CHAPTER 3. STANDARD SUBSURFACE DISPOSAL SYSTEM COMPONENTS

3.1 Dimensional Requirements

Figure 3-1 shows the dimensional requirements for a standard drain field.

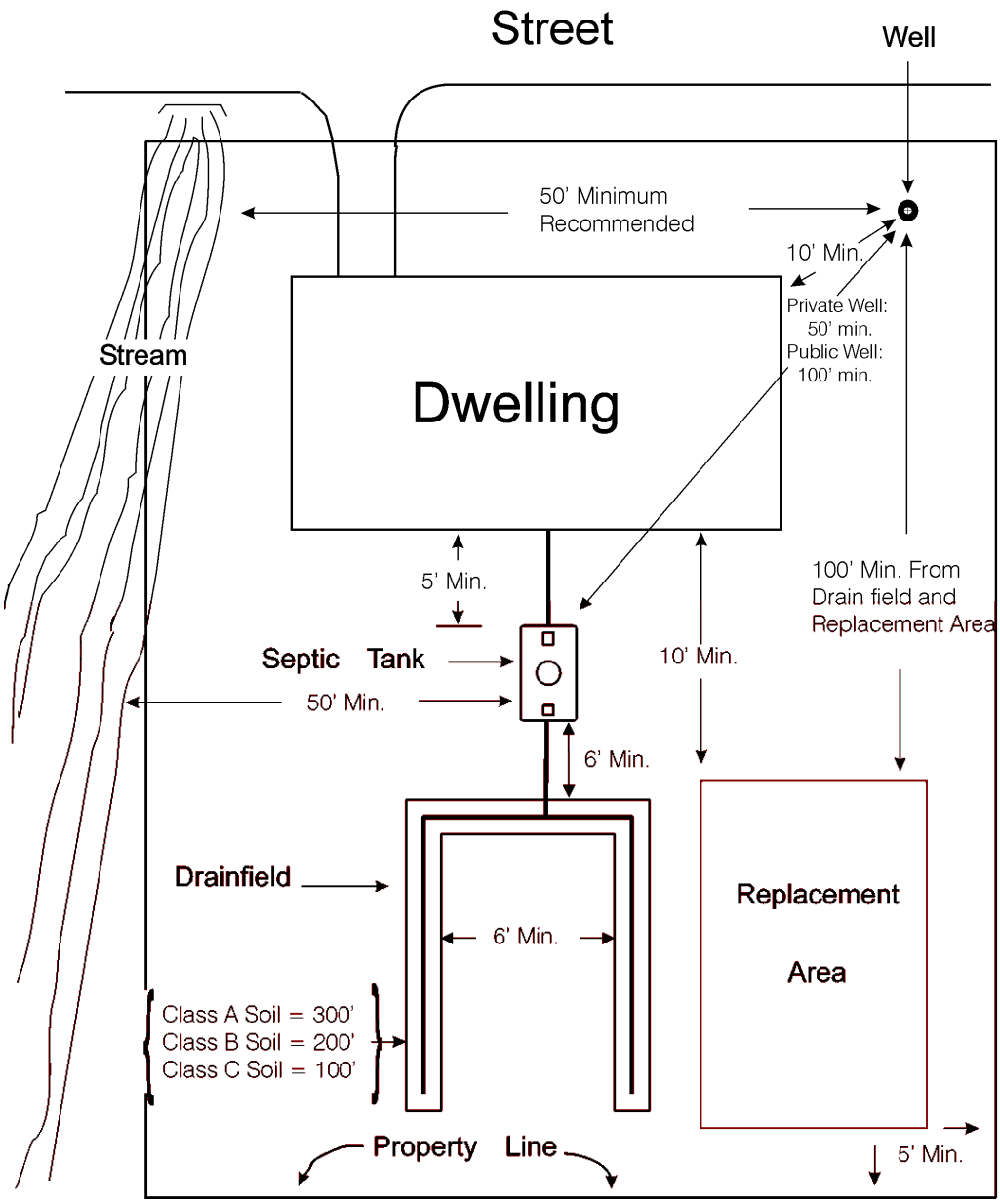

Figure 3-1. Dimensional Requirements for a Standard Drain Field

Notes:

1. The distance from a drain field to a dwelling with a basement is 20 feet.
2. There must be a minimum separation of 6 feet between absorption trenches and from installed trenches or beds to the replacement area.
3. The distance from the septic tank to the drain field is 6 feet.
4. The minimum distance between a building sewer and a domestic well is 50 feet.

