ORDINANCE MC20-92
(as amended)

ON-SITE WASTEWATER TREATMENT SYSTEMS

MINNEHAHA COUNTY, SOUTH DAKOTA

Minnehaha County Planning Department

Last Amended 10/18/11

INDEX

ARTICLE 1. INTRODUCTORY PROVISIONS

Section 1.01. Title: An ordinance for the regulation of on-site wastewater treatment systems in the unincorporated areas of Minnehaha County.

Section 1.02. Authority: The authority for this ordinance is promulgated by the South Dakota Centennial Environmental Protection Act of 1989 as codified in SDCL 7-18-20; and also through the authority given to counties by SDCL 7-8-33 and all existing health and safety statutes granting powers to regulate, investigate, and enforce provisions necessary to protect the welfare of county residents.

Section 1.03. Purpose and Intent: The improper design, location, installation, use, and maintenance of on-site wastewater treatment systems adversely affects the public health, safety and welfare. In order to promote the public health and welfare and to protect the waters of the state for public water supplies; propagation of fish, aquatic life and wildlife; recreational purposes; and agricultural, industrial, and other legitimate uses; Minnehaha County provides these minimum standards and criteria for the design, location, installation, use and maintenance of on-site wastewater treatment systems. It is the intent of these standards to ensure that wastewater entering on-site systems receives adequate treatment. These standards are not intended to cover systems treating industrial waste or other wastewater that may contain hazardous materials.

Section 1.04. Severability: Should any provision of this ordinance be declared invalid for any reason, such decision shall not affect the validity of the ordinance as a whole, or any portion thereof.

Section 1.05. Disclaimer of Liability: The degree of public and environmental protection offered by this ordinance is considered reasonable for regulatory purposes and is based on the best available scientific and engineering considerations. The application of this ordinance shall not create liability on the part of Minnehaha County, or any officer or employee thereof.

Section 1.06. Definitions:

(1) AWWA Standards: Standards developed by the American Water Works Association governing the use of materials, construction, and testing of sewer lines.

(2) Absorption Bed: A subsurface absorption system which consists of excavations wider than 3 feet each containing a bed of clean aggregate and a system of absorption lines through which effluent may seep into the surrounding soils.

(3) Absorption Field: The soils through which wastewater from an absorption system percolates and is treated by soil bacteria.

(4) Absorption Field Rock: Durable, insoluble rock ranging in size from 3/4 to 2 1/2 inches in diameter.

(5) Absorption Line: A perforated or open-jointed pipe that is installed in a covered trench or bed for the purpose of distributing wastewater to the surrounding soils.

(6) Absorption System: A system which utilizes absorption lines in trenches or beds to distribute wastewater to adjacent soils in an absorption field.

(7) Adequate Wastewater Treatment: The treatment of wastewater in a manner which does not cause the pollution of any ground or surface waters nor create a public health or an odor problem.

(8) Aerobic Wastewater Treatment System: A method of wastewater treatment utilizing the principle of oxidation in the biological decomposition of wastewater by either introducing air into the wastewater or allowing surface absorption of air into the wastewater.

(9) Building Sewer: That part of a wastewater system extending from a building which carries the wastewater to a public or individual wastewater treatment system.

(10) Cesspool: A covered underground receptacle which receives untreated domestic wastewater and permits the wastewater to seep into the surrounding soils.

(11) Cistern: A watertight underground receptacle designed for the storage of potable water.

(12) Conventional On-Site Wastewater Treatment System: A treatment system composed of a septic tank followed by an absorption system.

(13) Distribution Box: A watertight chamber from which wastewater is evenly distributed to the various portions of an absorption system.

(14) Domestic Wastewater or Sewage: Waste other than industrial wastes derived from premises such as houses, trailer courts, commercial buildings, recreation areas and institutions.

(15) Dosing Chamber: A tank that stores pretreated wastewater for periodic pressurized discharges to absorption systems.

(16) Effluent: The partially or completely treated liquid waste discharge from a wastewater treatment system.

(17) Engineered System: A wastewater treatment system designed for an estimated flow of over 2000 gallons per day or a commercial or self-serve laundry.

(18) Experimental System: A new device or design which needs further testing to provide additional information before it may be approved.

(19) Gray Water: The wastewater generated by water-using fixtures and appliances which do not discharge garbage or urinary or fecal wastes.

(20) Gray Water System: A wastewater system designed to recycle or treat wastes from sinks, lavatories, tubs, showers, washers, or other devices which discharge gray water.

