

Subchapter 5 – Technical Standards for Wastewater Disposal Systems and Potable Water Supplies

§1-501 Applicability and General Requirements

- (a) This Subchapter applies to all soil-based disposal systems with a design flow of less than 6500 gallons per day and sewerage connections of any size. Soil-based disposal systems with design flows of 6500 gallons per day or more may also require permits under the Vermont Indirect Discharge Rules.
- (b) This Subchapter applies to design flows for all potable water supplies that are not public water supplies. All the other requirements related to potable water supplies, such as standards for construction and location, are contained in the Vermont Water Supply Rules.
- (c) New projects and projects with increases in design flow must be designed and constructed in accord with these rules. A fully complying primary and replacement area shall be identified, except as otherwise provided in these rules. Replacement systems shall be constructed in accord with these rules, but are eligible for variances as provided in §1-308 of these rules.
- (d) A soil-based disposal system(s) may be located on the lot to be improved or on other land to which the lot owner has permanent legal access. Proof of permanent legal access will be required prior to issuance of any permit.
- (e) When reviewing projects under these rules, the Secretary shall review not only the project itself but also all potable water supplies and wastewater systems, in existence or permitted at the time the permit application for the project is deemed complete, that are potentially affected by the proposed project. This review shall, at a minimum, assure that the project will not adversely affect such potable water supplies and/or wastewater systems and shall assure that the project does not eliminate potential replacement areas for potable water supplies and wastewater systems located on the same lot as the one on which the proposed project is located.
- (f) Wastewater systems regulated by this Subchapter may be subject to provisions from several sections and appendixes. Applicants, installers, and particularly designers are encouraged to become familiar with the entire subchapter and the appendixes as there are general requirements, such as isolation distances, that apply to all systems and specific requirements, such as those for mound wastewater disposal systems, that apply to only certain types of systems.

§1-502 Minimum Site Conditions

- (a) No site may be improved by the construction of wastewater system unless the site meets one of the following three sets of requirements regarding the minimum requirements for the site. Please note that these are only the requirements for the site and that requirements related to any specific type of leachfield must also be met. Also note that if a site meets these minimum requirements, non-naturally occurring soils may be used in certain types of wastewater system designs in order to meet the requirements for separation distance to bedrock or the seasonal high water table.

- (b) Prescriptive Approach
 - (1) Sites that meet the following requirements can be improved using a prescriptive approach.
 - (A) There shall be at least 24” of naturally occurring soil with a percolation rate of 120 min/inch or less over bedrock.
 - (B) There shall be at least 24” of naturally occurring soil with a percolation rate of 120 min/inch or less above the seasonal high water table.
 - (C) The maximum ground slope shall not exceed 30% for wastewater systems on subdivided lots in existence before June 14, 2002. The maximum ground slope shall not exceed 20% for wastewater systems on lots that are subdivided on or after June 14, 2002. The maximum ground slope shall not exceed 30% for replacement wastewater systems no matter when the lot was created.

- (c) Enhanced Prescriptive Approach
 - (1) Sites that meet the following requirements can be improved using the enhanced prescriptive approach.
 - (A) There shall be at least 18” of naturally occurring soil with a percolation rate of 120 min/inch or less over bedrock.
 - (B) The site must have at least 12”, or the thickness of the “A” soil horizon plus 4”, whichever is greater, of naturally occurring soil above the seasonal high water table. Sites with less than 18” of naturally occurring soil above the seasonal high water table must lower the water table as described below:
 - (i) A site may be approved without pre-testing of the drain when a designer prepares a plan incorporating drainage of the site and asserts that the drainage will lower the seasonal high water table to provide at least 18” of permeable soil below the

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surface of the naturally occurring soil, and the Secretary agrees with the designer's assertion; or

(ii) if the Secretary does not agree, the designer may demonstrate through construction of a drainage system and the performance of groundwater monitoring in accordance with §1-506 below, that the seasonal high water table is lowered to at least 18" below the surface of the naturally occurring soil.

(C) The ground slope is at least 3% but does not exceed either 30% (for wastewater systems on subdivided lots in existence before June 14, 2002 and replacement systems on lots created at any point in time) or 20% (for wastewater systems on lots that are subdivided on or after June 14, 2002).

(D) The linear loading rate is not more than 2 gal/day/ft.

(E) The approvable site conditions must continue at least 25' downhill from the system or the toe of any fill used as part of a system.

(d) Performance Based Approach

(1) Sites that meet the following requirements may be improved using the performance-based approach.

(A) There shall be at least 18" of naturally occurring soil above bedrock.

(B) Sites that do not meet the above requirements for prescriptive designs or enhanced prescriptive designs for depth to seasonal high water table may demonstrate compliance with the rules, based on a detailed and site specific analysis. The analysis must demonstrate that the system will function during all portions of the year while maintaining at least 6" of naturally occurring unsaturated soil above the calculated level of the effluent plume. The analysis may be based on site specific hydraulic conductivity testing or on a desktop hydrogeologic analysis. All desktop hydrogeologic analyses shall be based on conservative assumptions. The level of information required in order to determine compliance with the rules will be related to site specific conditions with more "limited" sites requiring more detailed information.

(C) The maximum ground slope shall not exceed 20% for wastewater systems that are on lots subdivided on or after June 14, 2002. For systems built on other lots, including replacement systems, the

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maximum ground slope shall not exceed 30%, unless the Secretary has granted a specific approval to exceed 30%.

- (D) A site specific approval to construct a wastewater system on a subdivided lot in existence before June 14, 2002 with a ground slope exceeding 30% in the area of the wastewater system may be granted by the Secretary upon a request from a designer that:
 - (i) provides specific instructions on the method of construction;
 - (ii) Explains how the stability of the site will be maintained during and after construction with specific attention to erosion control; and
 - (iii) Provides site-specific guidance as needed for safe construction.

(e) Erosion control

An erosion control plan shall be submitted with each application involving construction of a wastewater system when the ground slope exceeds 20%. The plan shall address site stability in the area of the wastewater system before, during, and after construction. The plan shall include specifications for construction, surface water diversions if needed, and re-vegetation to prevent soil erosion.

(f) Restrictions

- (1) Notwithstanding the requirements of any other subsection of this section, until July 1, 2007 the enhanced prescriptive and performance based approaches may not be used for wastewater systems on lots that are subdivided on or after June 14, 2002, unless the project is located in a municipality that has:
 - (A) a planning process confirmed under 24 V.S.A. §4350; and
 - (B) zoning bylaws.
- (2) The enhanced prescriptive and performance based approaches may be used for wastewater systems on lots created after June 13, 2002 but before November 1, 2002 that are ten acres or greater in size without meeting the planning and zoning prerequisites listed above.
- (3) The Agency of Commerce and Community Development shall maintain a list of all municipalities that meet the criteria of subdivision (f)(1) of this section. Once a municipality has been listed, it shall only be removed from the list if it has repealed its zoning bylaws or the bylaws have otherwise become invalid.

§1-503 Isolation Distances

(a) All wastewater systems that are permitted under this Subchapter shall be designed so that they meet the following isolation distances:

Minimum Isolation Distances	Horizontal Distance (feet)		
	Leachfield	Septic Tank	Sewer
Drilled well	(b)	50	50
Gravel pack well, shallow well or spring	(b)	75	75
Lakes, ponds, and impoundments	50	25	25
River, streams	50	25	10
Drainage swales, roadway ditches	25	--	--
Main or municipal water lines	50	50	(d)
Service water lines	25	25	(d)
Roadways, driveways, parking lots	10	5	(c)
Top of embankment, or slope greater than 30%	25	10	--
Property line	25 ¹	10	10
Trees	10	10	10
Other disposal field or replacement area	10 ²	--	--
Foundation, footing drains, curtain drains	35 ³	10	--
Public Community Water Supply (e)	(f)	(f)	(f)
Suction water line	100	50	50

These distances may be reduced when evident that the distance is unnecessary to protect an item or increased if necessary to provide adequate protection.

Note: See footnotes and criteria on the following page.

§1-503 Isolation Distances

Footnotes (General Criteria Regarding Isolation Distances)

- (a) Isolation distances apply regardless of property line location and ownership.
- (b) Separation between potable water supplies and leachfields shall be determined by the methods in the Vermont Water Supply Rule, Appendix 21-A, Part 11, §11.4.
- (c) Sewers under roads, driveways, or parking lots may require protective conduits or sleeves.
- (d) Separation of pressure water lines considered as "service connections" and sewer lines shall adhere to the Vermont Plumbing Rules. Separation of pressure water lines (considered to be part of a public water system as defined by the Vermont Water Supply Rule) and sewer lines shall adhere to the requirements of the Vermont Water Supply Rule.
- (e) This refers to Public Community Water Systems, as defined in the Vermont Water Supply Rule.
- (f) Contact the Department of Environmental Conservation's Water Supply Division, 103 South Main Street, Waterbury, Vermont for isolation distances relative to a public community water supply.

Footnotes (Specific Criteria for Isolation Distances)

- 1. For mound wastewater disposal systems, the limit of mound fill must be 25 feet from any downhill property line and 10 feet from all property lines on the side or uphill.
- 2. No leachfield or replacement area shall be closer than 10 feet to one another, except as allowed for absorption trench systems in § 1-511(m).
- 3. If a curtain or foundation drain is downslope of the leachfield, the leachfield cannot be closer than 75 feet to the drain. If the curtain or foundation drain is upslope of the leachfield, it shall be 35' if possible, and a minimum of 20 feet to the leachfield. These distances may be reduced if the designer provides adequate data and analysis to show that effluent from the soil-based disposal system will not enter the drain or the distance may be increased if effluent will enter the drain.

§1-504 Design Flow

- (a) Wastewater design flows shall be determined based on Table 1 (pages 71-77). Directions for calculating reductions in design flow based on plumbing fixture type and connection to large wastewater disposal systems are included in the Table. Potable water supply design flows are determined per Subsection 1-504(g) below. It may be possible to add more residential or camping units to an existing potable water supply and/or wastewater system when the supply and/or system conform to design requirements of these rules.
- (b) When determining the flows for a particular project, the Secretary may determine that there is sufficient justification for requiring higher or lower flow values. When making this determination, the Secretary shall consider: the nature and design of the project; whether multiple units will be interconnected; past experience on existing projects; metered flows; the design safety factor allowances in Table 1 figures; and potential for fluctuations in flows.
- (c) Flow metering used to support a request for an increase in the amount or type of uses for an existing project, or to support new projects, will require at least six months of daily meter readings. The metering period shall include the peak use periods if there is a seasonal variation, such as for a campground or ski area. The strength of the wastewater must also be determined when needed to size the leachfield or any treatment devices, or to determine any adjustments in leachfield loading rates that may be required. Any decision to adjust design flows based on flow metering must consider data concerning peak flow and long term effects on the wastewater system.
- (d) For projects without a specific design flow in Table 1, such as food processing plants, the Secretary will determine a design flow for the specific project. The Secretary's determination will be based on available information related to the equipment and from metering information from similar projects that is submitted by a designer or that is available from other sources. The strength of the wastewater must also be determined when needed to size the leachfield or any treatment devices, or to determine any adjustments in leachfield loading rates that may be required.
- (e) When collection and building sewers exceed 500 feet in total length, the design flow shall include an allowance for infiltration. New collection systems shall be estimated at 300 gallons/inch of diameter/mile of pipe/day, except when a designer provides project specific information that supports a reduction to not less than 200 gallons/inch of diameter/mile of pipe per day. When a reduction is granted, the acceptable level of leakage for the post construction leakage testing must also be proportionately reduced.

§1-504 Design Flow

- (f) For potable water supplies that are not public water supplies, design flows shall be determined using this section of the rules. For potable water supplies that are public water supplies, design flow shall be determined in accord with Section 2.2 and Table A2-1 of the Vermont Water Supply Rules. The design flow for a potable water supply may be different than wastewater design flows if the potable water supply is a public water supply. Note: In the event of a conflict between these rules and the Water Supply Rules, these rules shall govern if the potable water supply is not a public water supply.

Table 1

<p>Design Flow for Residential Units</p> <p>(a) The design flow for single family residential units shall be calculated on the following requirements:</p> <ul style="list-style-type: none">(1) The design flow for each person shall be 70 gallons per person per day;(2) the first three bedrooms shall be assumed to have two persons per bedroom;(3) each additional bedroom may be assumed to have one person per bedroom. When a building will be subject to rental use or when it is likely there will be extended or frequent high occupancy use, the system should be sized for at least 2 persons per bedroom; and(4) the design flow for a single-family residence on its own individual lot shall be based on a minimum of three bedrooms.
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Note: Table 1 continues on the next page

- (b) When five or more single family residential units are connected to a single soil-based disposal system, a designer may choose to use the following design flows that are based only on the number of residential units without regard for the number of bedrooms:

Number of Single Family Units	Project Design Flow
5 units	1575 gallons per day
6 units	1830 gallons per day
7 units	2065 gallons per day
8 units	2280 gallons per day
9 units	2565 gallons per day
10 units	2800 gallons per day
11 units	3036 gallons per day
12 units	3264 gallons per day
13 units	3484 gallons per day
14 units	3696 gallons per day
15 units	3900 gallons per day
16 units	4112 gallons per day
17 units	4369 gallons per day
18 units	4518 gallons per day
19 units	4712 gallons per day
20 units	4900 gallons per day
20+ units	# of units X 245 gallons per day

Note: Single family residential units with only one bedroom, such as condominiums and apartment buildings will not benefit from the use of the design flows listed above. Single family residential units, with two bedrooms each, will benefit from use of the table when 11 or more units are connected to a single soil-based disposal system.

Note: Wastewater disposal systems with a design capacity of 6500 GPD or more may also require an Indirect Discharge Permit.

- (c) Single family residential units connected to a wastewater disposal system with a design capacity of at least 50,000 gallons per day may use a design flow of 210 gallons per unit per day, regardless of the number of bedrooms.

§1-504

Design Flow

Table 1 continued

Campgrounds (also see camps)	Open 7 mo/yr Or Less	Open more than 7 mo/yr
Campgrounds that allow only tents and camping units with no interior plumbing Central toilets and showers 4 people per site	75 gpd/site	100 gpd/site
Campgrounds that allow only tents and camping units with no interior plumbing Central toilets without showers 4 people per site	60 gpd/site	75 gpd/site
Campground sites that allow camping units with interior plumbing Served by central toilet facilities and dumping stations Served by an individual sewer hook-up	50 gpd/site for central facilities plus 25 gpd/site for the dumping station 75 gpd/site	90 gpd/site for central facilities plus 35 gpd/site for the dumping station 125 gpd/site
Seasonal RV site with individual sewer hook-up RV owned by the occupant RV not owned by the occupant	75 gpd/site 125 gpd/site	125 gpd/site 175 gpd/site
Cabins with RV type plumbing 4 people per site	125 gpd/site	175 gpd/site
Cabins with conventional plumbing Minimum of 4 people per site With or without kitchen With or without kitchen but with laundry facilities	50 gpd/person 70 gpd/person	50 gpd/person 70 gpd/person

§1-504 Design Flow Table 1 continued

Campgrounds	Open 7 mo/yr Or Less	Open more than 7 mo/yr
Park Model RV		
For first bedroom	140 gpd/site	140 gpd/site
For additional bedrooms	100 gpd/site	140 gpd/site
Mobile home used as vacation facilities		
For first bedroom	140 gpd/site	140 gpd/site
For additional bedrooms	100 gpd/site	140 gpd/site

Table 1 continued

<u>OTHER ESTABLISHMENTS</u>	<u>GALLONS/PERSON/DAY^{a,b}</u> (unless otherwise noted)
Assembly Areas, Conference Room	5
Airports (per passenger)	5
Bathhouses and Swimming Pools	5
Bowling Alley (no food service)(per lane)	75
Cafeterias (per seat)	50
Camps: Construction camps (semi-permanent)	50
Day camps (no meals served)	15
Resort Camps (Night & Day) with limited plumbing ...	50
Churches: Sanctuary seating x 25%	5
Church suppers	8
Country Clubs (per resident member)	100
Country Clubs (per non-resident member present)	25

§1-504 Design Flow Table 1 - continued

<u>GALLONS/PERSON/DAY^{a,b}</u>		
Day Care Centers:		unless otherwise noted
Without meals:		15
With one meal:		20
With two meals:		25
Dentists:		
Staff Member		35
Per Chair		200
Doctor's Office:		
Staff Member		35
Patient.....		10
Room Rentals:		
Boarding Houses		50
Addition for non-resident boarders		10
Rooming Houses (per occupant bed space)		40
Factories (gallons per person, per shift, exclusive of industrial waste).....		15
Gyms:		
Per Participant.....		10
Spectator		3
Hairdressers:		
Operator		10
Per Chair		150
Hospitals (per bed space)		250
Hotels with Private Baths(per person sleeping space) ^c		50
Institutions other than hospitals (per bed).....		125
Laundries, self service (gallons per machine)		500

§1-504 Design Flow Table 1 - continued

	<u>GALLONS/PERSON/DAY^{a,b}</u>
Mobile Home Parks:	
For wastewater systems serving 4 or fewer trailers (per space)	450
For wastewater systems serving 5 or more trailers (per space)	250
Motels with bath, toilet (per person sleeping space) ^c	50
Picnic Parks (toilet wastes only/picnicker)	5
Restaurants (toilet and kitchen wastes/seat, including restaurant and bar seats)	30
Additional per seat for restaurant serving 3 meals per day	15
Restaurants (fast food - see cafeterias).....	50
Schools:	
Boarding	100
Day, without gyms, cafeterias, or showers	15
Day, with gyms, cafeterias, and showers	25
Day, with cafeteria, but without gyms or showers ...	20
Service Stations (first set of gas pumps)	500
(each set thereafter)	300
Sewer Line Infiltration (where applicable) 300 gal/in pipe/dia/mile/day	
Shopping Centers/Stores: ^c	
Large Dry Goods	5 GPD/100 ft ²
Large Supermarkets with meat department without garbage grinder	7.5 GPD/100 ft ²
Large Supermarkets with meat department with garbage grinder	11 GPD/100 ft ²
Small Dry Good Stores (in shopping centers)	100 GPD/store
Theaters:	
Movie (per auditorium seat).....	5
Drive-in (per car space)	5

§1-504 Design Flow

Table 1 - continued

	<u>GALLONS/PERSON/DAY^{a,b}</u>
Veterinary Clinic (3 or less doctors):	
without animal boarding	750/clinic
with animal boarding	1,500/clinic
Workers:	
Construction (at semi-permanent camps)	50
Day at schools and offices (per shift)	15

Note: These rules change design flows for certain categories. It may be possible to add more residential or camping units to an existing potable water supply and/or wastewater system when the supply and/or system conform to current design requirements.