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

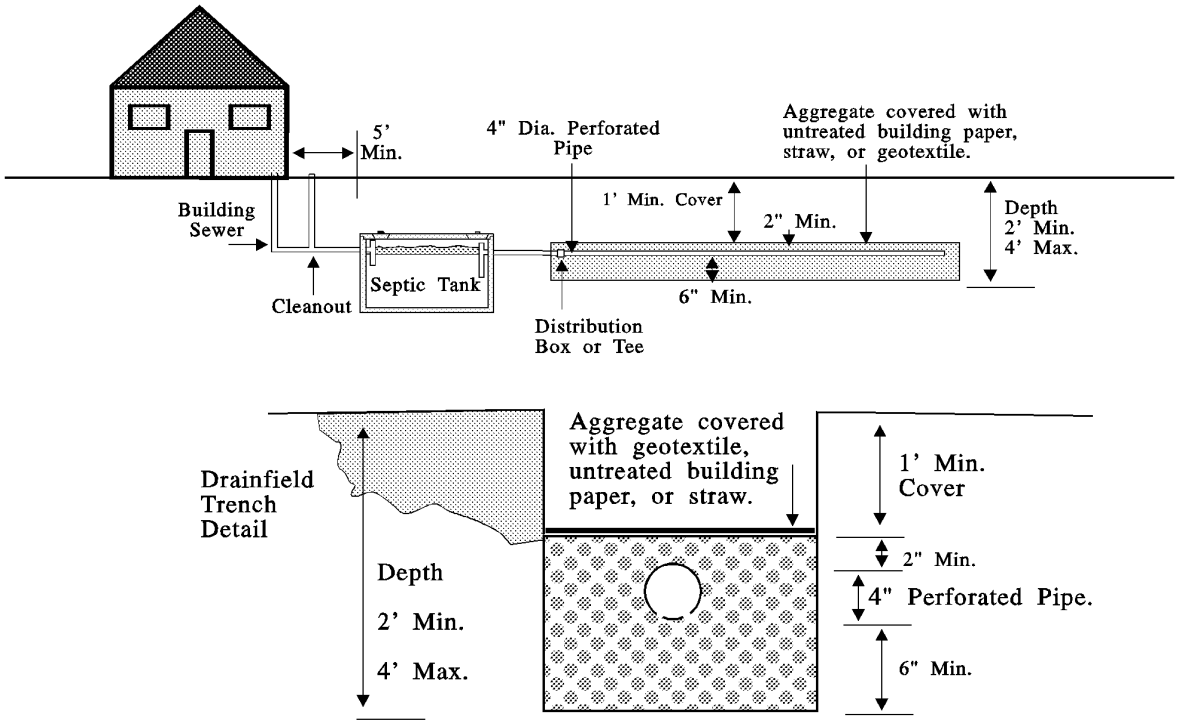

Figure 3-2. Cross-Sectional View of a Standard Drain Field and Trench Dimensional Requirements

3.2 Components of Standard Systems

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 wastewater treatment device. In this sense, they may be referred to as pretreatment devices.

The 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 establishments, car washes, slaughter houses or other establishments discharging substances in their wastewater that would be detrimental to the sewage disposal system. Effectiveness of the pretreatment device is substantiated by monitoring the effluent and reporting the operation and maintenance performed.

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

Table 3-1. Constituent Mass Loadings and Concentrations in Typical Residential Wastewater [a]

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
Nitrites (N-NO_2) and nitrates (N-NO_3)	<1	<1
Total phosphorus (TP) [c]	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) [d]		10^8 - 10^{10}
Fecal Coliforms (FC) [d]		10^6 - 10^8

[a] For typical residential dwellings equipped with standard water-using fixtures and appliances. Table source: USEPA, Onsite Wastewater Treatment Systems Manual, 2002, (EPA/625R-00-008), Table 3-7, page 3-11, which was in turn adapted from Bauer et al., 1979; Bennett and Linstedt, 1975; Laak, 1975, 1986; Sedlak, 1991; Tchobanoglous and Burton, 1991.

