ARTICLE VIII. ON-SITE SEWAGE TREATMENT AND DISPOSAL SYSTEMS: SITING, DESIGN, AND CONSTRUCTION CRITERIA

Sec. 6.4-80. General requirements

(a) All new, expanded, modified, repaired, or replacement systems must be placed in the specific location approved for such use by the Environmental Health Services Division. This location is that for which the applicant has obtained site evaluation data that has been approved by the Environmental Health Services Division for use in the design and installation of an on-site sewage disposal system.

(b) A replacement area equivalent to 100% of the initial system area conforming to these standards is required for every lot served by an on-site sewage disposal system. No division of a lot, boundary line modification, erection of structures, or improvement shall be made if such division, structure, or improvement impairs the usefulness of the replacement area. The replacement area shall be separate and distinct from the initial disposal field.

(c) The on-site sewage disposal system shall be designed to receive all sanitary sewage (bathroom, kitchen, and laundry) from the structures. Basement, footing, roof, water softener, swimming pool filter backwash, or surface drainage shall not be allowed to discharge to or enter any part of the system.

(d) Every on-site sewage disposal system shall be designed, located, constructed, and maintained so as to function in a sanitary manner, not create a nuisance or health hazard, and prevent any discharge of wastewater onto the ground surface, into the structure serviced, into surface water, or into groundwater, whether permanent, perched, or temporary, including zones of seasonal saturation.

(e) The on-site sewage disposal system shall consist of a building sewer, a septic tank, an acceptable distribution and absorption system and any required dosing tank, treatment device or other appurtenances required for standard or alternative treatment and disposal of sewage. Exception: The Environmental Health Services Division may waive the requirement for an alternative sewage disposal systems utilizing an aerobic treatment unit to include a septic tank as a separate treatment process if so recommended by the manufacturer of the aerobic treatment unit or registered consultant for the proper operation of the aerobic treatment unit.

(f) On-site sewage disposal systems shall be located so as to be accessible for maintenance or repair. Septic tanks, dosing tanks and interceptors shall be located so as to readily allow pumping and maintenance. Pressure distribution lines shall be located to accommodate monitoring and flushing of the lines.

(g) No portion of a disposal field or replacement area shall be paved over, subject to vehicular traffic, planted with vegetation that might damage an on-site sewage disposal

system, or otherwise modified in a manner that may detrimentally affect the usefulness of these areas as part of the septic system.

(h) An individual on-site sewage disposal system shall only be installed on the same lot as the structure to which it is connected.

(i) Disposal fields and replacement areas shall be maintained so as to facilitate aerobic treatment and the evapotranspiration of wastewater.

(j) A waste well, as used or referred to in Section 117020, California Health and Safety Code, is prohibited.

(k) On-site sewage disposal systems may be standard, alternative, or experimental. Experimental systems cannot be used as a method for individual on-site sewage disposal for proposed lots except if approved by the Environmental Health Services Division and under permit by the Regional Water Quality Control Board. Experimental systems may be approved as the method of individual on-site sewage disposal on existing lots created prior to the effective date of these standards provided:

(1) Their use will not create a potential health hazard, or contaminate the environment and,

(2) 200% replacement area exists on the lot to install a conventional or alternative system in conformance to these standards, or

(3) They are used as a repair of an existing, failing individual on-site sewage disposal systems, or

(4) They are used as a pretreatment device for a standard or alternative system where no pretreatment device is required, or as an additional pretreatment device in conjunction with a non-experimental system already utilizing a non-experimental pretreatment device.

(Ord. No. 1609, §18; Ord. No. 1655, §13)

Sec. 6.4-81. Site evaluation requirements for all lots

(a) A site evaluation is required prior to construction of any on-site sewage disposal system or expansion, alteration, or replacement of an existing system in order to determine compliance with these standards. The site evaluation shall be completed prior to issuance of permits to construct, expand, alter, or replace an on-site sewage disposal system or approval of a lot line adjustment or tentative subdivision map. Site evaluations shall be completed under inspection from the Environmental Health Services Division. All aspects of a site evaluation prepared for on-site sewage disposal shall be performed by a registered consultant. A registered consultant is a Registered

Civil Engineer, Registered Geologist, Certified Engineering Geologist, Registered Environmental Health Specialist, or Certified Professional Soil Scientist. NOTE: a site evaluation is not required for the placement of portable watertight facilities associated with a temporary work site or a special event.

(b) A site evaluation shall consist of on-site review of surface features and conditions and of one or more soil evaluations within the boundaries of the absorption area of the on-site sewage disposal system proposed for construction, expansion, alteration, replacement, or repair.

(c) The registered consultant shall provide a minimum of 24-hour advance notice to the Environmental Health Services Division prior to beginning any portion of a site evaluation. If the site evaluation is proposed to occur after normal business hours of the Environmental Health Services Division then notice must be given and the time of the evaluation arranged through mutual consent with the Environmental Health Services Division at least 48 hours prior to the evaluation. All required site evaluation fees must be paid prior to commencement of evaluations. Additional fees may be required for work performed outside of normal business hours.

(d) On-site sewage disposal systems shall not be installed in areas known to be subject to erosion or landslide. Installations in low swampy areas, in areas with permanent or intermittent springs, in areas with a high groundwater (permanent, fluctuating, seasonal, or perched) within two feet of the ground surface, in areas which are subject to standing water, or in areas which are subject to flooding by storms having a recurrence interval of less than ten (10) years shall not be acceptable. No portion of the lot in which there is ledge rock, hard pan, soils with a percolation test results greater than 120 mpi, or other impervious formations within two feet of ground surface will be acceptable as an area for installation, expansion, or replacement of an individual sewage disposal system. Installations into areas with fractured rock, or with 50% or more rock, within two feet of ground surface shall be prohibited. Installation into areas with percolation test results less than 1 mpi or areas of excessive slopes shall be unacceptable.

(e) The site evaluation report shall include all data relative to the proper placement, design and operation of an on-site sewage disposal system, including, but not limited to, percolation tests, soil profiles, hydrometer tests, depth to groundwater, slope measurements and surface water flow for each proposed sewage disposal system or lot to demonstrate compliance with these standards. All data, whether used in the final design of the disposal field, or whether rejected, shall be included in the report submitted as documentation with the permit application or with information required for lot line adjustments and tentative subdivision maps unless already on file at the Environmental Health Services Division. The report shall be signed by the registered consultant responsible for the site evaluation and include the registration number.

(f) The Environmental Health Services Division may require any additional information necessary to evaluate the proposed system. If, in the opinion of the Environmental Health Services Division, the land proposed for individual sewage disposal has severe soil limitations, or introduction of sewage effluent into the soil may create slope instability, submission of a technical report prepared at the applicant's expense by a Certified Professional Soils Scientist, Certified Engineering Geologist, Registered Geologist or Registered Civil Engineer shall be required.

(Ord. No. 1609, §18; Ord. No. 1655, §§14, 15)

Sec. 6.4-81.1. On-site review

(a) An on-site review of surface features by the registered consultant shall be conducted prior to any soil evaluation to determine that the area proposed for placement of the on-site sewage disposal system complies with these standards. The on-site review shall verify and describe general site features on each lot, including landform type, slope, location of cut banks, sharp breaks in grade, rock outcroppings and unstable land within 100 feet of locations proposed for the on-site sewage disposal system construction. The evaluation shall also identify the location of all wells, streams, drainage courses, and ponds within 200 feet of the proposed on-site sewage disposal system. The findings of the on-site review shall be detailed in the site evaluation report. The Environmental Health Services Division shall conduct a verification inspection during or after the on-site review by the registered consultant, or after receipt of the site evaluation report, to ensure that the findings of the on-site review are accurate and complete.

(b) It shall be the responsibility of the applicant to mark all property lines within fifty (50') feet of the proposed on-site sewage disposal system including replacement area prior to any on-site review by the registered consultant, or verification inspection by the Environmental Health Services Division. If the lot boundaries are not marked during the verification inspection of the on-site review by the Environmental Health Services Division, and it is determined it is necessary to do so, the applicant shall mark the boundaries, and reschedule another inspection.

(c) No portion of the lot shall be cut or filled until the on-site review has been completed and written approval to grade the lot is obtained from the Environmental Health Services Division and, if required by code, the Building Division of the Environmental Management Department.

(Ord. No. 1609, §18)

Sec. 6.4-81.2. Soil evaluation – profiles, percolation tests, and groundwater determination

(a) Soil evaluation shall occur within the boundaries of the proposed on-site sewage disposal system.

(b) Soil profile description:

(1) Soil characteristics shall be evaluated by profile observation within the boundaries of each proposed sewage disposal field. To properly evaluate soil permeability characteristics, excavation using a backhoe (or similar equipment) is required. At least one excavation in the primary disposal field, and one in the replacement field shall be required for this purpose. Soil profile excavations shall be made to a depth of at least eight (8') feet, or five (5') feet below the proposed disposal field trench, whichever is greater, or until a limiting condition is reached, and be at least two (2') feet wide. The profile description shall evaluate soil features as follow:

(A) Soil texture, color, structure, consistency, plasticity, and porosity, for each soil horizon in the excavation utilizing the United States Department of Agriculture (USDA) soil classification system.

(B) Depth and type of limiting condition, including but not limited to bedrock, hardpan, impermeable soil layers, observed free water, saturated soils, or groundwater.

(C) Depth of soil mottling, gleying or other evidence of periodic soil saturation.

(D) Other prominent soil features including, but not limited to, percentage of rock or coarse fragments, root porosity, dampness, or depth and type of fill or imported soil in the profile.

(2) Test holes dug by augur shall be an acceptable alternative upon written approval from the Environmental Health Services Division: (a) where use of a backhoe or other similar equipment is impractical because of access or because of the fragile nature of the soils, or (b) when necessary to verify conditions expected on the basis of prior soil investigations. When the auger method is used, at least three test holes in the primary disposal field and three in the reserve field are required.

(c) Soil Classification.

(1) The registered consultant shall field classify the soil using UDSA soil classification system and be responsible for collecting and retaining samples from the most limiting soil layer within the proposed active leaching layers observed in the sidewall of the excavated profile.

(2) Soils classified as sand and loamy sand shall be considered to have minimal treatment capacity unless it can be demonstrated by percolation testing after standard presoaking methods that the percolation test result is 5mpi (12 inches per hour) or greater. Percolation rates from 1 mpi to 5 mpi shall require increased depth to groundwater as per Table 1.

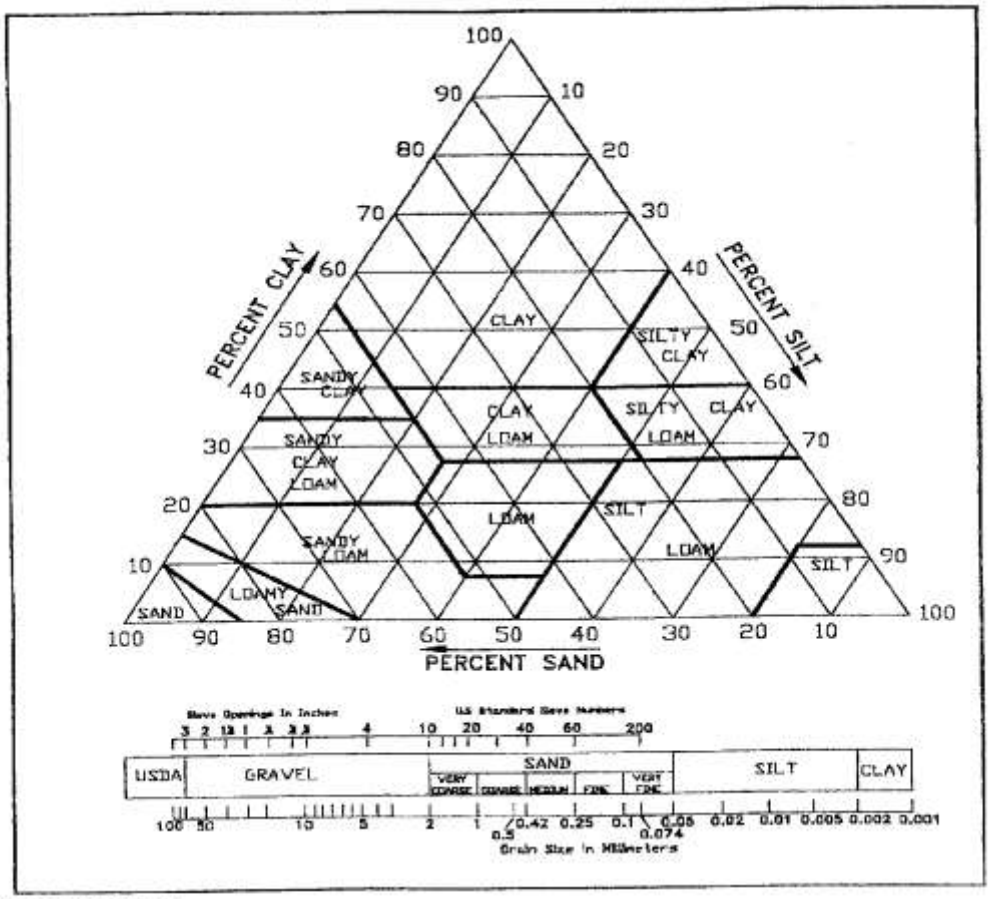
(3) Soils classified as sandy loam, sandy clay loam, and loam may be considered suitable for effluent disposal without additional percolation testing provided that the texture is confirmed using a hydrometer test. If an alternative system is necessary, percolation testing under fully saturated conditions may be required to determine design parameters. If multiple soil profiles are evaluated, then only one soil sample needs to be analyzed using a hydrometer test, provided the soil sample is taken from the most limiting soil layer observed from all soil profiles evaluated. All samples shall be appropriately labeled, and analyzed for soil texture and bulk density by the approved ASTM method or California Test Method. The tests shall demonstrate the presence of the minimum effective soil depth required beneath the trench or absorption bed. The test results shall be plotted on a soils textural triangle as shown in Figure 1.

(4) Soils classified as sandy clay, clay loam, silt loam, silty clay, silty clay loam, silt, and clay shall be considered marginal to unacceptable and will require percolation testing to determine whether the soils are suitable.

(5) If the classification of the soil is in question, then the Environmental Health Services Division shall require the consultant to provide hydrometer and bulk density test data to verify the actual classification of the soil on the soils textural triangle in Figure 1 to determine if percolation testing is required.

(d) Percolation testing.

Figure 1: USDA Soil Textural Triangle



INSTRUCTIONS:

1. Plot texture on triangle based percent sand, silt, and clay as determined by hydrometer analysis.

2. Adjust for coarse fragments by moving the plotted point in the 100 percent sand direction an additional 2 percent for each 10 percent (by volume) of fragments greater than 2mm in diameter.

3. Adjust for compactness of soil by moving the plotted point in the 100 percent clay direction an additional 15 percent for soils having a bulk-density greater than 1.7 gm/cc.

Note: For soils falling in sand, loamy sand, or sandy loam classification bulk density analysis will generally not affect suitability, and analysis is not necessary.

(1) When required by these standards to demonstrate adequate infiltrative capacity at a proposed on-site sewage disposal system location, percolation testing shall be performed or supervised by a registered consultant in compliance with Solano County's approved percolation test procedures. The applicant shall notify the Environmental Health Services Division at least 24 hours prior to constructing percolation test holes, presoaking the test holes, and conducting the test.

Percolation test holes shall be constructed during normal business hours unless prior arrangements have been made with the Environmental Health Services Division. The Environmental Health Services Division may require inspection of the percolation test hole construction process and/or presoak method, and percolation test. Failure to comply with these requirements may result in the need to reconstruct the test holes, and/or conduct a new presoak, and/or perform a new percolation test. All applicable fees shall be paid prior to construction of the percolation test holes.

(2) When deemed necessary by the Environmental Health Services Division, percolation tests may be required for any on-site sewage disposal permit application involving new construction, increases in the projected wastewater flow, relocation or expansion of an existing systems, and for land divisions or lot line adjustments, which do, or will, use on-site sewage disposal systems. The Environmental Health Services Division may require percolation tests prior to the issuance of permits to repair failing on-site sewage disposal systems, or prior to approving building additions on lots served by on-site sewage disposal systems.