(21) Grease Interceptor: An outdoor unit similar to a septic tank which is used to remove excessive amounts of grease and oils that may interfere with subsequent treatment of wastewater.

(22) Holding Tank: A watertight, covered receptacle which is designed to receive and store the discharge of domestic wastewater and is accessible for periodic removal of its contents.

(23) Incinerator Toilet: A waste disposal system which uses natural gas, propane, or electricity to incinerate wastes.

(24) Incorporation: The mixing of septage with top soil to a minimum depth of six inches by means of tillage equipment.

(25) Installer: One who supervises or sets up for use or service a wastewater system. All installers shall be properly certified by the South Dakota Department of Environment and Natural Resources.

(26) Invert Elevation: The lowest portion of the inside of any horizontal pipe.

(27) Limiting Soil Characteristics: Those soil attributes such as seasonal high water table, bedrock, or percolation rates faster than 1 minute per inch or slower than 120 minutes per inch which do not allow for proper soil treatment of effluent.

(28) Mottling: The spots or blotches of contrasting color or shades of color, usually red, brown, orange or gray, interspersed with the dominant background color of the soil. Mottles indicate a zone of alternating chemical activity caused by a seasonally fluctuating water table or saturated soil condition.

(29) Mound System: A system where the soil absorption area is built within a mound raised above the ground line to overcome limits imposed by proximity to seasonal high water table or bedrock, or by rapidly or slowly permeable soils.

(30) On-Site Wastewater Treatment System: A system used to contain or treat wastewater on or near the location where the wastewater is generated, including sewers, septic tanks, absorption fields, mound systems, seepage pits, vault privies, holding tanks, subsurface sand filters, gray water systems, dosing chambers and related equipment.

(31) Package Treatment Plants: Small or scaled-down versions of municipal wastewater treatment works which are generally assembled and shipped as complete mechanical units by the manufacturer.

(32) Percolation Test: A soil test performed at the depth of a proposed absorption system to determine the water absorption capability of the soil, the results of which are normally expressed as the rate at which one inch of water is absorbed over a period of time.

(32.2) Person: Any individual, partnership, firm, association, municipality, public or private corporation, state, tribe, nation, political subdivision, trust, estate or any other legal entity, including any officer or governing or managing body thereof (Amended MC20-1-96).

(33) Pit Privy: A structure which allows for the disposal of human excreta into a pit in the soil where a portion of the waste is dispersed by seepage into the surrounding soil.

(34) Planning Official: The Planning Director appointed by the Board of County Commissioners to supervise the activities of the Minnehaha County Planning Department or that person's authorized representative.

(35) Plastic Limit: The soil condition at which soil can easily be rolled into a wire or thread 1/8 inch in diameter.

(36) Potable Water: Water that does not contain pollution, contamination, minerals, or infective agents and is considered satisfactory for human consumption.

(37) Private Water System: A water supply system that provides water for human consumption to fewer than 15 service connections, that regularly serves fewer than 25 individuals, or that serves 25 or more individuals for no more than 60 days per year.

(38) Public Wastewater System: A facility owned by the state or any of its political subdivisions, including sanitary districts, which treat wastewater.

(39) Required Absorption Width: The width measured in the direction of the original land slope and perpendicular to the original contours, which is required for the sewage tank effluent to infiltrate into the soil for treatment according to the allowable loading rates of Table 7-3 in Section 7.06.

(40) Sand: A soil texture composed by weight of at least 25 percent of very coarse, coarse, and medium sand varying in size from 2.0 (sieve size 10) to 0.25 (sieve size 60) millimeters; less than 50 percent of fine or very fine sand varying in size from 0.25 to 0.05 (sieve size 270) millimeters, and no more than 10 percent of particles smaller than 0.05 millimeters.

(41) Seasonal High Water Table: The highest elevation in the soil where free or perched water exists for a sufficient period of time to cause ten percent or more of mottling or soil colors with a chroma of two or less as shown on a Munsell Soil Color Chart.

(42) Sedimentation Tank: A watertight basin or tank in which liquid waste containing solids that settle and suspended matter are retained for removal by gravity.

(43) Seepage Pit: A subsurface absorption device which consists of a covered excavation no deeper than 4 feet with open-jointed walls through which effluent, after primary treatment, may seep or leach into the surrounding soil.

