

Appendix B Design Standards

A. Septic Tanks

General

1. All tanks shall be concrete, plastic or fiberglass, regardless of material or method of construction, the tank shall be watertight.
2. So designed and constructed as to withstand all lateral earth pressures under saturated soil conditions with the tank empty.
3. So designed and constructed as to withstand the pressure, at the depth of the septic tank, of saturated earth cover above the tank top.
4. Not subject to excessive corrosion or decay.
5. Tanks shall be installed in accordance with manufacturer requirements. Tanks susceptible to freezing shall be insulated.

Design – all tanks shall conform to the following criteria:

1. The liquid depth of any septic tank or compartment thereof shall not be less than 30 inches. A liquid depth greater than 6 ½ feet shall not be considered in determining tank capacity.
2. No tank or compartment thereof shall have an inside horizontal dimension less than 24 inches.
3. Inlet and outlet connections of the tank shall be submerged by means of baffles or sanitary tees.
4. The space in the tank between the liquid surface and the top of the inlet and outlet baffles shall not be less than 6 inches or 100 gallons, whichever is greater, for all liquid depth with an effluent screen and alarm or for liquid depths of less than 39 inches without an effluent screen and alarm. The space between the liquid surface and the top of the inlet and outlet baffles shall not be less than 8 inches for liquid depths of 39 inches or more without an effluent screen and alarm.
5. Inlet and outlet baffles shall be constructed of acid resistant concrete, acid resistant fiberglass, or plastic. Baffles shall be resistant to excessive corrosion or decay. Inlet baffles shall not restrict the movement of solids.
6. Sanitary tees shall be affixed to the inlet or outlet pipes with a permanent water-proof adhesive. Baffles shall be integrally cast with the tank, affixed with a permanent water- proof adhesive or affixed with stainless steel connectors, top and bottom.
7. The inlet baffle, or sanitary tee, shall extend at least 6 inches, but not more than 20% of the total liquid depth below the liquid surface and at least 1 inch above the crown of the inlet sewer.
8. The outlet baffle, or tee, and the baffles between compartments shall extend below the liquid surface, a distance equal to 40% of the liquid depth, except that the penetration of indicated baffles or sanitary tees for horizontal cylindrical tanks shall be 35% of the total liquid depth. They also shall extend above the liquid surface. In no case shall they extend less than 6 inches above the liquid surface.
9. There shall be at least 1 inch between the underside of the top of the tank and the highest point of the inlet and outlet devices.
10. The inlet invert shall not be less than 2 inches above the outlet invert.
11. The inlet and outlet shall be located opposite each other along with the axis of maximum dimension. The horizontal distance between the nearest points of the inlet and outlet devices shall be at least 4 feet.
12. If site conditions warrant, the approving authority may allow the inlet and outlet to be located on walls that are not opposite each other along the axis of maximum dimension. However, the horizontal distance between the nearest points of the inlet and outlet shall be at least 4 feet. However, the requirements of #10 above shall be met.
13. Sanitary tees shall be at least 4 inches in diameter. Inlet baffles shall be no less than 6 inches or no more than 12 inches measured from the end of the inlet pipe to the nearest point on the baffle. Outlet baffles shall be 6 inches measured from beginning of the outlet pipe to nearest point on the baffle.