(3) Percolation Test Hole Construction

(A) Percolation test holes shall be placed uniformly into the undisturbed soil horizons in the proposed location of the initial and replacement on-site sewage disposal system's absorption field. At least three holes shall be placed in each proposed disposal field and in each reserve area location. Test holes shall be constructed to the depth of the bottom of the proposed leachfield. For Mounds and At-Grade Mounds, the depth of the leachfield for purposes of test hole depth, shall be considered 1 foot below grade. The registered consultant may construct one or more percolation holes at the midpoint elevation of the minimum effective soil depth for the purpose of application rate determination in conformance with section 6.4-87.2. For tests deeper than one foot a backhoe may be used to dig a bench to within one foot of the bottom of the test hole, provided the backhoe pit is left open. The registered consultant running the test is responsible for any needed shoring in deeper tests.

(B) Percolation test holes shall be at least four (4") inches to twelve (12") inches in diameter. The bottom and sides of the percolation test holes shall be carefully scratched with a sharp instrument to remove any smeared soil surfaces and provide a natural soil interface into which water may percolate. All loose soil must be removed from the hole.

(C) Not more than two (2") inches of coarse sand or pea gravel must be placed in the bottom of the hole to protect from scouring and sediment that may impact the test.

(D) The hole shall be left open, or a minimum four (4") inch perforated pipe with approved drain rock between the pipe and wall of the hole shall be placed in the test holes. The backhoe pit, if used for deep percolation tests, shall remain open and unfilled.

(4) Presoaking the Test Holes

The intent of this section is to provide sufficient presoaking that will result in soil conditions that represent, as closely as possible, those conditions encountered during the wettest months of the year.

(A) Standard Procedure.

Each percolation test hole shall be presoaked for a minimum of six (6) hours prior to the start of the percolation test or until the soils are completely swollen, whichever is longer. The six hour presoak shall not begin more than 24 hours prior to the start of the test. The Registered Consultant shall consider the soil texture and type in selecting an appropriate presoak period.-Underestimating the presoak time period will result in an extended rate measurement period. Many soils in Solano County will require a presoaking time period greater than six (6) hours. The Environmental Health Services Division may approve a shorter presoak period for soils with textures of sand, loamy sand or sandy loam.

(B) Presoak procedures shall result in complete wetting and swelling of the soil being tested. This shall be accomplished by thoroughly saturating each hole until the soil is fully swollen (this may require many gallons of water).

The water level in the percolation hole shall be maintained at least 12” above the sand or pea gravel at the bottom of the hole as required for the soil to achieve a swollen condition prior to the start of the percolation rate measurement. Only clean water without additives shall be used in the presoak and percolation tests.

(C) Failure to follow the presoak procedures may result in the requirement to begin the presoak procedure again, or lack of approval of the percolation test results.

(5) Percolation Rate Measurement

The intent of this section is to provide precise and accurate percolation rate measurements, of sufficient time, that represent to the greatest extent possible, the soil conditions encountered during the wettest months of the year.

(A) At the beginning of the percolation test, the depth of the percolation hole shall be recorded and the water shall be adjusted so that it is between 4 and 8 inches above the sand or pea gravel at the bottom of the hole.

(B) A fixed reference point over the hole, or on the side of the perforated pipe if used, must be established. All readings shall be taken from this fixed reference point to the top of the water in the hole. Floats with securely attached measuring devices may be utilized provided that the floats do not absorb water. The distance between the water and ground surface shall be recorded.

(C) Water level shall be measured to a minimum accuracy of one-eighth (1/8”) inch every thirty (30) minutes for a minimum of four (4) hours and until three (3) consecutive

stabilized measurements are made that are within 1/4th inch of the final measurement.. If water cannot be maintained in the hole for the first two (2) thirty (30) minute readings, then the water level shall be adjusted to six (6”) inches over the sand or pea gravel at the bottom of the hole, and readings shall be taken every ten (10) minutes for two (2) hours or until three (3) consecutive stabilized measurements are made, whichever is longer.

(D) For test holes with a permeability faster than 30 mpi after the required test period that do not have rates for a final three readings that are within ¼” of the last reading, an average of the last three readings will be used as the percolation rate.

(E) Inadequate presoaking of the test holes may result in unstabilized percolation rates at the end of a percolation test. In no case shall the percolation test end until the minimum percolation rate period has been reached and a stabilized rate has been achieved, as defined in section 6.4-81.2(d)(6)(c), unless the consultant chooses to repeat the test. Percolation test data that does not achieve a stabilized rate shall not be utilized in the design of sewage disposal systems.

(6) Percolation Test Data

(A) All data obtained from any percolation test shall be included in the site evaluation report submitted to the Environmental Health Services Division on the standard form provided. All test results, both passing and failing, shall be submitted.

(B) The completed report shall be accompanied by a scaled plot plan identifying the exact location of the percolation holes, along with other pertinent details such as the location of soil profiles, wells, water courses, structures, slopes, cut banks, property lines, etc.

(C) All data submitted must be stamped and signed by the registered consultant supervising or performing the tests.

(D) Groundwater determination.

(1) The highest anticipated level of groundwater shall be estimated by the highest extent of soil mottling to natural grade observed in a soil profile, or by direct observation of stabilized groundwater levels.

(2) Direct observations, if used or required, shall occur during wet weather conditions as defined below. Measurements shall occur every 2 weeks during the wet weather period. The Environmental Health Services Division may accept alternate wet weather groundwater plans from registered consultants provided the groundwater monitoring plan will capture seasonal high groundwater elevation in the proposed primary and reserve disposal fields. Direct observation of groundwater shall utilize performance wells or piezometers. At least one well shall be constructed in each initial and replacement area. Approval of the monitoring program shall be obtained from the

Environmental Health Services Division. The location of the well(s) shall be accurately depicted on all site plans submitted to the Environmental Health Services Division for approval of the on-site sewage disposal system. Where a conflict exists between the depth of groundwater observed through direct observation during wet weather conditions and the depth at which soil mottles are observed, the direct observation of actual groundwater levels shall govern.

(3) Some soils, such as sandy river soils, will not exhibit mottling. In cases where the soil lacks the necessary iron compounds to exhibit mottling, direct observation during wet weather conditions may be exclusively required.

(e) Wet weather testing period.

(1) The wet weather testing period for groundwater determination and, where required, for wet-weather percolation testing shall be determined annually by the Environmental Health Services Division on the basis of rainfall occurrence as measured by the following schedule:

(A) Beginning: On the occurrence of fifty (50%) percent of the annual normal rainfall or after 8 inches of rainfall in any 30 day period, whichever occurs first.

(B) Ending: On March 15, or later as determined by the Environmental Health Services Division in the event of unusually heavy springtime rainfall.

(C) Extensions: The wet weather testing period may be started earlier or extended later than the above-noted beginning and ending points if it is determined by the Environmental Health Services Division, through a monitoring program, that shallow groundwater tables are fully charged.

(f) Soil test results completed pursuant to these standards shall be valid as long as the conditions on the lot remain essentially unaltered by grading, construction, drainage, structures, well, cuts, landslides, etc. Testing may be invalidated if subsequent site evaluations reveal site conditions that are more limiting than noted during original tests, or that were misrepresented or ignored during original testing.

(g) Nothing in this Chapter shall prohibit a registered consultant from conducting percolation testing in accordance with these standards prior to soil profile evaluation.

(Ord. No. 1609, §18; Ord. No. 1655, §16)

Sec 6.4-82. Disposal system location and placement

(a) Soil depth.

(1) On-site sewage disposal systems shall be placed within and above effective soil. The effective soil depth below the bottom of the disposal field shall be as indicated in Table 1.

(2) Soil Texture Zones are those described in Figure 1, USDA Soil Textural Triangle. Increased depth of permeable soil may be required for systems proposed on sloping terrain. All horizons of the soil must comply with criteria established by these standards in order to be considered effective soil.

(b) Percentage of Rock. The percentage of coarse fragments throughout the effective soil depth shall not exceed fifty (50%) percent by volume as retained on a #10 sieve.

(c) Percolation Rates. The disposal field shall not be placed in an area with failing percolation test results. Percolation test results throughout the disposal field area and required effective soil depth shall not be less than one minute per inch or more than 60 minutes per inch. Exception: for alternative and experimental sewage disposal systems the percolation test results throughout the disposal field area and required effective soil depth shall not be less than one minute per inch or more than 120 minutes per inch.

(d) Slope. The native slope of any portion of a standard disposal field area shall not exceed twenty five (25%) percent. Other slope limitations may apply depending on the type of on-site sewage disposal system proposed. Lots may not be graded or altered in any manner to accommodate the slope requirements (except as indicated for areas of fill in section 6.4-82(e) below). Leach lines shall not be installed in areas of excessively concave slopes.

(e) Areas of filled soil or unstable soil formations shall not be used for a disposal field site. The on-site sewage disposal system shall be located and installed in natural, undisturbed and unobstructed ground or earth. Exception: fill placed for ten or more years that are stable and soil evaluation indicates characteristics acceptable for installation of an on-site sewage disposal system such as approved structure, texture, consistency, pore space, percolation rate, etc., may be utilized for an on-site sewage disposal system. No grading shall occur in the area of the proposed or installed on-site sewage disposal system or replacement area without the written approval of the Environmental Health Services Division.

(f) The minimum horizontal separation between the components of the system, including the required reserve area, and the subjects listed below shall be as shown in Table 2: Minimum Setback Requirements.

Where adverse conditions exist, the minimum horizontal separation distances specified by this section may be increased or a special means, particularly in the construction of the on-site sewage disposal system, may be required by the Environmental Health Services Division.

Table 1. Soil Depth below Absorption Field to Limiting Condition.

Soil texture[1]	*Percolation Rate*	*Depth to groundwater*	*Depth to other limiting factor*
Sand, Loamy Sand	*1 mpi – 5 mpi* 6 mpi- 60 mpi	*20 feet*[2] 5 feet[3]	*5 feet*[3] 5 feet[3]
Sandy Loam, *Sandy Clay Loam, Loam*	*6 mpi – 60 mpi* 61 mpi- 120mpi	*5 feet*[3] *3 feet*[4]	*5 feet*[3] *3 feet*[4]
Sandy Clay, Clay Loam, Clay, Silty Clay, *Silty Clay Loam,* *Silt Loam, Silt*	*6 mpi – 60 mpi* 61 mpi- 120mpi	*5 feet*[3] *3 feet*[4]	*5 feet*[3] *3 feet*[4]

1. Soil texture of most limiting soil layer in the active leaching layers directly below proposed disposal fields (within two (2') feet to five (5') feet below trench bottom depending on type of system).

2. Unless an alternative system is utilized, then depth may be reduced to two (2') feet to five (5') dependant on the alternative system proposed. Pretreatment and denitrification may be required for any allowed reduction of setback.

3. Separation distances may be reduced to three (3') feet if pressure distribution is used, or to two (2') feet if a pretreatment device approved by the Environmental Health Services Division is used prior to disposal of effluent into the soil through pressure distribution.

4. Applies only to sites approved for alternative sewage disposal systems utilizing pressure distribution methods. Can be reduced to two (2') feet if a pretreatment device approved by the Environmental Health Services Division is used prior to disposal of effluent into the soil.

Table 2. Minimum Setback Requirements.

(Distance in feet)

	Septic Tank, Interceptor, Dosing Tank, Holding Tank, Distribution Box	Disposal Field, Replacement Area	Solid Piping (ABS or Cast Iron)	Solid Piping (PVC or other)
Wells, abandoned wells, springs	100 feet(1)	100 feet	25 feet	50 feet
Bays, streams, rivers, ditches, canals, culverts or 10 year flood plains (2)	100 feet(1)	100 feet	25 feet(3)	50 feet
Ephemeral streams, rivers, unlined ditches, unlined canals, or unlined culverts (2)	50 feet	50 feet	25 feet(3)	50 feet
Lined ditches, lined canals, or watertight culverts or conduits	15 feet	15 feet	10 feet(3)	10 feet
Lake or reservoir (2)	100 feet	100 feet	25 feet	50 feet
Property line (public water supply and no on-site well)	10 feet	10 feet	10 feet	10 feet
Property line (neighboring lot on-site well or spring water supply)	25 feet	25 feet	10 feet	10 feet
Structures and foundations	5 feet	10 feet	0 feet	5 feet

Swimming Pool. Lined pond or lined basin	15 feet	15 feet	5 feet	5 feet
Areas subject to vehicular traffic	5 feet	5 feet	0 feet if sand packed	5 feet
Cut or fill banks, cuts, or steep slopes(4)	4 x height (50 feet maximum)	4 x height (100 feet maximum)	0 feet	10 feet
Easements and rights of way (5)	5 feet	5 feet	5 feet	5 feet

Notes:
(1) May be reduced to fifty (50') feet if the tank passes a field test to verify it is water tight.
(2) As measured from the highest water level obtained.
(3) Variance may be granted for creek crossings if pipe is pressure tested and adequately protected.
(4) Distance in feet equals four times the vertical height of the cut bank, fill bank, or escarpment.
(5) Unless easement is specifically and solely designated for an on-site sewage disposal system.
See Uniform Plumbing Code for parallel crossings.

(Ord. No. 1609, §18; Ord. No. 6155, §17)

Sec. 6.4-83. Intercept drains

(a) Intercept drains are trenches filled with gravel and drainage pipe installed below ground up slope from the disposal field for the purpose of intercepting, diverting, and discharging perched groundwater away from the disposal field. The goal is to eliminate completely, or significantly lower, the perched groundwater in the area of the disposal field to accommodate a specific design of on-site sewage disposal system.

(b) Intercept drains may be used to eliminate or lower perched water tables to allow a site to be used for sewage disposal when all of the following criteria can be met:

(1) The native slope exceeds 5%.

(2) The water table is shallow and perched on an impermeable subsurface feature such as bedrock, hardpan, or impermeable clay.

(3) The bottom of the intercept drain can be keyed into the impermeable feature.

(4) Monitoring to verify that the intercept drain is lowering the groundwater to approved levels shall be required. Performance wells shall be installed between the intercept drain and the absorption field to verify groundwater levels. The owner of the property shall be responsible for paying fees associated with ongoing monitoring and evaluation. The Environmental Health Services Division shall condition the on-site sewage disposal system permit with the provisions for monitoring.

(c) No portion of an intercept drain shall be located less than 10 feet up gradient, 15 feet laterally, or less than 50 feet down gradient from any septic tank or disposal field, replacement area, or less than 5 feet from any property line. Detailed plans prepared by a registered geologist, registered civil engineer or registered environmental health specialist must be submitted to and approved by the Environmental Health Services Division prior to installation of an intercept drain.

(Ord. No. 1609, §18; Ord. No. 1655, §18)

Sec. 6.4-84. Materials

(a) Materials used in construction of the septic system shall be in good condition, durable, sound, free from defects, capable of withstanding normal installation and operational stresses, and resistant to corrosion or decay.

(b) All materials, fixtures, pipe, fittings, distribution boxes, and devices used to construct a septic system must be IAPMO approved and listed, or be approved by the Environmental Health Services Division for the use intended. Approval by the Environmental Health Services Division may only be given after submission of detailed engineered designs that demonstrate compliance with all applicable standards.

(Ord. No. 1609, §18)

Sec. 6.4-84.1. Septic tank, dosing tank, and interceptor construction, inspection, testing, and capacity

(a) Each septic tank, dosing tank, and interceptor shall be designed, installed and maintained so as to prevent the entrance of rain, groundwater, or surface water drainage.

(b) All septic tanks, dosing tanks, interceptors, distribution boxes, risers, seams, joints and unions shall be made watertight. The Environmental Health Services Division may require a leak test in the field to confirm water tightness. When a leak test is required, water shall be placed two inches above the seam of the tank and riser. The water level must remain static within one (1”) inch for a twenty four-hour period.