^a Use eighty (80) percent of design flows for projects to be connected to a wastewater system with a design capacity of 50,000 gallons per day or greater. Note that this design flow reduction applies only to the wastewater flow and DOES NOT apply to a project's associated potable water supply design flows if the water supply is regulated as a public transient, non-transient, or community water supply.

^b A 10% reduction in the design flow, except for single family residences and campgrounds, may be used when the plumbing includes standard water saving designs. Toilets must be 3.5 gallons per flush or less and showers and faucets must be 2 gallons per minute or less. This reduction does not apply to single family residences or campgrounds as those numbers have already been adjusted.

^c Does not include laundry or restaurant waste.

Elderly housing may be calculated at 1.5 people per bedroom

§1-505 Building Sewers, Sewage Collection Systems, and Lift Stations

Appendix 1-A contains guidelines that provide acceptable criteria for the design of these components. Other design standards may be used if approved by the Secretary.

§1-506 Soil and Site Evaluations

(a) General

A designer shall conduct a soil and site evaluation. The designer shall prepare a soil and site evaluation report including the necessary tests and investigations that may include soil excavation, percolation testing, site and terrain investigation, groundwater levels, water supply investigations, and hydrogeologic investigations.

(b) Soil and Site Evaluations

A designer shall conduct soil excavations in locations chosen to accurately establish the soil conditions across the primary and replacement sewage disposal areas. The minimum number of excavations will be two for the primary and two for the replacement area unless a proposal to use fewer excavations is approved by the Secretary on a site specific basis. More excavations will be necessary to properly evaluate a site for systems with design flows greater than 600 gallons per day or when initial investigation identifies a highly varied soil condition. The Secretary will allow fewer excavations if the designer demonstrates that the soils are uniform. Primary and replacement areas shall be tested to a depth sufficient to demonstrate that, when installed, the proposed soil-based systems will meet the isolation distances to bedrock, seasonal high water table, and impervious soil. The Secretary may require additional investigations and excavations to be conducted within each proposed leachfield area to determine uniform suitability of soils or adequacy of depth over bedrock, impervious soils, and the seasonal high water table. Excavations shall be conducted prior to percolation tests to determine at what depth the percolation test shall be conducted. All soils information derived from excavations for the project shall be submitted including excavations that are not used as the basis of any particular wastewater disposal system design. See §1-302 of these rules for details of what must be submitted with a permit application.

- (1) The location of each excavation shall be individually identified and accurately shown on the site plan.

§1-506(b)(2) Soil and Site Evaluations

- (2) A soil profile description shall be written for each excavation. The thickness of the different soil horizons shall be indicated. Horizons shall be differentiated on the basis of color, texture, soil mottles, density, structure and bedrock. Depth shall be measured from the ground surface. The estimated elevation of the seasonal high water table shall be specified. Absence of a seasonal high water table shall also be specified. Soil mottles shall be described in accordance with Appendix 2-A.
- (3) Percolation tests shall be conducted in representative locations within the proposed leachfield areas using the procedures in Appendix 4-A. At least four percolation tests are required, with two in the primary area and two in the replacement area unless a lesser number is approved by the Secretary. The Secretary may require more tests for systems larger than 600 GPD, or when the soils downslope of the leachfield areas are in question.

§1-507 Groundwater Level Monitoring

- (a) Monitoring of the groundwater level may be used in lieu of a determination of the elevation of the seasonal high water table based on soil mottling. Once the elevation of the seasonal high water table is determined, the determination may be used for two purposes. The first is to determine if the site is suitable for wastewater disposal under the rules. If it is determined that the site is suitable, the second use of the information is to help decide what type of system may be used; an in-ground system, an at-grade system, or a mound system. All portions of the monitored area must comply with the rules. Testing must include the most limited portions of the monitored area.
- (b) Critical level determination of site suitability - Each monitoring program begins with a determination of the critical level. It must be determined that the seasonal high water table is at or below this level in order to meet the rules. A site to be used for wastewater disposal under the **prescriptive approach** must have at least 24" from the surface of the naturally occurring soil down to the seasonal high water table. A site using the **enhanced prescriptive approach** must have at least 18" from the surface of the naturally occurring soil down to the seasonal high water table. A site using the **performance-based approach** must first determine the amount of rise in the groundwater table that will occur when the effluent from the leachfield is added to the existing water table. This rise is called induced groundwater mounding. The critical level will be 6" plus the calculated induced groundwater mounding. For example, if the induced groundwater mounding in the water table is 8", the critical level will be 14" (based on 6" of unsaturated soil plus an 8" induced rise in the water table).

Groundwater Level Monitoring

Figure 5.1 Critical Levels for Site Suitability
Prescriptive and Enhanced Prescriptive Based Designs

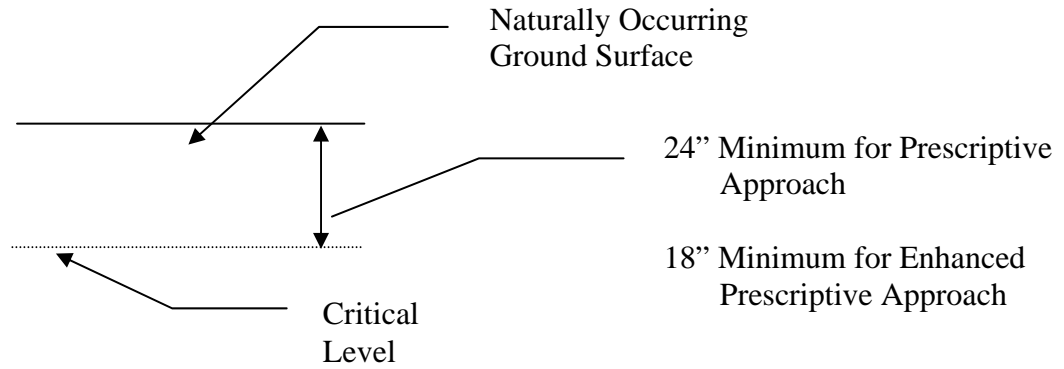
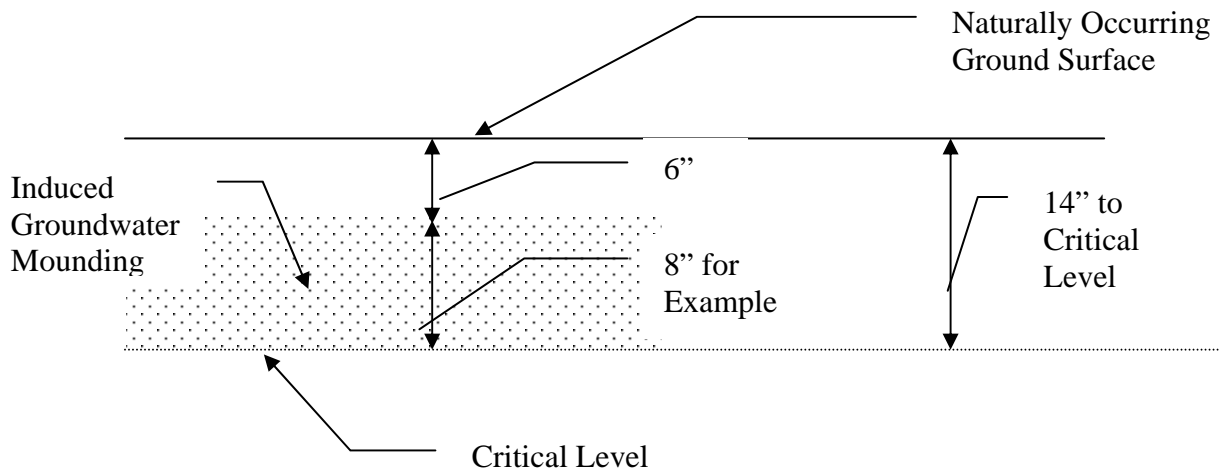


Figure 5.2 Critical Level for Site Suitability
Performance Based Designs

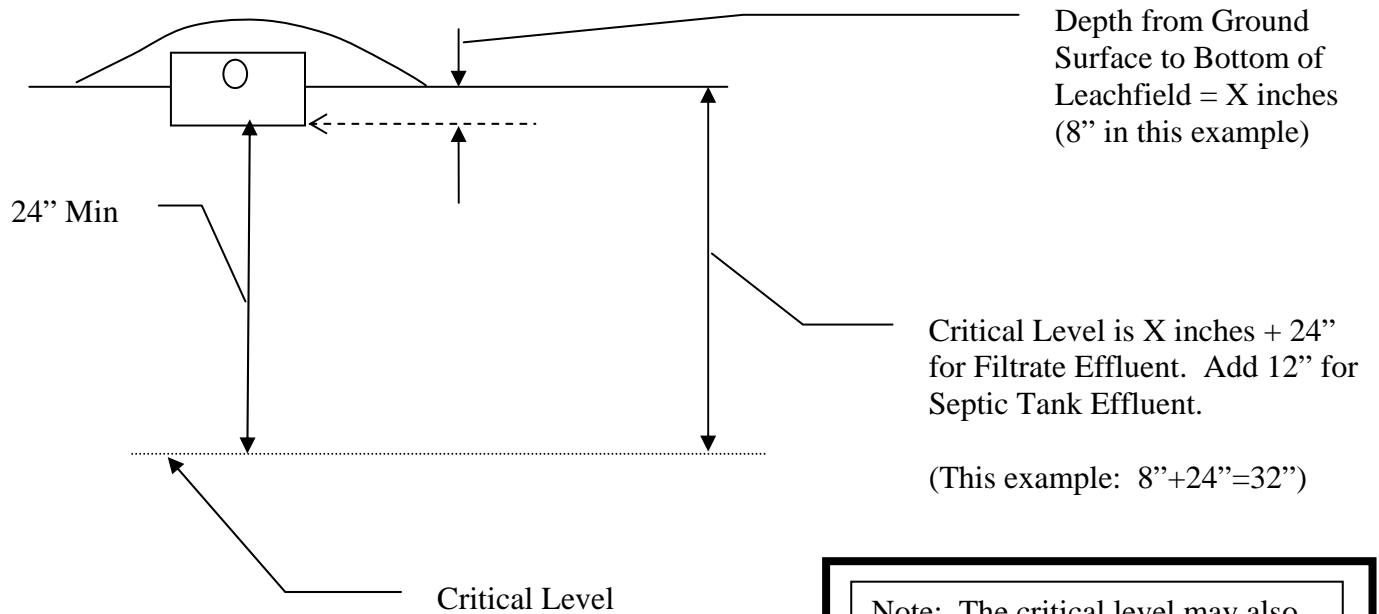


§1-507(c)

Groundwater Level Monitoring

- (c) While the critical levels noted in (b) are based on meeting minimum site standards, the question is sometimes whether an at-grade system can be used in lieu of a mound wastewater disposal system or an in-ground system in lieu of an at-grade system. For these cases, as shown in figure 5.3 below, the critical level will be 36” below the bottom of the leachfield for a system using septic tank effluent or 24” below the bottom of the leachfield when using filtrate effluent. As an example, if a shallow in-ground system using filtrate effluent with the bottom of the leachfield 8” below ground surface is proposed, the critical level will be $24”+8” = 32”$ below the ground surface.

Figure 5.3 Critical Level Based on Location of the Bottom of the Leachfield



Note: The critical level may also be affected by induced groundwater mounding. See §1-507(d) below.

§1-507(d) Groundwater Level Monitoring

(d) Induced groundwater mounding

- (1) Filtrate disposal systems with linear loading rates greater than 4.5 gallons/day/linear foot, and performance based systems, shall calculate the induced groundwater mounding under the leachfield. In addition to maintaining at least 2' of permeable soil between the bottom of the leachfield and the seasonal high groundwater table, the system shall maintain at least 18" between the bottom of the leachfield and the top of the induced groundwater mounding. If the induced groundwater mounding is more than 6" above the seasonal high water table level, the critical level will be more than 24" below the bottom of the leachfield. As an example, if the induced groundwater mounding is 8", the critical level will be 26" below the bottom of the leachfield (8"+18" = 26").
- (2) Mound wastewater disposal systems with design flows of greater than 1000 gallons/day and in-ground and at-grade systems with design flows greater than 2000 gallons/day shall calculate the induced groundwater mounding under the leachfield. The system shall maintain at least 36" of unsaturated soil between the bottom of the leachfield and the top of the induced groundwater mounding. As an example, if the induced groundwater mounding is 8" the critical level will be 44" below the bottom of the leachfield (8"+36" = 44").

(e) Monitoring Procedure

- (1) If a groundwater level monitoring program is proposed by a designer, or required by the Secretary, the Secretary shall be notified prior to beginning the monitoring program so that the Secretary may make periodic site inspections during the monitoring period. It is strongly suggested that a plan of study for the site be prepared by the designer and approved by the Secretary before any work begins to ensure that the results of the testing program will be acceptable. The designer should apply no later than February 1st to allow sufficient lead time for review and approval of a monitoring plan. Any proposal for monitoring groundwater levels must include a property access agreement so that Agency personnel may inspect the site during the monitoring period. Any groundwater monitoring program must consider drainage patterns, soil textures, relief watershed, monitor installation procedures, monitor locations, and monitoring schedule. A minimum of four monitor wells will be required for each area tested unless otherwise approved by the Secretary. Some sites will require more monitor wells to establish compliance with the site requirements.

§1-507(e)(2)

Groundwater Level Monitoring

- (2) Data collected from groundwater monitoring shall be evaluated against weather conditions over the period of measurement and data from other sites. In years with unusual seasonal groundwater patterns, actual monitoring data may not be representative of long-term seasonal high groundwater.
- (3) The monitoring period shall be from March 1 until May 31. Groundwater level readings shall be taken at least once every 7 days during the monitoring period. If the water level reaches or exceeds the critical level the readings shall be taken at least once every 4 days until the water level falls below the critical level. Each reading shall be considered to represent the water level existing for $\frac{1}{2}$ of the time since the previous reading plus $\frac{1}{2}$ of the time until the next reading. For example, if the readings were 7 days apart, each reading would represent the $3\frac{1}{2}$ days before and the $3\frac{1}{2}$ days after a particular reading.
- (4) The Secretary may consider information from a groundwater monitoring program that does not include the entire monitoring period. The results will be accepted only upon a conclusive demonstration by the designer that the results accurately represent the seasonal high water table during the monitoring period.
- (5) Each reading shall be recorded as the number of days represented, as described in (3) above. The groundwater monitoring program demonstrates that the critical level is maintained if:
 - (A) the groundwater level does not rise above the critical level for more than a total of 30 days during the monitoring period,
 - (B) the groundwater level does not rise more than 6" above the critical level for more than a total of 20 days during the monitoring period,
 - (C) the groundwater level does not rise more than 12" above the critical level for more than a total of 10 days during the monitoring period,
 - (D) the groundwater level never rises more than 18" above the critical level, and
 - (E) the seasonal high water table or, if calculated, the induced groundwater mounding, never rises to less than 6" from the naturally occurring ground surface and, if calculated, the induced groundwater mounding never rises to less than 6" below the bottom of a leachfield receiving filtrate effluent.

§1-507(f) Groundwater Level Monitoring

- (f) On some sites, due to low permeability soils, perched water tables may form in upper soil horizons. For the purpose of any wastewater system design under these rules, a perched water table is the seasonal high water table. The designer may analyze these in the same manner as any other type of groundwater table.