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14. Access to the septic tank shall be as follows:
 - a. There shall be 1 or more manholes, with a minimum diameter of 18 inches (least dimension) and located within 6 feet of all walls of the tank. All manhole covers shall be at a minimum brought 6 inches above the finished grade.
 - b. Covers shall be safely secured by being locked, bolted or screwed, having a weight of at least 95 pounds, or other methods as approved by the adopting authority to prevent unauthorized entry.
 - c. There shall be a 4-inch minimum inspection pipe for each baffled wall. The manhole cover can serve as the inspection cover. All inspection pipes shall be at minimum brought 6 inches above the finished grade.
15. Compartmentation of single tanks
 - a. Septic tanks larger than 3,000 gallons and fabricated as a single unit shall be divided into 2 or more compartments.
 - b. When a septic tank is divided into 2 compartments, not less than 1/2 nor more than 2/3 of the total volume shall be in the first compartment.
 - c. When a septic tank is divided into 3 or more compartments, 1/3 of the total volume shall be in the first compartment and the other half equally divided in the other compartments.
 - d. Connections between compartments shall be baffled so as to obtain effective retention of scum and sludge.
 - e. Adequate venting shall be provided between compartments by baffles or by an opening of at least 50 square inches near the top of the compartment walls.
 - f. Adequate access to each compartment shall be provided by 1 or more manholes. Manholes shall meet the provisions of these rules.
16. Multiple tanks
 - a. Where more than 1 tank is used to obtain the required liquid volume, the tanks shall be connected in series.
 - b. Each tank shall comply with all other provisions of these rules.
 - c. No more than 4 tanks in series can be used to obtain the required liquid volume.
 - d. The first tank shall be no smaller than any subsequent tanks in series.
17. Outlet pipe from septic tank
 - a. The outlet pipe from the septic tank shall not be cast iron.
 - b. The outlet pipe extending from the septic tank shall be of sound and durable construction, not subject to corrosion or decay.
 - c. The outlet pipe extending from the septic tank to the undisturbed soil beyond the tank shall meet the strength requirements of the American Society for Testing and Materials (ASTM), schedule 40 plastic pipe and shall be supported in a manner that there is no deflection during the backfilling and subsequent settling of the soil between the edge of the septic tank and the edge of the excavation.
 - d. The soil around the pipe extending from the septic tank shall be compacted to original density for a distance of 3 feet beyond the edge of the tank excavation.
18. Capacity
 - a. Dwelling - the liquid capacity of a septic tank serving a dwelling shall be based on the number of bedrooms contemplated in the dwelling served and shall be at least as large as the capacities given below in Table I:

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Table I Tank Sizing for Dwellings

Number of Bedrooms	Tank Liquid Capacities (Gallons)
1 to 3	1,000
4 to 5	1,500
6 to 7	2,000
8 to 9	2,500

*For 10 or more bedrooms, the septic tank shall be sized as an “other” establishment.

- b. Other Establishments. The liquid capacity of the septic tank serving a building other than a dwelling shall be determined by multiplying the design flow, see Appendix D -Estimated Sewage Flow for Other Establishments *For Reference Only*, by:
 - i. 3 if sewage is delivered by gravity to the tank
 - ii. 4 if the sewage is delivered by pressure to the tank
 - c. If a garbage disposal is installed in a dwelling or other establishment at any time, the septic tank capacity shall be at least 50% greater than that required in items a and b and either multiple compartments or multiple tanks shall be provided.
 - d. For other establishments and for dwellings utilizing a pressurized soil treatment area, an effluent filter shall be installed on the outlet of the last tank, closest to the pump chamber or soil treatment area.
 - e. Pump chamber capacity cannot be included in the sizing for septic tank liquid capacity.
19. Location
- a. The septic tank shall be placed so that it is accessible for the removal of liquids and accumulated solids.
 - b. The septic tank shall be placed on firm and settled soil capable of bearing the weight of the tank and its contents.
 - c. Setbacks see Table IV in Section C -Soil Treatment Area –Design and Construction.
20. The owner of any septic tank or their agent shall regularly inspect the tank. Whenever the top of the sludge layer is less than 12 inches below the bottom of the outlet baffle or whenever the bottom of the scum layer is less than 3 inches above the bottom of the outlet baffle the owner shall arrange for servicing by a septic system servicer.

B. Distribution and Dosing of Sewage Effluent

Supply Pipe

- 1. The supply pipe extending from the septic tank to the undisturbed soil beyond the tank excavation shall meet the strength requirements of American Society for Testing and Materials (ASTM), Schedule 40 Pipe, contained in the Standard Specifications for Poly Vinyl Chloride (PVC) Plastic Pipe Schedules 40, 80 and 120, ASTM D1785.
- 2. Supply pipe shall
 - a. Be made from materials resistant to breakdown from sewage and soil;
 - b. Be watertight, including all joints;
 - c. Be durable throughout the design life;
 - d. Not deflect, buckle, crush or longitudinally bend;

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- e. Be resistant to pressures, fatigue, and strain for the application
 - f. Be installed according to ASTM Standard Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity-Flow Applications ASTM D2321;
 - g. Be designed, installed, and protected to minimize the danger of freezing in the pipe;
 - h. Not be closer than 6 inches from final grade. Pipes susceptible to freezing shall be insulated and meet setback requirements, see Section C -Soil Treatment Area - Design and Construction.
3. Minimum slope for gravity supply pipes is 1%. Pipe restraints shall be used for slopes greater than 20% or where fluid velocities in the pipe exceed 15 feet per second.
 4. For pressure supply pipes, a minimum slope of 1% for drainback or other frost protection shall be employed.