[b] Milligrams per liter; assumed water use of 60 gallons/person/day (227 liters/person/day).

[c] The detergent industry has lowered the TP concentrations since early literature studies; therefore, Sedlak 1991 was used for TP data.

[d] Concentrations presented in Most Probable Number of organisms per 100 milliliters.

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.

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.

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 (1/4) of an 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 twelve (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 the 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 one hundred (100) feet in straight runs; and

    d) At every change in alignment or grade in excess of twenty-two and one-half (22 1/2) degrees, except that no cleanout will be required for one (1) forty-five (45) degree change of direction or one (1) forty-five (45) degree offset.

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 uncompacted fill greater than six inches deep. Some fill is often necessary to make a smooth bearing surface in the bottom of the excavation that will receive the tank or chamber.

Concrete tanks or chambers will often leak if not coated with a bituminous coating or other sealer. Such sealing is recommended in all dosing chambers and in 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.

All septic tanks must have a riser if the manhole opening of the tank is deeper than 24" below the ground surface. The riser must come within 18" of the surface. Dosing chambers must have their 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 at least 3' beyond. Thinner-walled ASTM D-3033 or 3034 plastic pipe may be used if the void at the tanks side is compacted with fill material. That material must be granular, clean and compacted to 90% proctor density. These latter two grades of plastic pipe are otherwise suitable, if placed on undisturbed earth, as the house sewer, the distribution line to the drain field and within the drain field. In no event should there be less than 12" of cover over thin-walled plastic pipe.
ASTM D-2729 pipe is acceptable for use as the effluent pipe. ASTM D-2729 is not a suitable class of pipe to span the septic tank or dosing chamber excavation. ASTM D-2729 must be laid on a stable base and not driven over by excavation equipment.

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 psf

      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 thirty (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 and without 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 ASTM rating of D-3034.

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 A-615 Grade 60, fy=60,000 psi. Details and placement shall be in accordance with 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 C-150, Type II. It shall have a cement content of not less than 5 sacks per cubic yard and a maximum aggregate size of 3/4 inch. Water/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) In order to demonstrate watertightness, tanks shall be tested prior to 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. 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 prior to installation. The tank should be filled with water for one hour. Any leakage or dimensional change greater than 1/2 inch shall be cause for rejection.

4. Septic Tank Abandonment. If in the opinion of the Director a septic system is abandoned (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:

a) Disconnection of the inlet and outlet piping, and

b) Pumping of 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.

Drain Fields

Whether it is a trench or a bed, the drain field should not be constructed when the soil is near or wetter than its optimum moisture. It's at the optimum moisture that 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 drain field when the soil is drier than optimum, then the sides and bottom should be raked to relieve any compaction. Backhoe buckets and teeth can very effectively smear both side walls and bottoms. Therefore, raking should be done manually with a strong iron garden rake after all excavation with a backhoe is complete and before the drain rock is put in place.

Drain rock should be checked for cleanliness before it is placed in the trenches. Long transportation time may generate additional fines. If drain rock 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 drain field must not be installed in floodways, at slope bases, in concave slopes or depressions. Drain field areas shall be constructed to allow for surface drainage and to prevent ponding of water over the drain field.

Table 3-2 gives the lengths of trenches in the 7 soil subgroups (A-2 has two application rates: see Table 2-10, Percolation and Application Rates per Soil Type, in the Soils and Ground Water Section).