§1-508 Septic Tanks

- (a) All-soil based disposal systems, including graywater disposal systems, shall include a septic tank. The septic tanks shall be sized as noted below:

Minimum Sizes for Septic Tanks

<u>Design Flow, Gal/Day</u>	<u>Liquid Capacity Below the Invert of the Outlet *</u>
Less than 667 Gal/Day	1,000 gallons
667 - 1500 Gal/Gay	1.5 times design flow
1,500 – 6500 Gal/Day	1,125 + 75% of design flow

* Unless a smaller tank can be justified by the designer.
Note: When an internal pump is installed within the septic tank, the capacity of the tank must be increased to allow for the dose volume and any emergency storage capacity that will be provided within the septic tank.

- (b) Use of garbage grinders is strongly discouraged. The septic tank capacity shall be increased by a minimum of 25% if a garbage grinder is used.
- (c) All septic tanks shall be installed with access risers to grade. Covers must be tight fitting and must be designed to prevent entry by children.
- (d) Septic tanks shall be watertight, structurally sound, and constructed of materials not subject to extensive corrosion or decay.
- (e) All septic tank installations shall include an effluent filter approved by the Secretary. The filter shall prevent passage of solids larger in size than 1/8th inch.
- (f) Specifications and Maintenance. See Appendix 3-A

§1-509 Grease Interceptor

- (a) An approved grease interceptor shall be installed in the waste line leading from sinks, drains, dishwashers, and other fixtures or equipment in restaurants, cafeterias, bars or clubs, hotels, factories, or school kitchens or other establishments where grease would be a particular concern, except when the wastewater will be disposed of in a municipal wastewater treatment plant.

§1-509(a) Grease Interceptor

Note: A municipal system receiving wastewater from the types of fixtures described above may have its own grease control requirements. Nothing in this rule exempts a person from complying with any municipal ordinance or policy regarding grease control requirements for wastewater being disposed of in a municipal wastewater treatment facility. The applicant is encouraged to contact the municipal officials as early in the design process as possible.

(b) A grease interceptor designed in accordance with the method described below, derived from the 1997 Uniform Plumbing Code, will be considered acceptable for soil based systems. Alternative designs may be reviewed and approved based on a demonstration of equal or greater grease removal. Grease removal is very case specific and the designer should consider all of the factors in preparing a design for a grease trap, including the effects of ultra hot water.

(1) Number of Meals per peak hour X Wastewater Flow Rate X Retention Time X Storage Factor = Size Requirement in liquid capacity.

(A) Number of meals served at peak operating hour (Seating Capacity) X Peak Factor

(i) Where peak factor for fast food restaurants is1.33

(ii) Where peak factor for all other food service types is. 1.0

(B) Wastewater flow rate:

(i) With dishwasher 6 gallon flow

(ii) Without dishwasher 5 gallon flow

(iii) Single Service kitchen 2 gallon flow

(iv) Food waste disposer 1 gallon flow

(C) Retention times

(i) Commercial kitchen waste/dishwasher 2.5 hours

(ii) Single service kitchen 1.5 hours

(D) Storage factors

(i) Fully equipped commercial kitchen ...8 hour operation .. 1

§1-509(b)(1)(D)(ii) Grease Interceptor

- (ii)16 hour operation .. 2
 - (iii) 24 hour operation .. 3
 - (iv) Single service kitchen 1.5
- (2) The minimum size grease trap shall be 1000 gallon capacity
- (3) Construction requirements:
- (A) The tank shall be watertight, structurally sound, and constructed of materials not subject to extensive corrosion or decay.
 - (B) The inlet and outlet baffles shall extend from 12” above the bottom of the tank and to well above the waterline and shall allow airflow back into the building plumbing system.
 - (C) Each compartment of the tank shall have an access riser to grade. The cover shall be tight fitting and designed to prevent entry by children.
- (4) For the purposes of this Section, a single service kitchen is one where the food preparation consists of heat and serve only and that uses service items not expected to be used again on the premises or, if reused, the items are not washed on the premises. Operations with grills, frying machines, or cooking devices other than those used to heat food are not single service kitchens.

Note: The Vermont Plumbing Rules may require installation of an interior grease interceptor. If required, it will not substitute for the grease interceptor required by these rules.

§1-510 Dosing and Pressure Distribution System Design

- (a) Dosing is recommended for all soil-based disposal systems and is required when the design flow requires more than 500 linear feet of distribution piping.
- (b) Dosing may be accomplished by pumps, siphons, or other devices that can provide sufficient flow and pressure to meet the design requirements of the distribution system.
- (c) Any soil-based disposal system using pressure distribution shall be dosed. The system shall be designed to maintain a minimum pressure of 1 psi (or 2.3 feet of head) at the end of each distribution line. There shall be a maximum of a 10% difference in the per-square foot loading rate between any two trenches or beds within a system. No trench or bed shall be loaded at a rate exceeding that permitted based on

§1-510 (c) Dosing and Pressure Distribution System Design

the percolation rate and any factors associated with advanced treatment except when approved as an innovative or alternative system. There shall be a maximum 10% difference in the discharge rate between any two orifices in a single trench or bed. The design shall provide even distribution throughout the leachfield. The minimum dose volume shall be 5 times the volume of the distribution network that must be filled during each dosing cycle. There shall be at least 4 dosing cycles per day based on the design flow of the soil-based disposal system. There shall be at least one orifice for each 25 SQFT of leachfield area unless there is a specific requirement in these rules for additional orifices.

- (d) Pressure distribution pipe shall be smooth, rigid pipe and the pipe network shall be designed to allow for periodic cleaning. The distribution pipe shall be constructed so that there is access to the piping system for flushing of the piping system.
- (e) All distribution pipe shall be laid level. Distribution pipe serving separate absorption trenches or absorption beds may be installed at different elevations provided that the design ensures even distribution.
- (f) The minimum orifice diameter shall be 1/8". An effluent filter that prevents passage of particles larger than 1/8" shall be used to protect the pump, siphon, or other dosing device and the distribution piping. The orifices shall be on the upper side of the pipe and shall be protected by orifice shields. One or more additional orifices may be placed in the bottom of the pipe to facilitate drainage in situations where freezing of the distribution pipe is possible.
- (g) Alternative designs proposed by a designer that result in equal distribution may be approved by the Secretary.

§1-511 Absorption Trenches

- (a) All absorption trench disposal fields shall comply with all isolation requirements set forth in §1-503 in addition to the isolation requirements in this subsection.
- (b) Absorption trenches shall have a maximum width of 48".
- (c) The size of an absorption trench is calculated as the bottom area of the trench. The amount of area is calculated based on the second slowest percolation rate in the proposed area of the trench, using the following formula:

$$LR = \frac{3}{\sqrt{t}}$$

where LR is the loading rate in gallons per square foot of absorption trench per day and t equals the percolation rate in minutes per inch. The size of the absorption

§1-511(c) Absorption Trenches

trench is determined by dividing the design flow in gallons per day by the loading rate in gallons per day per square foot. The result is the number of square feet of bottom area required. The minimum acceptable value for t is 4 min/inch and the maximum acceptable value for t is 60 min/inch. The maximum loading rate is 1.5 gallons per day per square foot.

- (d) Absorption trenches shall extend no deeper than 36" below ground surface.
- (e) Absorption trenches may be installed on slopes of up to 30% and slopes of more than 30% may be approved on a case by case basis using a performance based approach. (see restrictions in §1-502(f)). When a system is proposed on a slope of more than 20%, the plans shall address how the site stability will be maintained during and after construction with specific attention to erosion control.
- (f) When installed, the bottom of any absorption trench shall be at least 36" above the seasonal high water table, 36" above any impervious soil layer, and 48" above bedrock. On sloping sites, the measurements shall be taken from the deepest portion of the absorption trench. For systems with design flows of 2000 gpd or more, it shall be determined that the induced groundwater mounding associated with the system will be at least 36" below the bottom of the absorption trench. This determination shall be based on a site specific analysis using either the desk top hydrogeologic analysis or a site specific test unless the designer asserts, and the Secretary agrees that a site specific analysis is unnecessary to make the determination. For example, sites with highly permeable soil and with a seasonal high water table significantly more than 36" below the bottom of the absorption trench are possible candidates for such a determination.
- (g) The bottom of any absorption trench shall be level.
- (h) Absorption trenches shall have crushed stone extending a minimum of 2" above and 12" below the distribution pipe. Exception: Absorption trench systems that use the loading rate calculations for absorption beds shall have a minimum of 6" of crushed stone below the distribution pipe.
- (i) Absorption trench systems may be constructed using prefabricated leaching chambers with a minimum H-10 structural loading rating, instead of crushed stone. Distribution pipe must be used in any chamber system.
- (j) The distribution piping must be 4" rigid, perforated pipe that is laid level, or small diameter pipe under pressure. If the distribution piping is more than 100' in length, it must be dosed. The ends of all pipes must be capped except for those at the same elevation, which should be connected.
- (k) A layer of filter fabric shall be placed over the top of the crushed stone.

§1-511 (l) Absorption Trenches

- (l) Each absorption trench shall be covered with a minimum of 6” and a maximum of 12” of permeable soil, with the uppermost 2”- 4” being topsoil.
- (m) Absorption trenches shall be designed at least 6’ on center when measured on a horizontal plane, but in no case shall there be less than 4’ of naturally occurring, undisturbed soil between adjacent absorption trenches. Primary and replacement absorption trenches may be interfingered. There shall be at least 4’ of naturally occurring, undisturbed soil between the primary and replacement absorption trenches.
- (n) Absorption trenches on sloping ground shall be laid parallel to the ground contours.
- (o) A distribution box shall be installed when multiple absorption trenches are used. Flow equalization devices that can be adjusted to maintain equal distribution during the life of the wastewater system shall be installed in the pipes leading to each absorption trench. The distribution box shall be constructed with an at-grade access. The designer shall consider the need for protection against freezing and shall include design details as needed.
- (p) A reduction in the leachfield area may be allowed for absorption trenches and chamber trenches, where the depth of crushed stone exceeds the normal 12 inch depth below the distribution pipe, as follows:

PERCENTAGE OF STANDARD DISPOSAL FIELD AREA REQUIRED

For absorption trenches

Depth of Crushed Stone Below Distribution Pipe	Trench Width 12”	Trench Width 18”	Trench Width 24”	Trench Width 36”	Trench Width 48”
18 inches	60%	64%	66%	71%	75%
24 inches (max)	50%	54%	57%	62%	66%

- (q) No absorption trench shall be constructed in fill material except in accordance with the site modification requirements in §1-516 or §1-517.
- (r) Absorption trenches shall not be constructed in soils with a percolation rate that is slower than 60 min/inch. Construction of absorption trenches in soils with a percolation rate that is faster than 1 min/inch requires a site modification as described in §1-516(e).

§1-511 (s) Absorption Trenches

- (s) All piping from the building or structure to the septic tank, from the septic tank to a distribution box, or to a pump or siphon chamber, and to the absorption trench shall be non-perforated, rigid pipe. The pipe penetrations shall be sealed to prevent leakage.
- (t) After the absorption trench area has been excavated, any smeared surfaces shall be scarified with a rake. Construction equipment not needed to construct the leachfield shall be kept off the area to be used to prevent undesirable compaction of the soils. Construction shall not be initiated when the soil moisture content is high. If a fragment of soil from about 9” below the surface can easily be rolled into a wire, the soil moisture content is too high for construction purposes.

§1-512 Absorption Beds

- (a) All absorption bed systems shall comply with all isolation requirements set forth in §1-503 in addition to the isolation requirements in this subsection.
- (b) Leachfields that are wider than 48” are referred to as absorption beds.
- (c) The basis of design is the bottom area of the absorption bed. No reduction in area is allowed for extra stone under the distribution pipe.
- (d) The maximum capacity for any single absorption bed is 2000 gallons per day.
- (e) An absorption bed shall not be constructed in soils with a percolation rate slower than 60 minutes/inch. An absorption bed constructed in soils with a percolation rate faster than 1 minute/inch requires a site modification as described in §1-516 (e)
- (f) Absorption beds shall extend no deeper than 36” below ground surface.
- (g) When installed, the bottom of any absorption bed shall be at least 36” above the seasonal high water table, 36” above any impervious soil layer, and 48” above bedrock. On sloping sites, the measurements shall be taken from the deepest portion of the absorption bed. For absorption bed systems with design flows of 2000 gpd or more, it shall be determined that the induced groundwater mounding associated with the system will be at least 36” below the bottom of the system. This determination shall be based on a site specific analysis using either the desk top hydrogeologic analysis or a site specific test unless the designer asserts, and the Secretary agrees, that a site specific analysis is unnecessary to make the determination. For example, sites with highly permeable soil and with significantly more than 36” between the bottom of the absorption bed and the seasonal high water table are possible candidates for such a determination.
- (h) The bottom of any absorption bed shall be level.

§1-512 (i) Absorption Beds

- (i) Absorption beds on sloping ground shall be laid parallel to the ground contours.
- (j) A large length to width ratio is recommended.
- (k) Absorption beds shall have a minimum of 2” of crushed stone over the distribution piping and a minimum of 6” of crushed stone below the distribution piping.
- (l) All distribution piping shall be laid level. The piping shall be 4” rigid, perforated pipe unless small diameter pipe under pressure is used. Any length of pipe greater than 100’ shall be dosed.
- (m) Absorption bed systems may be constructed using prefabricated leaching chambers with a minimum H-10 structural loading rating, instead of crushed stone. Distribution pipe must be used in any chamber system.
- (n) There shall be a layer of filter fabric over the top of the crushed stone.
- (o) Each absorption trench shall be covered with a minimum of 6” and a maximum of 12” of permeable soil, with the uppermost 2”-4” being topsoil.
- (p) Absorption beds shall not be constructed in fill except in accordance with §1-516 or §1-517.
- (q) Absorption beds shall be sized on the bottom area only. The design shall be based on the second slowest percolation rate for the site. The loading rate shall be determined by the formula:

$$LR = 0.8 X \frac{3}{\sqrt{t}}$$

where LR is the loading rate in gallons per square foot of absorption bed per day and t equals the percolation rate in minutes per inch. The size of the absorption bed is determined by dividing the design flow in gallons per day by the loading rate in gallons per day per square foot. The result is the number of square feet of bottom area required. The minimum useable value for T is 4 min/inch and the maximum acceptable value for t is 60 min/inch. The maximum acceptable loading rate is 1.2 gallons per day per square foot.

- (r) Absorption beds shall not be installed on land with a slope greater than 10%.
- (s) All distribution lines within the absorption bed shall be uniformly spaced no more than 6’ apart. The maximum distance from a distribution line and the edge of the absorption bed shall be 3’.
- (t) Primary and replacement absorption beds shall be separated by at least 10 feet.

§1-512 (u) Absorption Beds

- (u) All piping from the building or structure to the septic tank, from the septic tank to a distribution box, or to a pump or siphon chamber, and to the absorption bed shall be non-perforated, rigid pipe. The pipe penetrations shall be sealed to prevent leakage.
- (v) After the absorption bed area has been excavated, any smeared surfaces shall be scarified with a rake. Construction equipment not needed to construct the leachfield shall be kept off the area to be used to prevent undesirable compaction of the soils. Construction shall not be initiated when the soil moisture content is high. If a fragment of soil from about 9" below the surface can easily be rolled into a wire, the soil moisture content is too high for construction

§1-513 Spray Disposal Systems

- (a) A spray disposal system is a wastewater system disposing of treated wastewater into the native soil by surface application to the land using aerial dispersion (sprinklers) to distribute the sewage evenly. The maximum size wastewater system approvable under these rules is 6499 gallons per day of design flow. Larger systems are reviewed under the Indirect Discharge Rules.
- (b) Wastewater shall be treated to provide an effluent with not more than 30 mg/l BOD₅ and 30 mg/l TSS. Disinfection with 20-minute chlorine contact time immediately prior to spraying and a 1.0 ppm chlorine residual at the spray nozzle, or a 4.0 ppm total residual chlorine (or other equivalent disinfection method acceptable to the Secretary) shall be required.
- (c) A soil and site evaluation shall be conducted under the supervision of a designer. The designer shall prepare a soil and site evaluation report in the following specific areas to properly locate and design a spray disposal system. The soil and site evaluation shall also include the designer's written opinion regarding the suitability of the soil and site to satisfactorily treat and dispose of the proposed volume of wastewater.
 - (1) An acceptable full-time spray disposal site should have a fragipan or other impeding layer (silt or clay) beneath a more permeable overburden to prevent direct recharge to an unconfined aquifer or bedrock. A relatively flat site with impermeable soils at the ground surface may sometimes be utilized for spray disposal at lower than normal wastewater applications. Such application rates should be consistent with seepage and evaporation rates expected in the area.
 - (2) There shall be sufficient soil investigations on the site to establish that the fragipan or impeding layer is continuous on the site. Investigations shall also indicate the nature of the soil overlying the impeding layer. Soils investigations shall include, but are not necessarily limited to: in-place

§1-513(c)(2)

Spray Disposal Systems

densities, sieve analysis, horizontal and (when necessary) vertical permeability analysis.