Gravity Distribution

1. Serial distribution shall be used to distribute sewage effluent to individual trenches in a soil treatment area. If the necessary elevation differences between trenches for serial distribution cannot be achieved by natural topography or by varying excavating depths, parallel distribution shall be used. Serial distribution shall not create a pressure head on trenches at lower elevations.
2. If drop boxes are used for serial distribution, the following shall apply:
 - a. Boxes shall be watertight and be constructed of durable materials not subject to excessive corrosion or decay
 - b. The invert of the inlet supply pipe shall be at least 1 inch higher than the invert of the outlet supply pipe to the next drop box.
 - c. The invert of the outlet supply pipe to the next drop box shall be no greater than 2 inches higher than the crown of the distribution pipe serving the trench in which the box is located.
 - d. When sewage effluent is delivered to the drop box by pump, the pump discharge shall be directed against a wall or side of the box on which there is no outlet or directed against a deflection wall or other energy dissipater. The discharge rate into the drop box shall not result in surfacing of sewage from the drop box. The supply pipe shall drain after the pump shuts off.
 - e. The drop box shall be covered by a minimum of 6 inches of soil. If the top of the box is deeper than 6 inches, access shall be provided above, at, or within 6 inches of finished grade.
 - f. The drop box shall be placed on firm and settled soil.
3. Distribution boxes shall meet the following:
 - a. Shall be watertight and be constructed of durable materials not subject to excessive corrosion or decay.
 - b. The distribution box shall be covered by a minimum of 6 inches of soil. If the top of the box is deeper than 6 inches, access shall be provided above, at, or within 6 inches of finished grade.
 - c. The invert and all outlets shall be set and maintained at the same elevation.
 - d. The inlet invert shall be either
 - i. 1 inch above the outlet invert
 - ii. Sloped such that an equivalent elevation above the outlet invert is obtained within the last 8 feet of the inlet pipe.
 - e. Each trench line shall be connected separately to the distribution box and shall not be subdivided. Distribution boxes shall not be connected to one another if each box has distribution pipes.
 - f. When sewage effluent is delivered by pump, a baffle wall must be installed in the distribution box or the pump discharge must be directed against a wall, baffle, side of the box on which there is not outlet, or directed against a deflection wall, battle or other the pump discharge shall be directed against a deflection wall, baffle, or other energy dissipater. The baffle shall be secured to the box and extend at least 1 inch above the crown of the inlet pipe. The discharge rate into the drop box

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shall not result in surfacing of sewage from the box. Pressure shall not build up in the box during pump discharge.

4. Nonpressurized distribution pipes shall comply with the following:
 - a. Shall be at least 4 inches in diameter and constructed of sound and durable material not subject to corrosion or decay or to loss of strength under continuously wet conditions.
 - b. Shall have at least 1 row of holes of no less than 1/2 inch in diameter spaced no more than 36 inches apart.
 - c. Shall be laid level orientated away from the distribution device.
 - d. Shall have a load bearing capacity of not less than 1,000 pounds per lineal foot.
 - e. The distribution pipes in beds shall be uniformly spaced no more than 5 feet apart and not more than 30 inches from the side walls of the bed.

