLE OF CONTENTS

INTRODUCTION

- According to the **California Health and Safety Code, Section 117400 et seq.**, those who wish to enter into the business of sewage pumping or the rental of portable toilets, or both, must register their business with the local Health Officer of that city, town, or county in which is desires to conduct this activity.

- Pursuant to **Section 19310 of the Food and Agricultural Code**, grease haulers are required to register with the California Food and Agriculture Department.

- Likewise, **Kern County Ordinance Code 8.04.030** requires that those who desire to conduct these same businesses within Kern County "shall apply for an environmental health permit on the form provided, pay to the health officer the prescribed fee and penalty, if any, and shall at all ties possess said permit."

- The Kern County Public Health Services Department, Environmental Health Division (KCEHD), has the enforcement authority to register, issue environmental health permits, and regulate the activities of sewage pumping, grease trap pumping, and toilet rental businesses.

- The following information and application reflects the Terms and Conditions of Registration individuals and businesses conducting sewage pumping, grease trap pumping, and/or toilet rental businesses agree to follow. In so doing they will comply with both state law and the policies established by the Health Officer.

If there are any further questions, you may contact our office and ask to speak to a Solid Waste Specialist.

DISEASE HAZARDS OF SEWAGE

Exposure to human fecal waste can occur through the following methods:

- Swallowing
- Eating with soiled hands
- Contact with flies, cockroaches, etc.
- Soft tissue around the eyes and nose
- Cut and scratches on the skin
- Contact with hoses, hand tools, etc.
- Inhalation

Infectious diseases caused by the improper handling or disposal of sewage include:

- Dysentery
- Salmonellosis
- Hepatitis
- Typhoid fever
- Poliomyelitis (Polio)
- Paratyphoid fever
- Cholera

Sewage can also contain:

- Toxic chemicals
- Pesticides
- Heavy metals
- Parasites

Some of these materials can accumulate in the body over time, resulting in poor health or malignant (cancerous) health conditions.

It is important that those involved in the care of sewage disposal systems exhibit good sanitary practices and take precautions when handling and disposing of sewage wastes. It is recommended that sewage workers wear appropriate protective gear, including:

- Coveralls
- Rubber boots
- Non-absorbent gloves
- Eye protection

Additionally, appropriate measures are required to protect the public health by preventing contamination of soil and water. This is done by:

1. Maintaining vehicles and equipment in a clean, sanitary condition.

2. Maintaining leak-proof and fly-tight vessels, tanks, pumps, hoses, and holding containers reduces the incidence of accidental spillage, odors, and the attraction of vectors.