- (3) Groundwater recharge areas within bedrock or unconfined aquifer areas shall not be considered acceptable spray disposal sites.
- (d) A hydrogeologic investigation shall be conducted on each spray disposal site by a qualified hydro geologist. Such an investigation shall include the submission of data in the following specific areas.
 - (1) The character and thickness of unconsolidated sediments overlying bedrock at the site shall be provided. The saturated zones in the soil profile shall be indicated, including possible perched water tables, and regional or artesian aquifers at the site. Geophysical testing can be utilized.
 - (2) The direction of ground water movements to and from the site, and points or areas of ground water discharge or recharge shall be determined and located on a contour map for local and regional ground water regimes.
 - (3) All surface waters and potable and non-potable water supplies within 500 feet of the proposed spray disposal site shall be located on a contour map and, for potable and non-potable water supplies, the following information shall be obtained through house to house survey, well drilling records, observations, or whatever other means are necessary:
 - (A) owner of the water supply, whether it is in use or not, and its use as to potable, industrial or agricultural;
 - (B) type of water supply: drilled well, dug well, spring, surface water;
 - (C) well boring logs when available, depth of casing, depth to aquifer material, and material - i.e., gravel, bedrock, and if available, the predominant bedrock material.
 - (D) Any possible effects of the spray disposal system on quality or quantity of any local or regional aquifers, and water supplies shall be evaluated. Hydraulic relationships between the spray disposal site and identified water supplies shall also be evaluated and addressed as to the possible effects on the quality or quantity of the supply.
- (e) The maximum spray disposal site application shall be 2 inches per week over the actual wetted area, with a minimum of 24 hours of rest between applications. The capacity of full-time spray disposal sites shall be calculated on the basis of lateral

§-513 (e) Spray Disposal Systems

flow downslope over the impeding layer while maintaining a minimum of one (1) foot of unsaturated soil between the ground surface and the resulting water table. Calculations of spray field capacity shall be made using recognized subsurface flow equations. The maximum hourly wastewater application rate shall be 0.25 inches per hour based on the actual wetted area. The maximum acceptable slope for a spray disposal site shall be 25 percent. There shall be a minimum of 5 feet between the wetted area of laterals of sprinklers in the direction of surface water runoff. Spraying during the winter shall be conducted during daylight hours, when air temperatures exceed 10 ° F. The pumping system shall be sized to deliver the average daily wastewater flow to the spray field in not more than eight (8) hours. The spray disposal and storage system shall be sized so that the system can operate effectively without having to spray during the spring run-off months.

- (f) There shall be no spray disposal of sewage that discharges to Class A waters. Class A waters are identified and listed in the Vermont Water Quality Standards. Other controls regarding isolation distances for spray disposal systems are:
 - (1) the wetted area from any sprinkler in a spray disposal system shall not be closer than 100 feet to the edge of any surface water;
 - (2) spray disposal areas shall be well isolated from road, habitation, and other places open to the general public. Isolation distances are dependent upon the intended use and disposition of the treated wastewater, degree of treatment provided, and local meteorological, vegetative and topographical system. The wetted area shall not be permitted closer than 200 feet from habitation, property lines, roads, or areas frequented by the public;
 - (3) no portion of a spray disposal area shall be permitted closer than 200 feet to any potable or non-potable water supply; and
 - (4) the spray disposal area shall be restricted from the public access by fencing and posting of signs, or other means acceptable to the Secretary, so that the public will be warned against entering the area and possible direct contact with the spray area.
- (g) Any planned multiple use of the spray disposal area will be evaluated on its own merits, and approvals granted at the discretion of the Secretary, with such conditions and additional controls as required. When waivers to specific requirements of these rules are necessary in order to approve a multiple use, (e.g., waiver of isolation distance requirements for snowmaking on ski trails or irrigation of golf courses), the waiver will be granted upon a showing by the applicant that the environmental and human health concerns, addressed in this section, have been adequately addressed in the multiple use design.

§1-513(h) Spray Disposal Systems

- (h) When required by the Secretary, full-time spray disposal systems shall have a storage capacity capable of storing a minimum two months sewage. Seasonal spray disposal system facilities shall have sufficient storage capacity to allow for effective operation with a minimum acceptable storage capacity being 30 days of flow.
- (i) A detailed Operation and Maintenance Manual on the complete wastewater system shall be submitted for review and approval. All sludge removed from the wastewater treatment plant shall be disposed of at locations approved by the Residuals Management Section of the Department of Environmental Conservation. The permittee(s) shall comply with the reporting procedures specified in the Certification from the Residuals Management Section or approved Sludge Management Plan. Monitoring and operation for a spray disposal system shall be as required in §1-514.

§1-514 Monitoring and Operations

Monitoring and operation of wastewater systems shall adhere to the requirements of paragraphs (a) and (b) below:

- (a) The required operation and maintenance of a wastewater system that depends only on a septic tank shall be those activities considered necessary to maintain an effective wastewater system. At the discretion of the Secretary, the owner may be required to install and maintain a ground water sampling and monitoring program considered necessary to detect contamination and degradation of ground water and surface water and water supplies with the results submitted to the Secretary in accord with the permit conditions.
- (b) The treatment facilities of spray disposal systems shall be supervised by an operator licensed under the Vermont Wastewater Treatment Facility Operators Certification Program with the applicable certification and the facilities shall be operated and maintained in a manner satisfactory to the Secretary. Operation reports, including flows received, volumes disposed of, and results of testing necessary to maintain plant efficiency and to demonstrate the reliability of the treatment system, shall be submitted to the Secretary on a monthly basis. Owners of such spray disposal systems where the Secretary has required the installation ground water monitors shall maintain a ground water sampling and analysis program to detect contamination and degradation of ground or surface water and potable and non-potable water supplies.

§ 1-515 Construction

Wastewater systems shall be constructed in accord with the permitted design. The designer or the installer shall provide the installation certification required in §1-303(c) of these rules. When the installation is different from the permitted design, a designer shall specify any deviations from the approved plans, specifications, or permit conditions in “as-built” plans along with recommendations that the project be accepted as is, based on his or her

§ 1-515 Construction

certification of the revised design, or shall specify that alterations must be made to bring the project into compliance with the rules. If alterations must be made, an installation certification must be completed after the alterations are complete. When the Secretary determines that the scope, complexity, or size, of the proposed facility justifies it, construction shall be accomplished under the supervision of a designer.

§1-516 Site Modifications

- (a) Depending upon the severity of site limitations, it may be possible to convert marginal or unsuitable sites to sites that comply with the specific requirements of these rules. Applicants may submit plans for the treatment and disposal of sewage that involve modifications to an existing site intended to bring a non-conforming site into conformance with standards applicable for the type of wastewater system proposed. Cuts or fills of 1' or less shall not be considered site modifications for the purposes of this section.
- (1) Site conditions that may be improved by some degree of site modification are shallow depth to impervious layer, shallow depth to seasonal high ground water level, shallow depth to bedrock and excessive slope.
 - (2) Acceptable site modifications may include the installation of curtain drains to lower the water table, mound system construction and regrading of the site.
 - (3) Restrictions placed on site modifications apply only in cases where the site modifications are necessary to overcome limitations of an otherwise unacceptable site. The restrictions do not apply to modifications designed to enhance the functioning of a system on a complying site.
- (b) Application Procedures and Standard Requirements
- (1) All site modifications must be designed by a designer.
 - (2) All plans for site modifications shall be submitted on an accurate contour map with a maximum of two (2) foot contour intervals. A scale of not greater than 20 feet per inch is recommended. A plan may be rejected if the scale is not adequate for review. Existing and proposed ground contours shall be shown along with a permanent benchmark.
 - (3) Approval for construction of the site modifications will be dependent upon the final site testing and review of the final plans.
 - (4) Site modifications will not be permitted on sites with less than 24 of native soil over bedrock or ledge or other strata having a percolation rate slower than 120 minutes per inch except in accord with §1-502.

§1-516(b)(5) Site Modifications

- (5) Site modifications will not be permitted on sites having a seasonal high water table within two (2) feet of the ground surface. Exceptions:
 - (A) sloping sites with a seasonal high ground water table 18” or more from the ground surface may be approved for a mound wastewater system no larger than 600 gallons per day, if the designer concludes, and the Secretary agrees, that a curtain drain will lower the seasonal high water table to 24” or more. Mound wastewater disposal systems using trenches shall not use more than two trenches per system; and
 - (B) wastewater systems using enhanced prescriptive or performance based designs as described in sections §1-502 (c) and (d).
 - (6) Except where specifically permitted otherwise, site modifications shall be constructed under the supervision of a designer in accordance with the approved plans. Upon completion of construction, the supervising designer shall provide the certification required in §1-303(c) of these rules. Failure to construct the site modifications under the supervision of a designer shall be a basis for revoking approval for the project.
 - (7) For site modifications involving flows of more than 2,500 gpd, the Secretary may require such additional design or construction specifications as may be necessary to insure the proper functioning of the system.
- (c) Curtain or Dewatering Drains.
- (1) Curtain or dewatering drains may be used to lower seasonal high water tables, that prevent compliance with the required wastewater disposal system design requirements.
 - (2) Drains are highly dependent upon their design and construction and site conditions for continued adequate performance. Prior to designing such drains, it is recommended that the designer consult such references as Drainage of Agricultural Land by the USDA Natural Resources Conservation Service and these rules for design requirements and expected performance standards.
 - (3) When a drain is proposed to lower a seasonal high water table, it must be installed and tested during spring conditions to demonstrate its effectiveness before approval of the wastewater system, unless the Secretary concludes that the designer has provided sufficient evidence to show that the drain will work effectively and that spring testing is not necessary. Section §1-516 (b)(5)(A) also gives specific guidance for small mound systems.

§1-516(c)(4) Site Modifications

- (4) The designer shall submit a plan to the Secretary that shows the drain and the proposed location of the wastewater system. After approval of the design by the Secretary, the drain must be installed and tested before approval will be issued, unless an exception has been granted in accordance with subsection (3) above.
- (5) A plan of location of monitoring wells and schedule of measurement shall be approved by the Secretary.
- (6) Design Criteria
 - (A) All design criteria must be detailed as to plan, profile, discharge location, and typical section. When considered necessary to establish the effectiveness of the proposed drain, the Secretary may request supporting information, including permeability and sieve analysis of the soils at the site.
 - (B) The drain shall be constructed of material sufficient to transmit the water from the site and to prevent clogging of the drain and decrease of its effectiveness. The acceptable material shall be crushed stone, perforated or other porous pipe, and filter fabric material to prevent clogging. Other designs of graded material to prevent clogging may be approved when supported with sufficient information.
 - (C) If the curtain or foundation drain is downslope of the leachfield, the leachfield shall not be closer than 75 feet to the drain. If the curtain or foundation drain is upslope of the leachfield, it shall be a minimum of 20 feet, 35' if possible, to the leachfield. These distances may be reduced if the designer provides adequate data and analysis to show the effluent from this system will not enter the drain, or increased if effluent will enter the drain.
 - (D) All sites using drains shall have monitors installed to monitor their effectiveness. The location and design shall be detailed on the plans.
 - (E) The outlet of all drains shall be constructed to prevent erosion and clogging. Rodent guards are required.

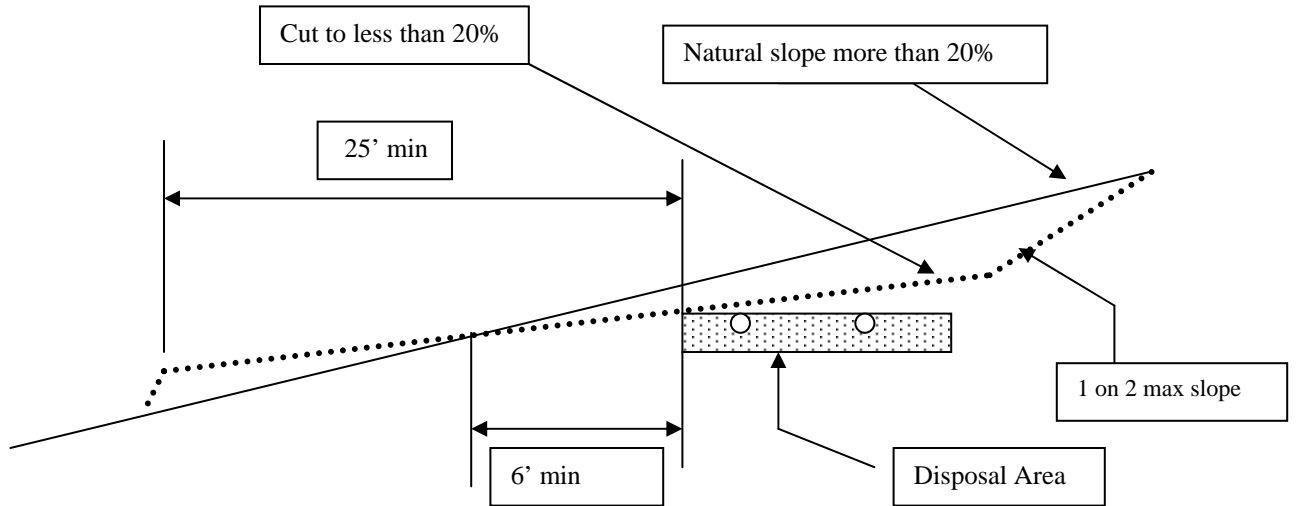
§1-516(d) Site Modifications

(d) Excessive Slope

- (1) In some cases, sites with slopes exceeding 20% may be regraded and reshaped to provide adequate leachfield sites. Prior to regrading, soil excavations shall be performed to show that there will be a sufficient amount of soil over the seasonal high water table and ledge after the regrading (Figure 5.4 page 99).
 - (A) The modification for primary and replacement area shall be complete and soil excavation and percolation tests performed before any regraded site can receive final approval.
 - (B) The leachfield shall not be installed in the fill area of a regraded site, though the area of fill may be used as a portion of the required 25 foot separation from the crown of a natural slope. There shall be a minimum of 6 feet of natural soil between the edge of a system and the downslope side of the regraded area.
 - (C) An erosion control plan per §1-502(e) shall be submitted as part of the application.

§1-516 Site Modifications

Figure 5.4
Natural slope more than 20%



(e) Rapidly Permeable Soils

For soils with a percolation rate of faster than one minute per inch, treatment shall be provided with (1) a mound wastewater disposal system; or (2) an absorption trench or absorption bed system backfilled with at least one foot of sandy fill material between the bottom of the crushed stone and the native soil. The fill shall have a percolation rate of three minutes per inch or slower. The application rate shall be based on the percolation rate of the fill in place.