Pressure Distribution

1. Pressure distribution pipes and associated fittings shall be properly joined together and withstand a pressure of at least 40 pounds per square inch.
2. The distribution network shall be designed so there is less than 10% variance in flow for all perforations.
3. Perforations shall be no smaller than 1/8-inch diameter and no larger than 1/4-inch diameter. The number of perforations, perforation spacing and pipe size for pressure distribution shall be in accordance with Table II. The friction loss in any individual perforated lateral shall not exceed 20% of the average pressure head on the perforation

Table II Maximum Number of Perforation per Lateral

¼ inch holes	Pipe diameter in inches				
	1	1.25	1.5	2	3
Perforation spacing in feet	Number of perforations per lateral				
2	10	13	18	30	60
2.5	8	12	16	28	54
3	8	12	16	25	52
3/16-inch holes	Pipe diameter in inches				
	1	1.25	1.5	2	3
Perforation spacing in feet	Number of perforations per lateral				
2	12	18	26	46	87
2.5	12	17	24	40	80
3	12	16	22	37	75
1/8-inch holes	Pipe diameter in inches				
	1	1.25	1.5	2	3
Perforation spacing in feet	Number of perforations per lateral				
2	21	33	44	74	149
2.5	20	30	41	69	135
3	20	29	38	64	128

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4. Perforations holes shall be drilled straight into the pipe and not at an angle. Pressurized distribution laterals shall be installed level. Perforation holes shall be free of burrs. The pipes shall drain after the pump turns off.
5. The pressure distribution pipes in beds shall be uniformly spaced no more than 36 inches apart and not more than 24 inches from the outside edge of the bed or mound.
6. Pressure distribution pipes shall be connected to a header or manifold pipe that is of a diameter of such that the friction loss in the header or manifold will be no greater than 5% of the average head at the perforations. The header or manifold pipe shall be connected to the supply pipe from the pump.
7. Perforated pressure distribution pipes shall not be installed closer than 12 inches from the edge of the absorption bed and shall terminate no closer than 12 inches from the ends of the absorption bed.
8. Pressure distribution pipes cleanouts shall be provided to check the system for proper operation and cleaning of plugged perforations. Cleanouts shall be accessible from final grade.

Dosing of Sewage Effluent

1. The pump controls and pump discharge line shall be installed to allow access for servicing or replacement without entering the dosing chamber.
2. The dosing chamber shall be watertight and constructed of concrete, plastic or fiberglass.
 - a. There shall be 1 or more manholes, with a minimum diameter of 18 inches (least dimension) preferably located directly above the dosing device. Manhole covers shall be brought 6 inches above the finished grade.
 - b. Covers shall be safely secured by being locked, bolted or screwed, having a weight of at least 95 pounds, or other methods as approved by the adopting authority to prevent unauthorized entry.
 - c. The size of the sewage effluent dose shall be determined by design of the soil treatment unit but in no case shall the dosing chamber be sized to provide a dose of less than 75 gallons.
 - d. It shall be the responsibility of the installer to contact a qualified electrician for proper installation of any electrical component used for dosing.
 - e. A mechanical warning system shall be installed to warn of pump failure.
3. Pumps for gravity distribution
 - a. The pump shall discharge at least 10 gallons per minute but no more than 45 gallons per minute.
 - b. The pump shall be constructed and fitted in accordance with ASTM Standards.
 - c. The pump shall have sufficient dynamic head for both the elevation difference and friction loss.
4. Pumps for pressure distribution
 - a. The pump shall be constructed and fitted in accordance with ASTM Standards.
 - b. The pump discharge capacity shall be based on perforation discharges for a minimum average head of
 - i. For dwellings: 1 foot for 3/16 inch to ¼ inch perforations and 2 feet for 1/8-inch perforations
 - ii. For other establishments: 2 feet for 3/16 inch to ¼ inch perforations and 5 feet for 1/8-inch perforations

Perforation discharge is determined by the following formula:

$$Q=19.56cd^2h^{1/2}$$

Where q= discharge in gallons per minute

C= 0.60 = coefficient of discharge

D = perforation diameter in inches

H = head in feet

- c. The pump discharge head shall be at least 5 feet greater than the head required to overcome pipe friction losses and the elevation difference between the pump and the distribution device.

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- d. The quantity of sewage effluent delivered for each pump cycle shall be no greater than 25% of the design flow and at least 4 times the volume of the distribution pipes plus the volume of the supply pipe.
5. Pumps shall be installed in accordance with manufacturer requirements.

C. Soil Treatment Area

General - Final treatment and disposal of all sewage effluent shall be approved by the adopting authority.