(c) Minimum septic tank capacity for single family residences shall be as follows:

Residences with 1 to 3 bedrooms:	1200 gallons

Residences with 4 bedrooms:	1500 gallons
Residences with 5 bedrooms:	1800 gallons
Each additional bedroom:	150 gallons

Commercial establishments (including residential care facilities)
Vol.= 1.5 Q + 1000 where Q= maximum daily flow.

(d) Approved Septic Tanks: Septic tanks shall be designed to provide clarified effluent consistent with accepted standards and shall provide adequate space for sludge and scum accumulations. Designs shall assure uniform flow through the entire length of the septic tank. The interior of all concrete tanks, above the liquid level, shall be coated with a bituminous coating or other approved material to prevent the degradation of concrete by sewage gases. The tank shall be permanently marked with the capacity and manufacturer and be accessible for cleaning and inspection.

(e) Compartments: The septic tanks shall be of two-compartment construction. The first compartment shall be twice the capacity of the second compartment and be separated from the second compartment by a baffle. The first compartment shall be at least three feet wide and five feet long with a liquid depth between 2½ feet and six feet. In septic tanks greater than 1500 gallons the second compartment may not be less than five feet in length. Side walls of the septic tank shall extend at least nine (9”) inches above the liquid level. The baffle shall extend at least four (4”) inches above the liquid level. A four (4”) inch inverted fitting with the opening extending midway into the liquid level of the septic tank shall be installed in the inlet compartment side of the baffle.

(f) The invert of the inlet opening into the septic tank shall be at least two (2”) inches above the invert of the outlet opening. The inlet and outlet pipe openings shall not be less in size then the connecting sewer pipe. The inlet and outlet pipes shall be provided with sanitary tees of equal internal diameter. The portion of the sanitary tee on the outlet extending into and above the liquid level may be larger than the outlet pipe to accommodate an effluent filter. Sanitary tees shall extend at least four (4”) inches above and twelve (12”) inches below the liquid level of the tank. Sanitary tees shall be located under the access openings. Ventilation shall be provided through the sanitary tees by means of a two-inch minimum space between the underside of the septic tank top and the top of the sanitary tee fitting. All pipe fitting and compartment partitions shall have a free vent area equal to or larger than the required cross sectional area of the house sewer discharging into the tank to provide free ventilation above the liquid level from the disposal field to the septic tank, house sewer and stack into the air.

(g) The top of the tank shall be located no greater than thirty-six (36”) inches below grade unless otherwise approved in writing by the Environmental Health Services Division.

(h) Access to each compartment of a tank shall be provided by an access opening twenty (20”) inches in minimum dimension into the top of the tank. A riser shall extend to two (2”) inches above grade from each access opening of the tank to allow for

inspection and maintenance of the tank. The risers shall be centered over the access openings into the tank. The riser shall be of sufficient size to protect access openings of the tank and allow for removal of any below grade covers if present. Watertight, airtight, vermin tight, securely fastened covers shall be installed over the risers. The covers must be removable with standard hand held tools. Risers and covers shall be constructed of durable materials approved by the Environmental Health Services Division. The riser shall be fastened to the septic tank with a durable, watertight seal that is either cast in place or retrofitted. The risers and lids shall be specifically manufactured for the use intended and shall be capable of withstanding all anticipated loads. Wherever the first compartment exceeds twelve (12') feet in length, an additional access opening with riser shall be provided over the baffle wall.

(i) Construction Materials. Unless otherwise approved in writing by the Environmental Health Services Division, septic tanks shall be constructed of reinforced concrete. Fiberglass or polyethylene tanks may be permitted only in circumstances where the placement of a concrete tank is not feasible because of access limitations, steep slopes, safety concerns or remote sites unless written approval is obtained from the Environmental Health Services Division. Fiberglass or polyethylene tanks are prohibited in areas of shallow groundwater where buoyancy is a concern. When fiberglass or polyethylene tanks are used, they must be installed and bedded in strict conformance with the manufacturer's instructions.

(j) Structural and Material Strength. The tank shall be capable of withstanding anticipated structural loads. The tank top must be capable of supporting an earth load of not less than three hundred (300 lbs) pounds per square foot when maximum coverage does not exceed three (3') feet. The minimum compressive strength of any concrete tank wall, top and covers, or floor is two thousand five hundred (2500 lbs) pounds per square inch.

(k) Installation: Concrete tanks shall be installed level and on a solid bed of at least 90% compacted earth or rock. Soil around the tank shall be hard-compacted or jetted. The depth of tank placement and additional installation details shall be as specified in the approved on-site sewage disposal system permit. Each of the following components of an on-site sewage disposal system shall be located at least two (2') feet from each other and five (5') feet from a distribution box and/or an absorption field as measured horizontally:

(1) Grease interceptor

(2) Septic tank

(3) Dosing tank

(l) When installed in locations where the seasonal groundwater is less than six (6') feet from the ground surface, tanks shall be made non-buoyant by the addition of concrete to the bottom or top surface of the tank, or by other means approved by the

Environmental Health Services Division.

(m) The Environmental Health Services Division shall conduct inspection of the tank at the time of installation. Tanks that are cracked, caved, or structurally deficient shall not be approved.

(n) An effluent filter approved by the Environmental Health Services Division shall be required in the outlet of all newly installed septic tanks, except if a dosing tank with a screened pump vault is being used immediately after the septic tank.

(o) Grease Interceptors

(1) Wastewater discharge from fixtures and equipment in commercial establishments which may contain grease, including but not limited to scullery sinks, pot and pan sinks, dishwashing machines, soup kettles and floor drains located in areas of food preparation shall only be drained to an on-site sewage disposal system through a grease interceptor.

(2) Any commercial food establishments using an on-site sewage disposal system except those serving drinks and/or prepackaged food only, shall have an interceptor installed pursuant to the provisions of these regulations prior to any transfer of operating permit by the Environmental Health Services Division.

(3) General Grease Interceptor Requirements

(A) Toilets, urinals, and other similar fixtures shall not discharge through an interceptor.

(B) An interceptor shall be identical to a septic tank designed pursuant to the provisions of these regulations except that the sanitary tees shall extend to a level of 12 inches from the bottom of the tank and an effluent filter is not required.

(C) All interceptors shall have risers provided over each access port as indicated in section 6.4-84.1(h).

(D) The interceptors shall be located outside of the structure and as close as possible to the source of grease. The location shall allow for ease of access for removal of the interceptor's contents.

(E) Interceptors shall discharge to a septic tank or sewer.

(F) Interceptors shall be at least 1000 gallons or sized based upon the following formulas below, whichever is greater:

(i) Commercial Kitchen:
Capacity = Number of meals per hour multiplied by the waste flow rate multiplied by

retention time multiplied by storage factor.

(ii) Laundries and laundromats:
Capacity = number of machines multiplied by 2 cycles per hour multiplied by waste flow rate multiplied by retention time multiplied by storage factor.

(G) Retention times and storage factors shall be equal to or greater than those listed in Table 3 or as determined by the Environmental Health Services Division if not listed. Waste flow rates are those listed in Table 4 or as determined by the Environmental Health Services Division if not listed.

(p) Distribution box specifications

(1) Distribution boxes shall be watertight and designed to accommodate the necessary distribution laterals and expected flows.

(2) Distribution boxes shall be constructed of durable, non-porous materials such as Class "A" concrete or other materials approved by the Environmental Health Services Division. The top, walls, and bottom of concrete distribution boxes shall be at least two (2") inches thick.

Table 3: Retention Time and Storage Factor for Interceptor Sizing.

FACILITY	RETENTION TIME	STORAGE FACTOR
Commercial Kitchen	Dishwasher and/or disposal unit = 2.5 hours. Single serving with disposal = 1.5 hours	Fully equipped kitchen: 8 hour operation = 1 16 hour operation = 2 24 hour operation = 3 Single service kitchen = 1.5
Laundry	2.0 hours	1.5

(3) Distribution boxes shall be constructed with a baffle or similar design.

(4) The inside of concrete distribution boxes shall be coated with a bituminous or other approved coating above the level of the sewage effluent.

(5) The invert of the inlet pipe shall be at least one (1") inch higher than the invert of the outlet pipes. The inverts of all outlet pipes shall be level.

(Ord. No. 1609, §18; Ord. No. 1655, §19)

Sec. 6.4-84.2. Pump systems

(a) A licensed Civil Engineer, Certified Engineering Geologist or a Registered Environmental Health Specialist shall design all pump systems. Plans detailing the dosing tank, pump, and all component features, including a cross section of the tank

complete with elevations of control switches, measured in inches, from the bottom of the chamber must be provided to the Environmental Health Services Division for review. Dosing tanks shall only receive clarified effluent that has been treated by a septic tank or pretreatment device.

(b) Dosing tank design is to include the following:

(1) Emergency storage volume shall be 150 gallons or 1/3 of the design flow rate, whichever is greater and is measured from the invert of the inlet tee and the point of high water alarm activation.

(2) In order to prevent floatation in areas where ground water will come into contact with the dosing tank the design must account for the volume of effluent required to remain in the tank after dosing occurs, or anti-flotation devices must be used.

(3) The access opening(s) into the top of the dosing tank and risers shall comply with section 6.4-84.1(h) and shall be designed and sized to allow ease of maintenance and removal of the pump, pump vault, screens, floats, and other components that may be within the dosing tank.

(4) Dosing tanks shall be vented back through the septic tank, or have a separate vent.

(5) A check valve shall be required unless the leach field or absorption system is located downhill from the pump.

(c) Requirements pertaining to the pump and associated controls are as follow:

(1) The pump off switch shall be set per manufacturer's specifications. A redundant "off" switch shall be used.

(2) The pump shall be placed so that it remains submerged to allow for cooling and prevent contact with sewer gas. The pump shall be set a minimum of four (4") inches above the bottom of the dosing tank.

(3) Float control switches shall be set to pump small, frequent doses. Timed dosages may be utilized in addition to on/off switches. The use of a dosing timer may be required in order not to exceed maximum allowable dosages for the specific on-site sewage disposal system proposed.

(4) The pump in the dosing tank shall be protected by either an effluent filter located in the septic tank, or by placement within a screened vault located in the dosing tank, or both.

(5) The pump shall be designed for sewage effluent and shall be U.L. approved. Pump curves and other required test certification shall be submitted to the

Environmental Health Services Division for approval.

(6) The alarm system is to contain an audible and visual alarm that will remain on once activated until turned off by the owner or maintenance person. The alarm must be installed on a separate circuit from the pump.

(7) The high water alarm switch shall be set two inches above the pump “on” switch.

(8) Alternating pumps are required for systems generating over 1500 gallons per day, or for commercial systems.

(9) A single family dwelling may use duplex pumps or a single pump. For using a single pump, the following criteria shall be used:

(A) The single pump is to be commercially engineered and capable of continuous duty.

(B) The pump must be capable of handling the total design flow of the on-site sewage disposal system.

(10) The control panel shall have a method to count the number of doses and elapsed time the pump is running.

(d) Requirements for the force main are:

(1) The force main is to be from one and one-quarter (1 ¼”) to two (2”) inches in diameter, rated for the head loss calculated pressure and velocity, and made of approved materials.

(2) The connection between the pumps and the force main shall allow for ease of pump removal and maintenance.

(3) Head loss calculations addressing all fittings and elevation differences must be provided with plan submittal to the Environmental Health Services Division.

(e) Exception: a separate dosing tank shall not be required if both of the following conditions are met:

(1) The pump system is being installed to repair an existing failed or failing on-site sewage disposal system, and the installation of a dosing tank is not possible or practical given site conditions, and

(2) If possible the pump shall be placed in a pump vault separate from the septic tank. However, if the pump is proposed to be placed in the septic tank for repair to a failed or failing on-site sewage disposal system, then the following criteria must be met:

(A) The pump flow rate and dose batch size shall be kept to a minimum to prevent surging of liquid levels in the septic tank.

(B) The pump shall be placed in the second compartment within a screened pump vault.

(C) The pump intake shall be equal distance between the liquid operating level and the bottom of the septic tank.

(D) The pump "off" switch must be set four (4") inches above the crossover pipe within the baffle to prevent first compartment scum from entering the second compartment.

(Ord. No. 1609, §18; Ord. No. 1655, §20, §21)

Sec. 6.4-85. Destruction of tanks

(a) Every cesspool, septic tank, interceptor, dosing tank, holding tank, or pit privy which has been abandoned, or has been discontinued from further use, or to which no building drain or building sewer from a plumbing fixture is connected, shall be immediately destroyed by filling with compact earth, sand, gravel, concrete or other material approved by the Environmental Health Services Division. Prior to filling, the top cover or arch over the cesspool, interceptor, septic tank, dosing tank, holding tank or pit privy shall be completely removed, the wastewater removed by an approved septage hauler, and at least five holes shall be broken into the bottom. Fill material shall not be placed above the top of the sidewalls, or above the level of any outlet pipe, until inspection and approval by the Environmental Health Services Division. After approval by the Environmental Health Services Division, the cesspool, septic tank, dosing tank, holding tank or pit privy shall be filled at least to grade level. An adequate fill cap shall be provided to account for future settling. Complete removal of the tank and backfill and compaction of the hole after its removal, is an acceptable alternative to destruction of the septic tank in place.

(b) Where on-site sewage disposal systems are abandoned after connecting any premises to a sanitary sewer, all abandoned on-site sewage disposal systems shall be destroyed within 30 days of the time of connecting to the sanitary sewer.

(Ord. No. 1609, §18; Ord. No. 1655, §22)

Sec. 6.4-86. Piping, joints, and connections

(a) All piping, joints and connections shall: (1) be at least three (3") inches internal diameter except as otherwise specified by the Environmental Health Services Division for piping subject to pressure; (2) have watertight joints; (3) be laid on stabilized, compacted earth, except for perforated piping within disposal area; (4) be installed pursuant to the requirements of these standards and IAPMO and the manufacturer's specifications; (5) be backfilled by soil free of large rocks and debris that may damage the piping, joints, and/or connections; (6) shall meet the minimum requirements of the

Uniform Plumbing Code; and (7) shall be marked by an approved listing agency.

(b) Pipe under driveways or other areas subject to heavy loads shall be installed to withstand the imposed loads.

(c) The Environmental Health Services Division may require the use of tracer wire for the location of piping systems.

(d) The building sewer shall have no tight ells or bends of 90 degrees.

(e) Cleanouts

(1) Cleanouts extending to grade shall be provided between the structure served by an on-site sewage disposal system and any septic tank or interceptor every 100 feet, or fraction thereof, of straight runs of building sewer and for each bend less than 1350 between pipes.

(2) All cleanouts shall extend to grade and shall be installed so as to allow cleaning in both directions.

(3) Cleanouts installed under concrete or asphalt paving shall be made accessible through risers or by extending flush with paving and shall be adequately protected.

(f) All piping, joints, and connections shall be ABS or cast iron, except for pipe subject to pressure and perforated pipe in the disposal field, which may be PVC.

(g) The fall between the structure and the septic tank or aerobic treatment unit if not preceded by a septic tank shall be at least one-quarter (¼") inch per foot. Between the septic tank and the distribution box the fall shall be at least one (1") inch in ten (10') feet.

(Ord. No. 1609, §18; Ord. No. 1655, §23)

Sec. 6.4-87. Absorption system: infiltration area and sizing the system

(a) Typical Standard Leach Field Design

(1) The typical standard leach field design for an on-site sewage disposal system may be used under the following conditions:

(A) There is gravity flow from the septic tank to all other portions of the on-site sewage disposal system.

(B) Soil evaluation has shown that:

(i) Groundwater, fractured rock, hardpan, bedrock, or other limiting condition is not encountered from natural ground surface to five (5') feet below the proposed trench bottom, and

(ii) The soil from ground surface to five (5') feet below trench bottom is classified as a sandy loam, sandy clay loam, or loam or, if classified as a sand, loamy sand, clay loam, sandy clay, or silt loam has a percolation rate from 6 to 60 mpi, and

(iii) The soil is not classified as a clay, silty clay, silty clay loam, or silt.