(44) Septic Tank: A watertight, accessible, covered receptacle which receives domestic wastewater from a building sewer and allows solids to settle from the liquid, provides digestion for organic solids, stores digested solids for a period of detention, and allows clarified liquid to discharge to addition system components for final treatment.

(45) Serial Distribution: An arrangement of absorption trenches or beds which retains effluent in each component so as to utilize the total effective area of each component before allowing the effluent to flow into a succeeding component.

(46) Soil Textural Classification: Where soil particle sizes or textures are specified in this ordinance, they refer to the soil textural classification in the Soil Survey Manual, Handbook No. 18, United States Department of agriculture, 1951.

(47) Suitable Soil: A soil which acts as an effective filter in the removal and/or treatment of organisms and suspended solids before the effluent reaches a layer of limiting soil characteristics.

(48) Type 1 Home: A home where the total floor area of the residence divided by the number of bedrooms equals 800 square feet per bedroom or more; or more than three of the following water-use appliances are installed: automatic washer, dishwasher, garbage disposal, hot tub/spa, water softener, self-cleaning furnace.

(49) Type II Home: A home with less than 800 square feet of total residence per bedroom or less than four of the water use appliances listed under the Type I Home definition.

(50) Unconventional System: A system or device, such as a compost unit, vault privy, or chemical toilet, which receives and treats human excreta without the use of water as a transport medium.

(51) Vault Privy: A structure which allows for the temporary disposal of human excreta into a watertight vault pending final disposal, provides for privacy and shelter, and prevents access to the excreta by flies, rodents, and other animals.

ARTICLE 2. GENERAL PROVISIONS

Section 2.01. Permit Required: No on-site wastewater treatment system or any other system for the treatment or disposal of human excreta shall be installed, constructed, changed or operated within the unincorporated area of Minnehaha County without a permit issued by Minnehaha County Planning Official in conformance with this ordinance.

1. State Approval - Where approval is also required by the State Department of Environment and Natural Resources, and where such approval is not granted in a

reasonable time, as is necessary to the permittee; then the Planning Official is empowered to issue the permit conditional upon state approval.

2. Permit Applications - The installer of a wastewater system or their representative shall complete an application on forms provided by the Planning Department in order to determine compliance of the proposed system with the provisions of this ordinance. All appropriate plans and specifications shall be submitted with the application and shall become a part of the permit. The signature of the installer shall be required on the application to verify the accuracy of the information and that the system will be installed in accordance with the permit. The Planning Official shall have the authority to require that a Planning Department Inspector review the soil condition hole (Section 3.03) and the percolation test holes (Section 3.06) prior to the issuance of a permit.

   The application shall become a valid permit upon the signature of the Planning Official and the payment by the applicant of a fee payable to the Minnehaha County Treasurer as outlined below (amended MC20-2-96, MC20-3-05, MC20-05-09):

Routine maintenance and repair	$75.00
Installation of a holding tank only	$100.00
Extension of existing drainfield	$150.00
New or replacement system	$150.00
Engineered system	$175.00

   The fee for any permit obtained after construction or repair of a system has commenced shall be double the normal fee unless previous arrangements have been made with the Planning Department.

3. Expiration Date - Every on-site wastewater treatment system permit issued under the provisions of this ordinance shall expire by limitation and become null and void if the construction authorized by such permit is not completed within 12 months from the date of the permit. After that time a new permit will be required before the construction of any wastewater treatment system can be recommenced (Amended MC20-1-96).

Section 2.02. Inspections Required and Right of Entry:

1. Inspections - The installer of an on-site wastewater treatment system shall ensure that all below ground components are inspected by the Planning Department Inspector prior to backfilling. Inspection of the installation, equipment, and operation of an on-site wastewater treatment system may be made at any time by the inspector.
2. Right of Entry - Whenever necessary for the purposes of inspection or to enforce any of the provisions of this ordinance, or whenever a Planning Official has reasonable cause to believe that there exists upon any premises a violation of this ordinance or any other county ordinance dealing with the protection of state waters, the abatement of nuisances or the regulation of solid waste, the Planning Official may enter such premises at all reasonable times to inspect the same, provided that if such premises be occupied, the official shall first present proper credentials and

request entry; and if the premises be unoccupied, the official shall first make a reasonable effort to locate the owner or other persons having charge or control of the premises and request entry. If such entry is refused, the Planning Official shall have recourse to every remedy provided by law to secure entry.

