CHAPTER 69
PRIVATE SEWAGE DISPOSAL SYSTEMS

[Prior to 7/l/83, Health Dept. Ch 12]
[Prior to 11/19/86, Water, Air and Waste Management[900] Ch 69]

567—69.1(455B) General.

69.1(1) *Applicability.* These rules are applicable only to private sewage disposal systems (PSDSs).

69.1(2) *Definitions.*

"Administrative authority" means the department or the local county board of health as authorized by Iowa Code section 455B.172 and Iowa Code chapter 137.

"Approved" means accepted or acceptable under an applicable specification stated or cited in these rules or accepted by the administrative authority as suitable for the proposed use.

"Area drain" means a drain installed to collect surface or storm water from an open area of a building or property.

"At-grade system" means a soil absorption system constructed at or near the ground surface used to disperse effluent from septic tanks in cases in which a seasonally high water table, high bedrock conditions, slowly permeable soils, or limited land areas prevent conventional soil absorption systems.

"Building drain" means that part of the lowest horizontal piping of a drainage system which receives the discharge from soil, waste, and other drainage pipes inside the walls of any building and conveys the same to the building sewer.

"Building sewer" means that part of the horizontal piping from the building wall to its connection with the main sewer or the primary treatment portion of a PSDS conveying the drainage of a building site.

"Chamber system" means a buried structure, typically with a domed or arched top, providing at least a six-inch height of sidewall soil exposure creating a covered open space above a buried soil infiltrative surface.

"Confining layer," also known as "limiting condition," means solid or fractured bedrock, seasonally high groundwater level, any layer of soil with a stabilized percolation rate exceeding 60 minutes for the water to fall one inch, or any other factor (natural or manmade) that does not provide the 36 inch depth separation required for soil absorption.

"Conventional," when used in reference to sewage treatment, means a soil absorption system involving a series of two- to three-foot-wide trenches filled with gravel one foot deep, containing a four-inch-diameter rigid pipe or other alternative trench technologies to convey the sewage effluent.

"Distribution box" means a device designed to accomplish the equal distribution of wastewater to two or more soil absorption trenches.

"Dosing siphon" means a manufactured device that provides a measured amount of effluent determined by the manufacturer's specifications and design.

"Drip irrigation" means a form of soil absorption using shallow pressure distribution with low-pressure drip emitters.

"Drop box" means a structure used to divert wastewater flow into a soil absorption trench. When the trench is filled to a set level, the drop box then allows any additional wastewater not absorbed by that trench to flow to the next drop box or soil absorption trench.

"Dwelling" means any house or place used or intended to be used by humans as a permanent or temporary residence.

"Expanded polystyrene (EPS) aggregate systems" means cylinders comprised of expanded polystyrene (EPS) synthetic aggregate contained in high-strength polyethylene netting. The cylinders are a minimum 12 inches in diameter and are produced both with and without a distribution pipe.

"Fill soil" means clean soil, free of debris or large organic material, which has been mechanically moved onto a site and has been in place for less than one year, and is characterized by a lack of distinct horizons or color patterns as found in naturally developed, undisturbed soils.

"Filtered pump vault" means a device installed in a septic or pump tank that houses a pump and screens effluent with ⅛ inch or small diameter openings before it enters the pump.

"Foundation drain" means that portion of a building drainage system which is provided to drain groundwater, not including any wastewater, from the outside of the foundation or over or under the basement floor and which is not connected to the building drain.

"Free access filter" means an intermittent sand filter constructed within the natural soil or above the ground surface, with access to the distributor pipes and top of the filter media for maintenance and media replacement.

"gal/ft²" means gallons per square foot.

"Gravel" means stone screened from river sand or quarried and washed free of clay and clay coatings. Concrete aggregate designated as Class II by the Iowa DOT is acceptable.

"Gravel aggregate system" means a form of soil absorption system utilizing gravel as the media.

"Grease interceptor" means a watertight device designed to intercept and retain or remove grease and fatty substances. The device may be located inside (grease separator) or outside (grease tank or grease trap) a facility.

"Holding tank for waste" means a structure used for the retention or storage of domestic sewage pending removal for further treatment.

"Intermittent subsurface sand filter" or *"ISSF"* means a bed of granular materials 24 to 36 inches deep underlain by graded gravel and collecting tile and provided with a natural topsoil cover over the crown of the distribution pipes. Wastewater is applied intermittently to the surface of the bed through distribution pipes, and the bed is underdrained to collect and discharge the final effluent. Uniform distribution is obtained by dosing so as to utilize the entire surface of the bed.

"Lake" means a natural or man-made impoundment of water with more than one acre of water surface area at the high water level.

"Mound system" means an aboveground soil absorption system used to disperse effluent from septic tanks in cases in which a seasonally high water table, high bedrock conditions, slowly permeable soils, or limited land areas prevent conventional soil absorption systems.

"Other pressure distribution device" means any device for the purpose of evenly distributing effluent other than a siphon device that is a manufactured product intended to be used for that purpose.

"Percolation test" means a falling water level procedure used to determine the ability of soils to absorb treated wastewater. See Appendix B of this chapter.

"Pond" means a natural or man-made impoundment of water with a water surface area of one acre or less at the high water level.

"Pressure distribution system" means a network of distribution pipes in which effluent is forced through orifices under pressure. Pressure distribution may be accomplished by use of a pump, siphon device, or other manufactured pressure distribution devices.

"Pretreated effluent" means effluent treated through aeration or other methods that, upon laboratory analysis, meets or exceeds a monthly average for $CBOD_5$ of 25 mg/L and TSS of 30 mg/L.

"Primary treatment unit" means a unit or system used to separate the floating and settleable solids from the wastewater before the partially treated effluent is discharged for secondary treatment.

"Private sewage disposal system" or *"PSDS"* is defined in Iowa Code 455B.171. For the purposes of this chapter, the term includes septic tanks, holding tanks for waste, proprietary treatment systems, chemical toilets, impervious vault toilets, and portable toilets.

"Professional soil analysis" means an alternative to the percolation test which depends upon a knowledgeable person evaluating the soil characteristics, such as color, texture, and structure, in order to determine an equivalent percolation or loading rate.

"Professional soil scientist" means a person with training and experience in soil morphology, including, but not limited to, experience in testing the absorption qualities of soil by the physical examination of the soil's color, mottling, texture, structure, topography, and hillslope position.

"Proprietary treatment system" or *"PTS"* means any device or product that is manufactured utilizing a treatment media that provides treatment minimum standards and that is certified by a third-party certifier accredited by the American National Standards Institute (ANSI) to meet National Sanitation Foundation Standard (NSF) 40 (NSF/ANSI 40: Residential Wastewater Treatment Systems), Class I, including appendices, available on the NSF website at: https://www.nsf.org/, or equivalent testing as determined by the department. Examples may include, but are not limited to, peat moss biofilters, coconut fiber filters, synthetic foam filters, polystyrene bead media filters, textile filters, modular fixed film soil systems, or aerobic treatment units.

"PVC" means polyvinyl chloride.

"Qualified sampler," for the purposes of collecting compliance effluent samples required under NPDES General Permit No. 4, means one of the following persons: a city or county environmental health staff person; an Iowa-certified wastewater treatment operator; or an individual who has received department-approved training to conduct effluent sampling.

"Roof drain" means a drain installed to receive water collecting on the surface of a roof and discharging into an area or storm drain system.

"SCH" means schedule, as in Schedule 40 pipe. It describes the wall thickness of a pipe.

"SDR" means standard dimension ratio, which is the ratio of pipe diameter to wall thickness. It is a method of rating a pipe's durability against pressure.

"Secondary treatment system" means a system which provides biological treatment of effluent from septic tanks or other primary treatment units. Examples include, but are not limited to, soil absorption systems, ISSFs, PTSs, or other systems providing equivalent treatment.

"Septic tank" means a watertight structure into which wastewater is discharged for solids separation and digestion (referred to as part of the closed portion of the treatment system).

"Stream" means any watercourse listed as a "designated use segment" in rule 567—61.3(455B). This includes any watercourse that maintains flow throughout the year or contains sufficient pooled areas during intermittent flow periods to maintain a viable aquatic community.

"Soil absorption system" means a system of perforated conduits connected to a distribution system, forming a series of subsurface, water-carrying channels into which the treated effluent is discharged for direct absorption into the soil (referred to as part of the open portion of the treatment system).

69.1(3) *General PSDS regulations.*

a. Connections to approved sewer systems.

(1) No PSDS shall be installed, repaired, or rehabilitated where a publicly owned treatment works (POTW) is available or where a local ordinance requires connection to a POTW. A POTW may be considered unavailable when the POTW, or any building or any exterior drainage facility connected thereto, is located more than 200 feet from any proposed building or exterior drainage facility on any lot or premises which abuts and is served by a POTW. Final determination of availability shall be made by the administrative authority.

(2) When a POTW becomes available within 200 feet, any building then served by a PSDS shall be connected to said POTW within a time frame and under conditions set by the administrative authority.

(3) When a POTW is not available, every building wherein persons generate domestic sewage shall be provided with an approved PSDS. A holding tank for waste may be used only if all other PSDS options are impractical.

(4) If a building is to be connected to an existing PSDS, that existing system shall meet the requirements of these rules and be appropriately sized.

b. Construction or alteration. All constructed or altered PSDSs shall comply with this chapter. Alteration includes any changes that affect the treatment or disposal of the waste. Repair of existing components of a PSDS that do not change the treatment or disposal of the waste are not considered alterations. However, the discharge restrictions in 69.1(9) apply.

c. Abandonment. PSDSs shall be abandoned in the following manner:

(1) Concrete tanks shall be pumped, the tank lid crushed into the tank, and the tank filled with sand or soil.

(2) Plastic, fiberglass, or metal tanks shall be pumped and removed, and the cavity filled with sand or soil.

69.1(4) *Construction permit required.* No PSDS shall be installed or altered as described in 69.1(3)*"b"* unless a construction permit issued by the administrative authority has been obtained prior to construction. PSDS installation shall be in accordance with these rules.

69.1(5) *Permit by rule.* This chapter is intended to act as a permit by rule for PSDS. Activities in compliance with this chapter are permitted by the director for purposes of compliance with Iowa Code sections 455B.183 and 455B.186.

