Chapter 3. Standard Subsurface Disposal System Components

3.1 Dimensional Requirements

Revision: July 18, 2013

Figure 3-1 shows the major horizontal separation distance requirements for a standard drainfield. Figure 3-2 shows the major horizontal separation distance requirements for a septic tank.

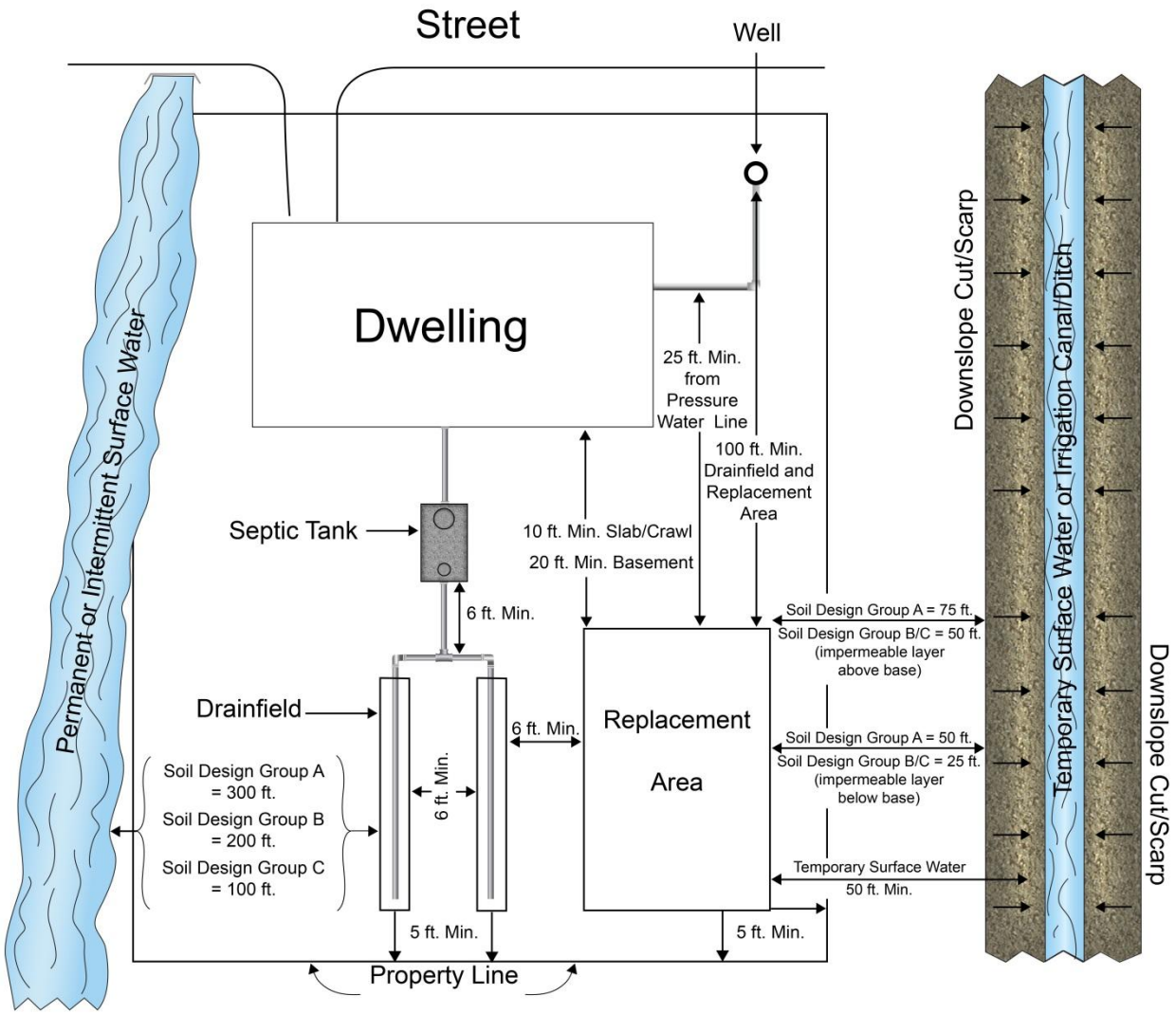

Figure 3-1. Horizontal separation distance requirements for a standard drainfield (IDAPA 58.01.03.008.02.d and 58.01.03.008.04).