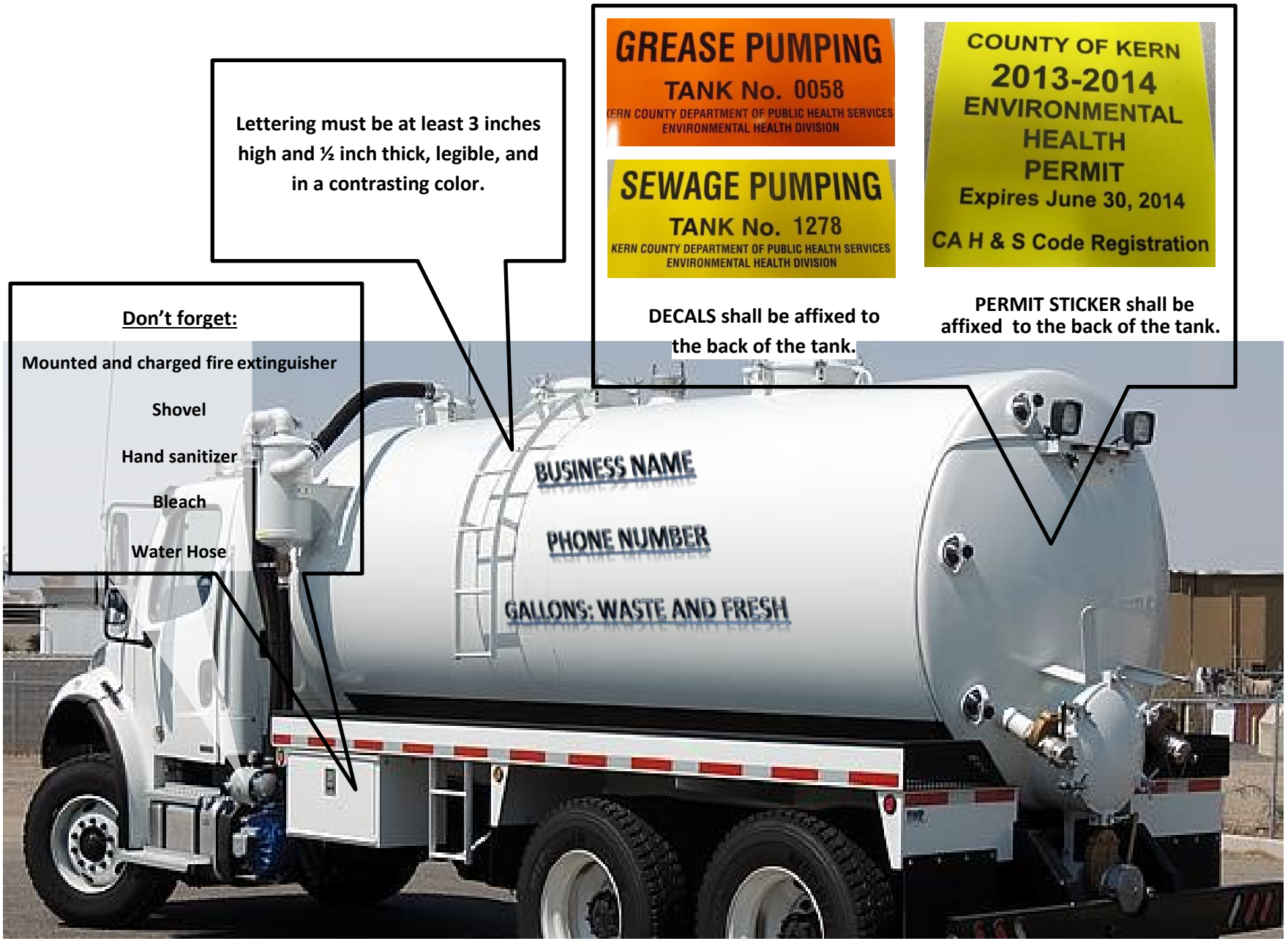
3. The immediate clean-up and proper disinfection of contaminated areas ensures that disease causing organisms are effectively destroyed.

PROOF OF KNOWLEDGE BY WRITTEN EXAMINATION

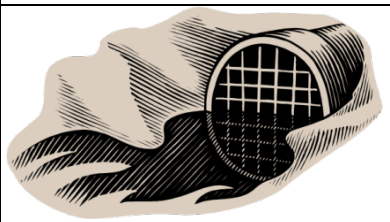
California Health and Safety Code, Section 117420, the health officer shall issue a "registration" only after the applicant satisfactorily completes an examination. The test consists of twenty (20) questions, which measure the applicant's knowledge of sanitary laws and ordinances, as well as equipment and reporting requirements within Kern County. The questions have been taken entirely from the contents of this booklet. The application package is not complete until the applicant passes the test with a passing grade of 70%. If applicant fails the test, he/she may retake the test within 10 days. If the applicant fails the test the second time, he/she shall fill out a new application and resubmit all application materials. The application package is not complete until applicant passes the test.

Minimum Operator Requirements

It is the responsibility of the applicant that vehicle drivers possess the correct class of driver's license to operate a sewage pumping, grease trap pumping, and/or toilet cleaning business pumping vehicle. When pulling a trailer and the gross vehicle weight is 10,001 pounds or higher, a Class A license is required. When operating a single unit and the gross vehicle weight is 26,001 pounds or more, a Class B license is required. It is also the responsibility of the applicant to ensure that all operators of sewage pumping, grease trap pumping, and/or toilet cleaning vehicles are knowledgeable in observing sanitary principles and laws and in operating their equipment.