(C) The system serves a residential dwelling with four (4) bedrooms or less and the wastewater generated does not exceed six hundred (600) gallons per day.

(2) The typical standard leach field design shall be: six hundred (600') lineal feet of trench, not more than thirty-six (36") inches deep by thirty-six (36") inches wide; a three (3") inch minimum diameter perforated pipe shall run the entire length of each trench; twelve (12") to eighteen (18") inches of gravel under the pipe and two (2") inches of gravel over the pipe shall be installed. Chamber systems that provide equivalent treatment may be substituted for the gravel trenches. No reduction in length of the total lineal feet required will be allowed for the use of a chamber system. Gravel trenches and chamber systems shall have twelve to eighteen inches of cover soil. The top of the gravel layer or chamber may be installed as high as flush with grade.

(b) Non-Typical Standard Leach Field Design and Alternative Systems.
For systems that do not meet the requirements for a typical standard leach field design, or if the owner decides to pursue a non–typical standard design or alternative system design on a site where a typical standard design would normally be allowed, then a Registered Civil Engineer, Certified Engineering Geologist or Registered Environmental Health Specialist shall prepare and design an on-site sewage disposal system complying to these standards for the proposed building. Any design shall incorporate the following criteria:

(1) The total length of leach line required shall be calculated using the infiltrative area as specified in this section. For calculation purposes the infiltrative area per lineal foot shall not exceed 3 square feet per lineal foot unless the effective soil below the leachfield consists of loam, sandy loam or sandy clay loam in which case the maximum infiltrative surface area shall not exceed 5 square feet per lineal foot. For systems utilizing more than 3 square feet per lineal foot, only side wall shall be used in the calculation of infiltrative surface area. The infiltrative area used to calculate the size of absorption beds or trenches for alternative systems shall not exceed the specifications established by these standards for the specific type of disposal system proposed.

(2) Projected wastewater flows. On-site sewage disposal system designs shall be determined based upon site evaluation and the determination of the projected maximum daily flow. The minimum design capacity of any on-site sewage disposal system designed by a licensed consultant serving new construction of a residential structure or project shall not be less than 450 gallons per day. Projected wastewater flow for single family dwelling units with more than three bedrooms shall be increased by 150 gallons per day for each additional bedroom. (Exception: Legal second dwelling units with a

separate septic system shall have a minimum design capacity of not less than 150 gallons per day per bedroom.) For repairs or additions to on-site sewage disposal systems for residential occupancies the sewage flow shall be based on 150 gallons per bedroom per day. For other types of occupancies, the projected sewage flow shall be based upon 150 gallons per day, or Table 4, or if not listed in Table 4, as approved by the Environmental Health Services Division, whichever is greater. For multiple residences, establishments, or occupancies in the same.

Table 4: Projected Daily Sewage Flow

TYPE OF OCCUPANCY	GALLONS PER DAY
Airports	5 per passenger
Campgrounds: Campground with central comfort station Campground with flush toilets, no showers Day Camps (no meals served) Summer and seasonal	 35 per person 25 per person 15 per person 50 per person
Churches (sanctuary) With kitchen wastes	5 per seat 7 per seat
Factories	35 per person per shift
Hospitals Kitchen waste only Laundry waste only	250 per bed space 25 per bed 40 per bed
Hotels/Motels with private bathroom (No kitchen waste) Hotels/Motels without private bathroom (No kitchen waste) Hotels/Motels with private bathroom and kitchen	60 per two person room 50 per two person room 75 gallons per person
Institutions other than hospitals	125 per bed space
Movie Theaters	5 per seat
Offices	20 per employee
Picnic Parks with toilets and showers Picnic parks with toilet waste only	10 per person 5 gallons per person
Resort Camps with limited plumbing	50 gallons per person
Restaurants: Kitchen wastes (multi use utensil) Kitchen wastes disposable utensil And add the following for type of facility present: Conventional sit down Short Order Bar and Cocktail	5 per meal served 3 per meal served 10 per person 8 per person 3 per person
Schools (non-boarding) With gym and showers add With cafeteria using disposable utensils	20 per student 5 per student 3 per meal served
Self service laundries	50 gallons per wash
Service Stations	10 gallons per vehicle served
Retail Stores For public restroom add	20 per employee 1 per 10 square feet
Swimming pools and bathhouses	10 per person
Tourist camps or mobile home parks with individual bath units Tourist camps or trailer parks with central bathhouse	100 per person 75 per person
Work or construction camps (semi-permanent)	50 per person
Wine Tasting Facility (no meals served)	3 per person

Note: Employee use shall be added to all above occupancies at a volume of 20 gallons per day per employee establishment, the cumulative projected wastewater flow as determined by the Environmental Health Services Division shall be used.

For intermittently used on-site sewage disposal systems, the design capacity shall be based on the maximum projected daily flow during the period of use. Waste flow values that incorporate periods of non-use shall not be used in the design. Seating or occupant capacity of any establishment shall be based on the maximum occupancy permitted by the local fire marshal.

(B) The on-site sewage disposal system's disposal field shall be sized according to the infiltration rates listed in Table 5 or Table 6. The table used shall be based on the final test method utilized to determine infiltration rate.

(C) Hydrometer test and percolation rates.

If percolation tests are required, then typical and non-typical standard disposal fields may be used only if percolation test results are between 6 mpi and 60 mpi, inclusive. Typical and non-typical standard systems may be used in soils with percolation test results from 1 mpi to 5 mpi, inclusive, if groundwater is more than 20 feet below the bottom of the trench. Alternative systems shall be used if percolation test results are 61 mpi to 120 mpi, and may be required if the percolation test result is from1 mpi to 5 mpi. On sites having sandy soils with percolation test results from 1 mpi to 5 mpi and groundwater closer than 20 feet below the bottom of the disposal field, or that have slowly permeable soils with percolation test results from 90 mpi to 120 mpi, pretreatment before discharge into the disposal field may be required.

(3) A non-typical standard leach field design may include a dosing tank to provide lift to a gravity disposal field.

(4) Nothing in this chapter shall prohibit a Registered Environmental Health Specialist, Registered Civil Engineer or Certified Engineering Geologist from designing an alternative sewage disposal system in an area that meets all the requirements of this chapter for a standard or non-typical standard system. An alternative sewage disposal system installed in an area that meets the minimum requirements for a standard or non-typical standard system does not require an annual operation permit.

(Ord. No. 1609, §18; Ord. No. 1655, §24, §25, §26, §27, §28, §29)

Sec. 6.4-87.1. Disposal field: minimum effective soil depth by system type

Disposal fields shall be placed above the minimum effective soil depth as described in the following table:

System Type	Minimum Effective Soil Depth (ft)
Typical and Non-Typical Standard	5
Pressurized Disposal Field without	3

pretreatment	
Pressurized Disposal Field with pretreatment	2

(Ord. No. 1655, §30)

Sec. 6.4-87.2. Disposal field infiltration area requirements: sewage application rates

The leachfield design shall be based on the average of the soil application rates at the elevation of the trench and the midpoint elevation of the effective soil depth below the leachfield. For above grade systems, the elevation of the trench for testing purposes shall be considered 1 foot below grade.

(a) The application rate at the base of the trench shall be determined by conducting a percolation test or hydrometer test as described in section 6.4-81.2.

(b) The application rate at the midpoint elevation of the effective soil depth below the leachfield shall be determined by perrometer testing, hydrometer analysis or texture by feel and structure at the registered consultant's discretion and in conformance with Table 5 or Table 6 in section 6.4-88.

(Ord. No. 1655, §31)

Sec. 6.4-88. Disposal field: general construction practices

(a) The disposal field shall consist of one or more leach lines consisting of drain rock, perforated pipe, and untreated building paper or filter fabric, or chamber system components that provide equivalent treatment, and appurtenant components. Unless otherwise approved by the Environmental Health Services Division, the disposal field shall be preceded by a septic tank and if required, a dosing tank. Pretreatment devices may also be required. Alternative material or methods of disposal field construction may be approved by the Environmental Health Services Division for use in alternative or experimental systems.

(b) Disposal fields shall be designed, installed, and maintained so as to maximize equal distribution of wastewater throughout the entire disposal field. The maximum difference in length between any two leach lines in a disposal field shall not exceed ten (10%) percent unless a pressure distribution disposal field is used. Standard systems with two or more leach lines shall use a distribution box secured to a base of concrete over undisturbed or compacted earth. All pipes must be secured into the distribution box with non-shrink cement grout or other approved method. The terminal ends of the perforated pipe in the leach line shall be capped. Alternative systems that use pressurized distribution of effluent shall have an interconnected system of tightline manifold laid on undisturbed soil connected to perforated pipe within the disposal field.

(c) Installation of the septic system during seasonal wet conditions shall be prohibited without the written authorization of the Environmental Health Services

Division. Excavation or backfill of the septic system shall be prohibited when the soil is frozen or so wet that soil material rolled between the hands will form a soil wire.

(d) All smeared or compacted soil surfaces in the sidewalls or bottom of leach line excavation shall be scarified to the depth of smearing or compaction and the loose material removed prior to placement of drain rock.

(e) Once excavated and approved by the Environmental Health Services Division, trenches shall be evenly filled with drain rock, chamber leaching components that provide equivalent treatment, or other material approved by the Environmental Health Services Division. Drain rock used in the trenches shall be ¾" inch to 2½" inch washed river rock, gravel, or other approved hard rock. Rock and gravel that are easily decomposed are prohibited. Rock and gravel that has not been washed or that is contaminated with fine particles is prohibited. Rock and gravel shall contain no more than one percent (1%) fines, dust, sand, or clay by weight (less than one (1%) percent by weight passing the #200 sieve). The Environmental Health Services Division may require testing of the rock to verify its cleanliness. If chamber system components are used no reduction in length of the total lineal feet required will be allowed.

Table 5: Infiltration Rates (gallons/ft^2/day) based on soil profile.

Soil Texture Class	Single Grain	Granular	Strong: Angular, Subangular Blocky	Moderate: Angular, Subangular Blocky	Weak: Angular, Subangular Blocky	Structureless, Massive, Friable, Very Friable	Structureless, Massive, Compact, Firm, Very Firm
Sand	1.2	N/A	N/A	N/A	N/A	N/A	N/A
Loamy Sand	1.2	0.729	N/A	N/A	0.729	N/A	N/A
Sandy Loam	N/A	0.729	N/A	0.56	0.56	0.56	N/A
Sandy Clay Loam	N/A	0.487	0.487	0.417	0.417	0.417	0.0
Loam	N/A	0.487	0.487	0.417	0.35	0.35	0.0
Silt Loam	N/A	0.417	0.417	0.35	0.2	0.2	0.0
Silty Clay Loam	N/A	0.35	0.35	0.2	0.2	0.2	0.0
Clay Loam	N/A	0.35	0.35	0.2	0.2	0.2	0.0
Sandy Clay	N/A	0.35	0.35	0.2	0.2	0.2	0.0
Silty Clay	N/A	0.2	0.2	0.2	0.2	0.0	0.0
Clay	N/A	0.2	0.2	0.2	0.2	0.0	0.0

Table 6: Infiltration rates based on percolation tests.

Minutes/Inch	Inches/Hour	Gal/Ft^2/Day		Minutes/Inch	Inches/Hour	Gal/Ft^2/Day
1-3	20	1.2		47	1.3	0.437
4	15	1.143		48	1.3	0.430

5	12	1.086		49	1.2	0.423
6	10	1.029		50	1.2	0.417
7	8.6	0.971		51	1.2	0.410
8	7.5	0.914		52	1.2	0.403
9	6.7	0.857		53	1.1	0.397
10	6	0.800		54	1.1	0.390
11	5.5	0.786		55	1.1	0.383
12	5	0.771		56	1.1	0.377
13	4.6	0.757		57	1.1	0.370
14	4.3	0.743		58	1.0	0.363
15	4	0.729		59	1.0	0.357
16	3.75	0.714		60	1.0	0.350
17	3.5	0.700		61	1.0	0.345
18	3.3	0.686		62	1.0	0.340
19	3.2	0.671		63	1.0	0.335
20	3	0.657		64	0.9	0.330
21	2.9	0.643		65	0.9	0.325
22	2.7	0.629		66	0.9	0.320
23	2.6	0.614		67	0.9	0.315
24	2.5	0.600		68	0.9	0.310
25	2.4	0.593		69	0.9	0.305
26	2.3	0.587		70	0.9	0.300
27	2.2	0.580		71	0.8	0.295
28	2.1	0.573		72	0.8	0.290
29	2.1	0.567		73	0.8	0.285
30	2.0	0.560		74	0.8	0.280
31	1.9	0.553		75	0.8	0.275
32	1.9	0.545		76	0.8	0.270
33	1.8	0.538		77	0.8	0.265
34	1.8	0.531		78	0.8	0.260
35	1.7	0.523		79	0.8	0.255
36	1.7	0.516		80	0.8	0.250
37	1.6	0.509		81	0.7	0.245
38	1.6	0.501		82	0.7	0.240
39	1.5	0.494		83	0.7	0.235
40	1.5	0.487		84	0.7	0.230
41	1.5	0.479		85	0.7	0.225
42	1.4	0.472		86	0.7	0.220
43	1.4	0.465		87	0.7	0.215
44	1.4	0.457		88	0.7	0.210
45	1.3	0.450		89	0.7	0.205
46	1.3	0.443		90-120	0.7-0.5	0.2

Where there is more than one application rate for the same inches/hour rate, the lowest application rate shall be used.

(f) Perforated pipe shall be centered in the leach line trench over the drain rock. Perforated piping shall be installed level to within a tolerance of three (3”) inches per one hundred (100’) feet. Leach lines shall be installed with the aid of a transit and shall follow the natural contour of the ground. The orifices in all perforated pipe shall face downward, except for pressure distribution fields in which case the orifices may face upwards provided they are protected by properly installed shielding. The terminal ends of the distribution pipe shall be capped. Drain rock and perforated pipe shall extend the entire length of the leach line.

(g) Once the installation of the gravel and pipe, or chamber system components, are approved by the Environmental Health Services Division, if perforated pipe is used the filter material shall be placed to completely fill the absorption system to a height of two (2”) inches over the top of the perforated pipes and the remainder of the absorption system shall be backfilled with excavated soil. If chambers are used, then dirt backfill shall be placed over the chamber components.

(h) Prior to backfilling, drain rock shall be covered with untreated building paper, clean straw, geo-textile fabric, or other approved, similar, porous material that will allow air movement, moisture to evaporate and prevent closure of rock voids by earth backfill.

(i) Leach line trenches shall not be constructed in a manner that allows wastewater to flow backwards from the perforated pipe or to undermine the distribution box, manifold, header pipe, septic tank, or any other portion of the septic system. Distribution boxes and tightline shall be set on compact undisturbed earth.

(j) Leach line trench cover

(1) The installer shall assume responsibility for backfilling the system. Backfill shall be carefully placed to minimize compaction and prevent damage to the system.

(2) The quality of the backfill shall be consistent in structure and texture with the topsoil already existing on the site. Backfill shall be free of any materials that could damage the system, including, but not limited to, rocks, construction materials, and wood.

(3) Leach lines of standard on-site sewage disposal systems shall be backfilled to a level that will match grade after settling of the backfill.

(k) Heavy equipment or vehicular traffic shall not be driven over the absorption system during construction or after completion of the on-site sewage disposal system. The Environmental Health Services Division may require the installation of an approved traffic barrier or fence around a disposal field and/or replacement areas to protect from vehicular traffic and large animals including, but not limited to, cows, horses, and llamas.

(l) Standard leach lines shall not branch or tee off, except for a single bend with a minimum inside angle of 135 degrees.

(m) The cross section of the transmission line and the beginning of the leach line trench shall be stepped so as to prevent seepage of effluent from trench to trench.

(n) Each leach field shall have an inspection well installed at the terminal end of at least one leach line per distribution box. The pipe shall be 4-inch diameter, perforated in the horizon of the leach line, and extend vertically from the bottom of the leach line to grade. Leaching chambers shall be provided with inspection wells at the end of each leach line. A secure, insect-proof and vermin-proof, water-tight cap shall be provided over each inspection well.