Section 2.03. Existing Systems - Compliance: On-site wastewater treatment system existing prior to February 28, 1975 are not subject to the provisions of this ordinance unless the systems are modified or repaired, the systems cause the ground water to become polluted, the systems are allowing wastewater to surface, or the provisions of Section 3.02 are not met. Abandoned wastewater systems are not exempt from this ordinance and shall be abandoned in accordance with Section 2.10.

Section 2.04. Minimum Lot Size: A water-carriage wastewater treatment system may not be installed or operated on a lot which is smaller than 43,560 square feet (1 acre). If an existing lot is of insufficient size to provide for the required absorption area as required in Section 7.01, then an unconventional system, holding tank, combination of a holding tank and an absorption system (Figure 2-1), or connection to a central sewer system will be required.

Section 2.05. Existing Subdivisions - Compliance: Housing subdivisions and housing developments platted before February 28, 1975, are exempt from the lot size requirements of Section 2.04 provided compliance with other provisions of this ordinance can be achieved.

Section 2.06. On-Site Systems Prohibited When Public Systems Available: No person may construct, install, or operate an on-site wastewater treatment system where a public wastewater system is available. A public system is considered available to premises under the following circumstances:

1. The structure or wastewater system is located within the jurisdictional boundaries of a sanitary district,
2. The sewerage collection system of the public system exists within 400 feet of the building, and
3. The sanitary district requests to provide service to the premises.

Section 2.07. On-Site System Compliance: All on-site wastewater treatment systems shall be designed for the reception and treatment of all wastewater from the dwelling, mobile home park, commercial establishment, business, recreation area, institution, or other establishment. Any system constructed, installed, expanded or altered after February 28, 1975 shall comply with this ordinance. No on-site system, regardless of when constructed may cause a violation of any existing water quality standard, cause a health hazard, or fail to meet the requirements of Section 2.09 - 2.12, inclusive.

Section 2.08. Variances: Variances to this ordinance shall be made only by the Planning Director and only when a particular situation would make it impossible to meet the requirements of this ordinance.

Section 2.09. Types of Wastewater Treatment: An individual or on-site wastewater treatment system may use any of the following types of treatment:

1. A conventional system of a septic tank and an absorption system.
2. An aerobic treatment unit utilizing an aeration and sedimentation process along with an absorption system.
3. A septic tank with a mound-type absorption/transpiration system.
4. A holding tank.
5. A septic tank and gray water system.

All wastewater must pass through a primary treatment such as a septic tank, sedimentation tank, or aeration system prior to discharge to an absorption system.

Section 2.10. Abandoned System Closure: Abandoned wastewater treatment systems shall be disconnected from the building, the pipe plugged, and any receptacles dismantled or removed. Any void space in which receptacles were contained shall be filled with soil. Before filling, receptacle contents shall be pumped out and disposed of in accordance with Section 9.03.

Section 2.11. Wastewater Not To Surface on Ground or Enter Waters of the State: No person may allow wastewater from any on-site system to be deposited upon the ground surface, nor may any person operate an on-site wastewater treatment system which allows wastewater to surface upon the ground or enter any waters of the state. Gray water systems are exempt from this requirement in locations where they will not create a public nuisance or enter any waters of the state.

Section 2.12. Wastewater Not to be Discharged into Abandoned Wells or into Certain Geological Formations: Wastewater, treated or untreated, shall not be discharged into any abandoned or unused well, nor shall it be discharged into any crevice, sinkhole, gravel pit, or naturally fissured rock formation.

Section 2.13. Cesspools and Pit Privies: The construction of any cesspool or pit privy is prohibited. The operation of a cesspool or pit privy constructed after February 28, 1975, is prohibited.

Section 2.14. Seepage Pits: A seepage pit is permissible only at the end of an absorption system if the bottom of the pit is no more than four feet below the ground surface and the requirements of Sections 3.02 and 7.01 are met.

Section 2.15. Vault Privies: Vault privies shall be constructed to include a fly-tight vault; an enclosure affording complete privacy; an earth mound around the top of the vault and below floor level, which slopes downward away from the vault; a floor and riser of reinforced concrete at least four inches in thickness or of another impervious material; and a hinged, self-closing, fly-proof seat and lid of easily cleanable, impervious material. All venting shall be fly-proofed with number 16 or smaller mesh screening. The vault shall be
located in an area which is accessible for the removal of its contents. The vaults shall be durable and have corrosion-resistant material on the interior and exterior.