Lettering must be at least 3 inches high and ½ inch thick, legible, and in a contrasting color.
GREASE PUMPING
TANK No. 0058
KERN COUNTY DEPARTMENT OF PUBLIC HEALTH SERVICES
ENVIRONMENTAL HEALTH DIVISION
SEWAGE PUMPING
TANK No. 1278
KERN COUNTY DEPARTMENT OF PUBLIC HEALTH SERVICES
ENVIRONMENTAL HEALTH DIVISION
COUNTY OF KERN
2013-2014
ENVIRONMENTAL
HEALTH
PERMIT
Expires June 30, 2014
CA H & S Code Registration
DECALS shall be affixed to the back of the tank.
PERMIT STICKER shall be affixed to the back of the tank.
Don't forget:
Mounted and charged fire extinguisher
Shovel
Hand sanitizer
Bleach
Water Hose
BUSINESS NAME
PHONE NUMBER
GALLONS: WASTE AND FRESH

Minimum Requirements for ALL Vehicles

Permits and Decals	Lettering	Equipment
__1. Copy of the current health permit within the vehicle at all times.	__9. Business name and phone number affixed on both sides of the vehicle.*	__15. Racks are constructed and maintained so as to be easily cleanable.
__2. Current health permit registration stickers affixed to the tank. 	__10. Tank volume affixed on both sides of the vehicle. **	__16. Discharge gates or valves are constructed and maintained to prevent leakage or spillage.
__3. Sewage/Grease pumping decals affixed to the tank.  	__11. Tanks with split volumes shall be so indicated on both sides of the tank. **	__17. Discharge gates or valves are constructed to discharge contents in a manner which will not cause pollution or create a nuisance.
Tank Construction __4. Tank is metal, and welded or riveted.	__12. Lettering a minimum of 3inches in height and ½-inch diameter.	__18. Pumps are constructed and maintained to prevent leakage or spillage.
__5. Tank is watertight and splash proof.	__13. Lettering is distinctly contrasting from the background.	__19. Adequate hoses are present to properly reach sources without spilling onto the surface of the ground.
__6. All access ports are adequately sealed and do not leak.	__14. Lettering is legible during daylight hours from a distance of fifty (50) feet.	__20. A water hose present with a minimum 5/8-inch diameter and fifty (50) feet in length.
__7. The tank has an automatic shut-off valve to prevent overflow.		__21. A mounted and charged fire extinguisher.
__8. The tank is properly baffled to prevent sloshing.		__22. Shovel(s) in good repair.
*Vehicles which are able to unhitch waste tanks from the vehicle itself, must permanently affix information to the tank, not only the doors of the vehicle. **Tank volume must be placed on the tank itself, not the door(s) of the vehicle.		__23. Hand cleaner and/or hand soap.
		__24. One (1) gallon of liquid bleach or other approved disinfectant for disinfecting small spills.

PORTABLE CHEMICAL TOILET REQUIREMENTS

__1. Toilets maintained clean and sanitary.	__5. Doors are self-closing and lock from the inside.	__9. Toilets have a minimum of ten (10) square feet of floor area when equipped with a urinal, and a minimum of eight (8) square feet of floor space when not equipped with a urinal.
__2. Toilets maintained free of refuse or debris.	__6. Toilets have adequate ventilation ports which are fly screened and vector-proof.	
__3. Toilets free of ponding of septage, sewage, and/or wastewater.	__7. Toilets are constructed with smooth, nonabsorbent, and easily cleanable surfaces.	
__4. Portable chemical toilet pumping vehicles have fresh water to service toilet units.	__8. Toilets have a holding tank with a minimum of forty (40) gallons	

Maintenance Yards and Storage Facility Requirements

__1. Zoning is approved by the Kern County Planning Department or local planning authority.	__4. The facility is free of ponding, pooling, standing sewage or septic waste water effluent, fecal material, or grease waste on the surface of the ground.	__7. Appropriate land use approval has been granted for stationary holding tanks and containment vessels used for the temporary portable waste, sewage, and grease prior to transport for disposal.
__2. Property owner authorization to use the property for storage purposes.	__5. The facility is free of stagnant water which would provide a breeding area for mosquitos and other insects.	__8. The property is free of refuse, trash, debris, and excessive weeds.
__3. The property is free from cross connection hazards to the public water system.	__6. The operator has supplied a hazardous materials operational business plan to the local authority of the storage of hazardous materials and hazardous wastes.	