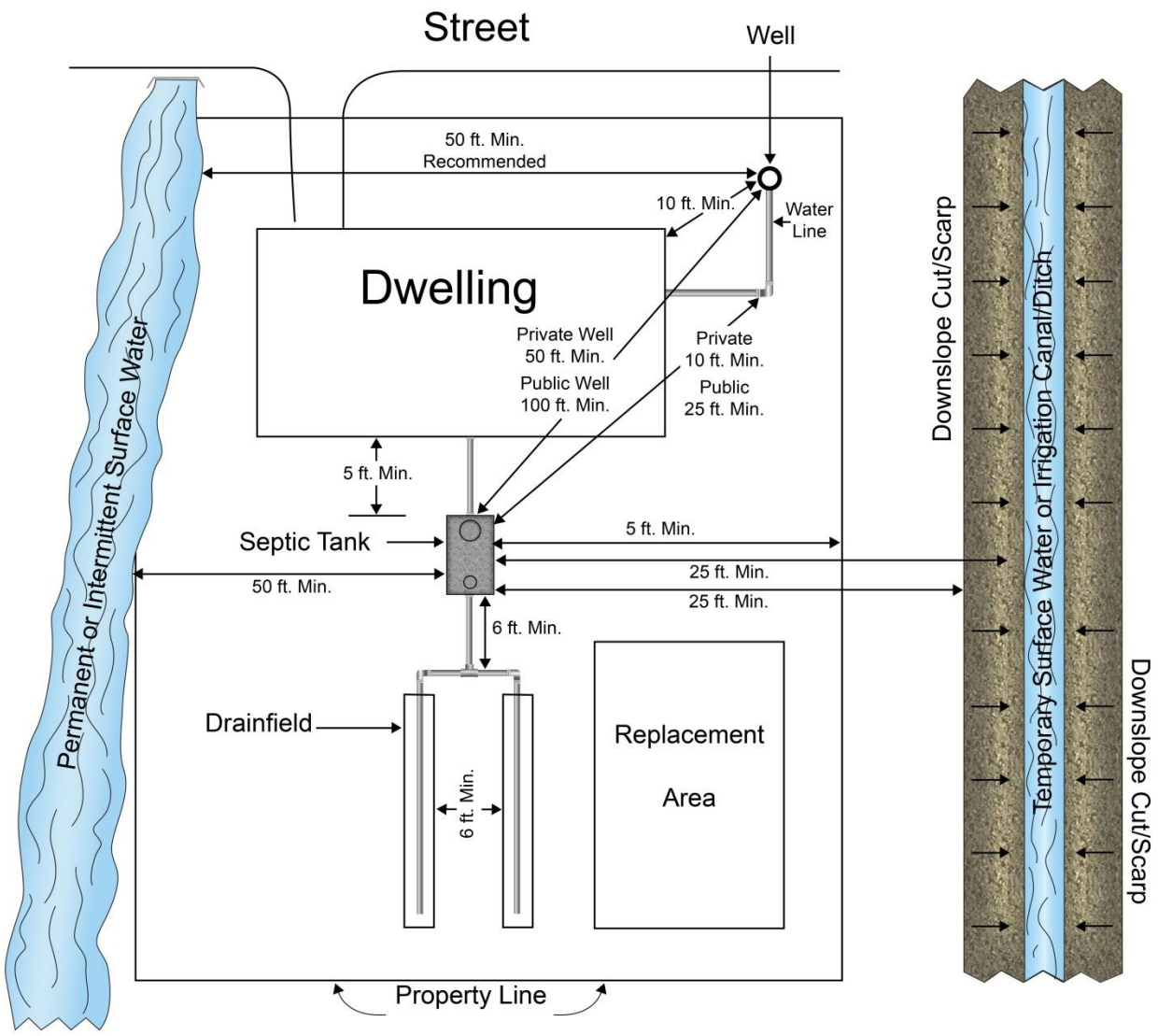

Figure 3-2. Horizontal separation distance requirements for a septic tank (IDAPA 58.01.03.007.17).