69.1(6) *Equivalent of 16 individuals.*

a. A PSDS may be permitted by the local county board of health in accordance with this chapter if a PSDS provides treatment for the equivalent of less than 16 individuals on a continuing basis as described in this subrule. A system that provides treatment for sixteen or more individuals on a continuing basis must be permitted by the department under 567—Chapter 60.

b. A PSDS provides treatment for the equivalent of less than 16 individuals on a continuing basis when any of the following are true:

(1) It is a single or interconnected PSDS which has a secondary treatment system with a maximum design flow of 1,500 gallons per day (gpd), and there are no other PSDSs on the property containing the treating system;

(2) It is a single or interconnected PSDS which has a secondary treatment system with a maximum design flow of 1,500 gpd, and all other PSDS on the property containing the system are either holding tanks for waste, chemical toilets, impervious vault toilets, or portable toilets; or are used solely to treat domestic waste from a private dwelling; or

(3) It is part of a property-wide scheme to provide for the treatment and disposal of domestic waste, where:

1. The property-wide scheme utilizes multiple septic tank-style or other PSDS, but does not include holding tanks for waste, chemical toilets, impervious vault toilets, or portable toilets;

2. The sum of the total maximum design flow of all the secondary treatment systems used in the property-wide scheme is less than 1,500 gpd; and

3. All other disposal systems on the property not used in the scheme are either holding tanks for waste, chemical toilets, impervious vault toilets, or portable toilets; or are used solely to treat domestic waste from a private dwelling.

c. For purposes of this subrule, "property" includes contiguous properties which are under common ownership.

69.1(7) *Site Analysis***.**

a. Site evaluation. A site evaluation shall be conducted by the administrative authority prior to issuance of a construction permit. Consideration shall be given, but not be limited, to the impact of the following:

(1) Topography; including drainage ways, terraces, floodplains, and percent of land slope;

(2) The location of property lines, easements, buried utilities, existing and proposed tile lines, and existing, proposed, and abandoned water wells;

(3) The amount of available area for installation of the system;

(4) Evidence of unstable ground; and

(5) Alteration (cutting, filling, compacting) of existing soil profile.

b. Soil characteristics and permeability. The soil characteristics and permeability of a specific site shall be determined by performing a percolation test or a soil analysis. The local administrative authority shall determine who is a trained and qualified professional soil scientist and who may conduct percolation tests. All percolation tests shall be conducted in accordance with Appendix B of this chapter.

c. Final inspections. The administrative authority shall conduct an at-location inspection of all newly constructed PSDSs before the system is backfilled. A final as-built drawing shall be made as part of the final inspection and kept on file with the construction permit.

d. Onsite wastewater tracking system. All pertinent information including, but not limited to, the site address, owner, type, date of installation, percolation test or soil analysis, and as-built drawing of the PSDS shall be entered into the department's onsite wastewater tracking system, available on the department's website at www.iowadnr.gov, after a final inspection is conducted.

69.1(8) *Separation distances.* All PSDSs shall be located in accordance with the minimum separation distances in Table A in 567—paragraph 43.3(7)*"d."*

69.1(9) *Discharge restrictions.* It is prohibited to discharge any wastewater from PSDSs (except as permitted in this chapter) to any ditch, stream, pond, lake, natural or artificial waterway, county drain tile, surface water drain tile, or land drain tile, to the groundwater, or to the surface of the ground. Under no conditions shall effluent from PSDSs be discharged to any abandoned well, agricultural drainage well, or sinkhole. Existing discharges to any of the above-listed locations or structures shall be eliminated by the construction of a system in compliance with this chapter.

a. Requirements when effluent is discharged into surface water. All discharges from PSDSs which are discharged into any designated waters of the state or subsurface drainage tile shall conform with the requirements of NPDES General Permit No. 4 issued by the department, as referenced in 567—Chapter 60. Prior to the use of any system discharging to designated waters of the state or a subsurface drainage tile, a Notice of Intent to be covered by NPDES General Permit No. 4 shall be submitted to the department. Systems covered by NPDES General Permit No. 4 must meet all applicable permit requirements, including effluent sampling and monitoring. No PSDS shall discharge to a state-owned natural or artificial lake, an outstanding Iowa water, or an outstanding national water as defined in 567—subrule 61.2(2).

b. Requirements when effluent is discharged above the ground surface. All discharges from PSDSs which are discharged to the surface of the ground and that require a maintenance contract shall be installed, operated, and maintained by a manufacturer-certified technician in accordance with the manufacturer's instructions and the requirements of the local administrative authority.

c. Requirements when effluent is discharged into the soil. No septage or wastewater shall be discharged into the soil except in compliance with this chapter.

69.1(10) *Maximum flow rates.*

a. Residential wastewater design flow rates are based on 150 gallons per bedroom per day. Wastewater design flow rates for non-residential waste applications serving the equivalent of fewer than 16 individuals on a continuing basis are detailed in Appendix A of this chapter.

b. Wastewater design flow rates for a non-residential use not listed in Appendix A may be determined by a professional engineer licensed in the State of Iowa prior to issuance of a construction permit by a local administrative authority. The local administrative authority may require that the system be designed using the non-residential flows listed in Appendix A.

69.1(11) *Flow equalization.* Flow equalization may be used at the discretion of a professional engineer licensed in the State of Iowa. The determination to use flow equalization shall be made prior to issuance of a construction permit by a local administrative authority. If used, flow equalization shall meet all of the following criteria:

a. The design flow of the secondary treatment unit which receives the equalized flow cannot exceed 1,500 gallons per day.

b. Equalized flow to the secondary treatment unit shall be mechanically time dosed.

c. The design engineer shall accompany the local administrative authority on the final inspection to ensure the system is properly installed.

567—69.2(455B) General design standards.

69.2(1) *Building sewer requirements*.

a. Location and construction. Building sewers shall be constructed in accordance with the separation distances in Table B in 567—paragraph 43.3(7)"*d."* The distances shall be considered minimum distances and shall be increased where possible to provide better protection.

b. Type. Building sewers used to conduct wastewater from a building to the primary treatment unit of a PSDS shall be constructed of:

(1) SCH 40 PVC pipe (SDR 26 or stronger) with solvent-weld or bell-and-gasket-type joints approved for use for below grade applications or for the wastewater industry; or

(2) Cast iron with integral bell-and-gasket-type joints.

c. Size. Building sewers shall not be less than four inches in diameter.

d. Grade. Building sewers shall be laid to the following minimum grades:

4-inch sewer . . . . . 12 inches per 100 feet

6-inch sewer . . . . . 8 inches per 100 feet

69.2(2) *Cleanouts.*

a. Spacing. A cleanout shall be provided where the building sewer leaves the structure and at least every 100 feet downstream.

b. Change of direction or grade. An accessible cleanout shall be provided at each change of direction or grade if the change exceeds 45 degrees prior to primary treatment.

69.2(3) *Grease interceptors.*

a. Applicability. Grease interceptors shall be provided for kitchen flows at restaurants, nursing homes, schools, hospitals, and any other facilities from which grease can be expected to be discharged.

b. Installation. Grease interceptors shall be installed on separate building sewers serving kitchen flows into which the grease will be discharged. A discharge from a grease interceptor must flow to either a properly designed septic tank or to a building sewer and then to the primary treatment unit.

69.2(4) *Impervious vault toilets*.

a. *Location.* Impervious vault toilets shall be located in accordance with the separation distances in Table A in 567—paragraph 43.3(7)"*d"* for the closed portion of a treatment system.

b. *Construction.* The vault shall be constructed of reinforced, impervious concrete at least four inches thick. The superstructure, including floor slab, seat, seat cover, riser, and building, shall comply with good design and construction practices to provide permanent, safe, and sanitary facilities. The vault shall be provided with a cleanout opening fitted with a fly-tight cover.

c. *Wastewater disposal.* Wastewater from impervious vault toilets shall be disposed of at a POTW or other department-permitted wastewater disposal system (DS).

69.2(5) *Portable toilets.*

a. Design. All portable toilets shall be designed to receive and retain the wastes deposited in them and shall be located and maintained in a manner that will prevent the creation of any nuisance condition.

b. Wastewater disposal. Wastewater from portable toilets shall be disposed of at a POTW or other

department-permitted wastewater DS.

69.2(6) *Holding tanks.*

a. General. Holding tanks may only be used when site characteristics or restrictions do not allow for the installation of a system that consists of both primary and secondary treatment or when the use will be seasonal or sporadic.

b. Capacity. The minimum liquid-holding capacity shall be 1,250 gallons.

c. Pumping frequency. Holding tanks shall be pumped as necessary to prevent overflows, leaks, or releases of waste.

d. Record keeping. Holding tank owners shall keep all pumping records for three years, and records shall be available to the administrative authority upon request.

e. Construction. Holding tanks shall be constructed and installed using the materials and processes allowed for septic tanks in 69.3(8). All holding tanks shall be equipped with a high-water alarm.

f. Wastewater disposal. Wastewater from holding tanks shall be disposed of at a POTW or other department-permitted wastewater DS.

69.2(7) No PSDS shall be located upon property under ownership different from the ownership of that property or lot upon which the wastewater originates unless easements to that effect are legally recorded and approved by the proper administrative authority.

567—69.3(455B) Primary treatment unit.

69.3(1) *General.* Every PSDS shall have, as a primary treatment unit, a septic tank as described in this rule.

a. All wastewater from a facility shall discharge into a septic tank, and all septic tank effluent shall discharge into a secondary treatment system in compliance with this chapter.

b. Septic tanks shall not be used for the disposal of chemical wastes or grease in quantities which might be detrimental to the bacterial action in the tank or for the disposal of drainage from roof drains, foundation drains, or area drains.

69.3(2) *Capacity.*

a. The minimum liquid-holding capacity for septic tanks is specified in Table I (capacity may be obtained by using one or more tanks):

Table I - Septic Tank Holding Capacity

Home Size	Septic Tank Minimum Liquid Holding Capacity in gallons
Up to and including 3-bedroom homes	1,250 gal.
4-bedroom homes	1,500 gal.
5-bedroom homes	1,750 gal.
6-bedroom homes	2,000 gal.
Each additional bedroom	+ 250 gal.

b. Approval of septic tank capacity and design must be obtained from the administrative authority, if an installation serves a facility other than a house and serves the equivalent of fewer than 16 individuals on a continuing basis. Minimum septic tank liquid-holding capacity shall either be 1,250 gallons or two times the daily sewage flow as estimated from Appendix A, whichever is greater.

c. The minimum liquid-holding depth in any tank compartment shall be 40 inches. The maximum liquid-holding depth for calculating capacity of a tank shall not exceed 6½ feet.

d. The interior length of a septic tank should not be less than five feet and shall be at least 1½ times the width (larger length-to-width ratios are preferred). No tank or compartment shall have an inside width of less than two feet. The minimum inside diameter of a vertical cylindrical septic tank shall be five feet.