(o) For standard systems installed into sloping ground, effluent shall be distributed evenly across the slope.

(p) Dual systems connected by a diversion valve may be required for large systems or systems installed in high clay content or heavily compacted soils.

(Ord. No. 1609, §18; Ord. No. 1655, §32)

Sec. 6.4-88.1. Disposal field: trenches

Leachfields shall meet the construction requirements of Table 7.

Table 7: Construction requirements for leach lines.

	Minimum	Maximum
Leach Lines per field	1	No limit
Length of leach line Standard System Alternative System	 25 ft. 25 ft.	 100 ft. 100 ft.
Bottom width of trench	18 inches	36 inches
Spacing of trenches[1]	5 ft.	No maximum
Earth cover over rock or chamber	12 inches	18 inches
Grade of trench and piping	Level	3 inches/100 feet
Depth of gravel under pipe	18 inches[2]	42 inches[3]
Depth of gravel over pipe	2 inches	3 inches

1. Plus an additional one (1') foot for each six (6") inches of depth, or portion thereof, of leach line beyond eighteen (18") inches.
2. May be reduced for some types of alternative systems
3. Maximum depth of trench is five (5') feet below grade.

(Ord. No. 1609, §18)

Sec.6.4-89. Alternative systems – general specifications

(a) An alternative system may be approved as specified in this section by the

Environmental Health Services Division provided it complies with this Chapter. All alternative systems associated with subdivision of land, new construction, including additions and remodels, repairs to on-site sewage disposal systems on lots created after the effective date of these standards, and for any repair using pretreatment devices, shall be subject to a program of monitoring and oversight as required by the Environmental Health Services Division.

(b) Alternative systems that may be proposed for existing lots and subdivision of land in Solano County are listed below.

(1) Pressure Distribution (PD) systems.
These below ground systems allow wastewater disposal on sites with shallow or slowly permeable soil over impermeable soil, fractured rock or bedrock, or sites with high groundwater on slopes up to twenty five (25%) percent. Required minimum separation for Pressure Distribution systems to a limiting condition is thirty-six (36”) inches below the trench bottom, unless an approved pretreatment device is provided, then it may be reduced to twenty-four (24”) inches. The design shall comply with these standards. See section 6.4-89.1(a) for specific details on Pressure Distribution system design.

(2) At-Grade systems. These above ground systems allow wastewater disposal on sites with shallow or slowly permeable soil over impermeable soil, fractured rock or bedrock, high groundwater, or other limiting condition within three (3’) feet of the ground surface and on slopes up to twenty-five (25%) percent. Pretreatment of effluent may be required prior to disposal. If pretreatment is used, twenty-four (24”) inches of native soil is required above a limiting condition. The design shall comply with these standards. See section 6.4-89.1(b) for specific details on At-Grade system design.

(3) Mound systems. These above ground systems allow wastewater disposal on sites with shallow or slowly permeable soil over impermeable soil, fractured rock or bedrock, high groundwater, or other limiting condition within two (2’) feet of the ground surface and on slopes up to 12½ percent. The mound design and minimum area requirements shall comply with these standards. See section 6.4-89.1(c) for specific details on Mound design.

(4) Sand Filtration systems. Are appropriate on lots and commercial operations where additional treatment is necessary to reduce waste strength. Pressure Distribution trenches and At-Grade systems receiving effluent from a sand filter must be located at least two (2’) feet above groundwater or other limiting conditions. The design shall comply with these standards. See section 6.4-89.1(d) for specific details on Sand Filter system design.

(5) Aerobic treatment units (ATU) or synthetic filter media units. These are proprietary devices that treat the sewage effluent prior to disposal. They are used instead of sand filters. Pressure Distribution trenches and At-Grade systems receiving effluent from these devices must be located at least two (2’) feet above groundwater or other limiting conditions. ATU’s must comply with section 6.4-89.1(e). Construction

inspection requirements for synthetic filter media units shall be those described for ATU's in section 6.4-89.1(e). In addition the use of aerobic treatment units or synthetic filter media units may only be approved under the following conditions:

(A) There exists adequate area meeting all setbacks on the lot for installation of an appropriately sized intermittent sand filter, and

(B) Documentation acceptable to the Environmental Health Services Division is provided to demonstrate the unit will provide effluent quality equal to, or better than that produced by an intermittent sand filter, and

(C) The Environmental Health Services Division may require installation of an intermittent sand filter should performance monitoring of the unit after installation indicate it is not providing the required effluent quality.

(D) The owner may be required to maintain a maintenance agreement with the proprietor, the proprietor's distributor, or other contractor knowledgeable in the repair and maintenance of the unit.

(6) Any alternative system that is approved and under permit from the Regional Water Quality Control Board having jurisdiction and where the Regional Water Quality Control Board has approved the system's use in a subdivision.

(c) Alternative On-site sewage disposal systems approved for use only on existing lots are:

(1) Alternative systems approved by the Regional Water Quality Control Boards in Region 2 or Region 5, whichever is appropriate.

(2) Experimental systems under the following criteria:

(A) Repair of existing, failing on-site sewage disposal systems, or

(B) As an additional pretreatment device in conjunction with another non-experimental alternative system utilizing pretreatment, or

(C) As a pretreatment device in conjunction with an alternative system or conventional system not requiring pretreatment by these standards, or

(D) On lots where 200% replacement area exists, provided that a conventional system or non-experimental alternative system can be installed into the replacement area, and

(E) Documentation is provided and acceptable to the Environmental Health Services Division that demonstrates the experimental system will function to mitigate the existing site constraints.

(3) Constructed wetlands. These are an experimental system and may be used only after all other options for correction of sewage system failure on existing developed lots have been exhausted. Wetlands are generally not suitable for new construction.

(d) Vaulting systems and holding tanks: Sealed vaults, including portable toilets, may be used only in the following circumstances:

(1) Temporary work sites, such as construction sites, special events, agriculture operations.

(2) Campgrounds, rest stops, fishing piers, or similar facilities that are remote or where the site is not suitable for an on-site sewage disposal system and where the facility is operated and maintained by a government agency.

(3) Existing residential or commercial operations where a severe sewage disposal failure has occurred and there is no feasible alternative for repair.

(4) Intermittently used non-residential, non-commercial structures such as duck clubs in the primary area of the Suisun Marsh where site evaluation demonstrates conditions that prohibit the installation of an on-site sewage disposal system and where the operators have installed appropriate high-level alarms and have shown evidence of a maintenance contract with a licensed septage pumper.

(e) Unacceptable designs: The following are systems that are not acceptable in Solano County:

(1) Evapotranspiration systems: any system that depends, as part of the design calculation, on evaporation or transpiration for proper performance. Exception: these systems may be allowed if the effluent quality meets public health standards as prescribed by the California Department of Health Services and Regional Water Quality Control Board for reuse provided the system is designed by an individual listed in subsection (f) below and storage of sufficient size is provided to account for wet weather periods.

(2) Leach pits: below ground soil infiltration systems with width greater than three (3’) feet or depth greater than five (5’) feet.

(3) Cesspools.

(4) Composting toilets.

(5) Incineration systems.

(f) Designs for alternative on-site sewage disposal systems must be prepared by a California Registered Civil Engineer, Certified Engineering Geological or California

Registered Environmental Health Specialist. Designs for alternative systems shall include such technical data as necessary to support and demonstrate that the system will function as designed, will not adversely affect surface or groundwater quality, and will not create a potential health hazard. Designs proposed for any use other than repair of a failing or failed system must have demonstrated satisfactory performance in soil conditions similar to those encountered in the proposed application.

(g) In areas with elevated nitrate levels in the soil and groundwater, the Environmental Health Services Division may require systems in soils having percolation rates from 1-5 minutes per inch and having groundwater within twenty (20') feet of the trench bottom to utilize enhanced treatment devices that effectively reduce nitrogen in the effluent prior to discharge to the underlying soil. In such cases, the Environmental Health Services Division shall determine the amount of nitrogen removal required to protect ground water from significant increase in nitrate load.

(h) Conditions for approval to construct and operate an alternative on-site sewage disposal system shall include, but not be limited to, the following:

(1) When required, the property owner shall obtain an operation permit, and maintain it valid, including paying any required fee and complying with any required conditions of the operation permit;

(2) The property owner or his/her contractor or consultant must monitor the performance of the alternative system as required by the Environmental Health Services Division;

(3) The property owner shall allow Solano County Environmental Health Services personnel and its agents entry onto the real property for purposes of inspection, sampling, testing and monitoring of the alternative system upon reasonable notice;

(4) The property owner shall maintain the system in conformance with the approved plans and permits, and any requirements of the operating permit;

(5) The property owner, in the event of failure or inadequate performance of the alternative system, shall repair the system and/or cease the discharge of sewage, if necessary;

(6) The property owner shall give a copy of the operation permit and all conditions thereto to any subsequent purchaser or tenant, and shall notify a purchaser of the need to renew the operating permit within 60 days of the date of transfer of the property;

(7) Any other provisions as necessary to protect public health and the environment.

(i) Construction of the alternative system must be inspected during installation by the design consultant and the Environmental Health Services Division for its conformance with the design. The Environmental Health Services Division prior to final

approval of the installation shall require written certification from the design consultant that the system has been constructed in conformance with the design and that it is functioning properly.

(j) All persons required to hold an operation permit shall provide to the Environmental Health Services Division an evaluation of each alternative septic system under their control at least once every calendar year. The evaluation shall include an on-site inspection, results of sampling, and monitoring and maintenance records. The Environmental Health Services Division may also perform evaluation inspections to determine the performance or operation of alternative systems.

(k) The application rates used in alternative soil absorption systems shall not exceed those listed in Table 5 or Table 6 depending upon the test method required, unless specifically authorized in writing by the Environmental Health Services Division. Where soil evaluation procedures indicate different acceptable design standards, the more conservative standard or measure shall be used.

(l) Performance Standards for Alternative systems

(1) Performance wells

(A) Performance wells shall be provided to verify performance of alternative systems. A concrete annular seal of twelve (12”) inches deep between the earthen sidewall and solid portion of the pipe is required for all performance wells. Performance wells shall be protected and encased within plastic, concrete, or other approved type box to provide easy access. The soil shall be scarified to remove compaction or smeared soil that may seal the performance well. Performance wells shall be constructed to a depth that will allow verification that the system is functioning properly and not contaminating groundwater. Performance wells shall be placed up gradient, within, laterally, and down gradient from alternative systems.

(B) Performance wells may be sampled for coliform bacteria, fecal bacteria, nitrate, or other chemical or physical constituents that act as indicators of sewage contamination.

(2) Sample Results

(A) An alternative system with sample results exceeding 240,000/100 ml most probable number (MPN) total coliform bacteria and/or 2.2 MPN fecal coliform from purged wells located twenty five (25’) feet or further down gradient shall be deemed to be in a state of failure. Exception: if the up gradient performance wells have similar contamination levels as down gradient wells, then the contamination shall be deemed to be background in the area.

(B) An alternative system with sample results exceeding 3,000/100 ml MPN but less than 240,000/100 ml MPN total coliform bacteria and/or less than 2.2 MPN fecal

coliform from purged wells located twenty five (25') feet or further down gradient shall be deemed to be in a state of marginal operation. Exception: if the up gradient performance wells have similar contamination levels as down gradient wells, then the contamination shall be deemed to be background in the area.

(Ord. No. 1609, §18; Ord. No. 1655, §33, §34, §35)

Sec. 6.4-89.1. Alternative systems – specific design parameters

(a) Pressure Distribution Systems

(1) Unless otherwise approved by the Environmental Health Services Division, the components of a Pressure Distribution system are a septic tank, dosing tank, pump with associated controls, and small diameter piping with small diameter perforations laid in gravel or inside chamber components. The system distributes septic tank effluent uniformly throughout the disposal field under pressure through intermittent, small volume, doses. A timer may also be used to discharge the effluent to the disposal field evenly throughout the day instead of in surges.

(2) Pressure Distribution systems can be utilized alone or after a pretreatment device if site conditions warrant.

(3) Pressure Distribution Site Criteria

(A) Pressure Distribution system can be placed in all soil types with percolation rates ranging from 1 to 120 mpi. Pretreatment may be required in some soil types.

(B) The minimum effective soil depth under the bottom of the trench shall be thirty six (36") inches unless an approved pretreatment device is utilized, in which case it may be reduced to twenty four (24") inches.

(C) To maximize evapotranspiration, Pressure Distribution systems may not be installed below non-permeable type soils such as high shrink swell clays, highly compacted soils, and/or massive or platy soil structures.

(4) Pressure Distribution Design Requirements

(A) The depth of the trench shall be between 12" and 60"

(B) Spacing of the distribution lines shall be based upon slope and depth of the system. Minimum trench spacing shall be five (5') feet edge-to-edge on slopes of 20% or less. Greater spacing may be required for steeper slopes.

(C) Distribution trenches shall follow the natural contours of the ground. The bottom of the trench shall remain level within a tolerance of three (3") inches per one hundred (100') feet. Trenches shall be angled or curved to stay on contour. The distribution field shall not be placed on concave landforms.

(D) Distribution Piping

(i) Pressurized perforated distribution pipe shall be PVC schedule 40 type pipe of at least 3/4” diameter laid within rock or inside chamber components. The maximum distance between perforations shall be 36”. The first and last perforation must start half of the distance used between orifices from the beginning and end of the perforated distribution line. The orifice hole diameter shall not be less than 1/8” if sixty inches of lift is provided, or less than 3/16” diameter if twenty-four to forty-eight inches of lift is provided. If sixty inches of lift is proposed, then the orifices must be pointed upwards and protected by an orifice shield. If chamber components are used, the pressure distribution line shall be suspended from the top with the orifices facing up. Orifice shields do not need to be utilized within chambers. The end of the perforated distribution line shall have a sweep. A purge valve and method to conduct a squirt test once backfield shall be provided at the end of each distribution line.

(ii) Pressurized distribution manifold shall be 1¼” to 3” diameter PVC schedule 40 or better. Balancing valves shall be provided to each perforated distribution line.

(iii) The maximum length of run for pressurized perforated distribution piping shall be 100 feet.

(iv) There shall be a minimum three (3’) feet separation from the transmission line to the beginning of the aggregate portion of the trench. The cross section of the transmission line and the beginning of the distribution line shall be stepped so as to prevent seepage of effluent from trench to trench.

(5) Balancing Valves and Purge Valves

(A) The system shall have a balancing valve at the beginning of each distribution line and a purge valve at the end.

(B) All balancing and purge valves shall be encased in plastic or concrete boxes that extend to grade and have a secure cover. The boxes shall be 10 inches across or larger, round or square, and be of adequate size to allow for maintenance and installation of a standpipe on the end of the purge valve.

(C) Balancing valves shall be schedule 40, or higher, gate or ball valves.

(D) Purge valves shall be schedule 40, or higher, gate or ball valves. They must have, or be capable of having placed, a removable fitting that will allow a squirt test to be conducted.

(6) Designers shall calculate the total dynamic head loss as feet of elevation of the entire distribution system. The calculation shall include:

(A) Vertical Differences

(B) Length of the entire piping

(C) Head loss of all valves, tees, elbows, and appurtenances

(D) Hydraulic orifice discharge

(7) Dose Volume:

Small, frequent doses not exceeding 10% of the projected daily flow being discharged from the orifices used per dose after charging the manifold and laterals is recommended. A timer may be utilized to meet this. The maximum dose volume allowed shall not exceed 20% of the maximum potential daily flow being discharged from the orifices during the dose cycle after charging the manifold and laterals. Devices that will utilize the disposal trenches of a field in an alternating series may be approved to achieve low flow volumes while disposing of the required daily volume, provided that the application rate per day is not exceeded in any one location.

(8) Soil cover shall be the same in structure and texture as the topsoil already existing at the site, except if clay then the soil cover shall be loam. A minimum depth of cover of 12” is required over the gravel.