DISPOSAL AND INTERIM STORAGE OF WASTE

1. All sewage, portable toilet, and grease trap wastes shall be disposed of at a municipal waste water treatment plant.

2. Copies of disposal permits/letters of authorization or approved "*Will Serve Letter"* issued by any treatment plant shall be submitted to Kern County Environmental Health Division (KCEHD) within fifteen (15) days of issuance. A "*Will Serve Letter"* is a written document, which promises to provide or allow the use of their waste disposal plant, upon completion of the Environmental Health Permit Registration.

3. Firms operating in Kern County which plan to utilize land application disposal sites require prior approval from KCEHD.

4. Stationary Tanks used for the interim storage of sewage before transporting to an approved disposal location, require land use approval from the local authority for this activity.

5. Vehicles and/or tankers used for the interim storage of sewage, must possess a valid health permit/registration issued by KCEHD.

Assembly Bill 1333 and Grease Pumpers

On August 28, 2006, the Governor of California signed into Law **Assembly Bill 1333**. According to this Assembly Bill, vehicles which pump grease interceptors/traps cannot be used to pump any other waste. In Kern County, **businesses must designate vehicles for the sole purpose of pumping grease or other wastes—but the same vehicle cannot be used pump grease and other waste streams.**

In addition, this bill mandates that the entire grease trap tank shall be pumped.
Used interchangeably in some parts of the country, "traps" may refer to the small, indoor, above-grade system used to prevent kitchen grease from entering the sewer system, while "interceptors" may refer to the large, external, below-ground devices. For purposes of this Registration Pamphlet, "traps" will be used for both.

DOCUMENTATION AND REPORTING

Record Retention

All pertinent records for the current and previous **two (2) years** shall be kept accurate and made available for inspection upon request. Pertinent records include:

1. Customer receipts;
2. Waste manifests;
3. Monthly pumping reports; and
4. Information requested in the Health and Safety Registration Application.

Mandatory Reporting

A change in company address shall be reported in writing to KCEHD by registered mail within **two (2) working days.**

Additionally, any change in the following shall be reported in writing to KCEHD **within five (5) working days**:

1. Any change in vehicle storage yard location;
2. Addition or removal of pumping vehicles;
3. Change in company ownership; and
4. Change in/addition of waste disposal locations.

All discharges, including spills exceeding five (5) gallons, in areas not intended for discharge shall be reported to KCEHD **within twenty-four (24) hours** of said discharge. Written notification shall be provided to KCEHD **within five (5) working days**. Written notification may be submitted via fax to: (661) 862-8701, via mail, or via E-mail to: eh@kerncounty.com.

Customer Records

The customer shall receive from the sewage/grease trap pumping business, a written statement showing the services rendered. It is also understood, that the entire septic tank/grease trap shall be pumped. The following information is required on the customer's written receipt or statement:

1. Customer name, physical address, and date of pumping service;
2. The number of compartments pumped;
3. Estimated gallons removed;

4. The type of septic containment device pumped: e.g. septic tank, cesspool, sewage well, vault, privy, restaurant grease trap, wastewater pond; and