69.3(3) *Compartmentalization.* Every septic tank shall be divided into two compartments as follows. Compartmentalization may be obtained by using more than one tank.

a. The influent compartment capacity shall not be less than ½ or more than ⅔ of the total tank capacity.

b. The effluent compartment capacity shall not be less than ⅓ or more than ½ of the total tank capacity.

c. The invert of the inlet pipe shall be a minimum of two inches and a maximum of four inches higher than the invert of the outlet pipe.

69.3(4) *Baffles.*

a. Four-inch-diameter SCH 40 PVC pipe tees shall be used as inlet and outlet baffles.

b. Inlet tees shall extend at least six inches above and eight inches below the liquid level of the tank. The inlet tee shall extend below the liquid level for no more than 30 percent of the liquid depth.

c. The outlet tee shall extend above the liquid level a distance of at least six inches and below the liquid level a distance of at least 15 inches, but no more than 40 percent of the liquid depth.

d. A minimum one-inch clearance between the top of the inlet and outlet tees and the bottom of the tank lid shall be provided. A horizontal separation of at least 36 inches shall be provided between the inlet baffle and the outlet baffle in each compartment.

e. Outlet baffles shall be fitted with, or replaced by, an approved effluent screen. All effluent screens shall be certified by a third-party certifier accredited by ANSI to meet NSF/ANSI Standard 46: Water Treatment System Components, available on the NSF website at: https://www.nsf.org/; or other equivalent testing as determined by the department. Effluent screens require periodic inspection and cleaning to ensure their continued proper operation.

f. A horizontal slot four inches by six inches, or two suitably spaced four to five-inch-diameter holes in the tank partition, may be used instead of a tee or baffle. The top of the slot or holes shall be located below the water level within the middle third of the liquid depth. A ventilation hole or slot, located at least eight inches above the liquid level, shall be provided in the partition.

69.3(5) *Access.*

a. Access necessary for adequate inspection, operation, and maintenance must be provided to all parts of septic tanks.

b. Access openings shall be provided for each chamber, including the inlet, outlet, and pump chamber (if applicable). Openings shall be at least 18 inches in the smallest dimension, and of adequate size to allow for pumping, maintenance, and visual inspection.

c. Watertight risers with a minimum diameter of 18 inches shall be installed to bring the access openings to the ground surface. To deter tampering, risers shall be secured using either stainless steel fasteners of sufficient complexity, locking devices, concrete lids of sufficient weight, or another device approved by the administrative authority.

69.3(6) *Installation.*

a. Concrete, fiberglass, or plastic tanks shall be bedded and installed according to the manufacturer's specifications. Provisions should be made to prevent flotation of the tanks when they are empty.

b. Any septic tank placed in fill soil shall be placed upon a level base that is stabilized through compaction or other manufacturer allowed practices.

69.3(7) *Connecting pipes*.

a. Pipes connecting septic tanks installed in series and prior to the distribution box or distribution network or device shall be a minimum of four-inch-diameter SCH 40 PVC (SDR 26 or stronger).

b. All inlet and outlet connections shall be made by self-sealing gaskets either cast into the concrete or formed into the plastic or fiberglass approved for below grade applications or for use in the wastewater industry.

c. All joints in connecting pipe shall be approved connections that match the rating of the pipe, such as solvent-welded or compression-type gaskets approved for below grade applications or use.

d. Pipes shall be used to extend across excavations or unstable ground to at least two feet beyond the point where the original ground has not been disturbed during septic tank installation. If the excavation spanned is more than two feet wide, it must be filled with sand or compacted fill to provide a firm bed for the pipe. The first 12 inches of backfill over the pipe shall be applied in thin layers, using material free from stones, boulders, large frozen chunks of earth, or any similar material that could damage or break the pipe.

69.3(8) *Construction.*

a. Septic tanks shall be constructed of either watertight poured concrete, fiberglass, or plastic resistant to corrosion or decay and shall be designed so that the tanks, whether full or empty, will not collapse or rupture when subjected to anticipated earth and hydrostatic pressures. Metal tanks are prohibited.

b. Tanks shall be watertight. Prior to approving a tank, the administrative authority may ask for proof that a tank is watertight.

c. Tank divider walls and divider wall supports shall be constructed of either heavy, durable plastic, fiberglass, concrete, or other similar corrosion-resistant materials approved by the administrative authority.

d. Inlet and outlet ports of pipes shall be constructed of SCH 40 PVC sanitary tees or other similar approved corrosion-resistant material.

e. Concrete used in precast septic tank construction shall have a maximum water-to-cement ratio of 0.45. Cement content shall be at least 650 pounds per cubic yard. Minimum compressive strength (f^c) shall be 4,000 pounds per square inch (28 megapascals) at 28 days of age. The use of ASTM C150 Type II cement or the addition of either silica fume or Class F fly ash is recommended.

f. Minimum wall thickness for septic tanks shall conform to the most recent International Association of Plumbing and Mechanical Officials (IAPMO) standards, available on their website at: https://www.iapmo.org/publications/read-uniform-codes-online/, or to the following specifications:

Poured concrete	6 inches thick
Poured concrete, reinforced	4 inches thick
Special concrete mix, vibrated and reinforced	2.5 inches thick
Fiberglass or plastic	0.25 inches thick

g. Septic tank bottoms shall conform to the specifications in paragraph *"f"* of this subrule for septic tank walls, except that special mix concrete shall be at least three inches thick.

h. Concrete or masonry septic tank tops shall be a minimum of four inches in thickness and reinforced with ⅜-inch reinforcing rods in a six-inch grid or equivalent. Fiberglass or plastic tank tops shall be a minimum of ¼ inch in thickness, have reinforcing, and be of ribbed construction.

i. The concrete cover for reinforcing bars, mats, or fabric shall not be less than one inch.

567—69.4(455B) Effluent Distribution.

69.4(1) *Pump systems.* Dosing through mechanical pumping is the recommended method of effluent distribution, and is preferred to improve distribution, improve treatment, and extend system life. In the event that effluent from a septic tank outlet cannot be discharged by gravity while maintaining the proper lateral depths, the effluent may be discharged into a watertight pump pit with an inside diameter of not less than 24 inches, equipped with a tight-fitting cover at grade level. Pumps shall be of a submersible type of corrosion-resistant material.

a. Inlet. Pump inlets shall be elevated at least four inches above the bottom of the pump tank to prevent the pump from drawing excessive settled solids.

b. Electrical. Electrical installations shall comply with all applicable State and local codes and ordinances. Electrical connections shall be located in an exterior weatherproof box. No onsite electrical connections shall be located in the pump pit.

c. Pump setting. Pumps shall be installed in the pump pit in a manner that ensures ease of service and protection from frost and settled sludge. Pumps shall be set to provide a dosing frequency of approximately four times a day based on the maximum design flow.

d. Pipe. Distribution pipe used in pressure dosed systems shall be rated for pressure use and be a minimum SCH 40 PVC pipe (SDR 26 or stronger).

e. Pressure line size. The diameter of the pressure line from the pump to the point of discharge shall not be smaller than the outlet of the pump it serves.

f. Drainage. Pressure lines shall either be installed to provide total drainage between dosing to prevent freezing or shall be buried below frost level up to the distribution point.

g. High water alarm. Pump pits shall be equipped with a sensor set to detect if the water level rises above the design high water level if the pump fails. This sensor shall activate an auditory or visual alarm to alert the building occupants.

h. Discharge point. The effluent may either be discharged under pressure into a distribution box or distributed by small-diameter pipes throughout the entire absorption field.

i. Filtered pump vaults. Filtered pump vaults, when used, require periodic inspection and cleaning to ensure their continued proper operation.

69.4(2) *Gravity distribution.* Septic tank effluent may be serially loaded to soil absorption trenches by drop boxes or overflow piping (rigid sewer pipe). Otherwise, effluent shall be distributed evenly to all trenches by use of either a distribution box or a commercial distribution regulator approved by the administrative authority.

a. General design and use. Gravity distribution boxes shall:

(1) Be installed with separate watertight headers leading from the distribution box to each lateral.

(2) Be constructed of corrosion-resistant rigid plastic materials. Header pipes shall be rigid SCH 40 PVC pipe (SDR 26 or stronger) meeting ASTM 2729 or equivalent.

b. Equal length. Soil absorptions trenches served by a gravity distribution box shall be of equal length. Soil absorptions trenches served by drop boxes may vary in length.

c. Baffles. There shall be a pipe tee at the inlet to break the water flow.

d. *Outlets.*

(1) A distribution box shall have outlets at the same level, at least four inches above the bottom of the box, to provide a minimum of four inches of water retention in the box.

(2) All distribution box outlets shall be made level. A four inch cap with an offset hole approximately 2½ inches in diameter shall be installed on each outlet pipe. The caps shall be rotated until all outlets discharge at the same elevation. Equivalent leveling devices may be approved by the local administrative authority.

(3) All unused outlet holes in the box shall be securely closed.

69.4(3) *Other distribution devices.* For all other effluent distribution devices, the manufacturer's specifications shall be adhered to for installation, cleaning, and maintenance.

567—69.5(455B) Secondary treatment - soil absorption systems. When a PSDS uses secondary treatment prior to the discharge, land application, or other disposal of effluent, it shall comply with all applicable provisions of this rule or rule 567—69.6(455B).