§1-517 Mound Wastewater Disposal Systems

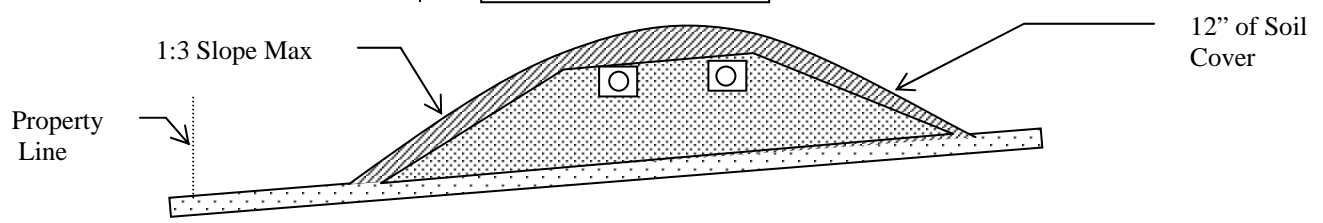
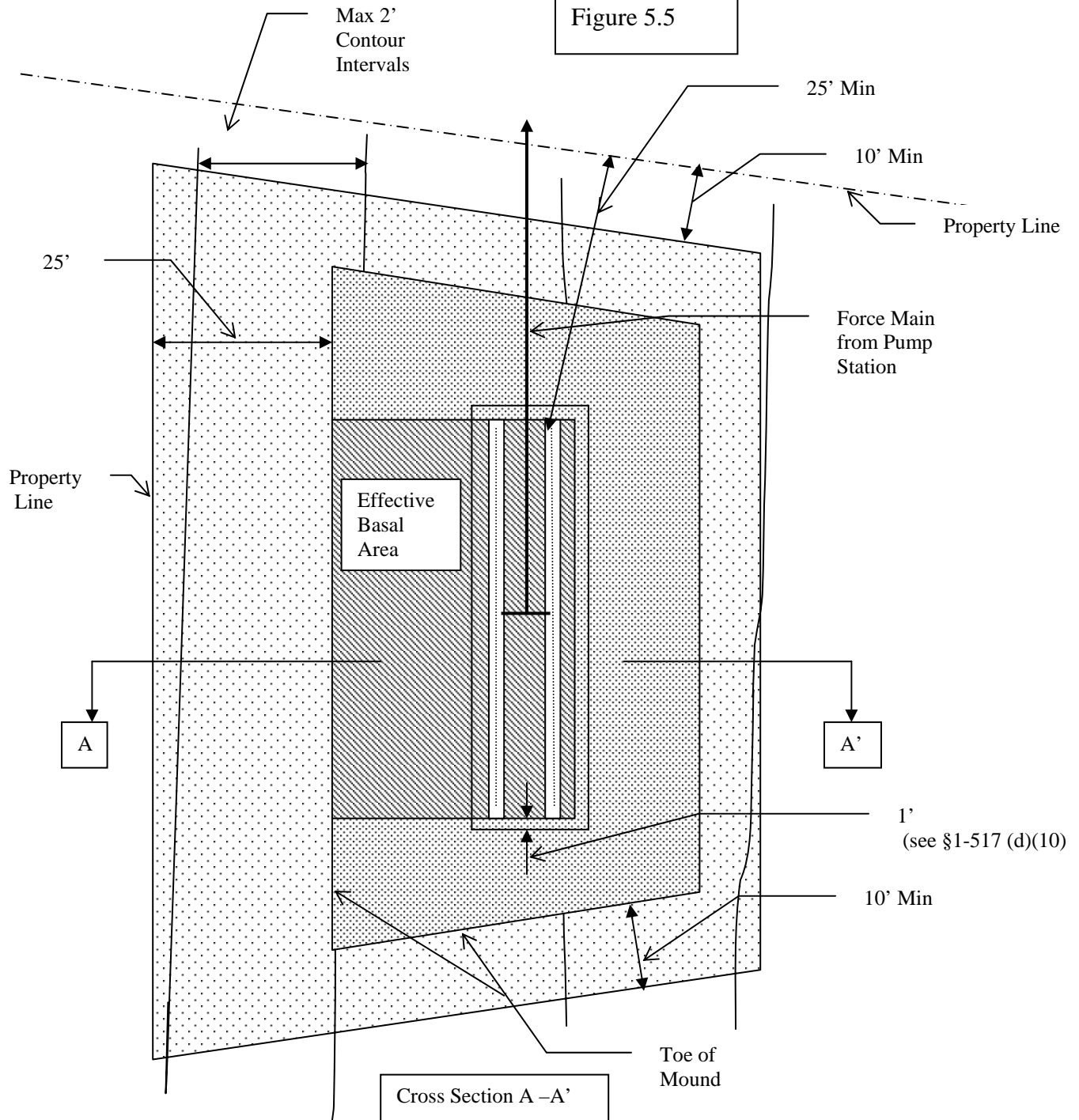
- (a) Mound wastewater disposal systems may be considered whenever site conditions preclude the use of a subsurface system. Due to the nature of a mound wastewater disposal system, the selection of mound location, size of mound, and construction techniques must be thoroughly considered and the criteria established in this section must be carefully followed. See Figure 5.5 on page 102.
- (1) All mound wastewater disposal systems must be designed by a designer.
 - (2) The designer shall prepare a contour map using a contour interval of not more than two feet. A scale of not greater than 20 feet per inch is recommended. All details of the mound wastewater disposal system, including but not limited to toe of slope, surface drains, curtain drains, existing and proposed contours, and trench details shall be shown on the plans.
 - (3) The plans shall show that there is sufficient area separate from the primary mound site on the lot to allow for construction of a replacement mound that meets all requirements. The toe of the replacement mound shall not be closer than 10 feet to the primary mound on the sides or closer than 25 feet on the uphill or downhill side.
 - (4) For mound wastewater disposal systems serving projects generating more than 1,000 gallons per day of sewage, a hydrogeologic study of the site must be conducted to demonstrate the capability of the site to dispose of the volume of sewage to be generated. The ground water level at the downhill toe of the mound shall be raised no closer than 12" below the ground surface and the induced groundwater mounding beneath the mound shall be no closer than 36" below the bottom elevation of the leachfield within the mound unless using a performance based design per §1-502 of these rules and /or when disposing of filtrate effluent per §1-520 of these rules. A site specific test may be conducted if a desktop hydrogeologic analysis is insufficient for an approval.
- (b) Site requirements
- (1) Soils where the seasonal high water table, bedrock, or other strata having a percolation rate slower than 120 minutes per inch occurs within twenty-four inches of natural grade, are not suitable for mound wastewater disposal systems. These limitations may be different if the enhanced prescriptive or the performance based approach is used. The site must be free of these limitations beyond the toe of a mound (primary and replacement) for a distance of twenty-five (25) feet in the downslope direction and ten (10) feet on all other sides.




§1-517(b)(2) Mound Wastewater Disposal Systems

- (2) Mound wastewater disposal systems may be constructed upon undisturbed naturally occurring soils. Mounds may also be approved for sites where the naturally occurring soil has been removed or where fill has been placed over the naturally occurring soil. In both cases the remaining naturally occurring soil needs to comply with the soil and siting criteria for mound wastewater disposal systems.
- (3) A crest site is preferred; no mound wastewater disposal system shall be located in a depression, which could act as a natural surface or ground water collection area.
- (4) Generally, sites with large trees, numerous smaller trees or large boulders are unsuitable for a mound wastewater disposal system because of difficulty in preparing the surface and the reduced infiltration area beneath the mound. Rock fragments, tree roots, stumps and boulders occupy space, within the mound area, thus reducing the amount of soil for proper operation. If no other site is available, then it is recommended to cut the trees at ground level, leaving the stumps. A larger mound area may be necessary if too many stumps are involved, so that sufficient soil is available to accept the effluent.
- (5) The minimum isolation distance to drinking water supplies, per §1-503, shall be measured from the edge of the minimum required effective basal area of the mound wastewater disposal system.
- (6) Mound wastewater disposal systems shall be located at least 50 feet from any surface water, including but not limited to, streams, watercourses, lakes, or impoundments as measured from any toe of the mound.
- (7) Mound wastewater disposal systems shall be located a minimum distance of 10 feet, as measured from the toe of the mound, from buildings, driveways, or any other subsurface obstruction except that this distance shall be 25 feet in the downgradient direction from the mound. Mound wastewater disposal systems shall be located a minimum distance of 10 feet, as measured from the toe of the mound or 25 feet as measured from the edge of the leachfield within the mound, whichever is greater, from property lines except that the distance from the downgradient toe of the mound to property lines shall be a minimum of 25 feet. The land area 25' downgradient of the elevated sand mound is the effluent dispersal area and soil in this area may not be removed or disturbed except as specified herein.
- (8) Separation may be required between mound wastewater disposal systems to prevent hydraulic interference in the disposal area.

§1-517 Mound Wastewater Disposal Systems

Figure 5.5



	Naturally occurring soils that meet the minimum site conditions per § 1-502
	Sand fill § 1-517 (c)
	Soil less permeable than sand fill with 2-4" of topsoil to be seeded and mulched

§1-517 (c) Mound Wastewater Disposal Systems

(c) Fill Material: The fill material from the natural soil plowed surface to the top of the trench or bed shall be sand texture with one of the following sieve analyses:

(1)

<u>Sieve Number</u>	<u>Opening (mm)</u>	<u>Percent Passing, by Weight</u>
10	2.000	85 - 100
40	0.420	25 - 75
60	0.240	0 - 30
100	0.149	0 - 10
200	0.074	0 - 5

(2)

<u>Sieve Number</u>	<u>Opening, (mm)</u>	<u>Percent Passing, by Weight</u>
4	4.750	95 - 100
8	2.380	80 - 100
16	1.190	50 - 85
30	0.590	25 - 60
50	0.297	10 - 30
100	0.149	2 - 10

(3)

<u>Sieve Number</u>	<u>Opening (mm)</u>	<u>Percent Passing by Weight</u>
10	2.000	85 - 100
40	0.420	30 - 50
200	0.074	0 - 10

(4) The fill material must meet the specifications (1), (2), or (3) above. Interpolation of analyses is not permitted. Fill material (2) is ASTM Specification C-33 and is intended for manufactured material.

(5) Mound wastewater disposal systems approved under the September 10, 1982 Environmental Protection Rules may use the fill material allowed under this subsection without redesign.

§1-517(d) Mound Wastewater Disposal Systems

(d) Design

- (1) There shall be a minimum of one (1) foot of fill material and sufficient naturally occurring soils to meet the requirements in §1-502 between the bottom elevation of the leachfield within the mound wastewater disposal system and the highest elevation of the limiting soil conditions.
- (2) Sufficient depth of fill material shall be placed to provide for 48" of vertical separation between the bottom elevation of the leachfield within the mound wastewater disposal system and creviced or permeable bedrock.
- (3) Sufficient depth of fill material shall be placed to provide for 36" of vertical separation between the bottom elevation of the leachfield within the mound wastewater disposal system and the seasonal high water table. For mound wastewater disposal systems with design flows of 1000 gpd or more, a designer shall determine that the induced groundwater mounding will be at least 36" below the bottom of the leachfield within the mound wastewater disposal system. This determination shall be based on a site specific analysis using either the desk top hydrogeologic analysis or a site specific test unless the designer asserts, and the Secretary agrees, that a site specific analysis is unnecessary to make the determination. For example, systems that are only slightly larger than 1000 gpd on sites with highly permeable soil and with low linear loading rates are possible candidates for such a determination.
- (4) The effective basal area is the area within the sand fill that is downslope of the long dimension of the leachfield constructed within the mound wastewater disposal system.
- (5) The minimum isolation distance to drinking water supplies, per §1-503, shall be measured from the edge of the minimum required effective basal area of the mound wastewater disposal system.
- (6) Mound wastewater disposal systems shall utilize pressure distribution. Absorption trench(s) or a seepage bed with a maximum 10' width shall be used. Mound wastewater disposal systems shall not be installed on land with a slope greater than 30% percent, except as approved on a site specific basis (see restrictions in §1-502). The mound systems shall be installed with the long dimension of the system parallel to the land contour. Spacing between trenches shall be no less than 4'. For trench designs, the minimum trench length shall be twice the dimension across the top of the mound from the outside to outside of the trenches.

§1-517(d)(7) Mound Wastewater Disposal Systems

- (7) The required absorption trench or absorption bed bottom area shall be based upon a maximum application rate of 1.0 gallons/day/square foot.
- (8) The minimum required effective basal area of the mound wastewater disposal system, for soils with a percolation rate of 61 to 120 minutes per inch, is to be calculated using a maximum application rate of 0.24 gallons/day/square foot.
- (9) The minimum required effective basal area of the mound wastewater disposal system for soils with a percolation rate of 0 to 60 minutes per inch is to be calculated using a maximum application rate of 0.74 gallons/day/square foot.
- (10) The area of sand fill shall be sufficient to extend one (1) foot beyond the edge of the required absorption trenches or the absorption bed before the sides are shaped to the acceptable slope.
- (11) The maximum acceptable slope for toe slopes of mound wastewater disposal systems shall be 1 on 3. The mound fill shall extend beyond the effective basal area.

(e) Pressure Distribution System Design

- (1) Pressure distribution shall be required for all mound wastewater disposal systems.
- (2) The leachfield shall be dosed a minimum of four times per day and not more than once in any thirty minute period. The size of the dosing pump or siphon shall be selected to maintain a minimum pressure of one pound per square inch or 2.3 feet of head at the end of each distribution line. The pump or siphon and the distribution piping shall be protected with an effluent filter that prevents the passage of any particle larger than 1/8".
- (3) The pressure distribution pipe shall be rigid plastic pipe, Schedule 40 to 80 with a minimum of diameter of one (1) inch. The pipe shall provide a single row of holes, minimum 1/8-inch diameter, on center along the length of the pipe with the last hole in the end cap. A design that assures uniform distribution throughout the leachfield is required. There shall be a minimum of one opening in the distribution piping per 25 square feet of leachfield area. There shall be a maximum of a 10% difference in the per-square foot loading rate between any two absorption trenches within a system. There shall be a maximum 10% difference in the discharge rate between any two orifices in a single

§1-517(e)(3) Mound Wastewater Disposal Systems

absorption trench or absorption bed. The design shall provide even distribution throughout the leachfield. The minimum dose volume shall be 5 times the volume of the distribution network that must be filled during each dosing cycle. All joints and connections shall be solvent welded.

- (4) The pressure distribution pipe shall be placed in crushed stone with the orifices upward. The holes shall be covered with an orifice shield. One or more additional orifices may be added to allow drainage of the piping when freezing may be a problem. The material used to cover the top of the stone shall be one layer of filter fabric.
 - (5) The ends of all distribution pipes shall be capped.
 - (6) The distribution pipe shall be constructed so that there is access to the piping system for flushing of the piping system.
- (f) Construction
- (1) A designer shall review the mound wastewater disposal system through the critical stages of construction. Upon completion of construction, the designer shall submit a report in writing to the Secretary including the certification required in §1-303(c) of these rules. Upon completion of plowing of the mound area and prior to the placing of the fill material, the designer shall inspect the site preparations. This shall be specifically addressed in the designer's report. Upon completion of the installation of the distribution piping, the network shall be tested with clean water to assure that distribution is complete and meets the requirements in §1-517 (e)
 - (2) A plan showing the test locations and any calculations shall be included with the designer's report.
 - (3) To prevent compaction, construction equipment shall not be moved across the plowed surface or the effluent dispersal area (see §1-517(b)(7)). However, after placement of a minimum of six (6) inches of sand fill over the plowed area, construction equipment may be driven over the protected surface to expedite construction. Construction and/or plowing shall not be initiated when the soil moisture content is high. If a sample of soil obtained from approximately nine (9) inches below the surface can be easily rolled into a wire, the soil moisture content is too high for construction purposes.

§1-517(f)(4) Mound Wastewater Disposal Systems

- (4) Aboveground vegetation shall be closely cut and removed from the ground surface throughout the area to be used for the placement of the fill material. The area shall then be plowed to a depth of seven (7) to eight (8) inches, parallel to the land contour with the plow throwing the soil upslope to provide a proper interface between the fill and natural soils. Tree stumps should be cut flush with the surface of the ground and roots should not be pulled. Once plowing is completed, the area should be fenced to prevent vehicles and equipment from entering the plowed area, unless the fill material is going to be in place within 24 hours of the plowing. If the site cannot be plowed, a backhoe bucket fitted with chisel teeth may be used to “till” the site by creating furrows that are parallel to ground contour.
- (5) The area surrounding the mound wastewater disposal system shall be graded to provide diversion of surface run-off waters.
- (6) Construction should be initiated immediately after preparation of the soil interface by placing the sand fill. After construction of the distribution system, but prior to covering the distribution system, a designer shall direct the testing of the distribution system. After successful testing of the distribution system, filter fabric shall be installed and the system completed, The entire mound wastewater disposal system is to be covered with topsoil native to the site, or of similar characteristics, to support vegetation found in the area. The installer shall crown the entire mound wastewater disposal system with a cover of soil less permeable than the mound fill, covering with 12" on the sides of the mound. Native soil from the site is normally suitable for cover material, though the top 2 - 4" of this cover must be topsoil. The entire mound shall be seeded or sodded to assure stability of the installation. This grass cover shall be maintained and should be mowed on at least an annual basis.

§1-518 At-grade Systems

- (a) At-grade systems may be used on some sites that are not suitable for in-ground systems because of inadequate depths to seasonal high water table, bedrock or impermeable soil. At-grade systems are constructed by tilling the ground surface and placing the crushed stone directly on the tilled surface. The crushed stone is not placed subsurface as in an in-ground system and no sand is placed under the crushed stone as in a mound wastewater disposal system. Figures 5.6 and 5.7 (pages 113 + 114) show the layouts of typical at-grade systems.
- (b) Site Requirements:
- (1) Sites with either a high groundwater level or soil strata having a percolation rate slower than 60 minutes per inch (mpi) or faster than 1 mpi within 36 inches of natural grade are not suitable for at-grade systems. Also, soils that have bedrock within 48 inches of natural grade are not suitable. The site must be free of these limitations beyond the edge of the fill for a distance of 10 feet on all sides. At-grade systems shall not be located in a depression or swale that could act as a natural surface water collection or runoff area.
 - (2) Generally, sites with large trees, numerous small trees or large boulders are unsuitable for at-grade systems because of the difficulty in preparing the ground surface and the reduced infiltration area. If no other site is available, all trees shall be cut flush with the ground, leaving the stumps. Stumps shall not be removed as removal of the stumps creates channels where the roots existed and may allow inadequately treated wastewater to reach groundwater or bedrock. A larger area shall be designed if numerous stumps and/or boulders are involved so that sufficient soil surface is available to accept the wastewater.
 - (3) The maximum slope allowable for at-grade systems is 20% percent, except as permitted on a site specific basis (see §1-502).
 - (4) Cut sites that meet the other site requirements for at-grade systems are acceptable. Sites with excessive slopes that have received approval from the Secretary for cutting shall receive permit approval when the designer submits a written report stating that the cut(s) has been completed as approved.
 - (5) Filled sites may be approved by the Secretary for at-grade systems on a case-by-case basis where the existing original soil under the fill meets the other site requirements for at-grade systems.
 - (6) At-grade systems are not allowed on sites having a percolation rate faster than 1 mpi within the 3 feet of soil below the bottom of the system. Replacing the excessively drained soil with filter sand is not allowed for at-grade systems.

§1-518(b)(7) At-grade Systems

- (7) At-grade systems shall comply with the isolation distances in §1-503 of these rules with the leachfield measurements taken from the edge of the crushed stone.

(c) Site Evaluation:

The site shall be evaluated in accord with §1-506 of these rules.