1. The soil and limiting factors shall determine the type of soil treatment area. See Appendix A for soil boring and percolation test procedures.
2. Soils shall be analyzed and reported by an entity approved by the adopting authority or a registered professional soil classifier.
3. The soil sizing factor shall be determined by the soil between the limiting factor and the bottom of the soil treatment area, using the most restrictive layer as the soil sizing factor.
4. The vertical separation between the bottom of the soil treatment area and the limiting factor shall be at least 24 inches.
5. In sandy soils, a minimum of 36 inches of vertical separation shall be required.
6. Excessive overland surface flow shall be diverted from the soil treatment area.

Sizing

1. After considering the soil conditions, the required size of the soil treatment area shall be determined by number of bedrooms for dwellings, the sum of the areas required for each individual unit for multiple residential units, and by the daily sewage flow for other establishments.
2. For a multifaceted building the gallons per day of each service, number of bedrooms etc. shall be cumulative to determine the gallons per day.
3. Estimates of sewage flow for dwellings are given below in Table III:

Table III Dwelling Sewage Flow

Number of Bedrooms	Sewage Flow (gallons per day)
2	300
3	450
4	600
5	750
6	900
7	1050
8	1200
9	1350

4. For other establishments, see Appendix D as reference.
5. The minimum soil treatment area required for any dwelling shall provide treatment for at least 2 bedrooms, 300 gallons per day.

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Design and Construction

Setbacks are given below in Table IV:

Table IV Minimum Setback Distances

Feature	Sewage tanks, holding tank (feet)	Soil treatment area and distribution device (feet)
Well < 100 feet deep	100	100
Well > 100 feet deep	50	50
Any other water supply well or buried water suction pipe	50	50
Buried pipe distributing water under pressure	10	10
Surface Water bodies –from ordinary high water mark	100	100
Buildings	10	20
Property lines	10	10

Trench

1. The sizing of the soil treatment area shall be determined in accordance with Table V:

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TABLE V Soil Sizing Factors

Percolation Rate (minutes-per-inch)	Soil Texture	Soil Sizing Factor (feet ² /gallon per day)	Area per Bedroom (feet ²)
<0.1*	Coarse sand		
0.1 – 5	Medium sand	0.83	125
0.1 – 5	Fine sand	1.67	250
6 – 15	Sandy loam	1.27	190
16 – 30	Loam	1.67	250
31 – 45	Silt loam, silt	2.00	300
46 – 60	Clay loam sandy clay or silty clay	2.20	330
61 - 120**	Clay, sandy or silty clay	4.20	630
>120***			
*Soil is unsuitable for standard system if percolation rate is less than 0.1 minutes-per-inch		** Consider at-grade or mound for soils with this percolation range	***Soil is unsuitable for standard system if percolation rate is slower than 120 minutes-per-inch

2. On slopes in excess of 12%, the soil profile shall be carefully evaluated in the location of the proposed soil treatment system and down slope to identify the presence of layers with different permeability that may cause side hill seepage. In no case shall a trench be located within 15 feet of such a layer surfacing on the down slope.
3. Trenches shall not be less than 18 inches nor more than 36 inches wide. Any trench wider than 36 inches shall be considered a bed. See Section C -Soil Treatment Area -Seepage Bed.
4. Trenches should have a minimum spacing of 6 feet on center, unless located on a slope of more than 6%, then a minimum of 10 feet of undisturbed soil is required between each of the trenches.
5. The bottom of the trench excavation shall be level and along the contour. Sidewalls shall be as vertical as practical and not intentionally sloped.
6. The bottom and sides of the soil treatment system to the top of the filter material shall be excavated in such a manner as to leave the soil in a natural, un-smearred, and uncompacted condition. Excavation shall be made only when the soil moisture content is at least or less than the plastic limit.
7. Trenches shall not be more than 110 feet in length, without approval from the adopting authority.
8. Trenches shall not have a depth greater than 4 feet.
9. When in slower draining loam to clay soil, excavation shall be by backhoe or other means that allow the equipment wheels or tracks to remain on the surface soil. Excavation equipment or other vehicles shall not be driven on the soil treatment area.
10. When installed in sand, the soil treatment area shall employ one of the following:
 - a. Employ pressure distribution;