69.5(1) The following provisions apply to all soil absorption systems. Soil absorption systems are the best available treatment technology and shall always be used where possible.

a. Locations. All soil absorption systems shall be located to maximize the vertical separation distance from the bottom of the absorption trench to the confining layer, but under no circumstances shall this vertical separation be less than three feet.

b. Prohibited drainage. Roof, foundation, area, and storm drains shall not discharge into or upon a soil absorption system. Nothing shall enter a soil absorption system which does not first pass through a septic tank.

c. Prohibited construction. There shall be no construction of any kind, including driveways, covering the septic tank, distribution box, or absorption field of a soil absorption system. Vehicle access should be infrequent, primarily limited to vegetation maintenance.

d. Driveway crossings. Connecting lines under driveways shall be constructed of SCH 40 PVC pipe (SDR 26 or stronger) or equivalent and shall be protected from freezing.

e. Soil evaluation. Either a percolation test or a professional soil analysis including a confining layer determination is required before any soil absorption system is installed.

(1) Percolation test. If a percolation test is performed, it shall comply with the procedure in Appendix B of this chapter.

(2) Professional soil analysis. If a professional soil analysis is performed, soil characteristics including, but not limited to, soil content, color, texture, and structure shall be used to determine a soil loading rate.

(3) Acceptable percolation rate. An area is deemed suitable if:

1. For conventional systems, the average percolation rate is less than 60 minutes per inch and greater than one minute per inch.

2. For nonconventional soil absorption systems, an average percolation rate of 120 minutes per inch is achieved.

(4) Confining layer determination. An additional test hole six feet in depth, or to water or rock, whichever occurs first, shall be provided in the center of the proposed absorption area to determine the location of any confining layer. This six-foot test hole may be augered the same size as the percolation test holes or may be made with a soil probe.

f. Loading rates and trench size.

(1) Percolation and soil loading tables. All soil absorption systems installed under this subrule shall comply with the following tables. Table IIa provides a correlation between percolation rates and soil loading rates. Table IIb provides soil loading rates based upon soil texture and structure. Table IIa and Table IIb shall be used to determine the appropriate soil loading rate. Table IIc specifies linear feet of lateral trenches required based upon the soil loading rate, wastewater flow rate, and trench width. Table IId provides a method to determine the size of an absorption bed. Absorption beds shall not be used except when the lot size limitations preclude the installation of a lateral trench system. Further details concerning limitations of the absorption bed alternative shall be obtained from the administrative authority before authorization for installation is requested.

Table IIa
Maximum Soil Application Rates Based Upon Percolation Rates - Monthly Averages in gal/ft^2/day

Percolation Rate (minutes per inch)	Septic Tank Effluent[1] $CBOD_5$ 25 mg/L - 215 mg/L; TSS 30 mg/L - 150 mg/L	Pretreated Effluent $CBOD_5 \leq 25$ mg/L; TSS ≤ 30 mg/L
0 to 5	1.2	1.6
Fine sands	0.5	0.9
6 to 10	0.8 – 0.6[2]	1.2

11 to 29	0.6 – 0.5[2]	0.9
30 to 45	0.5 – 0.4[2]	0.7
46 to 60	0.4 – 0.2[2]	0.5
61 to 120	0.0	0.3
Greater than 120	0.0	0.0

[1]Typical waste strengths for domestic waste. Pretreatment should be considered for waste of higher strength.
[2]Percolation rates and soil loading rates do not precisely correlate; therefore, a range is provided.

Table IIb
Maximum Soil Loading Rates Based Upon Soil Evaluations in gal/ft²/day

Soil Texture	Single Grain	Massive	Structure - Granular, Blocky, or Prismatic			Platy	
			Weak	Moderate	Strong	Weak	Moderate to Strong
Coarse sand and gravel	1.2 (1.6)	X	1.2 (1.6)	X	X	1.2 (1.6)	X
Medium sands	0.7 (1.4)	X	0.7 (1.4)	X	X	0.7 (1.4)	X
Fine sands	0.5 (0.9)	X	0.5 (0.9)	X	X	0.5 (0.9)	X
Very fine sands[1]	0.3 (0.5)	X	0.3 (0.5)	X	X	0.3 (0.5)	X
Sandy loam	X	0.3 (0.5)	0.45 (0.7)	0.6 (1.1)	0.65 (1.2)	0.4 (0.6)	0.3 (0.5)
Loam	X	0.4 (0.6)	0.45 (0.7)	0.5 (0.8)	0.55 (0.8)	0.4 (0.6)	0.3 (0.5)
Silty loam	X	NS	0.4 (0.6)	0.5 (0.8)	0.5 (0.8)	0.3 (0.5)	0.2 (0.3)
Clay loam	X	NS	0.2 (0.3)	0.45 (0.7)	0.45 (0.7)	0.1 (0.2)	0.1 (0.2)
Silty clay loam	X	NS	0.2 (0.3)	0.45 (0.7)	0.45 (0.7)	NS	NS

Notes: Values in ( ) are for pretreated effluent. “X” means not found in nature. “NS” means not suitable for soil absorption.
[1]Flow rates are difficult to determine for some very fine sands; experience may provide better information and flow rates.

Table IIc
Minimum Length of Absorption Trenches in Lineal Feet by Width of Trench and Soil Loading Rate

Soil loading rate gal/ft²	Two bedroom, 300 gpd[1]		Three bedroom, 450 gpd[1]		Four bedroom, 600 gpd[1]		Five bedroom, 750 gpd[1]		Six bedroom, 900 gpd[1]	
	Width of trench in feet									
	2′	3′	2′	3′	2′	3′	2′	3′	2′	3′
0.1	Not suitable for soil absorption trenches									
0.2	750	500	1125[2]	750	1500[2]	1000[2]	1875[2]	1250[2]	2250[2]	1500[2]
0.3	500	333	750	500	1000[2]	666	1250[2]	833[2]	1500[2]	1000[2]
0.4	375	250	562	375	750	500	938[2]	625	1125[2]	750
0.5	300	200	450	300	600	400	750	500	9002	600
0.6	250	167	375	250	500	333	625	417	750	500
0.7	214	143	321	214	428	286	536	357	643	429
0.8	188	125	281	188	375	250	469	312	562	375
0.9	167	111	250	167	333	222	417	278	500	333
1.0	150	100	225	150	300	200	375	250	450	300
1.1	136	91	205	136	273	182	341	227	409	273
1.2	125	84	188	125	250	167	313	208	375	250

[1]gpd - gallons per day. Design flow rates are based on 150 gallons per bedroom per day.
[2]Requires pressure distribution (pump).

Table IId
Absorption Bed Area by Percolation Rate or Loading Rate

Note: Absorption beds may only be used when site space restrictions require and shall not be used when the soil percolation rate exceeds 30 min./inch.

Percolation Rate min./inch	Loading Rate/Day gal/ft²	Absorption Area/Bedroom ft²
OR		
1 – 5	0.5	300

6 – 15	0.375	400
16 – 30	0.25	600

(2) Unsuitable absorption. Conventional soil absorption trenches shall not be installed in soils that have a percolation rate less than one minute per inch or greater than 60 minutes per inch.

g. Construction details for all soil absorption trenches.

(1) Depth. A trench bottom depth of 18 to 24 inches is recommended. Soil absorption trenches shall not exceed 36 inches in depth. Not less than six inches of porous soil shall be provided over the laterals. The minimum separation between the trench bottom and any confining layer shall be 36 inches.

(2) Length. No soil absorption trench shall be greater than 100 feet long, unless the use of a drop box has been approved by the administrative authority.

(3) Separation distance. At least six feet of undisturbed soil shall be left between each trench edge on level sites. Two feet of separation distance should be added for each five percent increase in slope from level.

(4) Grade. The trench bottom shall be constructed level from end to end. On sloping ground, the trench shall follow a uniform land contour to maintain a minimum soil cover of six inches and a level trench bottom.

(5) Compaction. There shall be minimum use of, or traffic of heavy equipment on, the area proposed for soil absorption. In addition, heavy equipment shall not be used on the bottom of the trenches in the absorption area.

(6) Soils. Soil absorption systems shall not be installed in fill soil. Disturbed soils which have stabilized for at least one year shall require a recent percolation test or professional soil analysis.

(7) Soil smearing. Soils with significant clay content should not be worked when wet. If soil moisture causes trench bottom or sidewall smearing, the installation should be discontinued until conditions improve.

69.5(2) *Soil absorption systems*. The following provisions apply to all soil absorption systems. Soil absorption systems are the best available treatment technology and shall always be used where possible.

a. Groundwater. If the seasonal high groundwater level is present within three feet of the trench bottom final grade and cannot be successfully lowered by subsurface tile drainage, the area shall be classified as unsuitable for the installation of a soil absorption system. The administrative authority shall be consulted to determine an acceptable alternative method of wastewater treatment.

b. Site limitations. In situations where specific location or site characteristics would appear to prohibit installation of a conventional soil absorption system, design modifications which could overcome such limitations may be approved by the administrative authority. Such design modifications could include, but are not limited to, the installation of subsurface drainage; the use of shallow or at-grade trenches, drip irrigation, or mound systems; or the use of pretreated effluent.

69.5(3) *Gravel aggregate systems.* The following provisions apply to gravel aggregate systems.

a. Gravel.

(1) A minimum of six inches of clean, washed river gravel, free of clay and clay coatings, shall be laid below the distribution pipe, and enough gravel shall be used to cover the pipe.

(2) This gravel shall be of such a size that 100 percent of the gravel will pass a 2½-inch screen and 100 percent will be retained on a ¾-inch screen.

(3) Limestone or crushed rock is not recommended for soil absorption systems; however, if used, it shall meet the following criteria:

1. The percent wear, as determined in accordance with the American Association of State Highway and Transportation Officials (AASHTO) T 96, Grading C, shall not exceed 40 percent.

2. When gravel is subjected to the freezing and thawing test, Iowa DOT Materials Laboratory Test Method 211, Method A, the percentage loss shall not exceed 10 percent.

3. The percent absorption, determined in accordance with Iowa DOT Materials Laboratory Test Method 202, shall not exceed three percent.

b. Trench width. Soil absorption trenches for gravel systems shall have a minimum width of 24 inches and a maximum width of 36 inches at the bottom of the trench.

c. Grade. The distribution pipes shall be laid with a minimum grade of two inches per 100 feet of run and a maximum grade of six inches per 100 feet of run, with a preference given to the lesser slope.

d. Pipe.

(1) Distribution pipe used in gravity-based distribution type systems shall be SCH 40 PVC (SDR 26 or stronger) meeting ASTM 2729.

(2) The inside diameter shall be not less than four inches, with perforations at least ½ inch and no more than ¾ inch in diameter, spaced no more than 40 inches apart.