(d) Design:

- (1) A designer shall prepare a one-foot interval contour map having a scale of 20 feet per inch or less. In addition, all of the information in §1-302 of these rules shall be submitted.
- (2) The loading rate shall be based on the second slowest percolation rate using the following formula: $(3/\sqrt{t}) (0.8)$ where t is the second slowest percolation rate in minutes per inch. The maximum loading rate shall be 1.0 gallons per day per square foot. The effective infiltration area is the area upon which at least 6 inches depth of crushed stone is placed. It does not include the downslope area of the crushed stone that is less than 6" thick, the side slope fill areas or the portion of the crushed stone that is upslope of the distribution pipe on sites with slopes of greater than 3 percent. All at-grade system sizing calculations shall be submitted with the application.
- (3) At-grade systems shall be laid out parallel to ground contour and should be designed to be long and narrow to minimize the linear loading rate. The maximum width of the effective infiltration area shall be 6 feet and the minimum width of the effective infiltration area shall be 3 feet.
- (4) A minimum length to width ratio of 2:1 shall be provided for at-grade systems. The system length and width shall be determined by measuring from the outer edges from the six-inch depth of the crushed stone. The width dimension includes the separation distance (6 ft. minimum) between individual infiltration areas for at-grade systems having more than one infiltration area. The width does not include the two feet of crushed stone upslope from the distribution pipe for at-grade systems on slopes of greater than 3 percent. See figure 5.7 (page 114)
- (5) A minimum of 6 inches of crushed stone shall be placed under the distribution pipe and at least 2 inches of crushed stone shall be placed above the crown of the distribution pipe. Filter fabric shall be placed over the top of the crushed stone. The crushed stone shall be covered with a minimum of 12 inches of permeable soil, with a maximum of 18" of soil, the upper 2 to 4 inches of which shall be topsoil and the remainder of a fine sandy loam to medium

§1-518(d)(5)**At-grade Systems**

sand texture. All four sides of the fill area shall be designed to slope away at a pitch that is not steeper than 1:3. The design shall indicate that a vegetated cover is to be maintained over all portions of the system.

- (6) The distribution pipe shall be placed in the center of the effective infiltration area on sites with less than 3 percent slopes (figure 5.6, page 113) and placed at the upper side of the effective infiltration area on sites with slopes that are greater than 3 percent. (figure 5.7, page 114).
- (7) On sites with slopes that are greater than 3 percent, only the area directly under the distribution pipe to the downslope limit of the 6-inch depth of crushed stone shall be used to meet the effective infiltration area square footage requirement (figure 5.7, page 114).
- (8) All at-grade systems shall be pressurized and dosed by pump or siphon as described in §1-510 of these rules. Pressure distribution hydraulic calculations including but not limited to friction loss, elevation head and pump/siphon sizing shall be included with the application.
- (9) Where more than one effective infiltration area is used, there shall be at least 6 feet of separation between the tail edges of the crushed stone in each effective infiltration area (figure 5.7, page 114). Primary and replacement infiltrative areas shall not be interfingered unless the areas are at least 25' apart, as measured from the edge of the crushed stone.
- (10) At-grade systems receiving more than 2,000 gpd of design wastewater flow shall require a hydrogeologic analysis showing that a minimum of 36 inches of unsaturated native soil is maintained between the bottom of the crushed stone and the induced groundwater mounding beneath the system. At-grade systems that are closer than 25 feet to each other as measured from the edge of stone aggregate shall be evaluated as one system for purposes of determining the need to conduct a hydrogeologic analysis.
- (11) For at-grade systems receiving 3,000 gpd or more of design wastewater flow, dual-alternating at-grade systems shall be required. The dual alternating system requirement applies if either the primary or the replacement systems have design flows of 3,000 gpd or more.
- (12) At-grade systems that are closer than 25 feet to each other as measured from the edge of stone aggregate shall be evaluated as one system for purposes of determining the need to have dual alternating at-grade systems. Exception: A hydrogeologic analysis may be used to demonstrate that systems located less than 25' apart are hydraulically independent.

§1-518(d)(13) At-grade Systems

- (13) Where primary and replacement at-grade systems are placed next to each other, the systems shall be at least 10 feet apart when placed end-to-end, as measured from the stone aggregate, and at least 25 feet apart when placed in the same flow path as measured from the edge of the filled area.
 - (14) A surface water diversion swale shall be constructed upgradient of all at-grade systems on sites with slopes that are greater than 3 percent.
 - (15) The area 25 feet downgradient of the at-grade system as, measured from the lower edge of the fill, shall not be disturbed by any construction activity including, but not limited to, building construction, roadways and parking areas.
 - (16) Where subsurface drains (including building perimeter drains) are located downslope of an at-grade system, the crushed stone shall be at least 75' from the drain.
- (e) Construction Practices:
- (1) The surface water diversion swale (mandatory for sites with slopes of more than 3 percent) shall be installed prior to constructing the at-grade system to keep surface water runoff away from the system while it is under construction.
 - (2) Construction of the at-grade system and/or tilling shall not take place when the soil moisture is high in the system area. If the soil at 9 inches below grade can be rolled into the shape of a wire, the soil moisture content is too high for construction to begin.
 - (3) To prevent compaction, construction equipment shall not be moved across and downslope of the at-grade system area before or after tilling.
 - (4) Vegetation shall be cut close to the ground and removed from the area to be tilled. Tree stumps shall be cut flush with the ground and the roots left in place. On wooded sites, the forest litter shall be raked off if more than an inch thick. The at-grade system area shall be tilled, preferably by mold board or chisel plow to a depth of 6 to 8 inches, parallel to the ground contour. During plowing, the soil should be thrown upslope to provide a proper interface between the soil and stone aggregate. If the site cannot be plowed, a backhoe bucket fitted with chisel teeth may be used to "till" the site by creating furrows that are parallel to ground contour.

§1-518(e)(5)

At-grade Systems

- (5) The forcemain may be installed before tilling or after tilling when the forcemain enters the system at the upslope side of the system. When the forcemain enters the system at the downslope side, the forcemain should be installed before tilling. If practical, forcemains should connect to the distribution pipe from the ends of the distribution pipe or from the upslope side of the system. In either situation, the forcemain shall be installed by working from the upslope edge of the system.

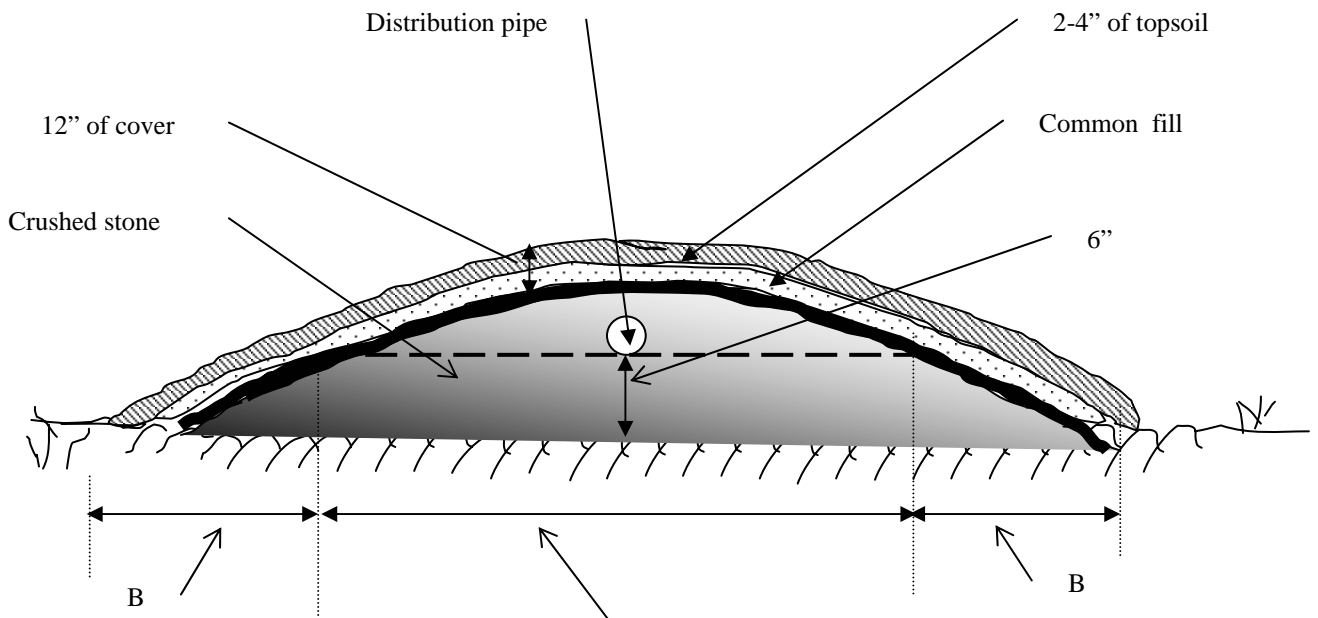
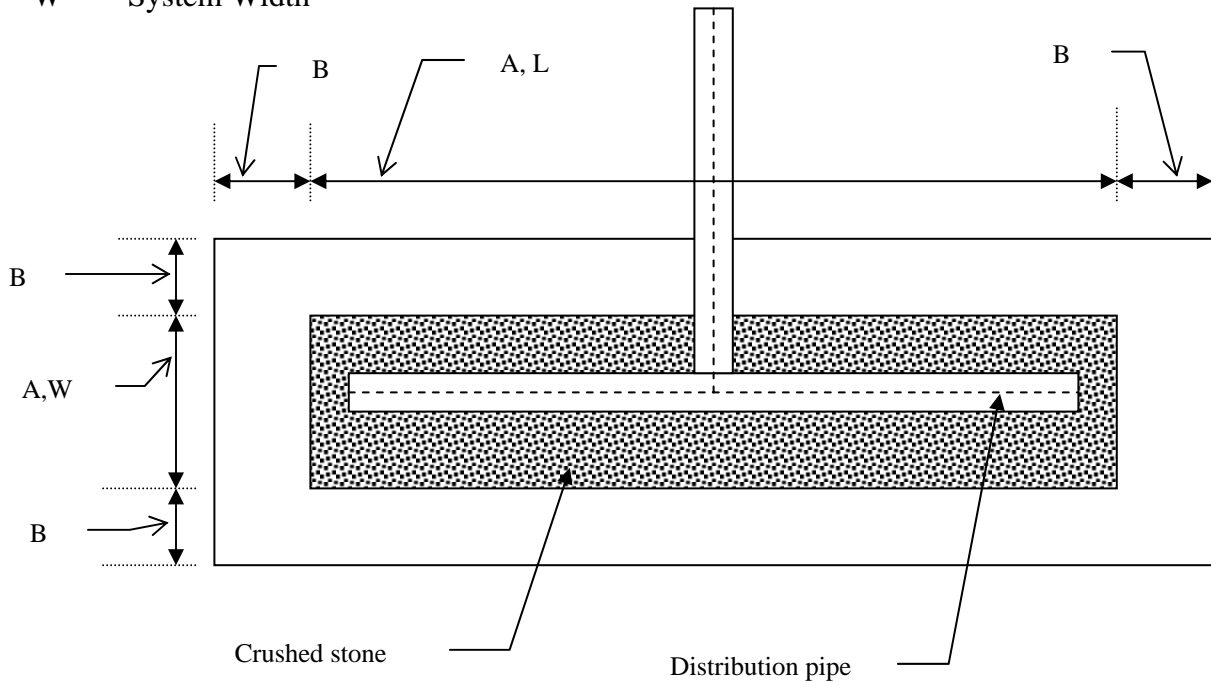
Note: at-grade system diagrams are shown on the next two pages

§1-518 At-grade Systems

Figure 5.6

Plan and Cross Sectional Views of an At-Grade System Having One Infiltration Area on a Level Site (less than 3 percent).

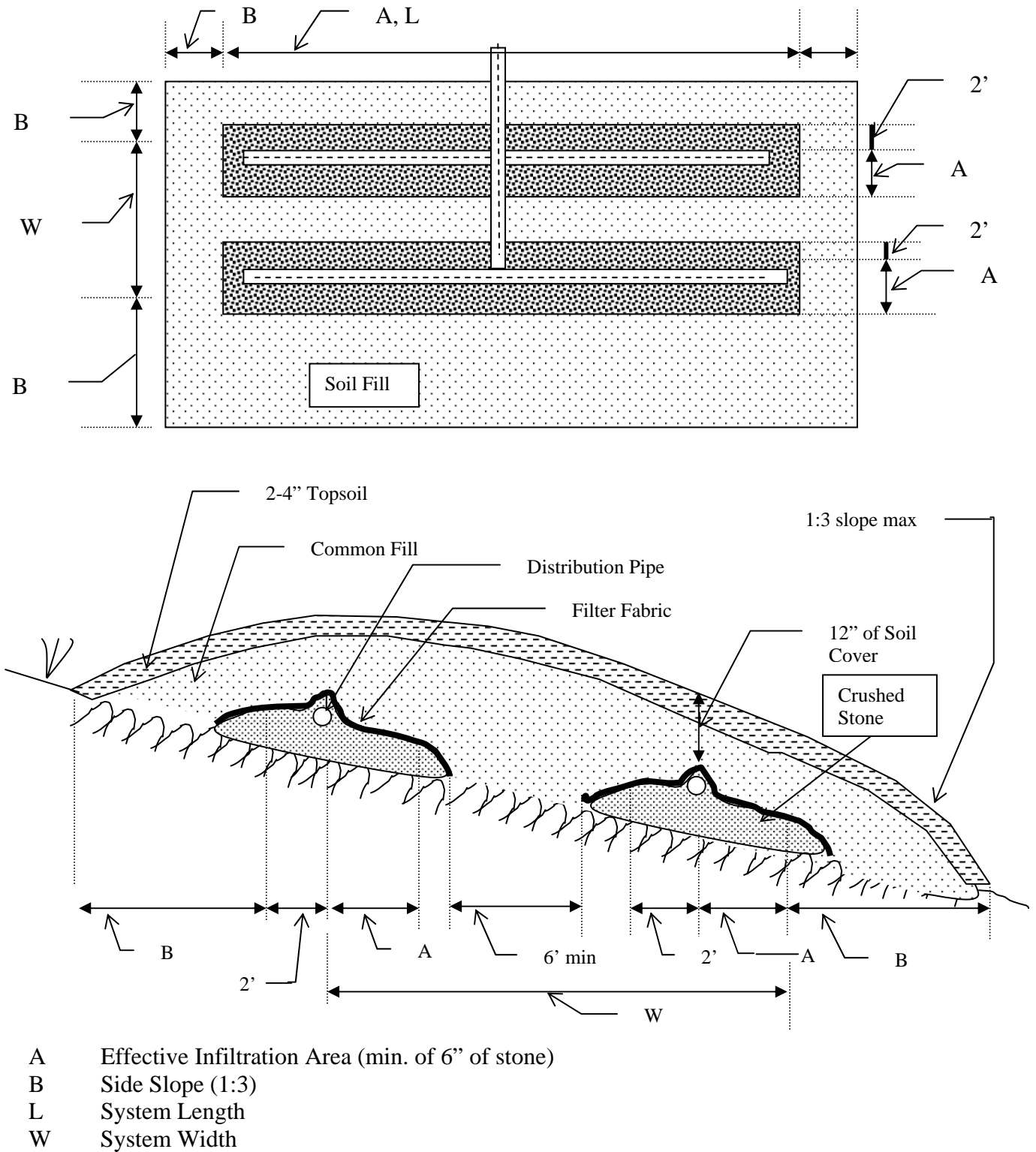
- A Effective Infiltration Area System Length
- B Side Slope (1:3)
- L Length
- W System Width



§1-518 At-grade Systems

Figure 5.7

Plan and Cross Sectional Views of an At-Grade System with Two Infiltrative Areas on a Sloping Site (greater than 3%).



1-518(e)(6) At-grade Systems

- (6) Upon completion of the tilling and before placing the stone aggregate, a designer shall inspect the site preparations.
- (7) Construction should begin immediately after the tilling by placing the stone aggregate. The pressure distribution pipe shall be laid level on top of the stone and caps installed at the ends of the pipe. Upon completion of the distribution piping, the designer shall test the system with clean water. The test shall show that a minimum pressure of 2.3 feet of head is present at the ends of the pipe and that the distribution requirements in §1-510 are met. After connecting the distribution pipe to the forcemain, the distribution pipe shall be covered with at least 2 inches of clean stone aggregate. The stone aggregate shall be covered completely with filter fabric.
- (8) The filter fabric shall be covered with a minimum of 12 inches of soil but not more than 18 inches, with the upper 2 to 4 inches of soil being topsoil and the remainder of the fill being of a fine sandy loam to medium sand texture. The soil cover shall be placed at a maximum slope of 1:3. A vegetated cover free of large brush and trees shall be maintained over the system.
- (9) Prior to use of the at-grade system, a designer shall submit a written report that includes the certification required by section §1-303(c) of these rules. The report shall specifically address the inspection of the site preparations and include numerical results of the orifice discharge rate comparison and pressure test.

§ 1-519 Sand Filters

Sand filters are intended for use in conjunction with a filtrate disposal system (see §1-520). They allow for a reduction in the final disposal requirements due to the additional treatment of the wastewater. This subsection addresses the use of two different sand filter types: the intermittent sand filter and the recirculating sand (gravel) filter.