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**
Soil Group A-1 Total ft	125	167	208	250	292	333
3’ wide trench	42’	56’	69’	83’	97’	111’
2.5’ wide trench	50’	67’	83’	100’	117’	133’
2’ wide trench	63’	83’	104’	125’	146’	167’
Soil Group A-2a Total ft	150	200	250	300	350	400
3’ wide trench	50’	67’	83’	100’	117’	133’
2.5’ wide trench	60’	80’	100’	120’	140’	160’
2’ wide trench	75’	100’	125’	150’	175’	200’
Soil Group A-2b Total ft	200	267	333	400	467	533
3’ wide trench	67’	89’	111’	133’	156’	178’
2.5’ wide trench	80’	107’	133’	160’	187’	213’
2’ wide trench	100’	133’	167’	200’	233’	267’
Soil Group B-1 Total ft	250	333	417	500	583	667
3’ wide trench	83’	111’	139’	167’	194’	222’
2.5’ wide trench	100’	133’	167’	200’	233’	267’
2’ wide trench	125’	167’	208’	250’	292’	333’
Soil Group B-2 Total ft	333	444	556	667	778	889
3’ wide trench	111’	148’	185’	222’	259’	296’
2.5’ wide trench	133’	178’	222’	267’	311’	356’
2’ wide trench	167’	222’	278’	333’	389’	444’
Soil Group C-1 Total ft	500	667	833	1000	1167	1333
3’ wide trench	167’	222’	278’	333’	389’	444’
2.5’ wide trench	200’	267’	333’	400’	467’	*
2’ wide trench	250’	333’	417’	500’	*	*
Soil Group C-2 Total ft	750	1000	1250	1500	1750	2000
3’ wide trench	250’	333’	417’	500’	*	*
2.5’ wide trench	300’	400’	500’	*	*	*
2’ wide trench	375’	500’	*	*	*	*

* Exceeds 500 feet of trench length or 1500 ft of total trench area. Use an alternative system or request a variance.

Serial Distribution

On sloped ground it is often preferable to use serial distribution, that is, distribution such that each trench in order is completely filled before effluent flows to the next trench. In order to maintain trenches between 2’ and 4’ below ground it may be particularly 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 down-slope 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

down-slope trench should just be deep enough to accept the solid connector pipe. Figure 3-3 shows the detail of a drop box.

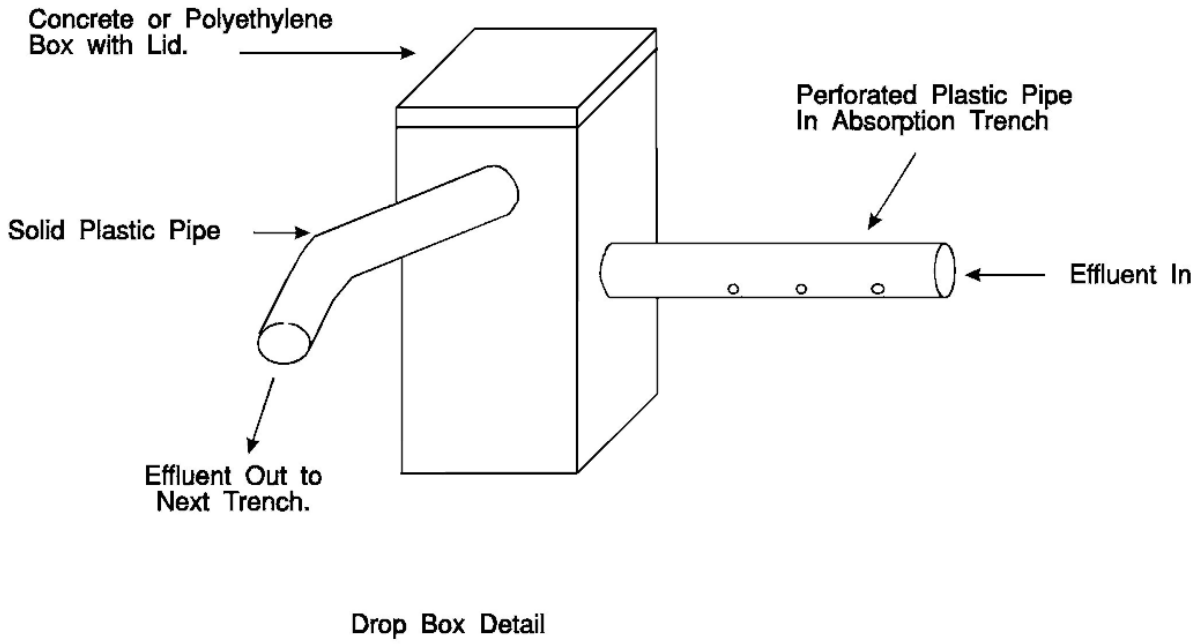

Figure 3-3. Drop Box Detail

Drain Field Cover

Although straw and untreated building paper may be used to cover drain rock, geotextiles of greater than one 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.