(3) Two rows of perforations shall be provided; located 120 degrees apart along the bottom half of the tubing and each 60 degrees up from the bottom centerline.

(4) The end of the pipe in each trench shall be sealed with a watertight cap, unless, on a level site, a footer is installed connecting the trenches together.

(5) Coiled perforated plastic pipe shall not be used.

e. Gravel cover. Synthetic drainage fabric or other material approved by the manufacturer or administrative authority shall be laid so as to separate the gravel from the soil backfill.

69.5(4) *Chamber systems.* The following provisions apply to chamber systems.

a. Usage. Chamber systems may be used as an alternative to gravel aggregate systems.

b. Installation. The manufacturer's specifications and installation procedures shall be adhered to.

c. Trench length. The total length of soil absorption trench for chambers 22 inches wide shall be the same as given in Table IIc for a two-foot-wide conventional soil absorption trench. Chambers 33 inches wide or greater shall be sized as given in Table IIc for a three-foot-wide conventional soil absorption trench.

d. Sidewall. The chambers shall have at least six inches of sidewall effluent soil exposure height.

69.5(5) *Expanded polystyrene (EPS) aggregate systems.* The following provisions apply to EPS aggregate systems.

a. Usage. EPS aggregate systems may be used as an alternative to gravel aggregate systems.

b. Installation. The manufacturer's specifications and installation procedures shall be adhered to.

c. Trench length. The total length of soil absorption trench for 12-inch EPS aggregate bundles less than 33 inches wide shall be the same as given in Table IIc for a two-foot-wide conventional soil absorption trench. Twelve-inch EPS aggregate bundles 33 inches wide or greater shall be sized as given in Table IIc for a three-foot-wide conventional soil absorption trench.

d. EPS cylinders. EPS cylinders may be configured in a trench, bed, at-grade, or mound application to obtain the desired width, height, and length. EPS cylinders containing a distribution pipe shall be connected end-to-end with an internal coupling device.

69.5(6) *Mound systems.* The following provisions apply to mound systems.

a. General design and use.

(1) Mound systems shall be permitted only after a thorough site evaluation has been made, landscaping, dwelling placement, effect on surface drainage, and general topography have been considered, and the site has been determined to be suitable.

(2) Mound systems shall be located in accordance with the separation distances in Table A in 567—paragraph 43.3(7)*"d"* as measured from the outer edge of the sand in the mound.

(3) Mound systems shall not be utilized on:

1. Sites subject to flooding with a 10-year or greater frequency, or

2. Soils where either:

- The high groundwater level, impermeable bedrock, or soil strata having a percolation rate exceeding 120 minutes per inch occurs within 12 inches of natural grade, or
- Where creviced bedrock occurs within 20 inches of natural grade.

(4) No buildings, driveways, or other surface or subsurface obstructions shall be permitted within 50 feet on the downgradient side of the mound when the mound is constructed on a slope greater than five percent.

(5) No future construction shall be permitted in the effluent disposal area as long as the mound is in use.

b. Specifications and design standards. Specifications given in these rules for mounds are minimal and may not be sufficient for all locations. Other design information beyond the scope of these rules may be necessary to properly design a mound system. Refer to Appendix C of this chapter for mound system construction design standards.

69.5(7) *At-grade systems.* The following provisions apply to at-grade systems.

a. General design and use.

(1) At-grade systems shall be permitted only after a thorough site evaluation has been made, landscaping, dwelling placement, effect on surface drainage, and general topography have been considered, and the site has been determined to be suitable.

(2) At-grade systems shall be located in accordance with the separation distances in Table A in 567—paragraph 43.3(7)*"d"* as measured from the outer edge of the distribution bed in the system.

(3) At-grade systems shall not be utilized on:

1. Sites subject to flooding with a 10-year or greater frequency, or

2. Soils where a confining layer occurs or soil strata having a percolation rate exceeding 60 minutes per inch occur within 36 inches of natural grade.

(4) No buildings, driveways, or other surface or subsurface obstructions shall be permitted within 25 feet on the downgradient side of an at-grade system when the system is constructed on a slope greater than five percent.

(5) No future construction shall be permitted in this effluent disposal area as long as the at-grade system is in use.

b. Specifications and design standards. Specifications given in these rules for at-grade systems are minimal and may not be sufficient for all locations. Other design information beyond the scope of these rules may be necessary to properly design an at-grade system. Refer to Appendix D of this chapter for at-grade system construction design standards.

567—69.6(455B) Secondary treatment - other.

69.6(1) *Intermittent subsurface sand filters (ISSF).* The following provisions apply to ISSF systems.

a. General design and use.

(1) ISSFs may be used when the administrative authority determines the site is unacceptable for a soil absorption system.

(2) ISSFs shall be located in accordance with the separation distances in Table A in 567—paragraph 43.3(7)*"d."*

(3) All ISSFs shall have a sample port or means of collecting a representative effluent sample.

(4) There shall be no construction, such as buildings or concrete driveways, covering any part of an ISSF.

(5) ISSFs may be constructed where the water table is verified to be less than 12 inches above the bottom of the collector pipe and a liner is installed. Plastic liners shall use a minimum of 30-millimeter plastic or product of equivalent thickness as determined by the local administrative authority. Where the water table can be successfully lowered by use of subsurface drainage tile, the minimum depth of the subsurface drainage tile shall be greater than or equal to the lowest portion of the sand filter bed and shall meet the separation distances in Table A in 567—paragraph 43.3(7)*"d."*

b. Specifications and design standards. Specifications given in these rules for ISSFs are minimal and may not be sufficient for all applications. Other design information beyond the scope of these rules may be necessary to properly design an ISSF. Refer to Appendix E of this chapter for ISSF construction design standards.

69.6(2) *Proprietary Treatment System (PTS).* The following provisions apply to all PTSs.

a. General.

(1) A PTS may be used when the administrative authority determines the site is unacceptable for a soil absorption system or an ISSF.

(2) PTS manufacturers shall submit to the department, by February 1 of each year, their current installation and maintenance manual, including the applicable third-party certification.

(3) For a PTS that utilizes replaceable media, a media disposal plan shall be included in the installation and maintenance manual. Used media from a PTS is considered "septage," and septage shall be disposed of in accordance with 567—Chapter 68.

b. Design, installation, and operation. A PTS shall be installed and operated in accordance with the manufacturer's requirements. Additionally:

(1) A PTS other than an aerobic treatment unit shall be preceded by a septic tank with a minimum capacity in accordance with 69.3(2), or shall have an incorporated component that is, or performs the same function as, a septic tank. A pretank or chamber that is part of the design, that is intended to serve the same function as a septic tank, and that was approved by third-party certification shall satisfy this requirement.

(2) An aerobic treatment unit PTS that does not have an incorporated component that is, or performs the same function as, a septic tank as part of the approved design shall be preceded by a pretreatment tank with a minimum capacity of 500 gallons.

(3) A PTS that utilizes a soil absorption system to disperse the treated effluent shall comply with rule 567—69.5(455B).

(4) All PTSs shall have a sample port or means of collecting a representative effluent sample.

c. Monitoring and maintenance.

(1) Prior to installation, a contract for PTS monitoring and maintenance shall be established between the system owner and a manufacturer-certified technician. A maintenance contract is required for the life of the system. A copy of the maintenance contract shall be made available to the administrative authority. A PTS shall

be inspected, monitored, and maintained in accordance with the manufacturer's specifications or at least once annually, whichever is more frequent.

(2) All PTS monitoring and maintenance shall be performed by a manufacturer-certified technician. PTS manufacturers shall ensure that an adequate number of certified technicians are available to service their PTSs at the specified intervals.

(3) Certified technicians shall report monitoring and maintenance results to the system owner and to the administrative authority. Certified technicians shall also report any discontinuance of PTS maintenance to the administrative authority.

567—69.7(455B) Time of transfer (TOT) inspections.

69.7(1) *Inspection criteria.* Pursuant to Iowa Code section 455B.172, if a building where a person resides, congregates, or is employed is served by a PSDS, the PSDS shall be inspected prior to any transfer of ownership of the building.

a. If a PSDS is properly treating wastewater and not creating an unsanitary condition in the environment at the time of inspection, the system is not required to meet current construction standards. However, the discharge restrictions in 69.1(9) shall always apply.

b. If a PSDS is failing to ensure effective wastewater treatment or is otherwise improperly functioning, the PSDS shall be renovated to meet the department's current construction standards, either by the seller or, by agreement within a reasonable time period as determined by the administrative authority, by the buyer. A PSDS is failing to ensure effective wastewater treatment or is otherwise improperly functioning when one or more of the following conditions exist:

(1) The system's tank is constructed of metal; is not watertight; was not designed for use as a PSDS tank; the primary treatment tank is less than 500 gallons; or is damaged and cannot be repaired to the manufacturer's standards using a manufacturer-approved method.

(2) All fixtures on the property served by the PSDS that produce or transport domestic waste do not enter the PSDS;

(3) More than 50 percent of the system's soil absorption area does not accept water;

(4) There is evidence that the system is failing to effectively treat wastewater or is otherwise improperly functioning in a manner not detailed above; or

(5) The system is a dry well structure.

c. Transfer does not include the situations listed in Iowa Code section 455B.172(11)(a)(1) to (12).

69.7(2) *Certified TOT inspectors.* Inspections shall be conducted by an inspector certified by the department, in accordance with Iowa Code section 455B.172 and this rule. In order to be a certified TOT inspector, an individual shall have met the experience requirements, have successfully completed the inspection course and examination, and have been issued a TOT certification by the department.

a. Experience requirements. In order to be certified by taking the inspection course and examination only, an individual must have at least two years' experience in the operation, installation, inspection, design or maintenance of PSDSs. Individuals lacking this experience must complete additional coursework before attending the inspection course with examination. The additional courses shall include, but not be limited to, "Basics of Onsite" offered by the Onsite Wastewater Training Center of Iowa or equivalent courses as determined by the department.

b. Examination application form and evaluation.

(1) All applications to take the certified TOT inspector examination shall be filed using a department form, available on the department's website at www.iowadnr.gov.

(2) Examination applications shall be reviewed by the department and an application review decision will be sent to the applicant. The applicant shall have the right to dispute the application evaluation.