1. Minimum separation distance of 20 feet is required between a drainfield and a dwelling with a basement (IDAPA 58.01.03.008.02.d). If the basement is a daylight-style basement and the drainfield installation is below the daylight portion of the basement the minimum separation distance can be reduced to 10 feet.

2. Minimum separation distance of 6 feet is required between absorption trenches and from installed trenches or beds to the replacement area. Separation distance must be through undisturbed soils (IDAPA 58.01.03.008.04).

3. Minimum separation distance of 6 feet is required between the septic tank and the drainfield. Separation distance must be through undisturbed soils (IDAPA 58.01.03.008.04).

4. Minimum separation distance of 50 feet is required between an effluent line and a septic tank to a domestic well (IDAPA 58.01.03.007.17 and 58.01.03.007.22).

Figure 3-3 shows a cross-sectional view of a standard drainfield, along with trench dimensional installation requirements.

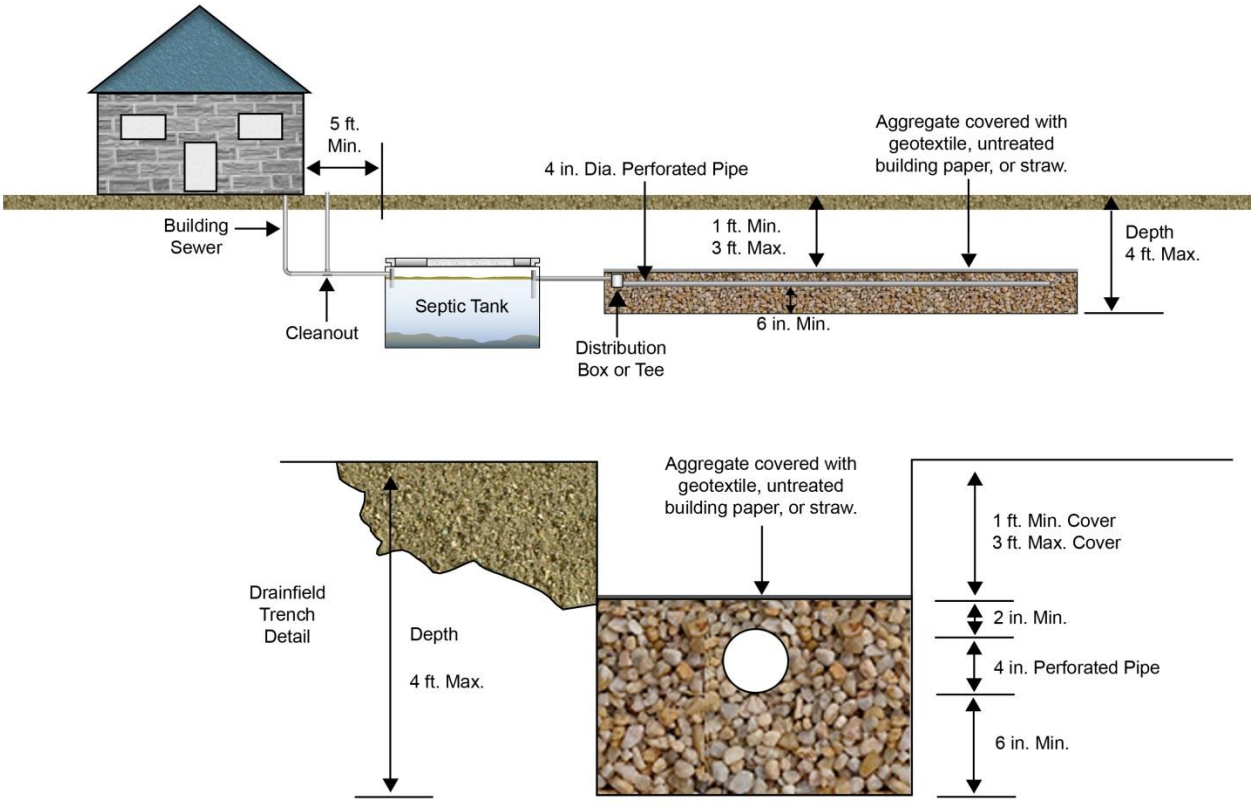

Figure 3-3. Cross-sectional view of a standard drainfield and trench dimensional installation requirements.