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- b. Divide the total dispersal area into multiple units that employ serial distribution, with each dispersal unit having no greater than 15 percent of the required bottom absorption area.
11. Material Used
 - a. Drain field rock trench system
 - i. There shall be a layer of at least 6 inches but no more than 24 inches of filter materials on the bottom of the trenches.
 - ii. The filter material shall completely encase the distribution pipes; see Section B - Distribution and Dosing of Sewage Effluent, to a depth of at least 2 inches.
 - iii. The filter material shall be covered with an unwoven geo-textile fabric or a similar, permeable material approved by the adopting authority
 - b. Other materials and devices may be used to distribute sewage effluent over the soil treatment area and shall be installed in accordance with manufacturer requirements, upon approval by the adopting authority.
12. The minimum depth of cover over the crown of distribution pipes shall be 12 inches of soil. The maximum depth of cover over the crown distribution pipes shall be no more than 36 inches. No more than 24 inches is preferred.
13. Each trench shall have an inspection pipe that is 4 inches in diameter. The inspection pipe shall be located at the end opposite where sewage effluent enters the drain field and allow for monitoring of current water level. Perforations shall not be located above the fabric, if used. The inspection pipe shall extend to the bottom of the distribution medium, be secured and capped 6 inches above finished grade, or accessible below grade. If the first trench has an additional inspection pipe it shall be at the entrance of the trench.
14. The trenches shall be backfilled and crowned above finished grade to allow for settling.
15. A grass cover shall be established over the soil treatment system.

Seepage Bed

In addition to applicable design and construction information found in Trench Design and Construction, beds shall meet the following requirements:

1. Beds shall have prior approval from the adopting authority.
2. Beds shall be sized with 50% more square feet than trenches.
3. Bed construction shall be limited to areas having natural slopes of less than 6%.
4. Maximum width for gravity bed is 12 feet, the maximum for pressurized bed is 25 feet.
5. Multiple beds shall be spaced at one-half the bed width.

Mound

1. Buildings utilizing a mound as soil treatment area that employs a garbage disposal shall have an effluent filter that is capable of removing food waste.
2. Mounds shall be constructed on original soil and meet the separation requirement between the bottom of the distribution medium and limiting factor.
3. There shall be at least 12 inches of original soil with a percolation rate faster than 120 minutes-per inch above the limiting factor.
4. The sizing of the soil treatment area shall be determined in accordance with Table VI by using the percolation rate of the 12 inches of original soil immediately under the clean sand layer.

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Table VI Absorption Width Sizing

Percolation rate of original soil (minutes-per-inch)	Soil Texture	Loading Rate (gallons per day/square foot)	Absorption Ratio (square feet per gallon/day)
<5	Coarse sand Sand	1.20	1.00
0.1 – 5	Fine sand Loamy fine sand	0.6	2.0
6 – 15	Sandy loam	0.78	1.50
16 - 30	Loam	0.60	2.00
31 – 45	Silt loam, silt	0.50	2.40
46 – 60	Clay loam, silty or sandy clay loam	0.45	2.67
61 – 120	Silty or Sandy Clay or Clay	0.24	5
>120	Soil is unsuitable for standard system if percolation rate is slower than 120 minutes-per-inch		

5. Mounds shall not be located on natural slopes exceeding 12%.
6. On slopes of 3% or greater, and where the original soil is a clay, sandy clay or silty clay soil, mounds shall not be located where the ground surface contour lines that lie directly below the long axis of the distribution bed represent a swale or draw, unless contour lines have a radius of curvature greater than 100 feet. Mounds shall never be located in swales or draws where the radius of curvature of the contour lines is less than 50 feet.
7. The required absorption width of mounds constructed on ground sloping from 0 to 1% shall include the width of the distribution bed plus a distance measured between the outer edges of the upslope and the down- slope banks. The required absorption width for mounds constructed on ground sloping between 1% and 12% shall include the width under the drain field rock layer plus a portion of the width of the downslope bank.
8. The side slopes on the mound shall not be steeper than 4 to 1.
9. The supply pipe from the pump to the mound area shall be installed before soil surface preparation. The trench shall be carefully backfilled and compacted to prevent seepage of sewage effluent.
10. All vegetation in excess of 4 inches in length and dead organic debris shall be removed from the surface of the total area selected for the mound, including the area under the banks. The total area shall be roughened by plowing to a depth of at least 8 inches or the sod layer broken and roughened by backhoe teeth. Furrows shall be thrown uphill and there shall be no dead furrow under the mound.
11. The soil shall be plowed or roughened when the moisture content of a fragment 8 inches below the surface is below the plastic limit. The soil under a mound including the area under the banks shall not be roughened by rototilling or pulverizing. In soils that are sandy in the top 8-inch depth, discing may be used for surface preparation as a substitute for plowing. Mound construction shall proceed immediately after surface preparation is completed.
12. A rubber-tired tractor may be used for plowing or disking, but shall not be driven on the absorption area after the surface preparation is completed. A crawler or track- type tractor shall be used for mound