(3) An examination application approval shall be valid for examination purposes for one year from the date the application is approved by the department.

c. Certification. Applicants who successfully meet the requirements of this subrule will receive a TOT certification from the department. The department shall maintain a current listing of certified TOT inspectors on its website at www.iowadnr.gov.

(1) All certificates shall expire on June 30 of even-numbered years and must be renewed every two years.

(2) Renewal applications shall be submitted on a department form, available on the department's website at www.iowadnr.gov, and must be submitted 60 days before the expiration date of the current certificate. Renewal

certificates will only be granted to inspectors that meet the CEU requirements of 69.7(2)*"d,"* that have paid the appropriate certification fee in 69.7(2)*"e,"* and that conduct inspections in accordance with 69.7(3).

(3) Inspectors who have complied with the continuing education requirements may continue to request a renewal up to 45 days following expiration of their certificate. However, inspectors may not perform inspections until a renewal certificate has been issued by the department.

d. Continuing education units (CEUs). The following CEU requirements apply to TOT certification:

(1) A certified inspector must earn 1.2 CEUs or 12 contact hours during each two-year period. Newly certified inspectors (previously uncertified) who become certified after April 1 of a two-year period will not be required to earn CEUs until the next two-year period.

(2) CEUs must be earned during each two-year period from April 1 of the even-numbered year until March 31 of the next even-numbered year. CEUs earned between April 1 and the end of the 45 day grace period cannot be counted towards the certification which expires on June 30 of that year.

(3) All activities for which CEU credit will be granted must be approved by an accredited college, university, technical institute, or the department and shall be related to PSDSs. Any entity providing training eligible for CEU credit shall, upon request, provide the training at no cost to one department staff member for audit purposes and shall provide all course materials to the department upon request.

(4) It is the personal responsibility of a certified inspector to maintain a record of and to notify the department of the CEUs earned during the two-year period. The CEUs earned during the period shall be shown on the renewal application.

e. Certification fees. The following nonrefundable fees apply:

(1) The examination application fee is $50.

(2) The new inspector certification fee is $300. This fee must be paid prior to the issuance of a certification. This fee shall be prorated to $75 for each one-half year of a two-year period from a certification issuance date to June 30 of the next even-numbered year. Certifications obtained within the first half year period of the certification period shall be subject to the full certification fee of $300. The department will inform the applicant of the prorated fee amount prior to certification.

(3) The certification renewal fee is $300. This fee must accompany a renewal application in order for a certificate to be renewed.

f. Certified inspector obligations. Certified inspectors shall conduct TOT inspections in accordance with this subrule.

69.7(3) *Inspection procedures.* TOT inspections shall be conducted as follows:

a. Inspection report.

(1) A TOT inspection shall be conducted using a department form, available on the department's website at www.iowadnr.gov.

(2) Upon completion of an inspection, all information, inspection data, and all attachments shall be provided as follows: to the department for review; to the county environmental health department for review and enforcement of any follow-up mandatory improvements to the system; and to the person ordering the inspection within 10 business days from the inspection date.

(3) Submittal of a complete inspection form and all attachments in the online TOT database, available on the department's website, shall be deemed compliant with this requirement.

b. Record search.

(1) Prior to an inspection, a certified inspector shall contact the administrative authority to obtain any permits, as-built drawings, or other available information concerning the system being inspected. Information may also be obtained from service providers or the homeowner.

(2) The inspector shall:

1. Verify an existing as-built drawing, or

2. If no as-built drawing is available, develop an as-built drawing as part of the inspection.

c. Septic tanks, vault toilets, and holding tanks. At the time of inspection, any existing tank(s) shall be opened and have the contents properly disposed of. Alternatively, the owner may provide evidence of proper tank pumping by a licensed commercial septic tank cleaner within three years prior to the inspection, so long as such evidence includes documentation of the size and condition of the tank and its components at the time of pumping.

d. Pumps and pump chambers. Pump chambers or vaults shall be opened for inspection, and the pump and all alarms and controls shall be tested to ensure proper operation.

e. Secondary treatment. Proof that a secondary treatment system (if any) is in place shall be provided. This proof includes, but is not limited to, performing and documenting the following actions during the inspection:

(1) Opening and inspecting all distribution box(es) or drop box(es);

(2) Locating and uncovering the header pipe of a soil absorption system, if the pipe location and status is unknown;

(3) Locating the vents and discharge pipe of a sand filter and probing the treatment area. A gravity sand filter with a distribution box shall have the box opened and inspected;

(4) Locating, opening the lids, and inspecting the components of any PTS according to the manufacturer's recommendations, and documenting the product model and serial numbers of the PTS;

(5) Probing any soil-based treatment systems to determine their condition; and

(6) A hydraulic loading test.

f. Discharging systems. During an inspection, a representative sample of effluent shall be collected for $CBOD_5$ and TSS from all PSDSs, with the exception of soil absorption systems, and the test results shall be included in the inspection report. The effluent quality shall meet the requirements of NPDES General Permit No. 4 for $CBOD_5$ and TSS. A certified inspector shall report the discharge location(s) for all discharging PSDSs.

g. Other systems and system components. Any PSDS or component not mentioned above shall be inspected for compliance with these rules and for proper function. Examples of components include, but are not limited to, effluent screens, tertiary treatment systems, disinfection devices, alarms, control boxes, and timers.

69.7(4) *Certified TOT inspector disciplinary action.*

a. Reasons for disciplinary action. Disciplinary action may be taken against a certified TOT inspector on any of the grounds specified in Iowa Code section 455B.219 or the following more specific grounds:

(1) Failure to use reasonable care or judgment or to apply knowledge or ability in performing the duties of a certified inspector.

(2) Failure to submit required inspection records or other reports required under applicable permits or department rules, including failure to submit complete records or reports.

(3) Knowingly making any false statement, representation, or certification on any application, record, report, or document required to be maintained or submitted under any applicable permit or department rule.

b. Disciplinary sanctions. Disciplinary sanctions may include the following:

(1) Permanent revocation without chance of recertification or for a specified period of time.

(2) Revocation or suspension of the practice of a particular aspect of a PSDS inspection.

(3) Probation under specified conditions relevant to the specific grounds for disciplinary action .

(4) Additional education, training, or reexamination may be required as a condition of reinstatement.

(5) Civil penalties not to exceed $1,000 may be assessed for causes identified in 69.7(4)*"a"* through the issuance of an administrative order.

c. Procedure.

(1) Department staff shall initiate a disciplinary action by conducting a lawful investigation to establish a legal and factual basis for action. Written notice shall be given to a certified inspector against whom disciplinary action is being considered. The notice shall provide the certified inspector with 20 days to present any relevant facts and to indicate the certified inspector's position in the matter.

(2) A certified inspector's failure to communicate facts and positions relevant to the disciplinary investigation by the required date may be considered by the department when determining appropriate disciplinary action.

(3) If an agreement as to appropriate disciplinary action, if any, can be reached between the department and the certified inspector, a written stipulation and settlement shall be entered into. The stipulation and settlement shall recite the basic facts and violations alleged, any facts established by the certified inspector, and the reasons for the particular sanction imposed.

(4) If an agreement as to appropriate disciplinary action cannot be reached, the department may initiate formal disciplinary procedures through the issuance of a letter imposing disciplinary sanctions deemed appropriate by the department. Service shall be provided by certified mail.

(5) A certified inspector may appeal any disciplinary sanction imposed by the department by filing a notice of appeal with the director within 30 days of receipt of a disciplinary sanction letter. If an appeal is filed, contested case proceedings shall be initiated by the department in accordance with 567—Chapter 7 and Iowa Code chapter 17A.

(6) Upon certificate revocation, application for certification may be allowed two years from the revocation date, unless otherwise specified in accordance with 69.7(4)*"b."* Any such applicant must meet all eligibility requirements in 69.2(2), successfully complete an examination, and be certified in the same manner as a new applicant.

69.7(5) *Procedures for noncompliance with child support order.* Upon receipt of a certification of noncompliance with a child support obligation as provided in Iowa Code section 252J.7, the department will initiate procedures to deny an application for inspector certification or renewal, or to suspend a certification in accordance with Iowa Code section 252J.8(4). The department shall issue to the person by certified mail a notice of its intent to deny or suspend inspector certification based on receipt of a certificate of noncompliance. The suspension or denial shall be effective 30 days after receipt of the notice unless the person provides the department with a withdrawal of the certificate of noncompliance from the child support recovery unit as provided in Iowa Code section 252J.8(4)"c." Pursuant to Iowa Code section 252J.8(4), the person does not have a right to a hearing before the department to contest the denial or suspension action under this subrule but may seek a hearing in district court in accordance with Iowa Code section 252J.9.

567—69.8(455B) Waivers. Waivers to these rules may be granted by the department or the administrative authority provided sufficient information is submitted, prior to construction, to substantiate the need for and propriety of such action. Applications for waivers and justification shall be in writing and filed with the department in accordance with 561—Chapter 10.

These rules are intended to implement Iowa Code chapter 455B, division III, part 1 and Iowa Code section 252J.