(a) General Requirements

(1) Wastewater Strength

- (A) Intermittent sand filters may be used for residential and for other low strength domestic wastewater.
- (B) Recirculating sand filters may be used for low and moderate strength wastewater.
- (C) Wastewater from a septic tank shall be considered low strength when it meets the following standard:
 - (i) $BOD_5 < 230$ mg/l;
 - (ii) $TSS < 150$ mg/l; and
 - (iii) Oil&Grease < 25 mg/l.
- (D) Wastewater from a septic tank shall be considered moderate strength when it meets the following standard:
 - (i) $BOD_5 < 400$ mg/l;
 - (ii) $TSS < 150$ mg/l; and
 - (iii) Oil&Grease < 25 mg/l

(2) Container Design & Construction

- (A) The filter container shall be water tight to prevent groundwater from infiltrating into the filter container and to prevent wastewater exfiltration from the filter container.
- (B) Reinforced concrete shall be used, unless other materials having equivalent function, workmanship, watertightness and at least a twenty (20) year service life are specified.

§1-519(a)(2)(C)

Sand filters

- (C) Flexible membrane liner materials may be used, provided they comply with the following requirements:
 - (i) they have properties that are at least equivalent to thirty (30) mil un-reinforced polyvinyl chloride;
 - (ii) they have field repair instructions and extra liner material that are provided to the purchaser with the liner;
 - (iii) they have factory fabricated “boots” suitable for field bonding onto the liner to facilitate the passage of piping through the liner in a waterproof manner; and
 - (iv) they are compatible with the wastewater being treated.
 - (D) All tanks associated with a sand filter, including septic and dosing tanks and any pumping vaults, shall have an at-grade access provided by a watertight manhole or riser not less than eighteen (18) inches in diameter, unless otherwise approved by the Secretary.
 - (E) After installation all components, including septic tanks, pump chambers, recirculation tanks and filter containers, shall be tested by filling to a point at least two inches, but not more than three inches, above the point of riser connection to the top of the tank, chamber, or container. During the test there shall not be a measurable leakage over a twenty-four (24) hour period.
 - (F) Notwithstanding subdivision (a)(2)(E) above, the Secretary may approve other leakage testing methods.
- (3) **Siting Requirements**
- (A) Filters must be protected from both groundwater and surface water infiltration.
 - (B) For the purpose of determining the minimum isolation distance to other site features, the filter container shall be comply with the isolation distances set forth in §1-503 for septic tanks.
- (4) **Monitoring**
- (A) **Wastewater Quality:** The sand filter shall be designed for wastewater sample collection before and after the sand filter.

§1-519(a)(4)(B)

Sand filters

- (B) Wastewater Quantity: All sand filters shall have the capability of measuring and recording the wastewater flow and the flow to the filter.
- (5) Annual inspections of each sand filter by a designer are required. A written report shall be submitted to the Secretary within 30 days of the inspection. At a minimum, the following items shall be addressed in the inspection report:
 - (A) use and age of system including the average daily flows;
 - (B) the recirculation ratio;
 - (C) mechanical or electrical malfunctions;
 - (D) neglect or improper use; and
 - (E) flushing of the laterals.
- (6) Operation & Maintenance Manuals: A user's manual for the sand filter shall be developed and/or provided along with an "as-built" drawing(s) at the time that the sand filter installation is completed. These materials, at a minimum, shall contain the following information:
 - (A) diagrams of the components and their location;
 - (B) an explanation of how the sand filter functions, operational expectations, and owner responsibility;
 - (C) specifications of the electrical and mechanical components installed (occasionally components other than those specified on the plans are used);
 - (D) names and telephone numbers of the designer, the local health authority, the supplier/installer, and/or the management entity to be contacted in the event of a failure;
 - (E) information on the periodic maintenance requirements of the sand filter, including the septic tank, the dosing and recirculating/mixing tanks, the sand filter unit, the pumps, the switches, the alarms, the filtrate disposal system, and other information as appropriate;

§1-519(a)(6)(F)

Sand filters

- (F) information on “trouble-shooting” common operational problems that might occur. This information should be detailed and complete as needed to assist the system owner make accurate decisions about when and how to attempt corrections of operational problems and when to call for professional assistance;
 - (G) information on the disposal of discarded filter media in accord with state and local requirements; and
 - (H) for proprietary sand filter units, a complete maintenance and operation document shall be developed and provided by the manufacturer. This document shall include all the appropriate items mentioned above, plus any additional general and site specific information useful to the system owner, and/or the maintenance person.
- (b) Intermittent Sand Filters: In addition to the applicable requirements of §1-519(a), the following system specific criteria shall apply to the design of intermittent sand filters:
- (1) Underdrain system
 - (A) The base of the filter container shall be level or constructed at a grade of one (1) percent or less towards the underdrain piping.
 - (B) The underdrain piping shall be installed in the interior of the filter container at the lowest elevation. The piping shall be on a grade of one (1) percent or less to the point of passage through the filter container.
 - (C) The underdrain piping and filter container bottom shall be covered with a minimum of six (6) inches of clean washed ¾” - 1½” stone.
 - (D) Other types of underdrain systems may be proposed and approved after review by the Secretary.

§1-519(b)(2) Sand filters

(2) Filter Media

- (A) A minimum of twenty-four (24) inches of approved sand filter soil media shall be placed over the underdrain system. The sand filter soil media complying with the specification listed below shall be approvable:

Sieve #	Opening (mm)	Percent Passing Number (by Weight)
3/8	9.500	100
4	4.750	95 - 100
8	2.380	80 - 100
16	1.190	45 - 85
30	0.590	15 - 60
50	0.297	3 - 15
100	0.149	0 - 4

- (B) Other filter media may be proposed, provided a designer submits to the Secretary technical justification for the substitution of materials. The Secretary shall review and may approve the proposed substitution.
- (C) The size of the sand filter shall be based on a maximum loading rate of 1.25 gallons per day per square foot.

(3) Distribution System

A pressurized distribution system shall be constructed in accord with the following requirements:

- (A) above the filter media there shall be a minimum of three (3) inches of washed, clean 3/4" to 1 1/2" stone aggregate below the distribution laterals, and sufficient stone above the laterals equal to or covering the orifice shields to provide a smooth even cover;
- (B) distribution laterals shall be spaced on maximum thirty (30) inch centers. Orifices shall be placed such that there is at least one orifice for each six (6) square feet of sand surface area;
- (C) the ends of the distribution laterals shall be designed and constructed with a means to perform flushing of the piping, collectively or individually, through the operation of a non-corroding and accessible valve. The flushed wastewater must be discharged to the septic tank or into the sand filter;

§1-519(b)(3)(D)

Sand filters

- (D) the diameters of the distribution manifold and laterals shall not be less than one half (1/2) inch diameter and shall be constructed of schedule 40 or 80 (or equivalent) piping;
- (E) the orifices shall not be less than 1/8" in diameter. All orifices shall be covered by a removable, protective, durable, non-corroding shield; and
- (F) other types of distribution systems may be proposed by a designer and used upon approval by the Secretary.

(4) Filter Dosing

- (A) The dose volume shall not exceed ten (10) percent of the daily design flow.
- (B) The system shall not dose more than once in a 30-minute period.
- (C) Head calculation shall include maximum static lift, pipe friction and a residual head of five (5) feet at the furthest orifice.
- (D) There shall be no more than a ten (10) percent flow variation between any two orifices.
- (E) The pumping system shall be protected from solids by a filter apparatus that will not allow the passage of solids larger in size than 1/8 inch.
- (F) The pump station designed to dose the filter shall be designed with storage equal to the one (1) day design flow above the high water alarm.

(5) Internal Pump Option

- (A) Where the effluent from a sand filter is to be discharged by means of a pump to another treatment unit, a distribution unit, or to an leachfield, the design and construction of the filter may include provisions for an internal pump station, providing the following conditions are met:
 - (i) the location, design, and construction of the pump station do not conflict with the requirements of these rules for design, construction and operation of a sand filter system;

§1-519(b)(5)(A)(ii)

Sand filters

- (ii) the pump and related apparatus shall be housed in a corrosion resistant vault designed to withstand the stresses placed upon it so that it will not allow the migration of drain media, sand, or underdrain media to its interior. The vault shall have a durable, attached floor. The vault shall provide watertight access to finished grade with a diameter large enough to remove, replace, or service any equipment in the vault shall and be designed to receive treated effluent from an elevation equal to that of a gravity discharging sand filter;
- (iii) the depth of underdrain media and the operating level of the pump cycle and alarm shall not allow effluent to come within two inches of the bottom of the sand filter media. The pump off level shall not be lower than the invert of the perforations of the underdrain piping; and
- (iv) an internal sand filter pump shall be electronically linked to the sand filter dosing apparatus in such a manner as to prevent wastewater from entering the sand filter in the event the internal sand filter pump fails.

(c) **Recirculating Sand (Gravel) Filters**

Recirculating Sand Filters are recommended for domestic wastewater of low to moderate strength. They are not recommended for seasonal residences or projects designed for periodic use. Projects that will experience periodic shut downs should take into account the cooling effect on the recirculating effluent and the effect of the filters going anaerobic and becoming odoriferous as a result.

In addition to the applicable requirements of §1-519(a), the following standards apply to recirculating sand filters:

- (1) Underdrain system
 - (A) The base of the filter container shall be level or constructed at a grade of one (1) percent or less towards the underdrain piping.
 - (B) The underdrain piping shall be installed in the interior of the filter container at the lowest elevation. The piping shall be on a grade of one (1) percent or less to the point of passage through the filter container.

§1-519(c)(1)(C)

Sand filters

- (C) The underdrain piping and filter container bottom shall be covered with a minimum of six (6) inches of washed clean ¾" - 1½" stone aggregate.
- (D) Other types of underdrain systems may be proposed and approved after review by the Secretary.

(2) Filter Media

- (A) A minimum of thirty-six (36) inches of approved filter media shall be placed above the underdrain system.
- (B) The filter media shall be a soil material complying with the following sieve analysis:

Sieve	Opening (mm)	Percent Passing Number (by Weight)
3/8	9.500	100
4	4.750	60-100
8	2.380	7 - 75
16	1.190	0 - 5
30	0.590	0 - 3
50	0.297	0 - 2

- (C) Other filter media may be proposed provided a designer submits to the Secretary technical justification for the substitution of materials. The Secretary shall review and may approve the proposed substitution.
- (D) The size of the recirculating sand filter shall be based on either a hydraulic loading rate or wastewater strength as described below. The maximum loading rate is the lesser of subdivision (i) or (ii) below.

(i) The maximum hydraulic loading rate shall be 5 gallons per day per square foot.

(ii) The maximum loading rate based on waste strength, (expressed as gallons per square foot per day) shall be determined using the formula:

$$\text{Loading Rate (gal/sqft/day)} = \frac{5 \text{ gal/sqft/day} \times 230 \text{ mg/l}}{\text{BOD}_5 \text{ mg/l}}$$

§1-519(c)(2)(D)(ii)

Sand filters

where BOD₅ equals the wastewater strength of the septic tank effluent for the particular project. In particular, non-residential wastewater may exceed 230 mg/l of BOD₅.

(3) Distribution System

A pressurized distribution system shall be constructed in accordance with the following requirements:

- (A) there shall be a minimum of three (3) inches of washed, clean ¾" to 1½" stone aggregate that is below the distribution laterals and above the filter media, and sufficient stone covering the orifice shields to provide a smooth even cover;
- (B) distribution laterals shall be spaced on maximum twenty-four (24) inch centers. Orifices shall be placed such that there is at least one orifice for each four (4) square feet of sand surface area;
- (C) the ends of the distribution laterals shall be designed and constructed with a means to perform flushing of the piping, collectively or individually, through the operation of a non-corroding and accessible valve. The flushed wastewater must be discharged to the septic tank or into the sand filter;
- (D) the diameters of the distribution manifold and laterals shall not be less than one half (1/2) inch diameter and shall be constructed of schedule 40 or 80 (or equivalent) piping;
- (E) the orifices shall not be less than 1/8" in diameter. All orifices shall be covered by a removable, protective, durable, non-corroding shield; and
- (F) other types of distribution systems may be proposed by a designer and used upon approval by the Secretary.

(4) Recirculation/Dilution Tank and Dosing: The recirculation tank receives septic tank effluent and overflow from the filter. The recirculation tank shall have sufficient capacity to provide one (1) day's emergency storage above a high water alarm level. The recirculation tank and dosing system shall comply with the following requirements:

- (A) the system shall be designed with a minimum recirculation ratio of not less than four (4). The recirculation ratio is the daily volume of recycled effluent divided by the design flow;

§1-519(c)(4)(B) Sand filters

- (B) the filter should be wetted 48 times per day and not more than once in a thirty (30) minute period. The minimum resting period between doses shall be twenty (20) minutes;
- (C) the minimum wet volume in the recirculation tank should be at least eighty (80) percent of the design flow;
- (D) the system shall be designed so that one hundred (100) percent of the filter effluent returns to the recirculation tank when the liquid volume of the tank is less than eighty (80) percent of the design flow. In addition to a high water alarm, a low water alarm shall be designed and installed to shut down the pump and notify the owner of the system when the liquid level of the recirculation tank is less than fifty (50) percent of the design flow;
- (E) head calculations shall include maximum static lift, pipe friction and a residual head of five (5) feet at the furthest orifice;
- (F) there shall be no more than a ten (10) percent flow variation between any two orifices; and
- (G) The pumping system shall be protected from solids by a filter apparatus that will not allow the passage of solids larger than 1/8" in diameter.

§1-520 Filtrate Effluent Disposal Systems

Filtrate effluent disposal systems may be used when some form of treatment in addition to that which occurs in the septic tank is used as part of the wastewater system. The loading rates may be increased and the isolation distances required from the bottom of the leachfield to bedrock and the seasonal high water table may be reduced when applying treated effluent with less than 30 mg/l of BOD₅ and less than 30 mg/l of TSS.

- (a) Filtrate effluent disposal systems shall be designed to hydraulically transmit the filtrate away from the filtrate disposal system. The minimum site conditions for filtrate effluent disposal systems are the same as for wastewater systems using only septic tanks for treatment prior to disposal of the wastewater.
- (b) All types of soil-based disposal systems permitted by §1-511, §1-512, §1-517, and §1-518 are acceptable as filtrate effluent disposal systems. Design and construction requirements related to methods, materials, and location are unchanged except as specifically noted in this section.

§1-520(c) Filtrate disposal systems

- (c) The following requirements refer to design variations based on the type of soil-based disposal system:
- (1) filtrate effluent disposal systems may be constructed in soils having a percolation rate faster than 120 minutes per inch. Section 1-516(e) shall be followed for soils with a percolation rate faster than 1 minute per inch;
 - (2) filtrate effluent disposal systems may be designed with a loading rate of up to twice that permitted for the system when septic tank effluent is applied; and
 - (3) the linear loading rate of any filtrate effluent disposal system shall be calculated using a site specific hydrogeologic analysis that demonstrates that the separation from the bottom of the leachfield to the induced groundwater mounding is met, except that systems using the prescriptive approach with a linear loading rate that does not exceed 4.5 gallons per day may be permitted without a hydrogeologic analysis. The analysis may be a desktop hydrogeologic analysis or based on site specific testing. The hydrogeologic analysis shall demonstrate that:
 - (A) the distance between the bottom of the leachfield and the seasonal high water table or induced groundwater mounding, as specified in §1-507(d)(1) is maintained. This distance may include both naturally occurring soil and approved fill material; and
 - (B) the induced groundwater mounding is at least one (1) foot below grade at the downhill toe of the filtrate effluent disposal system, except for systems using a performance based design that must maintain at least 6” from the induced groundwater mounding to the ground surface.
- Note: Filtrate effluent disposal systems located more than twenty five (25) feet apart may be considered hydraulically isolated from each other for the purpose of this subsection.

§1-521 Disposal of Wastes from Pump-Out Facilities for Marine Sanitary Holding Tanks

- (a) Where direct hookup to a wastewater treatment plant is available or site conditions permit, disposal of wastes from pump-out facilities shall be in conformance with the normal operational requirements of this Subchapter.
- (b) Where it is not feasible to comply with subsection (a) above, a holding tank may be used.

§1-521(c) Disposal of Wastes from Pump-Out Facilities for Marine Sanitary Holding Tanks

- (c) Holding tank design shall be in accord with §1-522 of these rules.