5. Any repairs and replacement parts used.

Monthly Pumping Reports

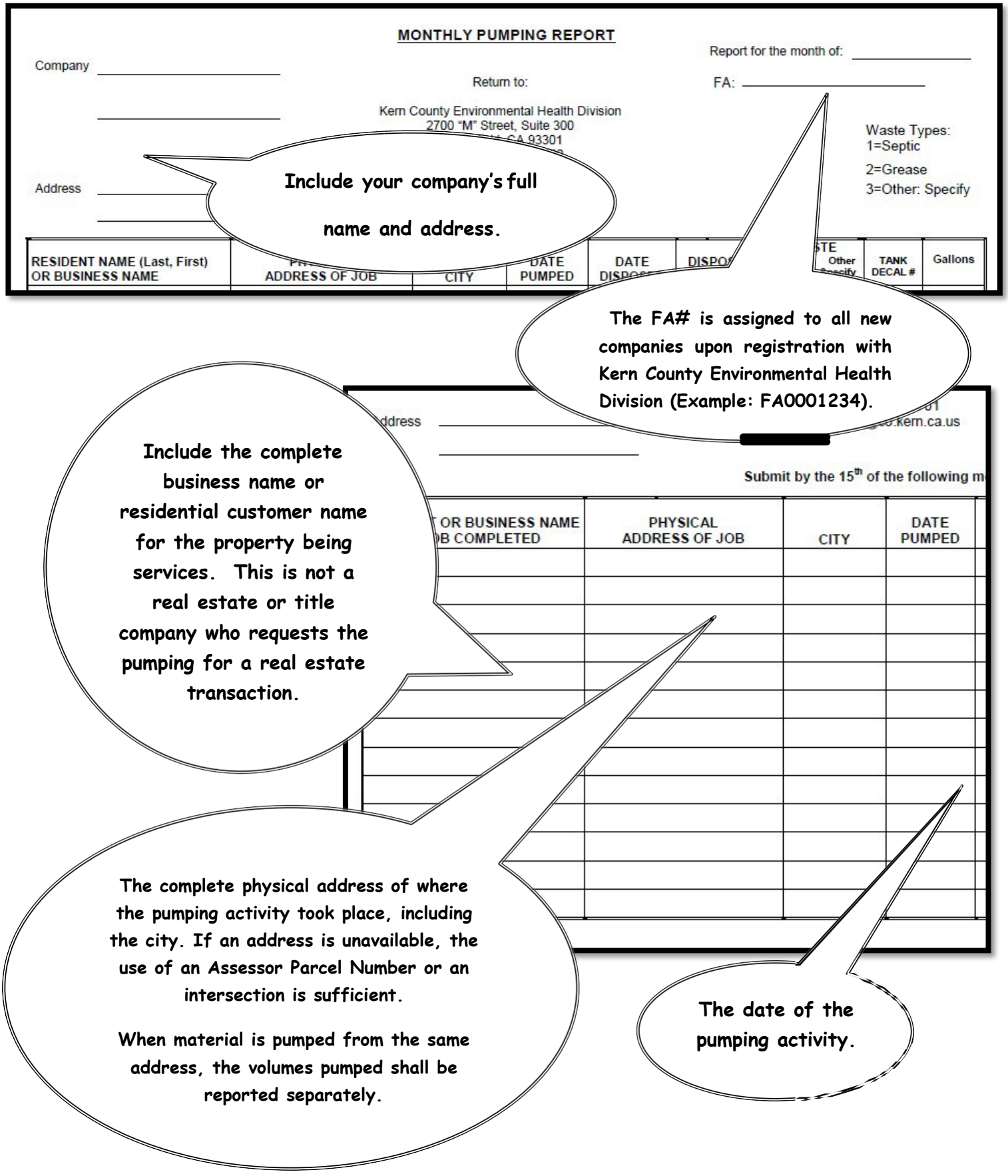
According to the **California Health and Safety Code, Section 117435(a),** all sewage pumping and grease trap pumping businesses shall file with the health officer, or his or her duly authorized representative, a report specifying the pumping activities over a given frequency. These reports are legal documents, and it is very important they are closely reviewed by the operator before being submitted to the Division.