Appendix A - Estimates of Non-residential Domestic Sewage Design Flow Rates

Source of use for sewage unit	Units	Gallons per day per unit
Dwelling Units		
Hotels or luxury motels	Per guest	60
	Add per employee	13
or	Per ft^2	0.3
Discount motels	Per guest	40
	Add per employee	13
or	Per ft^2	0.46
Rooming house	Per resident	50
	Add per nonresident meal	4.0
Commercial/Industrial		
Retail stores	Per ft^2 of sales area	0.13
or	Per customer	3.8
	Plus each employee	15
or	Per toilet room	590
Offices	Per employee	18
or	Per ft^2	0.25
Medical offices	Per ft^2	1.6
Industrial buildings	Per employee	20
Construction camp	Per employee	20
Visitor center	Per visitor	13
Laundromat	Per machine	690
or	Per load	50
or	Per ft^2	2.6
Barber shops	Per chair	68
Beauty shops	Per station	285
Car washes	Per inside ft^2	10
Shopping Center	Per employee	11.5
or	Per ft^2	0.15
or	Per parking space	2.5
Flea Market	Per vendor space, without food	15
or	Per vendor space, with food	50
Eating and Drinking Establishments		
Restaurant, not including bar or lounge	Per meal, without alcoholic drinks	3.5
	Per meal, with alcoholic drinks	8
or	Per seat	40
	Add per employee	13
Restaurant (carry out, including caterers)	Per ft^2	0.5
Dining hall	Per meal	4.0
Coffee shop	Per customer	2.5
	Add per employee	13
Cafeteria	Per customer	2.5
	Add per employee	13
Drive-in	Per car stall	30
Bar or lounge	Per customer	4.5
	Add per employee	16
or	Per seat	36
Entertainment Establishments		
Country clubs	Per member, no meals	22
or	Per member, meals and showers	118
or	Per member in residence	50
Lodge	Per person	74
Parks/swimming pools	Per guest	13
Picnic parks with toilet only	Per guest	10
Movie theaters	Per person	4.0
Drive-in theaters	Per space	5
Skating rink/dance hall	Per person	10
Bowling lanes	Per lane	185
Stadium	Per seat	5
Health club gym	Per member	35

Source of use for sewage unit	Units	Gallons per day per unit
Fairgrounds and similar gatherings	Per visitor	1.5
Resort retail store	Per person	4
Transportation		
Airport, bus or rail depot	Per passenger	4
or	Per ft^2	6.5
or	Per public restroom	630
Auto service station	Per vehicle served	13
	Add per employee	16
or	Per inside ft^2	0.6
or	Per public restroom	630
Gas station convenience store	Per customer	3.5
Institutional		
Hospitals	Per medical bed	220
	Add per employee	16
Mental institution	Per bed	147
	Add per employee	16
Prison or jail	Per inmate	140
	Add per employee	16
Nursing home	Per resident	125
	Add per employee	16
School	Per student, no gym, cafeteria or showers	14
or	Per student, cafeteria only	18
or	Per student, cafeteria, gym and showers	27.5
Boarding school	Per student	95
Churches	Per member	2
or	Per member, with kitchen	5
Assembly hall	Per seat	4
Outdoor recreational and related lodging facilities		
Campground	Per campsite with sewer hookup	100
or	Per campsite; without sewer hookup, with central toilet or shower facility	50
or	Per campsite; without sewer hookup, with central toilet or shower facility served by central dump station	63
Day camp, no meals	Per person	16
Day camp, with meals	Per person	25
Overnight camp, with meals	Per person	45

Appendix B - Percolation Test Procedure

a. At least three percolation test holes distributed evenly over the proposed lateral field are required.

b. Percolation test holes shall be four to twelve inches in diameter and to the same depth as the proposed absorption trenches (not to exceed 36 inches in depth).

c. Sides and bottoms of the test holes shall be scratched or roughened to provide a natural surface. All loose material shall be removed from each hole.

d. The bottoms of the test holes shall be covered with approximately two inches of rock to protect the bottom from scouring action when the water is added.

e. The hole shall be filled with at least 12 inches of clean water, and this depth shall be maintained for at least four hours; preferably overnight if clay soils are present. It is important that the soil be allowed to soak for long enough to swell if accurate results are to be obtained. Failure to perform the presoak when required will invalidate the percolation test results.

f. In sandy soils with little or no clay, soaking is not necessary. If, after the hole has been filled twice with 12 inches of water, the water seeps completely away in less than ten minutes, the test can proceed immediately.

g. Except for sandy soils, percolation rate measurements should be made at least four hours, but no more than 24 hours, after the soaking period began. Any soil that sloughed into the hole during the soaking period shall be removed, and the water level shall be adjusted to six inches above the gravel (or eight inches above the bottom of the hole). At no time during the test is the water level allowed to rise more than six inches above the gravel.

h. Immediately after adjustment, the water level shall be measured from a fixed reference point to the nearest ⅛ inch at 30-minute intervals. The test is continued until two successive water level drops do not vary by more than ⅛ inch. At least three measurements shall be made.

i. After each measurement, the water level shall be readjusted to the six inch level. Use the last water level drop to calculate the percolation rate.

j. In sandy soils, or soils in which the first six inches of water added after the soaking period seep away in less than 30 minutes, water level measurements shall be made at ten minute intervals for a one hour period. Use the last water level drop to calculate the percolation rate.

k. The percolation rate shall be calculated for each test hole by dividing the time interval between measurements by the magnitude of the last water level drop. This calculation results in a percolation rate in terms of minutes per inch.

(1) To determine the percolation rate for the area, average the rates obtained from each hole.

(2) If tests in the area vary by more than 20 minutes per inch, variations in soil type are indicated. Under these circumstances, percolation rates should not be averaged.

(3) Example: If the last measured drop in water level after 30 minutes is ⅝ inch, the percolation rate = (30 minutes)/(⅝ inch) = 48 minutes/inch.

Appendix C - Mound System Construction Design Standards

Mound fill material.

a. A mound shall be constructed using clean, medium-textured sand (a.k.a. concrete sand). The sand size shall be such that:

(1) At least 25 percent by weight shall have a diameter between 2.0 and 0.25 millimeter (mm);

(2) Less than 35 percent by weight, a diameter between 0.25 and 0.05 mm; and

(3) Less than five percent by weight, a diameter between 0.05 and 0.002 mm.

b. Rock fragments larger than 1⁄16 inch (2.0 mm) shall not exceed 15 percent by weight of the material used for mound fill.

Mound construction details.

a. There shall be a minimum of three feet of fill material and undisturbed naturally occurring soils between the bottom of the washed gravel and the highest elevation of the confining layer in accordance with 69.5(6)*"a"*(3)(2).

b. Gravel shall meet the requirements specified in 69.5(3)*"a."*

c. From one to two feet of medium-textured sand (depending upon the underlying soil depth, see *"a"* above) must be placed between the bottom of the gravel and the top of the plowed surface of the naturally occurring soil.

d. Mound systems shall utilize an absorption bed distribution piping design. The absorption bed shall be installed with the long dimension parallel to the land contour. Systems on steep slopes with slowly permeable soils should be narrow to reduce the possibility of toe seepage.

e. Minimum spacing between distribution pipes shall be four feet, and a minimum of three feet shall be maintained between any trench and the sidewall of the mound.

f. No soil under or up to 50 feet downgradient of the mound may be removed or disturbed except as specified herein.

g. Construction equipment which would cause undesirable compaction of the soil shall be kept off the base area. Construction or plowing shall not be initiated when the soil moisture content is high. If a sample of soil from approximately nine inches below the surface can be easily rolled into a ⅛- to ¼-inch-diameter wire 1½ inches long or more, the soil moisture content is too high for construction purposes.

h. Above ground vegetation shall be closely cut and removed from the ground surface throughout the area to be utilized for the placement of the fill material.

i. The area shall be plowed to a depth of seven to nine inches, parallel to the land contour, with the plow throwing the soil up slope to provide a proper interface between the fill and the natural soil. Tree stumps should be cut flush with the surface of the ground, and roots should not be pulled.

j. The base absorption area of the mound shall be calculated using the flow rate and the results of the percolation rate test or soil analysis, as indicated in Table IIa or IIb of 69.5(1)*"f"*(1).

k. The area of the sand fill material shall be sufficient to extend at least three feet beyond the edge of the gravel area before the sides are shaped to at least a 4:1 slope.

Distribution system.

a. The distribution pipe for a mound system shall:

(1) Either be SCH 40 or 80 PVC pipe (SDR 26 or stronger), with a one-inch nominal diameter, or an equivalent design that ensures proper distribution.

(2) Have either a single row of ¼-inch perforations in a straight line 30 inches on center along the length of the pipe or an equivalent design that ensures uniform distribution. No perforations shall be permitted within three inches of the outer ends of any distribution pipe. All joints and connections shall be solvent-cemented.

(3) Be placed in the clean, washed gravel with holes downward. The gravel shall be a minimum of nine inches in depth below the pipe and three inches in depth above the pipe.

b. The outer ends of all pressure distribution lines shall be turned up, with either a long 90-degree elbow or two 45-degree elbows, to allow for cleaning. The outer ends shall have a screw-on cap and cover which shall be accessible from the ground surface without excavation.

c. The central pressure manifold should consist of 1½- or 2-inch solid plastic pipe and should use either a tee for connecting the distribution lines or an equivalent design that ensures uniform distribution.

d. Construction should be initiated immediately after preparation of the soil interface by placing all of the sand fill material needed for the mound (to the top of the trench) to a minimum depth of 21 inches above the plowed surface. This depth will permit excavation of the trenches to accommodate the nine inches of washed gravel or crushed stone necessary for the distribution piping.

e. The absorption trench or trenches shall be hand-excavated into the sand. Trench bottoms shall be level.

f. Nine inches of gravel shall be placed in the trench and leveled. After the distribution pipe is placed, the pipe shall be covered with three inches of gravel.

g. The entire sand and gravel area shall be covered with synthetic drainage fabric or other material approved by the manufacturer or administrative authority.

h. After installation of the distribution system, the system shall be pressure-tested before it is covered with gravel.

i. The entire mound shall be:

(1) Covered with topsoil native to the site or of similar characteristics to support vegetation found in the area;

(2) Crowned by providing a minimum of 6 inches of topsoil on the side slopes, with a minimum of 12 inches of topsoil over the center of the mound; and

(3) Seeded, sodded, or otherwise provided with a grass cover to ensure stability of the installation.

j. The area surrounding the mound shall be graded to provide for diversion of surface runoff water.

Dosing.

a. Pump dosing shall be required for mound systems.

b. The dosing volume shall be three to ten times the distribution piping network volume, but not more than 25 percent of the design flow shall be applied to the soil in one dose.

c. The dosing pump shall be capable of maintaining a squirt height of three feet above the pipe at the outer ends of the distribution lines. All lines shall have an equal squirt height above the pipe to maintain equal distribution.