§1-522 Holding Tanks

- (a) The Secretary shall approve the use of sewage holding and pumpout tanks when it has been determined that :
- (1) the existing or proposed building(s) or structure(s) to be served by the holding tank are publicly owned;
 - (2) the plan for construction and operation of the holding tank will not result in a public health hazard or environmental damage;
 - (3) a designer demonstrates that an economically feasible means of meeting current standards is significantly more costly than sewage holding and pumpout tanks, based on a projected twenty (20) year life of the project; and
 - (4) the design flows do not exceed 600 gallons per day.
- (b) A holding tank may also be used for a project that is eligible for a variance under §1-308, whether or not the project is publicly owned, where the existing wastewater system has failed, or is expected to fail, and in either instance, where there is no other cost feasible alternative;
- (c) When a holding tank is proposed for use, a designer shall submit all information necessary to demonstrate that the holding tank will comply with the following requirements:
- (1) the holding tank shall be capable of holding at least 14 days of the expected flow from the building;
 - (2) the tank shall be constructed of durable materials that are appropriate for the site conditions and the nature of the sewage to be stored;
 - (3) the tank, any piping connected to the tank, and all access structures connected to the tank shall be watertight. The tank shall be leakage tested prior to being placed in service;
 - (4) the tank shall be designed to protect against floatation when the tank is empty, such as when it is pumped;
 - (5) the tank shall be equipped with audio and visual alarms that are triggered when the tank is filled to 75% of its design capacity;

§1-522(c)(6) Holding Tanks

- (6) the tank shall be located so that it can be reached by tank pumping vehicles at all times when the structure is occupied; and
- (7) the analysis supports a claim under subdivision (a)(4) of this section.
- (d) The permit application shall specify the method and expected frequency of pumping.
- (e) Any building or structure served by a holding tank shall have a water meter, or meters, installed that measures all water that will be discharged as wastewater from the building or structure.
- (f) Any permit issued for the use of a holding tank will require a designer to periodically inspect the tank, visible piping, and alarms. The designer shall submit a written report to the Secretary detailing the results of the inspection and any repairs or changes in operation that are required. The report shall also detail the pumping history since the previous report, giving the dates of pumping and the volume of wastewater removed. The frequency of inspections and reports shall be stated in the permit issued for the use of the tank, but shall be no less frequent than once per year. The designer shall also inspect the water meter or meters and verify that they are installed, calibrated, and measuring all water that is discharged as wastewater. The designer shall read the meters and compare the metered flow to the pumping records. Any significant deviation shall be noted in the report and explained to the extent possible.
- (g) The owner of a holding tank shall maintain a valid contract with a licensed wastewater hauler at all times. The contract shall require the licensed wastewater hauler to provide written notice of dates of pumping and volume of wastewater pumped. Copies of all such notices shall be submitted with the written inspection reports.

§1-523 Systems located within a two-year time of travel management zone

- (a) The separation distance normally required between the bottom of a wastewater disposal system and the seasonal high water table may be reduced or eliminated provided:
 - (1) the permittee owns or controls all of the property that is located within the two-year time of travel management zone (management zone);
 - (2) there are no sources of potable water within the management zone;
 - (3) the design flow is 700 GPD or less; and

§1-523(b)(4) Systems located within a two-year time of travel management zone

- (4) a qualified hydrogeologist has delineated the two-year time of travel management zone.
- (b) The management zone shall meet the following requirements:
 - (1) the soils throughout the management zone must be consistent and horizontally extensive, must be of silt or clay texture, and shall not be tills,
 - (2) site specific testing shall be done that demonstrates there will be at least a two-year time of travel from the bottom of the leachfield to the bedrock. The analysis must include any seasonal pathways such as drying cracks,
 - (3) the management zone must extend at least 50 feet uphill of the wastewater disposal system and at least 50 feet to the sides of the system with the downslope distance based on the two-year time of travel,
 - (4) the time of travel calculation must account for effluent movement in both shallow and more permeable layers and the deeper less permeable layers. The assumptions must include movement through the shallow layers when the mounded water table formed by the combination of the effluent and the SHWT is present within the shallow layers, and
 - (5) the effluent must be designed to meet the performance based approach requirement that the mounded water table remain at least 6 inches below the surface of the naturally occurring soil throughout the management zone.
- (c) Conditions may be included in any permit to ensure that the management zone is not altered or used in a way that would result in non-compliance with the two-year time of travel concept.

§ 1-524 Storage and dose concept

- (a) Systems that store the effluent during periods when the groundwater level is near the surface and then dose the wastewater into a leachfield when the groundwater is low may be approved provided:
 - (1) the system shall be designed so that the effluent will, at all times, remain at least 6 inches below the surface of the ground, and
 - (2) the design incorporates the two-year time of travel management zone, and
 - (3) the design flow is 700 gallons per day or less.

§ 1-524(b) Storage and dose concept

- (b) The design must demonstrate that, on a yearly basis, the system can function in compliance with (a) above while discharging the design flow in no more than 9 months per year.
- (c) The design may propose an initial storage tank capacity that reflects an average water usage, the expected occupancy of the building, and the expected duration of the storage period. For residential use, a minimum of 50 gallons per day per person, 3 person occupancy, and 30 day storage period shall be used. The design shall indicate how additional tankage can be added to accommodate the full design flow. The design shall incorporate a high water alarm system that provides 5 days of storage above the alarm level.
- (d) The system shall incorporate a control system that allows discharge of wastewater to the leachfield only when the effluent level is calculated to remain at least 6 inches below the surface of the naturally occurring ground.
- (e) Conditions may be included in the permit to ensure that the system is operated in accordance with the rules and that additional storage tankage is added if the site conditions or use exceed the initial capacity.

Subchapter 6 - Municipal Regulation of Potable Water Supplies and Wastewater Systems

§1-601 Applicability

- (a) This Subchapter sets forth the minimum standards for municipal ordinances that regulate soil-based disposal systems, the Secretary's approval process for such ordinances, and the establishment of statewide, uniform, minimum technical standards by July 1, 2007.

§1-602 Minimum Standards

- (a) All ordinances adopted by municipalities under the authority of 24 V.S.A. chapters 59 and 102 that regulate soil-based disposal systems:
 - (1) shall use the design, construction, operation, and maintenance standards and criteria for potable water supplies and wastewater systems set forth in Subchapter 5 of these rules and the Vermont Water Supply Rules; or a municipality may adopt the standards and criteria for potable water supplies and wastewater systems contained in the Small Scale Wastewater Treatment and Disposal Rules, effective August 8, 1996. Regardless of which set of rules is used, a municipality may not adopt or amend a sewage ordinance or a zoning bylaw that imposes technical standards or criteria that are more stringent than the rules on which they are based,
 - (2) may allow for variances from the standards and criteria of Subchapter 5, if done in accordance with the criteria of §1-308 of these Rules;
 - (3) may allow the use of innovative/alternative systems or products that have been authorized for use by the Secretary provided that the municipality has the authority to ensure compliance with all maintenance and operational requirements contained in the Secretary's authorization;
 - (4) shall specify the municipal officials responsible for implementation and enforcement of the ordinance;
 - (5) shall regulate all new, modified or replacement soil-based disposal systems located within the municipality; and
 - (6) shall contain references to the authority to enforce the requirements of the ordinance.

§1-603 Approval of Ordinances

- (a) No ordinance or ordinance amendment adopted under 24 V.S.A chapters 59 and 102 shall take effect until the municipality has submitted the ordinance or amendment to the Secretary for a determination of its compliance with the minimum standards set forth in §1-602 and the Secretary has approved, in writing, the ordinance or amendment.

§1-604 Statewide Uniform Minimum Technical Standards

- (a) After June 30, 2007, those provisions of existing municipal ordinances and zoning bylaws that establish technical standards and criteria for the design, construction, operation, and maintenance of potable water supplies and wastewater systems are superseded (i.e. no longer in effect) by the technical standards and criteria of these rules and the Vermont Water Supply Rules,
- (b) After June 30, 2007, municipalities that have been delegated the authority to implement the permit program established by these rules may continue to have ordinances and zoning bylaws that regulate potable water supplies and wastewater systems only to the extent that such ordinances and bylaws:
 - (1) eliminate some or all of the permit exemptions contained in this chapter; or
 - (2) establish requirements for the processing of permits, including but not limited to, informal appeals of municipal acts or decisions, suspension or revocation of permits, and other procedural requirements, that are consistent with the provisions of these Rules and the Vermont Water Supply Rules.

§1-605 Existing Ordinances

Municipal ordinances relating to wastewater systems that were approved by the Commissioner of the Vermont Department of Health before July 1, 1984 shall remain in effect until amended in accordance with this Subchapter, withdrawn, or superseded by these Rules.

Subchapter 7 – Delegation

§1-701 Purpose

- (a) The purpose of this subchapter is to set forth the requirements that municipalities must comply with in order to receive delegation of the permitting and enforcement authorities of this chapter. In order to receive delegation, a municipality must demonstrate that it has sufficient authority, organization, technical expertise and enforcement authorities to adequately administer the permit program in accord with these rules.
- (b) A municipality may not request partial delegation of the wastewater system and potable water supply permit program under 10 V.S.A. §1976, (the on-site sewage program).
- (c) The Secretary will suspend the issuance of state permits in a delegated municipality.

§1-702 Request for Delegation

- (a) Application:
 - (1) A municipality requesting the delegation of the permitting and enforcement program authorized by this chapter shall apply in writing on forms approved by the Secretary.
 - (2) The application shall include:
 - (A) the name and address of the municipality and the name of the authorized representative or chair of the local legislative body who is submitting the application on behalf of the municipality;
 - (B) signature of the authorized representative of the local legislative body of the municipality;
 - (C) the name, address and phone number of the designer responsible for the municipal program;
 - (D) a copy of any contract between the municipality and the designer if not a municipal employee;
 - (E) a copy of the appointment of the sewage officer, if any;
 - (F) a description of the process for accepting, reviewing and processing applications by the municipality;

§1-702(a)(2)(G)

Request for Delegation

- (G) a copy of the agreement signed by the authorized representative or chair of the local legislative body committing to administer the program in accord with these rules; and,
- (H) for municipalities cooperating to run the program, separate delegation applications from each municipality for delegation authority, with a copy of the intermunicipal cooperative agreement signed by the chair of each local body indicating the process agreed upon and the roles and responsibilities of the member municipalities.
- (I) authority for the Secretary or his/her designee to enter the municipal property during normal working hours to review documents related to the delegation of the program and to assure compliance with the rules.

§1-703

Performance Expectations

- (a) Municipalities receiving and retaining delegation under this subchapter shall:
 - (1) at all times administer the program in compliance with these rules and with related procedures established by the Secretary to clarify, interpret or properly implement the rules.
 - (2) process permit applications and amendments in a prompt and expeditious manner, generally within 30 to 45 days of receipt.
 - (3) only issue permits that have been reviewed and found to comply with these Rules by a designer employed by the municipality.
 - (4) not, if employing a design firm as the reviewer for the municipality, accept projects designed by employees of the firm for review.
 - (5) issue permits for sewerage connections only after receipt of the approved sewage allocation for the project from the owner of the wastewater treatment facility. A municipality shall not authorize connections that are beyond the reserve capacity of the wastewater treatment facility as determined by the Secretary. The municipality must send a copy of its authorization of each direct discharge or indirect discharge sewage allocation to the Secretary.
 - (6) provide copies of each permit or denial issued to the Agency.

§1-703(a)(8) Performance Expectations

- (7) maintain the items in the permit tracking system required by the Secretary.
 - (8) if delegation is revoked pursuant to section 1-707 of these rules, promptly provide copies of all documents and required permit tracking data related to the permits processed during the period of delegation to the Secretary. Electronic or microfilm copies will be acceptable.
 - (9) notify the secretary if the designer or sewage officer is replaced or if additional designers or sewage officers are authorized to act for the municipality.
- (b) Upon delegating the authority to implement these rules to a municipality, the department shall deliver electronic copies of the historical permitting documents (currently at Public Records) for permits issued in the municipality for use in administering the permit program.
- (c) The Secretary shall promptly provide implementation documents established for the state permit program to delegated municipalities for their use in implementing the delegated program. Documents establishing or clarifying required implementation procedures shall be provided to delegated municipalities.

§1-704 Application Fees

- (a) Fees for permit applications under this chapter in towns with valid delegation of the program shall be established by the municipality in an amount sufficient to support the municipal services provided by the delegated program.
- (b) Municipalities whose delegation authority is revoked, voluntarily or otherwise, shall remit to the state the application fees for any permit application that reverts to the state for issuance. The state shall have the usual processing time available for processing such permits after receipt of applications in the appropriate Regional Office.

§1-705 Enforcement

- (a) Municipalities shall take timely enforcement actions in accordance with 10 V.S.A. Chapter 201 to assure compliance with these rules.
- (b) Penalties imposed through enforcement actions taken by the municipality shall be retained by the municipality.

§1-705(c) Enforcement

- (c) Notwithstanding municipal delegation, in instances where a delegated municipality does not or cannot address non-compliance, the Secretary, after consultation with the municipality, may institute enforcement proceedings. In no case shall a program delegation usurp the authority of the Secretary to protect human health and the environment.

§1-706 Annual Report

- (a) An annual report shall be submitted by the delegated municipality to the Department of Environmental Conservation on forms provided by the Secretary by February 15th of the year following delegation and annually thereafter by the same date. The report shall cover the preceding calendar year or portion thereof and shall provide information on:
 - (1) number of systems permitted
 - (2) number of systems denied
 - (3) types of supplies and systems
 - (4) number of failed supplies and systems
 - (5) number of failed supplies and systems replaced
 - (6) causes of failure, if known, and method of repair
 - (7) number of permit violations
 - (8) number of enforcement actions initiated, and the number completed and the results of those enforcement actions
 - (9) number of designers referred to the Board of Professional Engineering for discipline
 - (10) number of designers who are not professional engineers referred to the Agency for discipline
 - (11) such data as the Secretary in consultation with the Agency of Commerce and Community Development and the Technical Advisory Committee may require in order to fulfill the reporting requirements of Act 133 section 15 (j), if such data is integral to the permit applications administered by the municipality.

§1-707 Revocation of Delegation

(a) Basis for revocation

- (1) The Secretary may revoke delegation to a municipality for the following reasons:
 - (A) violation of the delegation agreement;
 - (B) false or misleading information submitted in support of an application for delegation;
 - (C) issuing permits that do not comply with these rules; or
 - (D) failure to take timely and appropriate enforcement actions under these rules
- (2) Delegation shall not be revoked solely based upon a disagreement regarding fees that are appropriate to support the program.
- (3) Delegation shall not be revoked solely on the basis of independent actions of the municipality's designer. If the Agency suspends or revokes the license of the municipality's designer, the municipality shall promptly act to replace the designer. Permits shall not be issued without review by a designer on behalf of the municipality.
- (4) Prior to commencing revocation proceedings, the Secretary or designee shall work with the delegated municipality to achieve compliance with these rules.

(b) Process for revocation

- (1) Upon investigation of a complaint or on his/her own motion, the Secretary shall send a Notice of Pending Revocation to the subject municipality briefly outlining the proposed basis for revocation of delegation. If the proposed basis for revocation involves actions by a designer, the designer will also be sent the Notice.
- (2) If municipalities have contracted together to perform delegated activities, the Secretary will determine whether all the delegations are affected by the reasons for revocation, and may pursue revocation of delegation to one or all of the delegated municipalities as appropriate.

§1-707(c) Revocation of Delegation

- (c) Party Status: The Secretary shall determine the right of the complainant or other persons requesting party status to participate in the proceedings. The local legislative body of the municipality that is the subject of the proposed revocation is a party by right.
- (d) Notice of Pending Revocation Hearing:
 - (1) Notice of a Pending Revocation of Delegation shall be sent to the delegated municipality(ies). If the reasons for revocation involve any actions by a designer contracted to perform reviews for the municipality, the designer will also be sent the Notice. The Notice shall be issued at least two weeks before the hearing and shall contain:
 - (A) the legal authority for the revocation;
 - (B) a brief statement of the issues upon which the proposed action is based;
 - (C) notice that the Secretary is holding a hearing for the purpose of determining whether the delegation shall be revoked; and
 - (D) the date, time and place the hearing will be held, which shall be in the region of the municipality.
- (e) Hearing: The hearing for revocation of a municipal delegation shall be conducted by the Secretary. Any party to the revocation proceedings shall either appear in person or shall be represented by an attorney. The burden of proceeding and of proving that the permit delegation should be revoked shall be upon the party petitioning for revocation. The admissibility of evidence in all revocation proceedings shall be determined under criteria set forth in 3 V.S.A. §810. Upon the request of a party, a hearing shall be transcribed by a qualified stenographer or recorded on an electronic sound device at the election of the party. If transcription by a stenographer is requested, the request shall be in writing and filed at least 10 days before the hearing. Costs shall be borne by the requesting party. The requesting party shall provide one copy of the transcript to the Secretary without cost; other parties wishing a copy shall reimburse the requesting party on a prorated basis.
- (f) Voluntary revocation: The delegated municipality may voluntarily waive the right to have a petition and hearing prior to the Secretary revoking delegation.
- (g) Appeal of a decision to revoke delegation: Appeal of a decision to revoke delegation shall be to the Water Resources Board in accord with Title 10 V.S.A §1977 until January 31, 2005. As of January 31, 2005, any appeal shall be to the environmental court in accordance with 10 V.S.A. Chapter 220.

- (h) Applications in process: Applications in process by a municipality requesting voluntary revocation shall be processed by the municipality in accord with the delegation agreement prior to the revocation of delegation. No additional applications shall be accepted by the municipality while the revocation is proceeding. Applications in process by a municipality that has received a Notice of Pending Revocation shall continue to be processed by the municipality until such time as delegation is revoked.

§1-708 Audit of Delegated Programs

- (a) The secretary shall audit the programs delegated to the town at least once within the first two years of delegation to assure compliance with these rules. Such audits shall at a minimum review a random sample of permits issued, inspections made and enforcement actions taken to determine if there is a reasonable level of consistency with the review procedures being used in the regional office. The secretary may also perform audits for quality control, information gathering or in response to a complaint.
- (b) A town shall make reasonable accommodation to allow audits to be performed at any time during normal working hours and shall maintain the records so that such an audit will not be delayed.