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construction.

13. Materials Used

a. Drain field rock mound system

- i. The bottom area of the drain field rock layer shall be sized on the basis of 0.83 square feet-gallon per day of water per day at a minimum.
- ii. A minimum of 12 inches of soil defined as clean sand shall be placed in contact with the bottom area of the drain field rock layer area is to be located and shall be uniformly tapered to cover the entire original soil absorption area.
- iii. The clean sand shall be placed by using a construction technique that minimizes compaction. If the clean sand is pushed into place, a crawler tractor with a blade or unloaded bucket shall be used to push the clean sand into place. At least 6 inches of clean sand shall be kept beneath the equipment to minimize compaction of the plowed layer. When placing clean sand with a backhoe that has rubber tires, the tractor shall not drive over the drain field rock or banks of the mound. The clean sand layer upon which the drain field rock is placed shall be level.
- iv. A depth of at least 9 inches of drain field rock shall be placed over the rock layer area below the distribution pipe.
- v. Distribution of sewage effluent over the rock layer shall be by distribution pipe under pressure see Section B -Distribution and Dosing of Sewage Effluent.
- vi. The drain field rock shall completely encase the top and sides of the distribution pipes to a depth of 2 inches. The top of the drain field rock shall be level in all directions.
- vii. The width of the drain field rock layer in a single mound shall not exceed 10 feet.
- viii. The drain field rock shall be covered with a permeable synthetic fabric.
- ix. Construction vehicles shall not be allowed on the drain field rock until back fill is placed.
- x. On slopes of 3% or greater, the long axis of the level drain field rock layer shall not diverge up or down the slope by more than 12 inches of elevation from the natural contour line. The depth of the clean sand layer along the upper edge of the level drain field rock layer shall not vary by more than 12 inches.
- xi. Soil suitable to grow vegetative cover shall be placed on the soil treatment area to a depth of 1 foot in the center of the mound and to a depth of 6 inches at the sides.
- xii. A maximum of two 10-foot-wide rock layers may be installed side by side in a single mound if the original soil is sandy loam, loam, silt loam, silt, clay loam, sandy clay or silty clay to a depth of at least 24 inches below the clean sand layer. The rock layers shall be separated by 4 feet of clean sand.
- xiii. When 2 rock layers are installed side by side, the sandy loam fill shall be 18 inches deep at the center of the mound and 6 inches deep at the sides.

b. Other material and devices may be used to distribute sewage effluent over the soil treatment area upon approval by the adopting authority shall be installed in accordance with manufacturer requirements.

14. A clean out and vertical inspection pipe at least 4 inches in diameter shall be installed and secured at the distribution medium and sand interface. The inspection pipe shall allow for monitoring of current water level. Perforations shall not be located above the fabric, if used. The inspection pipe shall extend to the bottom of the distribution medium, be secured and capped 6 inches above finished grade, or accessible below grade.

15. A grass cover shall be established over the entire area of the mound.

16. Shrubs shall not be planted on the top of the mound. Shrubs may be placed at the foot and side of the

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mound.

17. Whenever mounds are located on slopes, a diversion shall be constructed immediately upslope from the mound to intercept and direct runoff.