Appendix D - At-Grade System Construction Design Standards

At-grade system construction details.

a. There shall be a minimum of three feet of undisturbed naturally occurring soils between the bottom of the gravel, chamber, or EPS aggregate in the at-grade system and the highest elevation of any confining layers.

b. An at-grade system may be installed up to 12 inches deep.

c. Gravel shall meet the requirements of 69.5(3)*"a"*. EPS aggregate or chambers are acceptable alternatives to gravel if the manufacturer's specifications and installation procedures are followed and pressure pipe is used to adequately dose the entire bed.

d. At-grade systems shall utilize an absorption bed distribution piping design. The bed shall be installed with the long dimension parallel to the land contour. Systems on steep slopes with slowly permeable soils should be narrow to reduce the possibility of toe seepage.

e. No soils under or within 15 feet of any at-grade system may be disturbed. On sloping sites, no soils shall be disturbed within 10 feet uphill of the system and within 15 feet downhill of the system, plus an additional five feet for every five percent slope downhill.

f. Construction equipment which would cause undesirable compaction of the soil shall be kept off the base area. Construction or plowing shall not be initiated when the soil moisture content is high. If a sample of soil from approximately nine inches below the surface can be easily rolled into a ⅛-inch diameter wire 1½ inches long, the soil moisture content is too high for construction purposes.

g. Aboveground vegetation shall be closely cut and removed from the ground surface throughout the area to be utilized for the placement of the fill material.

h. The area shall be plowed to a minimum depth of seven to nine inches, parallel to the land contour, with the plow throwing the soil up slope to provide a proper interface between the fill and the natural soil. Chisel teeth on a backhoe bucket shall be at least as long as the depth of plowing. Tree stumps should be cut flush with the surface of the ground, and roots should not be pulled. All work shall be done from the uphill side of the at-grade system.

i. The gravel bed absorption area of the at-grade system shall be calculated using the flow rate and the results of the percolation rate test or soil analysis, as indicated in Table IIa or IIb of 69.5(1)*"f"*(1).

j. One foot of loamy cover material shall be installed over the rock bed. Cover shall extend at least five feet from the ends of the rock bed and be sloped to divert surface water. Side slopes shall not be steeper than 4:1. The upper six inches of the loamy soil cover must be topsoil borrow. Topsoil borrow must be of a quality that provides a good vegetative cover on the at-grade system.

Distribution system.

a. The distribution pipe shall be:

(1) Either SCH 40 or 80 PVC pipe (SDR 26 or stronger), with a one-inch nominal diameter, or an equivalent design that ensures proper distribution.

(2) Provided with either a single row of ¼-inch perforations in a straight line 30 inches on center along the length of the pipe or an equivalent design that ensures uniform distribution. No perforations shall be permitted within three inches of the outer ends of any distribution pipe. All joints and connections shall be solvent-cemented.

(3) Be placed in the clean, washed gravel (or crushed limestone as described in 69.5(3)*"a"*(3)), with holes downward. The gravel shall be a minimum of 10 inches in depth below the pipe and two inches in depth above the pipe.

(4) Installed in the center of the gravel bed on slopes less than one percent and on the upslope edge at the gravel bed absorption width on slopes one percent or greater.

b. The outer ends of all pressure distribution lines shall be turned up, with either a long 90-degree elbow or two 45-degree elbows, to allow for cleaning. The outer ends shall have a screw-on cap and cover which shall be accessible from the ground surface without excavation.

c. The central pressure manifold should consist of 1½- or 2-inch solid plastic pipe and should use either a tee for connecting the distribution lines or an equivalent design that ensures uniform distribution.

d. The top of the gravel shall be covered with synthetic drainage fabric or other material approved by the manufacturer or administrative authority.

e. After installation of the distribution system, the system shall be pressure-tested before it is covered with gravel.

f. The entire at-grade system shall be:

(1) Covered with topsoil native to the site or of similar characteristics to support vegetation found in the area;

(2) Crowned by providing a minimum of 6 inches of topsoil on the side slopes, with a minimum of 12 inches of topsoil over the center of the at-grade system; and

(3) Seeded, sodded, or otherwise provided with a grass cover to ensure stability of the installation.

g. The area surrounding the at-grade system shall be graded to provide for diversion of surface runoff water.

Dosing.

a. Pump dosing shall be required for at-grade systems.

b. The dosing volume shall be three to ten times the distribution piping network volume, but not more than 25 percent of the design flow shall be applied to the soil in one dose.

c. The dosing pump shall be capable of maintaining a squirt height of three feet above the pipe at the outer ends of the distribution lines. All lines shall have an equal squirt height above the pipe to maintain equal distribution.

Appendix E - Intermittent Subsurface Sand Filter (ISSF) Construction Design Standards

ISSF filter sizing.

a. Residential systems.

(1) Gravity flow. Residential ISSFs shall be sized at a rate of 240 ft^2 of surface area per bedroom.

(2) Siphon-dosed. Residential ISSFs dosed by a dosing siphon shall be sized at a rate of 180 ft^2 of surface area per bedroom.

(3) Pressure-dosed. Residential ISSFs dosed by a pump shall be sized at a rate of 150 ft^2 of surface area per bedroom.

b. Non-residential. Effluent application rates for commercial ISSFs treating domestic waste shall not exceed the following:

(1) 1.0 gal/ft^2/day.

(2) The total surface area for any non-residential ISSF shall not be less than 200 ft^2.

c. Dosing. The dosing system shall be designed to cover the entire filter bed during the dosing cycle. A dosing frequency of greater than twice per day is recommended.

Collection pipelines.

a. Each bed of an ISSF shall contain a horizontal set of collector lines.

b. The collector lines shall be either equivalent to SDR 35 PVC pipe, 10-inch-diameter gravelless drainage technology, EPS aggregate, chamber, or other suitable materials.

c. One collector line shall be provided for each six feet of width or fraction thereof. A minimum of two collector lines shall be provided.

d. Collector lines shall be laid to a grade of one inch in ten feet (or 0.5 percent to 1.0 percent).

e. Each collector line shall be vented or connected to a common vent. Vents shall either extend at least 12 inches above the ground surface with the outlet either screened, provided with a 90 degree elbow, or provided with a perforated cap.

f. Gravelless drainage technology with a synthetic mesh wrap may be used for the collector lines. If a synthetic mesh wrap is used, no gravel or pea gravel is required to cover the collector lines and the pipe shall be bedded in filter sand.

g. EPS aggregate may be used for the collection system as an alternative to gravel and rigid PVC pipe. If used, EPS aggregate shall meet requirements equivalent to 69.5(5), follow the manufacturer's specifications and installation procedures, and cover the bottom of the sand filter. A six-foot separation between collection pipes shall be maintained. Fabric filter meeting the requirements of *"h"*(2) below shall be used instead of washed pea gravel.

h. If four-inch plastic pipe with perforations is used for the collector lines, the lines shall be covered as follows:

(1) Gravel ¾ inch to 2½ inches in size shall be placed around and over the lower collector lines until there is a minimum of four inches of gravel over the pipes; and

(2) The gravel shall be overlaid with a minimum of three inches of washed pea gravel, ⅛-inch to ⅜-inch in size, interfacing with the filter media. A layer of fabric filter may be used in place of the pea gravel. If used, fabric filters must either be 30 by 50 mesh with a percolation rate of at least five gallons/ft^2, or a material that allows for adequate air and water movement into the collector lines, per manufacturer specifications and as approved by the administrative authority.

i. A minimum of 24 inches of coarse washed sand shall be placed over the pea gravel or above the gravelless drainfield pipe. The sand shall meet the Iowa DOT standards for concrete sand, as follows:

(1) 100 percent of the sand shall pass a 9.5 millimeter (mm) screen,

(2) 90 to 100 percent shall pass a 4.75 mm screen,

(3) 70 to 100 percent shall pass a 2.36 mm screen,

(4) 10 to 60 percent shall pass a 600 terameter (Tm) screen, and

(5) 0 to 1.5 percent shall pass a 75 Tm screen.

j. The discharge pipe that extends from the collection system shall be SDR 35 PVC pipe at a minimum.

Distribution system and cover.

a. Six inches of gravel ¾ inch to 2½ inches in size or other material as discussed in this section shall be placed upon the sand in the bed.

b. Distribution lines shall be level and horizontally spaced a maximum of three feet apart, center to center. Distribution lines shall be rigid perforated PVC pipe if used with a gravel base.

c. For ISSFs using gravity distribution, venting shall be placed on the downstream end of the distribution lines, with each distribution line being vented or connected to a common vent. Vents shall either extend at least 12 inches above the ground surface with the outlet screened, have a 90 degree elbow, or be provided with a perforated cap. A vent is not required for systems using pressure distribution.

d. Enough gravel shall be placed to cover the distributors.

e. Synthetic drainage fabric or other material approved by the manufacturer or administrative authority shall be placed upon the top of the upper layer of gravel.

f. A minimum of 12 inches of soil backfill shall be provided over the rock or other material as discussed in this section.

g. A distribution box shall be provided for each filter bed where gravity distribution is used. The distribution boxes shall be placed upon undisturbed earth outside the filter bed. Separate watertight lines shall be provided leading from the distribution boxes to each of the distributor lines in the beds.

h. EPS aggregate or chamber may be used for the distribution system as an alternative to gravel and rigid PVC pipe. If used, EPS aggregate or chamber shall meet requirements equivalent to 69.5(5), follow the manufacturer's specifications and installation procedures, and cover the top of the sand filter. A three-foot separation between distribution pipes shall be maintained.

i. Pressure dosing is recommended to improve effluent distribution across the surface of the filter. Pressure distribution systems may use either conventional rock and PVC pipe, chambers with small-diameter pipe, or EPS aggregate with small-diameter pipe. Distribution lines shall be level and shall be horizontally spaced a maximum of three feet apart, center to center. See Table III below for specifications.

(1) The distribution pipe for a pressure-dosed system shall either be SCH 40 or 80 PVC pipe (SDR 26 or stronger), with a one-inch nominal diameter, or an equivalent design that ensures proper distribution

(2) The distribution pipe for a siphon-dosed or other manufactured non-pump pressured device shall be either SCH 40 or 80 PVC pipe (SDR 26 or stronger), with a 1½-inch nominal diameter, or an equivalent design that ensures proper distribution.

(3) It is recommended that the outer ends of all pressure type distribution lines be turned up with either a long 90-degree elbow or two 45-degree elbows to allow for maintenance. The outer ends should have a screw-on cap and cover and should be accessible from the ground surface.

(4) Holes in the distribution pipe shall be configured to evenly distribute the effluent.

j. Distribution line specifications.

Table III - ISSF Distribution Line Minimum Specifications

Distribution Type	Pipe Diameter/Type	Hole Size	Hole Spacing
Gravity	4 inch rigid SCH 40 PVC (SDR 26 or stronger)	Manufacturer specification	Manufacturer specification
Other Distribution Device (other than pump dosed)	1½ inch SCH 40 PVC (SDR 26 or stronger)	1/4 to 5/16 inch	3 feet minimum
Pump Dosed	Manufacturer specification		