3.2 Components of Standard Systems

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3.2.1 Interceptors (Clarifiers) and Grease Traps

Interceptors (clarifiers) and grease traps are specifically designed devices installed to separate and retain materials, such as greases and oils, from sewage. They are usually installed between the discharging fixture, such as a sink or slaughter pad, and the septic tank. Interceptor (clarifiers) and grease trap volumes are not substitutes for minimum septic tank capacities.

Design and installation of these devices is under the jurisdiction of the Idaho Division of Building Safety, Plumbing Bureau, or a local administrative authority. These devices or additional pretreatment devices may be required for commercial or industrial establishments, such as food service businesses, car washes, slaughter houses, or others who discharge substances in the wastewater that would be detrimental to the sewage disposal system. Pretreatment device effectiveness is substantiated by monitoring the effluent and reporting the operation and maintenance performed.

Any person applying to discharge nondomestic wastewater to a subsurface sewage disposal system shall be required to provide wastewater strength characterization and sufficient information to the Director, documenting that the wastewater will not adversely affect the waters of Idaho. Commercial establishments with wastewater strengths exceeding normal domestic wastewater strength, as depicted in Table 3-1, are required to pretreat the wastewater down to normal domestic wastewater strengths.

Information on these devices is found in the Uniform Plumbing Code, 2000 Edition, Chapter 10 and Appendix H. Plans and specifications for these devices must be approved by the Idaho Division of Building Safety- Plumbing Bureau, or local administrative plumbing authority.

Table 3-1. Constituent mass loadings and concentrations in typical residential wastewater.[a]
(Revision: January 30, 2009)

Constituent	Parameter	
	Mass Loading (grams/person/day)	Concentration (mg/L)[b]
Total solids (TS)	115–200	500–880
Volatile solids	65–85	280–375
Total suspended solids (TSS)	35–75	155–330
Volatile suspended solids	25–60	110–265
Five-day biological oxygen demand (BOD_5)	35–65	155–286
Chemical oxygen demand (COD)	115–150	500–660
Total nitrogen (TN)	6–17	26–75
Ammonia (NH_4+)	1–3	4–13
Nitrite (NO_2-N) and nitrate (NO_3)	< 1	< 1
Total phosphorus (TP)	1–2	6–12
Fats, oil, and grease	12–18	70–105
Volatile organic compounds (VOC)	0.02–0.07	0.1–0.3
Surfactants	2–4	9–18
Total coliforms (TC)[c]	—	10^8–10^{10}
Fecal coliforms (FC)[c]	—	10^6–10^8

Source: United States Environmental Protection Agency, *Onsite Wastewater Treatment and Disposal Systems Manual*, 2002, (EPA/625R-00-008), Table 3-7, page 3-11.
a. For typical residential dwellings equipped with standard water-using fixtures and appliances.
b. Milligrams per liter (mg/L); assumed water use of 60 gallons/person/day (227 liters/person/day).
c. Concentrations presented in Most Probable Number (MPN) of organisms per 100 milliliters.

3.2.2 Building Sewer

The design and installation of a building sewer is under the jurisdiction of the Idaho Division of Building Safety- Plumbing Bureau, or a local administrative authority. The state or local authority must approve any plans involving the construction or installation of a building sewer. Contact the Plumbing Bureau for all guidance, permitting, and inspection requirements related to the building sewer components from household fixtures up to the inlet of the septic tank.

Information provided here is advisory only and intended for planning purposes.

1. Building sewers must run at a uniform slope of not less than one-fourth inch per foot toward the point of discharge.

2. Building sewer piping should be laid on a firm, stable bed throughout its entire length.

3. Building sewers must be installed a minimum of 12 inches below the surface of the finished grade.

4. Cleanouts shall be placed:

a. Inside the building near the connection between the building drain and building sewer, or

b. Outside the building at the lower end of a building drain and extended to grade, and

c. At intervals of up to 100 feet in straight runs, and

d. At every change in alignment or grade in excess of 22.5 degrees, except that no cleanout will be required for one 45 degree change of direction or one 45 degree offset.