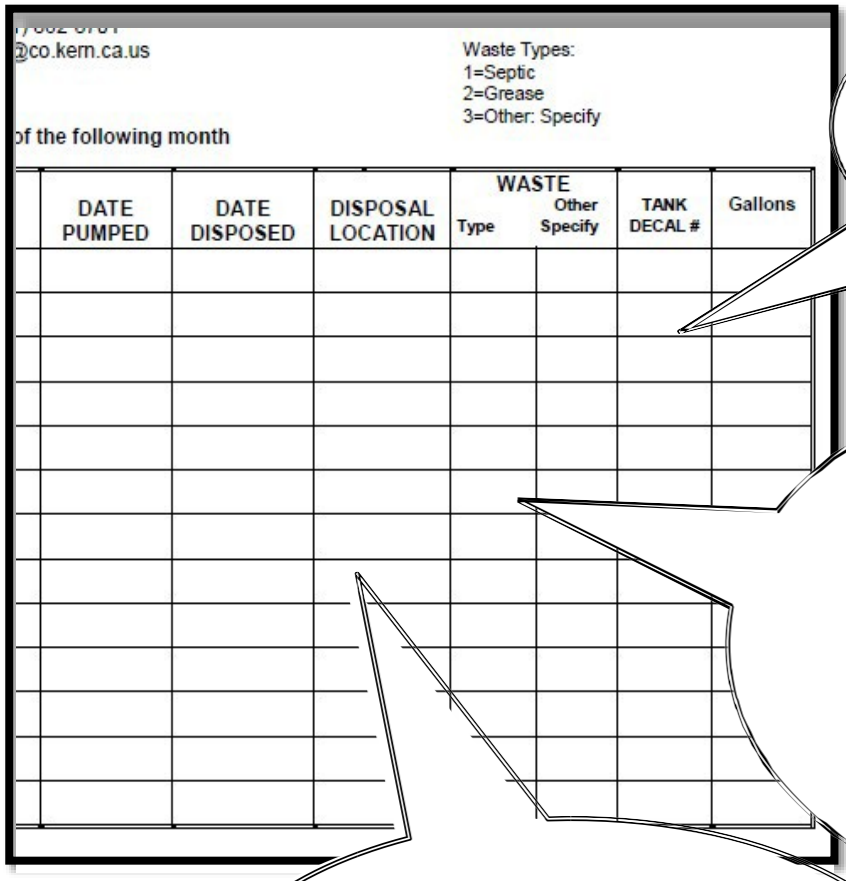
1. All companies shall submit a **typed or legibly printed** pumping report of activities to this Division no later than **the 15th day of the following month.**

2. Reports are specific to pumping activities within the designated month. If a pumping activity from a previous month is omitted from that month's report, it shall not be included on the following month's report. A corrected report shall be submitted reflecting the previously omitted activity.

3. Interim storage of sewage, portable toilet, and grease trap wastes in stationary tanks, transfer, or out-of-service vehicles shall be reporting in the Monthly Pumping Report.

4. If no pumping activity has occurred for the month, **"No Activity"** or **"No Pumping This Month"** shall be written on the pumping report and submitted.


MONTHLY PUMPING REPORT
Company
Report for the month of:
Return to:
FA:
Kern County Environmental Health Division
2700 "M" Street, Suite 300
Address
Waste Types:
1=Septic
2=Grease
3=Other: Specify
Include your company's full name and address.
RESIDENT NAME (Last, First) OR BUSINESS NAME
ADDRESS OF JOB
CITY
DATE PUMPED
DATE
TANK DECAL #
Gallons
The FA# is assigned to all new companies upon registration with Kern County Environmental Health Division (Example: FA0001234).
Include the complete business name or residential customer name for the property being services. This is not a real estate or title company who requests the pumping for a real estate transaction.
Submit by the 15th of the following m
OR BUSINESS NAME
PHYSICAL ADDRESS OF JOB
CITY
DATE PUMPED
The complete physical address of where the pumping activity took place, including the city. If an address is unavailable, the use of an Assessor Parcel Number or an intersection is sufficient.
When material is pumped from the same address, the volumes pumped shall be reported separately.
The date of the pumping activity.



@co.kern.ca.us

Waste Types:
1=Septic
2=Grease
3=Other: Specify

of the following month

DATE PUMPED	DATE DISPOSED	DISPOSAL LOCATION	WASTE Type	WASTE Other Specify	TANK DECAL #	Gallons

The "Tank Decal #" is the number found on the "Septic" or "Grease" sticker issued by Kern County Environmental Health.

The type of waste pumped:

1) Septic

(2) Grease trap

(3) Other. "Other" must be approved by this Division in writing prior to being pumped.

The specific disposal location of where waste is discharged. Your company must provide proof of authorization from the disposal facility, before obtaining a Health Permit from this Division.