(9) Shallow In Ground systems are Pressure Distribution systems where the drain rock extends close, or all the way, to grade, and the backfill cover is mounded above ground to provide at least 12” of soil cover over the leach field. Shallow In Ground systems may be approved in the following conditions:

(A) Percolation rate of 1-120 mpi on slopes 20% or less, or from 1-90 mpi on slopes from 21% to 25%. Pretreatment is required on sites with percolation rates from 90 to 120 mpi, inclusive, and for installation on slopes from 21% to 25%, and may be required for sites with percolation rates from 1 to 5 mpi depending upon depth to groundwater.

(B) Shallow In Ground systems shall have a minimum effective soil depth of twenty-four (24”) inches below the bottom of the trench with the use of a pretreatment, or thirty-six (36”) inches if no pretreatment is provided.

(C) Minimum 8 feet on center for 0-12½% slope, 12 feet on center for 12½% to 20% slope, inclusive.

(10) Performance wells

(A) A minimum of six performance wells shall be installed within and around the system. One or more performance wells shall be installed between the trenches in the middle of the leach field. Two performance wells shall be installed twenty-five feet down slope of the lowest trench line. One or more performance well shall be installed ten

(10') feet up slope of the highest trench. The Environmental Health Services Division may require additional performance wells or different locations than specified.

(B) Performance well construction shall be in conformance with section 6.4-89(l)(1).

(11) Construction Requirements for Pressure Distribution Systems

(A) Construction shall only occur if soil moisture conditions will allow installation of the system without compaction or smearing of the soil, and weather conditions during the construction process will not cause unsuitable soil moisture conditions.

(B) Construction staking or marking of all components of the system shall occur prior to commencement of construction so that configuration, location, and system details may be verified.

(C) Placement of the transmission line from the dosing tank to the first manifold shall be a minimum of twenty-four inches below ground.

(D) Trenches shall be constructed with strict attention to proper depth and contour.

(E) Side wall and bottom of trenches shall be scarified to remove all smearing.

(F) Distribution to and through all laterals shall be balanced so all laterals and orifices receive an equal volume. The difference in head between
any two lines, and the beginning and end orifice of the same line shall not exceed ten percent.

(G) For shallow systems a track vehicle may be required.

(H) The following meetings and inspection shall be required prior to commencing construction or covering any portion of the system. All meetings and inspections shall be scheduled with the Solano County Environmental Health Services Division at least 48 hours in advance and shall occur during normal business hours:

(i) Pre-construction meeting
Verification that the soil moisture is acceptable and that long term weather conditions will allow installation of the system. Verification that the construction stakes or marks are set to properly delineate all components of the system per approved plans.

(ii) General Construction Inspections

(aa) Function and settings of any control devices including but not limited to, floats, timers, counters, alarms, valves, and switches.

(bb) Open trench inspections.

(cc) Hydraulic testing (squirt test) of any pump and distribution system to ensure that the pump is adequate for design flows and delivers effluent equally to all orifices.

(dd) Depth and placement of gravel and lines in trench.

(ee) All the remaining elements for completion of the system shall be on site at time of the general construction inspection for verification of conformance with the plans and specifications.

(ff) Water tightness of septic tank and dosing tank.

(iii) Final Inspection

(aa) All construction elements are in general conformance with the approved plans and specifications. All performance wells are installed and erosion control has been completed.

(bb) A letter from the designer that the Pressure Distribution system has been installed and is operating in conformance with the design specifications shall be provided.

(b) At-Grade System

(1) At-Grade Site Criteria

(A) At-Grade systems shall not be installed in concave landscape formations, areas of seasonal saturation such as flood plains, vernal pools, drainage areas, areas that have been filled to artificially raise the separation to ground water or other limiting condition, cut or filled sites, or hummocky terrain.

(B) Areas proposed for the At-Grade system shall be undisturbed. Placement of the At-Grade system into areas where removal of large trees, boulders, or rock outcroppings is required is not permitted.

(C) The minimum effective soil depth below the At-Grade system is thirty-six (36”) inches except if an approved pretreatment device is provided it may be reduced to twenty-four (24”) inches.

(D) On sloping terrain, a minimum thirty six (36”) inches effective soil depth shall extend a horizontal distance of at least twenty five (25’) feet down gradient from the down slope edge of the proposed perimeter of the gravel bed. If an approved pretreatment device is used, the soil depth may be reduced to twenty-four (24”) inches extending a horizontal distance of twenty-five (25’) feet down slope from the edge of the gravel. On flat terrain the required effective soil depth shall be required on all sides and ends of the At-Grade system for a horizontal distance of twenty-five (25’) feet.

(E) The slope in the area of the At-Grade system shall not exceed the following:

(i) Twenty-five (25%) percent for percolation rates ranging from 1 to 60 mpi.

(ii) Six (6%) percent for percolation rates from 61 to 89 mpi.

(iii) Twenty (20%) percent for percolation rates ranging from 61 to 120 mpi if approved pretreatment device is used before distribution into the At-Grade system.

(F) The percolation rate of the soil thirty six (36”) inches and less below the At-Grade system shall be from 1 to 120 mpi, except if an approved pretreatment device is provided the required soil depth with these percolation rates can be reduced to twenty four (24”) inches.

(G) In addition to the other setbacks required by these standards, At-Grade Systems shall also comply with the following setbacks (as measured from the toe of the soil cover):

(i)	Buildings and Structures	
	Up gradient and laterally	10 feet
	Down gradient	25 feet
(ii)	Property Lines or Underground Utility Easements	
	Up gradient and Laterally	10 feet
	Down gradient	25 feet
(iii)	Areas of Geologic Instability	100 feet

(2) At-Grade Design Requirements

(A) Unless otherwise approved by the Environmental Health Services Division, At-Grade systems shall consist of at least a septic tank discharging to a dosing tank, which then pumps the sewage effluent under pressure through one or more pressure distribution laterals installed within a gravel bed placed upon the ground surface. The gravel bed is then covered with filter fabric and soil.

(B) Pretreatment of effluent before disposal into an At-Grade system is required for soils with percolation rates ranging from 90 mpi to 120 mpi, or on slopes greater than 6% with a percolation rate between 61 mpi and 120 mpi, inclusive, or for some types of commercial operations that generate high wastewater strengths.

(C) The gravel bed and soil cover shall follow natural contour of the ground. The bed must be installed within a tolerance of three (3”) inches vertically per one hundred (100’) feet horizontally. Only single gravel beds are acceptable.

(D) The maximum width of any gravel bed is ten feet. However, every effort shall be

made to make the gravel bed long and narrow for best performance of the At-Grade system.

(E) The dimension of the gravel bed shall be determined using the linear loading rates in Figure 2.

(i) When depth to a limiting condition is only twenty-four (24”) inches, the linear loading rate shall not exceed four (4 gal/ft/day) gallons per lineal foot per day. Exception: if it can be demonstrated that wastewater flow will be vertical, as well as horizontal, a higher loading rate based on figure 2 can be proposed.

(ii) Emphasis shall be placed on making the gravel bed long and narrow.

(F) The depth of the gravel bed shall be nine (9”) inches total depth (six (6”) inches below the laterals) for residential systems and twelve (12”) inches total depth (nine (9”) inches below the laterals) for commercial systems.

(G) The gravel bed configuration shall extend a minimum of twenty-four (24”) inches from the edge of the pressure dosed laterals on all sides. On slopes greater than two (2%) percent, this distance may be reduced to twelve (12”) inches on the uphill side.

(H) Drain rock used shall be double washed to reduce fines and range in size from 3/8”to 2” inches in diameter. The outer layer of the gravel bed shall be covered with Mirafi 140N geotextile fabric or equivalent.

(I) Soil Cover

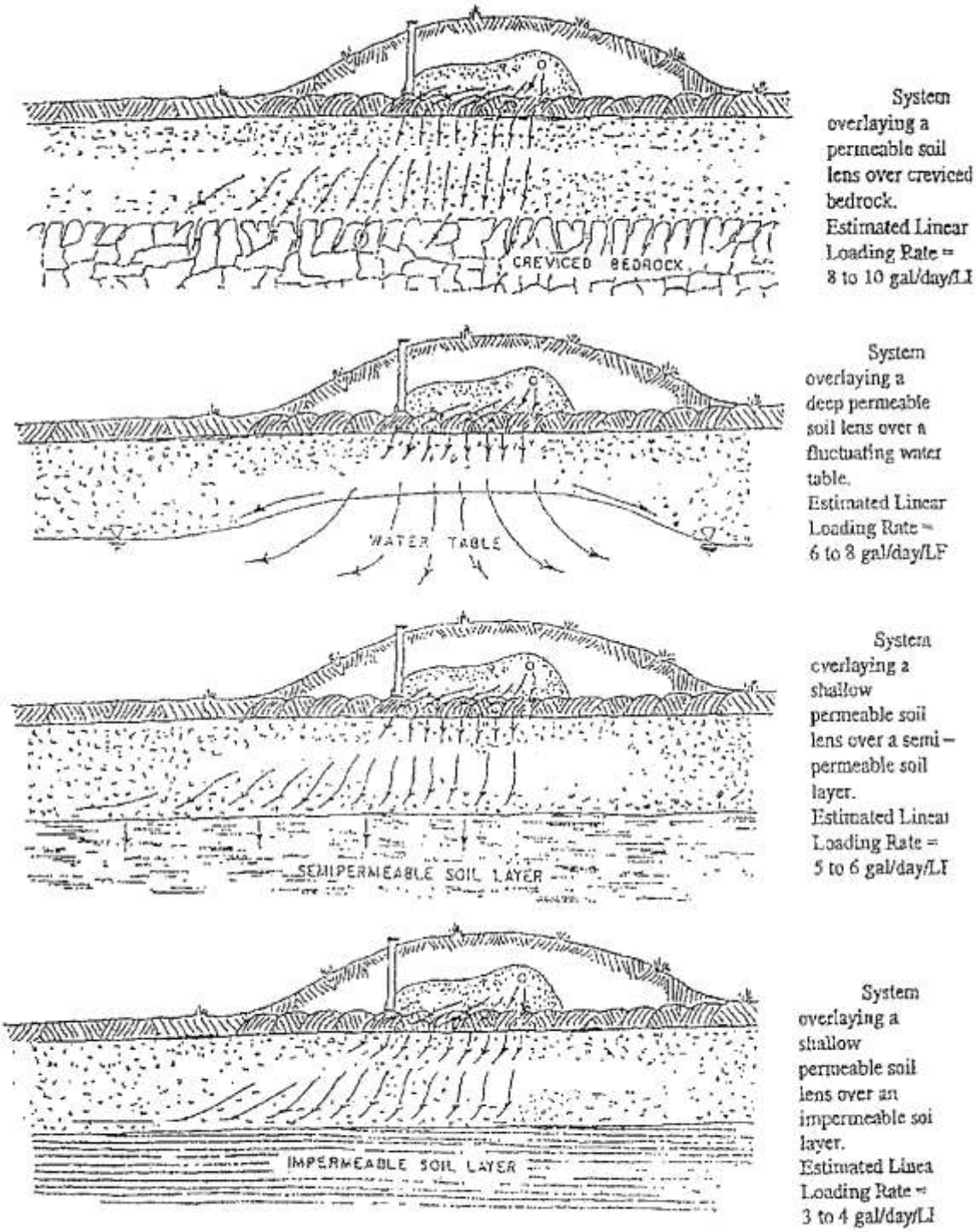
(i) Texture and structure of the soil cover shall be equal to or better than the soil existing at the site. Use of manufactured soil or high clay content soils that do not allow gas exchange to occur is prohibited.

(ii) A minimum depth of cover of twelve (12”) inches, mounded to eighteen (18”) inches directly over the center is required over the gravel.

(iii) Soil cover shall extend a minimum of four feet uphill and on both sides of the system. Soil cover on the downhill toe shall extend a minimum width of:

4 feet -	0-2% slope
6 feet -	>2-4% slope
8 feet -	>4-6% slope
10 feet	>6-8% slope
16 feet	>12.5-16% slope
20 feet	>16% - 20% slope

Figure 2: Linear Loading Rates for an At-Grade System.



(J) Distribution Piping System

(1) The distribution piping shall comply with the requirements listed in Section 6.4-89.1(a)(4)(d) for Pressure Distribution piping.

(2) The pressure dosed laterals must be placed at the upper edge of the gravel beds on sloping sites, and equidistant throughout the gravel on level sites.

(3) Spacing of the perforated pressurized lines shall be based on the width of the gravel bed. The minimum number of pressurized lines based on the width of the gravel bed is as listed below:

(A) On slopes 1% or less:

WIDTH OF BED	NUMBER OF LINES
3’ – 4’	1
>4’ – 6’	2
>6’ – 8’	3
>8’ –10’	4

(B) On slopes greater than 1%:

WIDTH OF BED	NUMBER OF LINES
3’ – 5’	1
>5’ – 10’	2

The manifold may feed the lines either at one end or in the center.

(K) Dose Quantities

Small, frequent doses not exceeding 10% of the projected daily flow being discharged from the orifices used per dose after charging the manifold and laterals is recommended. A timer may be utilized to meet this. The maximum dose volume allowed shall not exceed 20% of the potential daily flow being discharged from the orifices during the dose cycle after charging the manifold and laterals. Devices that will utilize the disposal trenches of a field in an alternating series may be approved to achieve low flow volumes while disposing of the required daily volume, provided that the application rate per day is not exceeded in any one location.

(3) Sizing the At-Grade system.

(A) Effective absorption area required shall equal the maximum projected sewage flow from the building divided by the infiltration rate of the soil.

(B) Width of the gravel bed shall be determined by dividing the Linear Loading Rate by the soil infiltration rate, but shall not exceed ten (10’) feet.

(C) The length of the gravel bed shall be determined by dividing the projected sewage flow by the Linear Loading Rate.

(D) Effective width and length are those dimensions of the gravel bed located down slope from the distribution pipe. Gravel placed uphill from the distribution pipe shall not be included in the required dimension. The area provided by the effective width and length shall be equal to or exceed the effective absorption area required. If the area provided does not equal or exceed the effective absorption area required, then the length of the At-Grade system shall be adjusted until the required effective absorption area is obtained or exceeded.

(4) Construction requirements for At-Grade systems

(A) The use of wheeled vehicles is prohibited for the purposes of ripping or chisel plowing, driving on areas that have been ripped or chisel plowed, moving the soil cover, or anytime the soil conditions are wet, moist, or saturated.

(B) Surface vegetation shall be mowed to native ground and the clippings removed.

(C) Construction staking or marking shall be provided of all components of the system prior to construction. The Environmental Health Services Division shall conduct a verification inspection of the construction staking or marking to confirm that the system will be constructed as designed.

(D) The soil surface shall be ripped or chisel plowed to a depth of eight (8”) inches to ten (10”) inches, with rippers set eight (8”) inches to ten (10”) inches apart. Initial ripping shall be performed in a path parallel to the contours of the land and only within the limits of the gravel bed. The interface of the native soil and the At-Grade soil shall be ripped after the gravel has been placed and just prior to At-Grade soil cover placement.

(E) No traffic is permitted on any ripped surface until after the gravel or soil cover has been placed.

(F) Temporary form boards required for the placement of material shall be removed prior to placement of the cover.

(G) Distribution to and through all laterals shall be balanced so all laterals and orifices receive an equal volume. The difference in head between any two lines, and the beginning and end orifice of the same line shall not exceed ten percent.

(H) Finished grade of the At-Grade system shall be established by track rolling and grooming by hand. Soil cover shall be conditioned with sufficient moisture to allow track rolling to a firm cohesive surface. All drainage work and erosion control shall be completed prior to final construction inspection. The soil cover shall be landscaped or seeded.

(I) The following minimum inspections prior to commencing construction or covering any elements of the system shall be required. Joint inspection by the designer,

contractor, and Environmental Health Services Division may be required. All meetings and inspections shall be scheduled with the Solano County Environmental Health Services Division at least 48 hours in advance and shall occur during normal business hours:

(i) Pre-construction inspection where the following items shall be verified:

(aa) Imminent weather conditions are such that they will not create unsuitable soil conditions during construction.