3.2.3 Septic Tanks and Dosing Chambers

Both concrete septic tanks and dosing chambers should be placed on original soil. They should not be placed on unconsolidated or un-compacted fill greater than 6 inches deep. Some fill is often needed to make a smooth bearing surface in the bottom of the excavation that will receive the tank or chamber.

Concrete tanks or chambers often leak if not coated with a bituminous coating or other sealer. Such sealing is recommended in all dosing chambers and septic tanks placed in or near ground water or in porous soils.

All plastic, polyethylene, and fiberglass tanks must be installed according to the manufacturers' recommendations (IDAPA 58.01.03.007.18).

All septic tanks must have a riser if the manhole opening of the tank is deeper than 24 inches below the ground surface. The riser must come within 18 inches of the surface (IDAPA 58.01.03.007.19). Dosing chambers must have the manhole extended to the ground surface.

ABS Schedule 40 or equivalent is recommended to connect septic tanks to dosing chambers. It is also recommended as the pipe to span the septic tank excavation and extend at least 3 feet beyond. Thinner-walled ASTM D3034 plastic pipe may be used if the void at the tank's side is compacted with fill material. The material must be granular, clean, and compacted to 90% proctor density. The ASTM D3034 grade of plastic pipe is suitable if placed on undisturbed earth, used as the house sewer, and used as the distribution line to the drainfield and within the drainfield. There should not be less than 12 inches of cover over thin-walled plastic pipe. ASTM D2729 pipe is acceptable for use as the effluent pipe. ASTM D2729 is not a suitable class of pipe to span the septic tank or dosing chamber excavation. ASTM D2729 must be laid on a stable base and not driven over by excavation equipment. See IDAPA 58.01.03.007.21 for inlet and outlet piping requirements.

3.2.3.1 Specifications

1. General

   a. The manufacturer shall provide structural design and certification by an engineer licensed in the State of Idaho.

b. The tank shall be designed for the following minimum loading conditions assuming a maximum coverage of 3 feet:

Top: 375 pounds per square feet

Walls shall be designed for an inside hydrostatic water pressure to the level of the outlet and for an outside earth pressure equivalent to that exerted by a fluid weighing 30 pounds per cubic foot, in accordance with accepted engineering practice.

Each tank shall be structurally designed to withstand all anticipated earth or other loads. If the tank is to be stable with greater than 3 feet of cover, the loading requirements should be increased accordingly and the maximum cover depth marked on the tank.

c. All tanks shall be capable of being filled with water above ground for 24 hours without leaking or a major deflection in shape.

d. All tanks shall be installed in strict accordance with the manufacturer's recommended installation instructions.

e. If pipe is used as the tank baffle system, it shall meet or exceed the rating of ASTM D3034.

2. Concrete Tanks

a. The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.

b. Reinforcing steel shall be ASTM A615 Grade 60, yield strength (f_y) = 60,000 pounds per square inch (psi). Details and placement shall be in accordance with American Concrete Institute (ACI) 315 and ACI 318 or equivalent as certified by a licensed professional engineer experienced in the use of structural reinforcement fibers.

c. Concrete shall be ready-mix with cement conforming to ASTM C150, Type II. It shall have a cement content of not less than 5 sacks per cubic yard and a maximum aggregate size of three-quarter inch. Water and cement ratio shall be kept low (0.45±), and concrete shall achieve a minimum compressive strength of 3,000 psi in 28 days.

d. Form release used on tank molds shall be compatible with the water-seal method used.

e. Tanks shall not be moved from the manufacturing site to the job site until the tank has cured for 7 days or has reached two-thirds of the design strength.

f. To demonstrate watertightness, tanks shall be tested before acceptance. The tank shall be tested by filling with water to the soffit and letting stand. After 24 hours, the tank shall be refilled to the soffit and examined for visible leaks.

3. Polyethylene and Fiberglass Tanks

    a. Polyethylene and fiberglass tanks shall meet or exceed Canadian Standard CAN 3-B66-M85. A report from an independent testing company certifying that the tank meets the Canadian Standard is required.

    b. Installation instructions, prepared by the manufacturer, shall accompany each tank. Strict conformance with the backfill instructions will be required.

    c. On-site hydrostatic testing is suggested before installation. The tank should be filled with water for 1 hour. Any leakage or dimensional change greater than one-half inch shall be cause for rejection.