I CERTIFY UNDER PENALTY OF PERJURY THAT THE FOREGOING IS TRUE AND CORRECT:

OWNER/OPERATOR SIGNATURE DATE

Print name of person signing above

The completed report shall be signed by the operator or authorized representative.

A report must be submitted even if pumping is not performed during the month. **If no pumping occurs for the month, write "No Pumping This Month" across the report.**

TOILET CLEANING MONTHLY REPORT

Company _____

Address _____

_____

FA _____

Return to:
Kern County Environmental Health Division
2700 "M" Street, Suite 300
Bakersfield, CA 93301
Office: (661) 862-8[illegible]
Fax: (66[illegible]

Month of _____ 20 ____

MUST BE RECEIVED BY THE 15TH OF THE FOLLOWING MONTH

DISPOSAL DATE	

The FA# is assigned to all companies upon registration with Kern County Environmental Health Division (E xample: FA0001234).

Include your company's full name and address.

DISPOSAL DATE	DISPOSAL LOCATION	GALLONS DISPOSED

The specific disposal location of where waste is discharged. Your company shall provide proof of authorization from the disposal facility, before obtain ing a Health Permit from this Divisi on.

The completed report shall be signed by the operator or authorized representative.

I CERTIFY UNDER PENALTY OF PERJURY THAT THE FORGOING IS TRUE AND CORRECT:

_____
OWNER/OPERATOR SIGNATURE **DATE**

_____
Print name of person signing above

A report must be submitted even if pumping is not performed during the month. **If no pumping occurs for the month, write "No Pumping This Month" across the report.**

Special Conditions

Waste Streams

1. Sewage pumping vehicles may only be used for pumping and transporting sewage and/or chemical toilet wastes in accordance with **AB 1333**.

2. **Penal Code 374.5(c) prohibits** grease trap pumping vehicles from transporting or removing "yellow grease, cooking grease, recyclable cooking oil, septic wastes, or fluids collected at car washes".

3. Any material hauled in a sewage pumping vehicle is considered to be contaminated with sewage and therefore must be deposited at a sewage treatment plant or permitted land disposal site.

4. Sewage pumping vehicles may **not** be used for:
    a. Pumping Grease Traps
    b. Spreading Water
    c. Hauling Oilfield Waste
    d. Hauling Car Wash Wastes
    e. Hauling Other Industrial Wastes

5. Other waste streams must be approved in advance by the KCEHD. Written notice must be received by this Division prior to approval.

California State Agency Requirements

Those pumping companies that engage in pumping grease interceptors shall also comply with the requirements of the Department of Food and Agriculture (CDFA). This includes registering with the CDFA and displaying the grease hauler registration decal.

Other Conditions

All permit fees must be paid prior to operating in Kern County. Kern County operates on a fiscal year, which commences on July 1st and ends on June 30th. The purpose of the health permit fee is to cover the initial cost of vehicle and storage yard inspections, and the review of monthly pumping reports. These fees are subject to change, pending approval of the Kern County Board of Supervisors.

Enforcement

When an operator of a sewage pumping, grease pumping, or toilet rental business is found in violation with the terms and conditions of the Health and Safety Registration, KCEHD may initiate enforcement action.

1. Methods of enforcement action include:
    a. Kern County Ordinance Code 8.04.190 (B): Failure to obtain or possess an Environmental Health Permit as required is a misdemeanor.
    b. Legal Notice or Notice of Violation
    c. Request for a Compliance Review
    d. Request for an Administrative Hearing
    e. Notice to Appear in Court

Kern County Ordinance Code 8.04.160: If the Director of Public Health Services determines that applicable laws have not been complied with, he may suspend or revoke the permit after first issuing a notice, setting forth the acts or omissions with which the permittee is charged and informing him of his right to a hearing.

California Public Resource Code, Section 16053: Up to $5,000 in civil penalties for the first violation, and up to $10,000 for second or subsequent violations.

Kern County Ordinance Code 8.04.130: The Director of Public Health Services is authorized to charge for services rendered by the personnel of the EHD, which are necessary to the performance of their duties as required by law. These charges are in addition to the health permit and fee(s) associated with the sewage pumping vehicle(s), grease pumping vehicle(s), and/or toilet rental business.