At-grade System

1. Buildings utilizing an at-grade system as soil treatment area that employs a garbage disposal shall have an effluent filter that is capable of removing food waste.
2. At-grade systems shall not be installed in areas with slopes greater than 25%.
3. At-grade beds shall not exceed a width of 15 feet. The at-grade width for slopes 1% and greater does not include any width of media necessary to support the upslope side of the pipe.
4. The sizing of the soil treatment area shall be determined in accordance with Table VI by using the loading rate for the upper 12 inches of soil.
5. Materials Used
 - a. Distribution of sewage effluent over the drain field rock layer shall be by distribution pipe under pressure see Section B -Distribution and Dosing of Sewage Effluent.
 - b. At-grade systems located on 1% slope or greater require only one distribution pipe located on the upslope edge, with the bed width being measured from the distribution pipe to the downslope edge. Multiple distribution pipes may be allowed for use to provide even distribution if necessary, based upon site conditions.
 - c. The upslope edge of an at-grade bed shall be installed along the natural contour.
 - d. At-grade materials shall be placed by using construction techniques that minimize compaction.
 - e. 12 inches of soil suitable to grow vegetative cover shall be installed over the distribution media. Cover shall extend at least 5 feet from the ends of the media bed and be sloped to divert surface water. Side slopes shall not be steeper than 4 to 1.
 - f. Other material and devices may be used to distribute sewage effluent over the soil treatment area upon approval by the adopting authority shall be installed in accordance with manufacturer requirements.
6. A clean out and vertical inspection pipe at least 4 inches in diameter shall be installed and secured at the distribution medium and sand interface. The inspection pipe shall allow for monitoring of current water level. Perforations shall not be located above the fabric, if used. The inspection pipe shall extend to the bottom of the distribution medium, be secured and capped 6 inches above finished grade, or accessible below grade.
7. A grass cover shall be established over the entire area of the at-grade.

D. Alternative Systems

All alternative systems require preapproval from the adopting authority.

Holding Tanks

1. A holding tank shall comply with the septic tank provisions of these rules, see Section A -Septic Tanks.
2. Capacity:
 - a. For a dwelling, the minimum size shall be 1,000 gallons or 400 gallons times the number of bedrooms, whichever is greater.
 - b. For permanent buildings other than dwellings and temporary facilities, the capacity shall be based on measured flow rates or estimated flow rates. The tank capacity shall be at least 7 times the daily flow rate.
3. Holding tanks shall be located:

Appendix B Design Standards

- a. In an area readily accessible to a pump truck under all weather conditions.
 - b. Where accidental spillage during pumping will not create a nuisance.
4. Proof for disposal and treatment of the sewage wastes shall be maintained by the owner with a septic system servicer.
5. Holding tanks shall be monitored to minimize the chance of accidental sewage overflows. A mechanical warning system shall be installed which allows 25% reserve capacity after actuation. It shall be the responsibility of the installer to contact a qualified electrician for proper installation of any electrical component.

Chemical Toilets

1. Chemical toilets shall consist of a toilet seat connected by a metal hopper to a metal tank containing chemicals, usually sodium hydroxide. All connections to the toilet seat and the tank shall be watertight. A rod shall extend above the floor of the room to operate the agitator in the chemical tank.
2. A supply of the chemical shall be available in a closed container for periodic additions to the toilet.

Privies

1. General specifications for the design and construction of a privy.
 - a. A privy pit shall be constructed by providing a watertight structure in the pit. The watertight structure shall provide a minimum capacity of 1000 gallons.
 - b. A privy building shall be placed over the structure.
 - c. The floor of this building shall be of concrete with the privy seat of suitable material which is easily cleanable and serviceable.
 - d. A vent located adjacent to the seat shall extend from the vault to a point above the roof of the building. The seat shall be provided with a cover.
2. All openings in the building shall be screened to prevent the entrance of flies. The building shall be so constructed as to prevent the entrance of vermin to the vault. The privy door shall be self-closing.
3. A contract for disposal and treatment of the sewage wastes shall be maintained by the owner with a septic system servicer.
4. Privies shall be monitored to minimize the chance of accidental sewage overflows. If a mechanical warning system is installed, it shall allow 25% reserve capacity after actuation. It shall be the responsibility of the installer to contact a qualified electrician for proper installation of any electrical component.
5. Removable cans: When removable cans are used in a privy, they shall be placed in watertight vaults and provisions made for removing the seat so the cans can be moved for disposal of the contents in a manner acceptable to the adopting authority. The privy building shall comply with the above specifications for a pit privy building.