4. Septic Tank Abandonment. If in the opinion of the Director (see IDAPA 58.01.03.003.10 for definition), a septic system is abandoned (IDAPA 58.01.03.003.01), and it is necessary to protect the public's health and safety from the eventual collapse of the septic tank or its misuse, the Director shall require the septic tank to be abandoned by (IDAPA 58.01.03.007.23):

    a. Disconnecting the inlet and outlet piping, and

    b. Pumping the scum and septage with approved disposal, and

    c. Filling the septic tank with earthen materials, or

    d. Physically destroying or removing the septic tank from the ground.

3.2.4 Drainfields

Whether it is a trench or a bed, the drainfield should not be constructed when the soil is near or wetter than its optimum moisture (IDAPA 58.01.03.008.06). At optimum moisture, a soil will compact to its maximum ability and thus reduce its capability to transmit water. This ability to compact and restrict flow is particularly true of finer soils, such as silt loams and clay loams. It is not as critical in sands or sandy loams.

If it is entirely unavoidable to excavate the drainfield when the soil is wetter than its optimum moisture content, then the trench sidewalls and trench bottom in the excavated drainfield should be raked to relieve any compaction. Backhoe buckets and teeth can effectively smear both trench sidewalls and trench bottoms. Therefore, raking should be done manually with a strong iron garden rake after all excavation with a backhoe is complete and before the drainrock is put in place.

Drainrock should be checked for cleanliness before it is placed in the trenches. Long transportation time may generate additional fines. If drainrock is found to be unsuitably dirty when it arrives at the site, it can often be cleaned in the truck by tipping the truck bed slightly and washing the rock with a strong stream of water.

Trenches do not have to be constructed straight. It is always preferable to follow the contour of the land. The drainfield must not be installed in floodways, at slope bases, in concave slopes, or

depressions. Drainfield areas shall be constructed to allow for surface drainage and to prevent ponding of water over the drainfield.

Table 3-2 gives the lengths of trenches in the seven soil subgroups (A-2 has two application rates; see section 2.3, Table 2-10).

Drainfields larger than 1,500 ft^2 trench area bottom are prohibited from being constructed as a standard (gravity) drainfield (IDAPA 58.01.03.008.04). Drainfields exceeding 1,500 ft^2 in total trench bottom area must be pressure-dosed (section 4.20).

Table 3-2. Area requirements and total trench lengths for standard subsurface sewage disposal systems.

Number of Bedrooms	1	2	3	4	5	6
Gallons per day	**150**	**200**	**250**	**300**	**350**	**400**
			Total Trench Lengths (feet)			
Soil Group A-1 total feet	125	167	208	250	292	333
3-ft wide trench	42	56	69	83	97	111
2.5-ft wide trench	50	67	83	100	117	133
2-ft wide trench	63	83	104	125	146	167
Soil Group A-2a total feet	150	200	250	300	350	400
3-ft wide trench	50	67	83	100	117	133
2.5-ft wide trench	60	80	100	120	140	160
2-ft wide trench	75	100	125	150	175	200
Soil Group A-2b total feet	200	267	333	400	467	533
3-ft wide trench	67	89	111	133	156	178
2.5-ft wide trench	80	107	133	160	187	213
2-ft wide trench	100	133	167	200	233	267
Soil Group B-1 total feet	250	333	417	500	583	667
3-ft wide trench	83	111	139	167	194	222
2.5-ft wide trench	100	133	167	200	233	267
2-ft wide trench	125	167	208	250	292	333
Soil Group B-2 total feet	333	444	556	667	778	889
3-ft wide trench	111	148	185	222	259	296
2.5-ft wide trench	133	178	222	267	311	356
2-ft wide trench	167	222	278	333	389	444
Soil Group C-1 total feet	500	667	833	1,000	1,167	1,333
3-ft wide trench	167	222	278	333	389	444
2.5-ft wide trench	200	267	333	400	467	534
2-ft wide trench	250	333	417	500	548	667
Soil Group C-2 total feet	750	1,000	1,250	1,500	1,750	2,000
3-ft wide trench	250	333	417	500	a	a
2.5-ft wide trench	300	400	500	600	a	a
2-ft wide trench	375	500	625	750	a	a

a. Exceeds 1,500 square feet of total trench area. Use an alternative system to reduce the installed square footage of trench area below 1,500 square feet or install a pressure-dosed system.