(bb) Soil moisture in the area of the proposed At-Grade system is not so high as to cause smearing or compaction as a result of construction activities.

(cc) Layout and staking or marking of all components of the At-Grade system.

(dd) The source of soil fill material shall be designated and a sample made available.

(ii) Ripping of the soil.

(iii) Gravel placement and Hydraulic Test:

(aa) Function and setting of all control devices.

(bb) Squirt test of system.

(cc) Depth and location of gravel.

(dd) Water tightness of septic tank and dosing tank.

(iv) Final Inspection:

(aa) Depth and texture of final soil cover over the At-Grade system is verified. All construction elements are in general conformance with the approved plans and specifications. All performance wells are installed and erosion control has been completed.

(bb) A letter from the designer that the At-Grade system has been installed and is operating in conformance with the design specifications must be provided.

(5) Performance wells

(A) Performance well construction shall be in conformance with section 6.4-89(l)(1).

(B) A minimum of six (6) performance wells shall be installed. Two (2) performance wells shall be installed at the center of the gravel bed during construction. Two (2) performance wells shall be placed twenty-five (25’) feet down gradient from the gravel

bed, and two (2) performance wells shall be placed ten (10') feet up gradient from the gravel bed.

(c) Mound Systems

(1) Mound Siting Criteria

(A) A Mound systems shall not be installed in concave landscape formations, areas of seasonal saturation such as flood plains, vernal pools, drainage areas, areas that have been filled to artificially raise the separation to ground water or other limiting condition, cut or filled sites, or hummocky terrain.

(B) Areas proposed for the Mound system shall be undisturbed. Placement of Mound Systems into areas where removal of large trees, boulders, or rock outcroppings is required is not permitted.

(C) The minimum effective soil depth below the Mound System is twenty four (24") inches. A minimum twenty four (24") inches effective soil depth shall also extend a horizontal distance of at least twenty five (25') feet down gradient from the down slope edge of the proposed perimeter of the sand bed on sites with sloping terrain. On sites with flat terrain the required effective soil depth shall extend for twenty five (25') feet beyond the sand basal area on all sides and ends of the mound. Increasing the sand depth of a mound system beyond one (1') foot does not allow a decrease in the minimum effective soil depth below the mound system.

(D) The slope in the area of the mound system shall not exceed twelve and one-half (12½ %) percent.

(E) The percolation rate of the soil twenty four (24") inches or less below the mound system shall be from 1 to 120 mpi.

(F) In addition to the other setbacks required by these standards, Mound Systems shall also comply with the following setbacks:

(i)	Buildings and Structures	
	Up gradient and laterally	10 feet
	Down gradient	25 feet
(ii)	Property Lines or Underground Utility Easements	
	Up gradient and laterally	10 feet
	Down gradient	25 feet
(iii)	Areas of Geologic Instability	100 feet

(2) Mound Design Requirements

(A) Unless otherwise approved by the Environmental Health Services Division, a Mound system shall consist of at least a septic tank discharging to a dosing tank, which then pumps the sewage effluent under pressure through one or more pressure distribution laterals installed within the gravel of a distribution bed placed upon the ground surface. Exception: The Environmental Health Services Division may waive the requirement for a mound system utilizing an aerobic treatment unit to include a septic tank as a separate treatment process if so recommended or required by the manufacturer of the aerobic treatment unit or registered consultant. The mound shall be covered with soil.

(B) For commercial systems the wastewater quality in terms of BOD, soluble BOD, suspended solids, grease and oils, temperature, and volatile suspended solids shall be given. If the strength of the wastewater exceeds 5 day BOD mean value of 185 ppm and Total Suspended Solids mean value of 75 TSS, then pretreatment of the wastewater prior to disposal in the Mound System is required.

(C) Distribution Bed

(i) The distribution bed shall consist of a gravel bed placed upon a portion of a sand bed. The required area of the sand bed is known as the sand basal area.

(ii) Distribution beds shall follow natural contour of the ground. The distribution bed must be installed within a tolerance of three (3”) inches vertically per one hundred (100’) feet horizontally.

(iii) Only single distribution beds are acceptable.

(iv) Gravel Bed

(aa) The maximum width of any gravel bed is ten feet. However, every effort shall be made to make the gravel bed long and narrow for best performance of the Mound system.

(bb) The width dimension of the gravel bed shall be determined using the linear loading rates in Figure 3. When depth to a limiting condition is only twenty-four (24”) inches, the linear loading rate shall not exceed four (4 gal/ft/day) gallons per lineal foot per day. Exception: If it can be demonstrated that wastewater flow will be vertical, as well as horizontal, a higher loading rate based on Figure 3 can be proposed.

(cc) The depth of the gravel bed shall be nine (9”) inches total depth (six (6”) inches below the laterals) for residential systems and twelve (12”) inches total depth (nine (9”) inches below the laterals) for commercial systems.

(dd) Drain rock used shall be double washed to reduce fines and range in size from 3/8 to 2 inches in diameter. The outer layer of the gravel bed shall be covered with Mirafi 140N geotextile fabric or equivalent. The infiltration rate of effluent onto the gravel

shall not exceed the following:

(1) Residential Systems: 1.2 gallons/square foot/day
(2) Commercial Systems: 1.0 gallons/square foot/day
Lower values are encouraged.

(v) Sand Basal Area

(aa) Sand basal area is based upon the average percolation rate, soil morphological conditions, and projected daily sewage flow.

(bb) The sand fill shall be level and extend a minimum of twenty-four (24”) inches horizontally level beyond the edge of the gravel bed on all sides, and then uniformly slope as determined by the mound dimensions. On slopes greater than two (2%) percent, the twenty-four (24”) inch dimension may be reduced to twelve (12”) inches on the uphill side of the distribution bed.

(cc) On slopes greater than one (1%) percent, the sand basal area uphill and beyond the longitudinal ends from the gravel bed shall not be included in the calculations for the required absorption area.

(dd) Sand shall comply with the specifications in figure 4, or as otherwise approved by the Environmental Health Services Division.

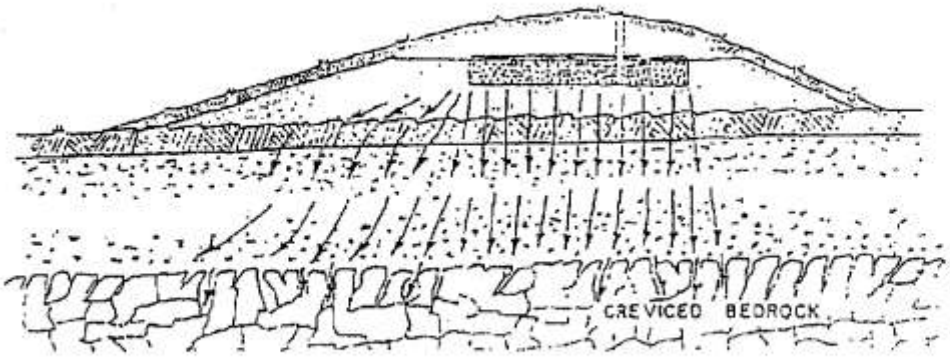
(vi) Distribution Piping System

The distribution piping shall comply with the requirements listed in Section 6.4-89.1(a)(4)(d) for Pressure Distribution piping.

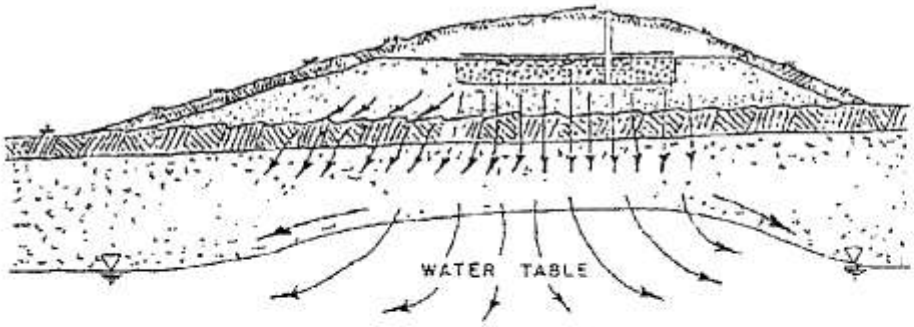
Spacing of the perforated pressurized lines shall be based on the width of the gravel bed. The minimum number of pressurized
lines based on the width of the gravel bed are as listed below:

WIDTH OF BED	NUMBER OF LINES
3’ – 4’	1
>4’ – 6’	2
>6’ – 8’	3
>8’ –10’	4

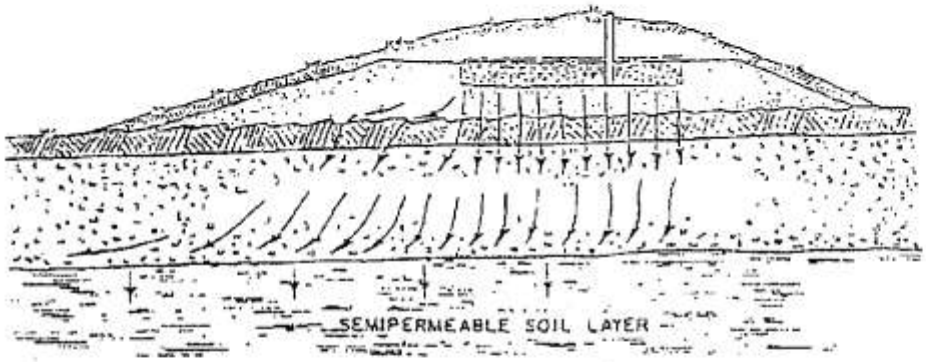
Figure 3: Linear Loading Rates for Mound Systems



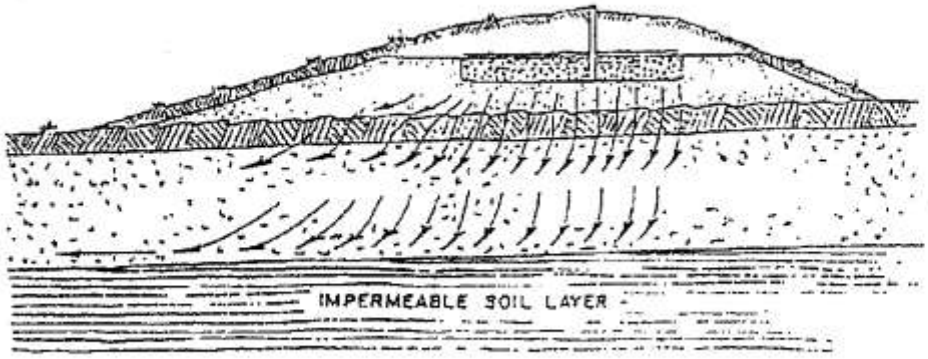
Mound System overlaying a permeable soil lens over creviced bedrock. Estimated Linear Loading Rate = 8 to 10 gal/day/LF



Mound System overlaying a deep permeable soil lens over a fluctuating water table. Estimated Linear Loading Rate = 6 to 8 gal/day/LF

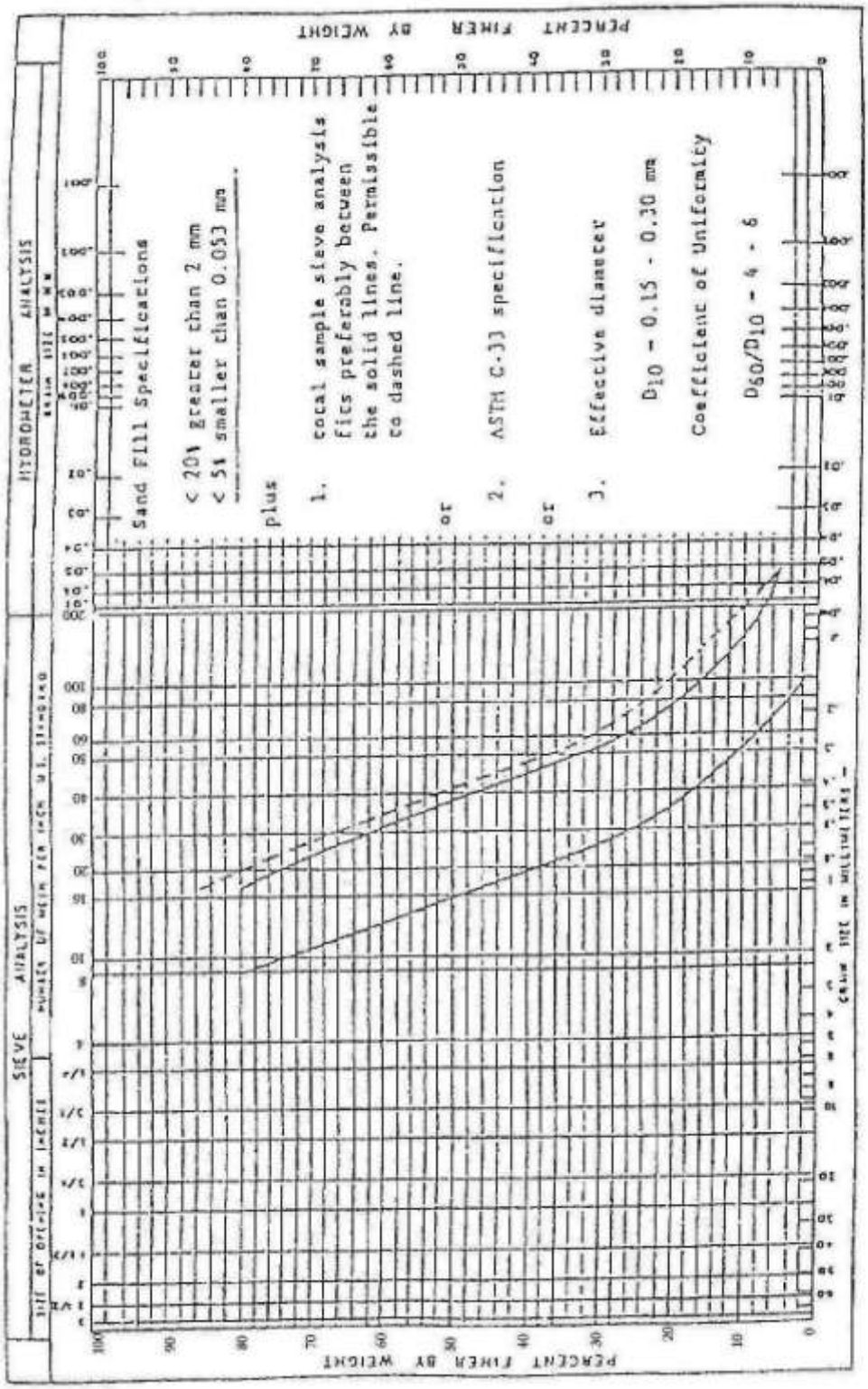


Mound System overlaying a shallow permeable soil lens over a semi-permeable soil layer. Estimated Linear Loading Rate = 5 to 6 gal/day/LF



Mound System overlaying a shallow permeable soil lens over an impermeable soil layer. Estimated Linear Loading Rate = 3 to 4 gal/day/LF

Figure 4: Sand Specifications for Mound Systems.



A guideline for the selection of the sand fill for Wisconsin mounds. The local sample sieve analysis contains 20% or less material larger than 2.0 mm and contains 5% or less material finer than 0.053 mm plus one of three additional specifications listed in figure. The fraction greater than 2 mm can have stones, and cobbles

(D) Soil Cover

(i) Texture and structure of the soil cover shall be equal or better than the soil

existing at the site. The permeability range shall be between 10 - 60 mpi. Use of manufactured soil or high clay content soils that do not allow gas exchange to occur is prohibited.