3.2.5 Serial Distribution

On sloped ground, it is preferable to use serial distribution, that is, distribution so that each trench in order is completely filled before effluent flows to the next trench. To maintain trenches between 2 to 4 feet below ground, it may be essential to use this kind of distribution.

The drop boxes are constructed so that each trench is completely flooded before the effluent flow runs to the next downslope trench. Care must be exercised in excavating the connecting line between trenches. Bleeding of effluent down this excavation is a common cause of surfacing effluent in serial distribution systems. The excavation of the connecting trench to the next downslope trench should be just deep enough to accept the solid connector pipe. Figure 3-4 shows the detail of a drop box.

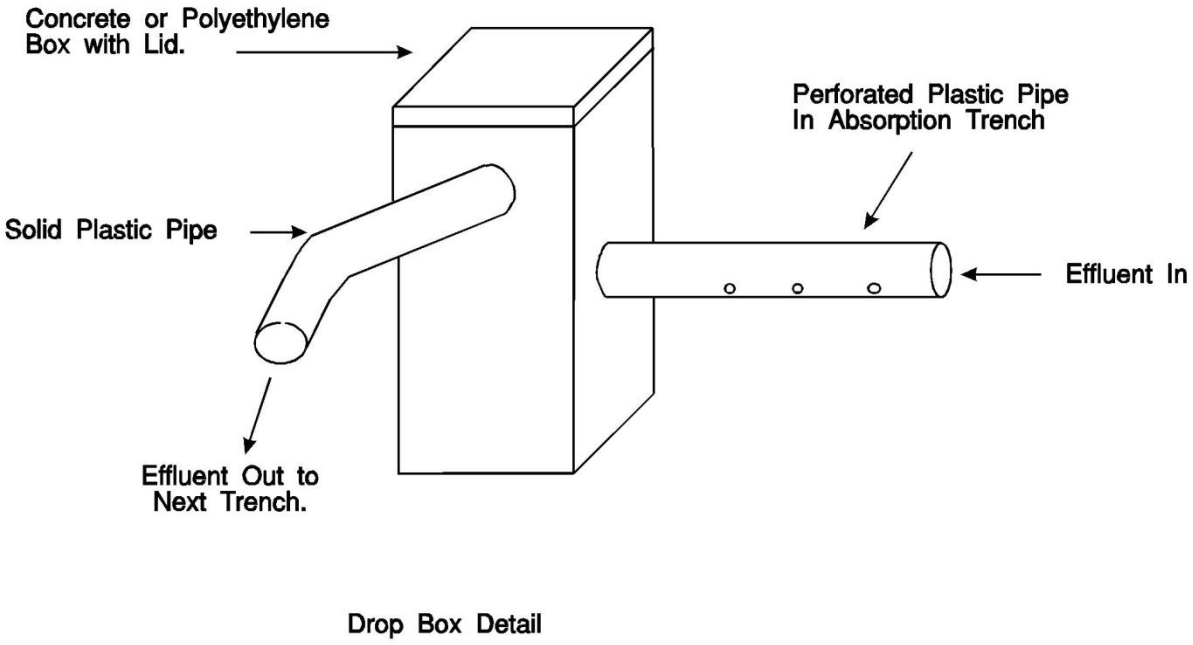

Figure 3-4. Drop box details.

3.2.6 Drainfield Cover

Although straw and untreated building paper may be used to cover drainrock, geotextiles of greater than 1 ounce per square yard weight are recommended. These materials are particularly recommended in soils that may flow when wet, such as uniform fine sands or silts and in pressure distribution systems.

3.3 References

EPA (United States Environmental Protection Agency). 2002. *Onsite Wastewater Treatment Systems Manual.* Washington, DC: EPA. EPA/625/R-00/008.