(ii) The soil cover shall be mounded to a height of twelve (12”) inches above the distribution bed, with a peak of eighteen (18”) inches at the center of the mound. The soil cover shall extend beyond the mound a minimum of four (4’) feet beyond the uphill side and longitudinal ends of the distribution bed, and on the downhill side, a minimum of:

4’	on slopes from	0 – 2%
6’	on slopes from	>2 – 4%
8’	on slopes from	>4 – 6%
10’	on slopes from	>6 – 8%
12’	on slopes from	>8 – 12 ½ %

(E) Dose Quantities

Small, frequent doses not exceeding 10% of the projected daily flow being discharged from the orifices used per dose after charging the manifold and laterals is recommended. A timer may be utilized to meet this. The maximum dose volume allowed shall not exceed 20% of the potential daily flow being discharged from the orifices during the dose cycle after charging the manifold and laterals. Devices that will utilize the disposal trenches of a field in an alternating series may be approved to achieve low flow volumes while disposing of the required daily volume, provided that the application rate per day is not exceeded in any one location.

(3) Sizing the mound system (refer to Figures 5 and 6).

(A) Effective absorption area of gravel required shall equal the projected sewage flow from the building divided by the infiltration rate of the gravel.

(B) Taking the linear loading rate and dividing it by the infiltration rate of the gravel shall determine effective width of the gravel bed.

(C) Taking the effective absorption area of gravel required and dividing it by the width of the gravel bed shall determine the effective length of the gravel bed.

(D) Uphill fill depth of sand shall be one (1’) foot.

(E) Downhill fill depth of sand shall be the uphill fill depth added to the gravel bed width multiplied by the slope, i.e.: uphill fill + (%slope)(gravel bed width).

(F) Vertical depth of gravel bed is as indicated in section 6.4-89.1(c)(2)(c)4(c).

(G) Down slope width is the sum of the downhill fill depth plus the vertical depth of

the gravel plus one, multiplied by three, multiplied by the down slope correction factor of Table 8, i.e.: {(e)+(f)+1}(3)(down slope correction factor)

(H) Upslope width is the sum of uphill fill depth plus the vertical depth of the gravel plus one, multiplied by three, multiplied by the up slope correction factor, i.e.: {(d)+(f)+1}}(3)(up slope correction factor).

(I) End width is the sum of the average of uphill and downhill sand fill depth plus the vertical depth of the gravel plus one multiplied by three, i.e.: [{(d)+(e)}/2 +(f) + (i)](3).

(J) Required sand basal area is the projected daily flow from the building divided by the infiltration capacity of the soil.

(K) Available sand basal area shall be greater than the required sand basal area. Available sand basal area is

(i) On flat ground: the length of the gravel bed multiplied by the total width of the sand bed.

(ii) On sloped ground: the length of the gravel bed multiplied by the sum of the width of the gravel plus the down slope width, i.e. (c){(b)+(g)}.

(M) If sufficient area is not available, then the down slope width or gravel bed length shall be increased.

Table 8: Slope Correction Factor for Mound System Calculations

Slope %	**Down slope Correction Factor**	**Up slope Correction Factor**
0	1.00	1.00
2	1.06	0.94
4	1.14	0.89
6	1.22	0.86
8	1.32	0.80
10	1.44	0.77
12 ½	1.57	0.73

(4) Construction requirements for a mound system

(A) The use of wheeled vehicles is prohibited for the purpose of ripping or chisel plowing, driving on areas that have been ripped or chisel plowed, driving on the sand fill, placing or moving the soil cover, or anytime the soil conditions are wet, moist, or saturated.

(B) Surface vegetation shall be mowed to native ground and the clippings removed.

(C) Construction staking or marking shall be provided of all components of the

system prior to construction. The Environmental Health Services Division shall conduct a verification inspection of the construction staking or marking to confirm that the system will be constructed as designed.

(D) The soil surface shall be ripped or chisel plowed to a depth of eight (8”) inches to ten (10”) inches, with rippers set eight (8”) inches to ten (10”) inches apart. Initial ripping shall be performed in a path parallel to the contours of the land, and only within the limits of the sand base. The interface of the native soil and the mound soil shall be ripped after all the sand has been placed and just prior to mound cover placement. No traffic is permitted on any ripped surface until after the sand or soil cover has been placed.

(E) The sand fill shall be uniformly placed and compressed by track rolling to a neat line and to a grade of 3:1, with a horizontal tolerance not exceeding one quarter (1/4’) foot horizontally.

(F) Temporary form boards required for placement of material shall be removed prior to placement of cover.

(G) Distribution to and through all laterals shall be balanced so all laterals and orifices receive an equal volume. The difference in head between any two lines, and the beginning and end orifice of the same line shall not exceed ten percent.

(H) Finished grade of the mound shall be established by track rolling and grooming by hand. Soil cover shall be conditioned with sufficient moisture to allow track rolling to a firm cohesive surface. All drainage work and erosion control shall be completed prior to final construction inspection. The soil cover shall be landscaped or seeded.

(I) The following minimum inspections prior to commencing construction or covering any elements of the system shall be required. Joint inspection by the designer, contractor, and Environmental Health Services Division may be required. All meetings shall be scheduled with the Solano County Environmental Health Services Division at least 48 hours in advance and shall occur during normal business hours:

(i) Pre-construction inspection where the following items shall be verified:

(aa) Imminent weather conditions are such that they will not create unsuitable soil conditions during construction.

(bb) Soil moisture in the area of the proposed mound system is not so high as to cause smearing or compaction as a result of construction activities.

(cc) Layout and staking or marking of all components of the mound system.
The source of soil fill material shall be designated and a sample made available.

(ii) Sand Placement: Ripping of the soil, sand quality, placement, and depth.

(iii) Gravel placement and Hydraulic Test:

(aa) Function and setting of all control devices.

(bb) Squirt test of system.

(cc) Depth of gravel.

(dd) Water tightness of septic tank and dosing tank.

(iv) Final Inspection:

(aa) Depth and texture of final soil cover is verified. All construction elements are in general conformance with the approved plans and specifications. All performance wells are installed and erosion control has been completed.

(bb) A letter from the designer that the Mound system has been installed and is operating in conformance with the design specifications must be provided.

(5) Performance wells

(A) Performance well construction shall be in conformance with section 6.4-89(l)1.

(B) A minimum of eight (8) performance wells shall be installed. Two (2) performance wells shall be installed in the gravel bed extending to the sand bed during construction of the distribution bed. Two performance wells shall be placed at the toe of the sand bed. Two (2) performance wells shall be placed twenty-five (25') feet down gradient from the sand bed, and two (2) performance wells shall be placed ten (10') feet up gradient from the sand bed.

(d) Sand Filter Systems

(1) Sand filters receive septic tank effluent under pressure. There are currently two approved types of sand filter systems. They are:

(A) Intermittent Sand Filter System (ISF). Wastewater passes through the filter once to achieve the total and fecal coliform reductions.

(B) Recirculating Sand Filter System (RSF). In addition to reducing the coliform content of the wastewater, the RSF also reduces the nitrate content of the wastewater. Wastewater is recirculated up to four (4) times through the RSF to achieve the reduction of the total and fecal coliforms and nitrate contents. Each time the wastewater is circulated through the RSF, 75 to 80 percent is recirculated through the unit and 20 to 25 percent of the wastewater exits the unit.

(2) The components of a Sand Filter are a containment pit or structure with a waterproof liner, distribution piping, gravel, sand, collection drain system, and a pump.

(3) A Sand Filter is used prior to disposal of effluent into a Pressure Distribution system, At-Grade system, Mound system or other alternative system requiring pretreatment of effluent prior to disposal. Refer to the appropriate sections of these standards for these specific methods of sewage disposal.

(4) A Sand Filter is an approved pretreatment device if built according to these standards. The minimum effective soil depth below an At-Grade, Pressure Distribution, or Mound system preceded by a sand filter is twenty-four (24”) inches. No further reduction in setback from a limiting condition is granted for use of a sand filter with a Mound system. Increasing the sand depth of a sand filter beyond two (2’) feet does not allow a decrease in the required depth of the minimum effective soil above a limiting condition.

(5) Placement of a sand filter shall comply with all setbacks established in these standards for the placement of septic tanks.

(6) Sand Filter Design Criteria

(A) Containment Pit or Structure

(i) A pit shall be dug into the ground for installation of the sand filter.

(ii) The pit shall have walls constructed of at least pressure treated or redwood heart grade materials of at least ½” thickness. All fasteners shall be flush, counter sunk or recessed.

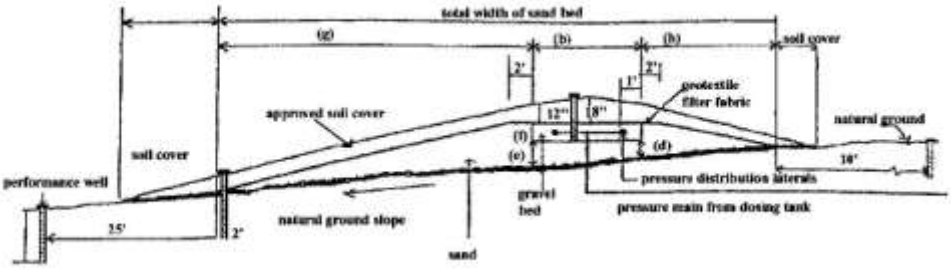
(iii) The walls shall be constructed so that the top is at least six (6”) inches above natural grade.

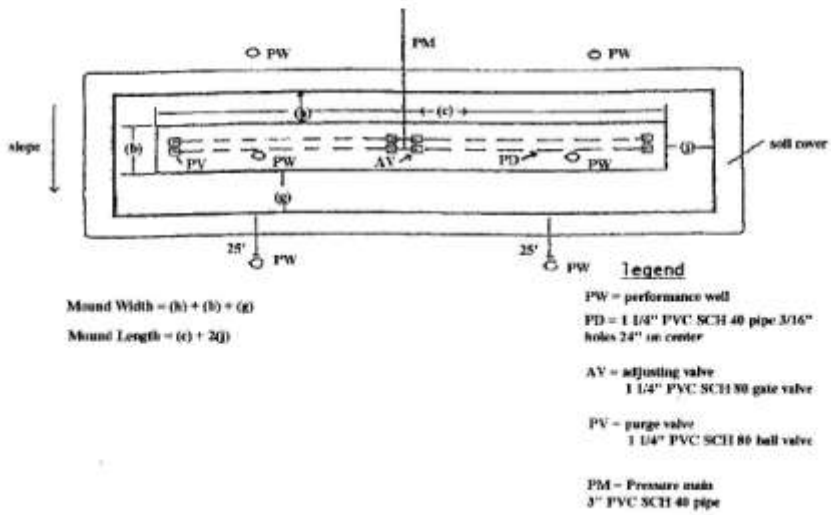
(iv) A geotextile fabric in a thickness appropriate to protect the liner shall be placed over all wood surfaces.

(v) The bottom of the pit must have a bedding layer of sand installed. The sand must be graded to provide a slope from the outer edges towards the point of the under drain system.

(vi) At least a 30 mil PVC liner shall be installed. All seams of the liner must be factory heat or solvent welded. Factory fabricated boots must be used where any plumbing lines pass through the liner. The boots must extend into the liner and be watertight. The liner must be large enough to cover the bottom and extend up the sides of the support structure with enough excess to allow the liner to be firmly anchored.

Figure 5: Plan and profile view of Mound System





(vii) The liner must be covered with adequate sand to bed the liner and protect it from puncture.

(B) Filter Bed Sizing

(i) Loading rate shall not exceed 1.2 gallons /day/square foot for an intermittent sand filter and 4 gallons/sq.ft./day for a recirculating sand filter.

(ii) The surface area required for the filter bed shall be determined by dividing the wastewater flow by the loading rate.

(C) Depth of sand shall be a minimum of twenty-four (24”) inches. Unless approved

otherwise by the Environmental Health Services Division, sand specifications in intermittent sand filters shall comply with the following:

Sieve Size	Percent Passing
# 3/8	100
# 4	95-100
# 8	80-100
# 16	45-85
# 30	15-60
# 50	3-10
# 100	0-2
# 200	0-1

Effective size and uniformity:
D_{10} = 1.5 – 2.5mm
Cu = 1 - 4

and sand specifications for a recirculating sand filter shall comply to the following:

Sieve Size	Percent Passing
3/8	100
# 4	70-100
# 8	5-78
# 16	0-4
# 30	0-2
# 50	0-1
# 100	0-1
#200	0-1

Effective size and uniformity:
D_{10} = 1.5 – 2.5mm
U_c = 1-3

The sand shall be analyzed by wet-sieve analysis using ASTM method C-117 or equivalent. Prior to placement of the sand, the Environmental Health Services Division must be provided with a copy of the sieve analysis, certified as to conformance with the standards by the consultant.

(D) Small, frequent doses not exceeding 10% of the projected daily flow being discharged from the orifices used per dose after charging the manifold and laterals is recommended. A timer may be utilized to meet this. The maximum dose volume allowed shall not exceed 20% of the potential daily flow being discharged from the orifices during the dose cycle after charging the manifold and laterals. Devices that will utilize the disposal trenches of a field in an alternating series may be approved to achieve low flow volumes while disposing of the required daily volume, provided that the application rate per day is not exceeded in any one location.

(E) The distribution piping shall comply with the requirements listed in Section 6.4-89.1(a)(4)(d) for Pressure Distribution piping.

(F) Slotted under drain pipe must be at least four (4”) inch diameter PVC collection pipe. The under drain pipe must be properly positioned within the lower gravel layer.

(G) Pressure distribution must be used from the sand filter to the disposal field. Effluent from the sand filter may gravity flow into a separate dosing tank, or into a pump chamber located within the sand filter.

(7) Performance wells shall be required in the sand filter. At least two wells shall be provided. One well shall extend to the bottom of the sand layer, the other to the top.

(8) The following minimum inspections prior to commencing construction or covering any elements of the system shall be required. Joint inspection by the designer, contractor, and Environmental Health Services Division may be required. All meetings shall be scheduled with the Solano County Environmental Health Services Division at least 48 hours in advance and shall occur during normal business hours:

(A) Pre-construction inspection where the construction staking or marking of the sand filter is provided and construction procedures are discussed.

(B) Sand Placement and quality.

(C) Hydraulic Test:

(i) Function and setting of all control devices.

(ii) Squirt test of system.

(iii) Water tightness of septic tank and dosing tank.

(D) Final Inspection

(i) All construction elements are in general conformance with the approved plans and specifications. All performance wells are installed and erosion control has been completed.

(ii) A letter from the designer that the Sand Filter system has been installed and is operating in conformance with the design specifications must be provided.

(e) Aerobic Treatment Unit (ATU)

(1) ATUs provide biological reduction of wastewater strength through pretreatment prior to disposal of sewage into a Pressure Distribution, At-Grade, Mound, or other

alternative system. They typically use fixed or suspended films that support biological growth, and air blowers.

(2) Construction Requirements

(A) The ATU shall be listed by 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. The ATU shall be manufactured and installed in accordance with the design specifications used to determine compliance to NSF Standard 40.

(B) All tanks housing an ATU shall be structurally sound, water tight and capable of withstanding 1,000 pounds of weight.

(C) The designer and installer shall follow the manufacturer's design, installation, construction, and operations procedure.

(D) The applicant must demonstrate that a written maintenance contract has been obtained for the proposed ATU to assure satisfactory post construction operation and maintenance. A maintenance agreement must be maintained valid for the life of the ATU.

(E) The ATU shall be preceded by a septic tank unless it can be demonstrated that such a requirement will adversely affect the performance of the ATU.

(3) The following minimum inspections prior to commencing construction or covering any elements of the system shall be required. Joint inspection by the designer, contractor, and Environmental Health Services Division may be required. All meetings shall be scheduled with the Solano County Environmental Health Services Division at least 48 hours in advance and shall occur during normal business hours:

(A) Pre-construction inspection where the construction staking or marking of the ATU is in place and installation procedures is discussed.

(B) Test of the ATU:

(1) Function and setting of all control devices and alarms.

(2) Water tightness of septic tank, ATU, and any dosing tank.

(C) Final Inspection

(i) A letter from the designer that the ATU system has been installed and is operating in conformance with the design specifications shall be provided.

(ii) A valid, signed maintenance agreement between the applicant/property owner

and service provider must be provided.

(Ord. No. 1609, §18; Ord. No. 1655, §§36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47)