Section 2.16. Unconventional and Experimental Systems:

1. Unconventional systems, such as non-portable chemical, composting, incinerating, recirculating, watersaving, or other innovative commercially manufactured toilets shall require a permit and shall be sized, installed, operated, and maintained in accordance with the manufacturers specifications. When vents are required, they shall be of corrosion-resistant material installed in accordance with the South Dakota state plumbing code, chapter 20:54:12. The units shall be designed to receive and contain the wastes deposited in them and shall be located and maintained in a manner that will not create a nuisance condition. Waste material from unconventional systems shall be disposed of in accordance with Section 9.03.
2. Systems employing new technology are considered experimental systems, and their design shall have provisions for a back-up system to be installed if the proposed system, once installed, is not functioning properly or is otherwise creating a hazard to the public health. Applications for temporary approval of experimental systems for demonstration purposes shall be accompanied with documentation of reliability and applicability in full-scale operations and provided with a written guarantee for service, component parts, or replacement provided by the manufacturer. Experimental systems shall be issued a permit only after approval has been granted by the Secretary of the Department of Environment and Natural Resources and the type of system has been investigated by the Planning Department.

Section 2.17. Protection of Potable Water: No connection may be made at any time between a tap or outlet furnishing potable water and a container or equipment holding wastewater by any means other than an open connection or with back siphonage protection.

Section 2.18. Drainage Not to Enter Wastewater Systems: Drainage and runoff from footings, roofs, and ground-water sump pumps shall not be allowed to enter an on-site wastewater treatment system. Absorption systems shall be located and designed so that surface runoff from drainage ways will not flow into or over the system.

Section 2.18A. Residential Garage Floor Drains. Any drainage from a floor drain in a residential garage or residential accessory building which discharges into an on-site wastewater treatment system shall have an accessible cleanout, be vented, and shall have a water trap seal. No-hub couplings shall be installed on both sides of the J bend at the tract and accessible as a clean out.

Residential garage floor drains may also be connected to a central sewer system or drained into a holding tank. Any floor drain that discharges into a central sewer system or a holding tank shall also be vented. *(amended 10/18/11 MC20-06-11)*

Section 2.19. Water Source Protection Districts: No permit shall be issued for any new or replacement on-site wastewater treatment system in any area designated as a water source protection overlay district unless a Planning Department Inspector first inspects the soil data hole required by Section 3.03 and the percolation test holes required by Section 3.05 and 3.06. New or innovative technologies may be considered only when complete engineering plans for the

system are submitted as a part of the permit application proving that the system will adequately treat wastewater, and the plans have received state approval as specified in Section 2.16.

Section 2.20. Gray Water Systems: A gray water system shall be designed in accordance with the following criteria:

1. The systems must be located in accordance with Section 3.08.
2. Design of the system for individual residences shall be based on a minimum gray water flow of 25 gallons per person per day. Three days retention time shall be provided in each gray water tank. For other facilities, the design flow shall be specified on a case by case basis by a Planning Official.
3. Gray water tanks shall conform to the requirements for septic tanks in Section 5.01.
4. Effluent from gray water systems may be recycled for toilet use, conveyed to absorption fields, mounds, or seepage pits, or for irrigation of lawns and areas not intended for food production. Percolation tests and site evaluations shall be conducted and the minimum size of the absorption area shall be in accordance with Section 7.01.

Section 2.21. Plumbing and Well Construction Codes: The design and location of, and the materials for use in building sewers and on-site systems shall comply with all applicable portions of both the South Dakota State Plumbing Code (ARSD 20:54) and the Well Construction Standard (ARSD 74:02:04).

Section 2.22. Headings and Figures: The headings for each section in this ordinance and all the referenced figures are included only for reference purposes and as examples. They are not intended as terms or provisions of this ordinance.

Section 2.23. State Certification Required: No person may perform the site evaluation tests required under Sections 3.03 and 3.05 or install, repair or otherwise modify any on-site wastewater treatment system unless they have first been certified for such work by the State of South Dakota (Amended MC20-1-96).

ARTICLE 3. SITE EVALUATION

Section 3.01. Evaluation Factors: All proposed sites for on-site sewage treatment systems shall be evaluated as to:

1. Depth to the seasonal high water table, bedrock, or other limiting soil characteristics.
2. Soil texture, color and percolation rate.
3. Ground slope.
4. Existence of lowlands, streams, lakes or rock outcrops.
5. All legal setbacks from buildings, property lines, water supply wells and lines, or utility lines.

Section 3.02. Separation from Limiting Soil Characteristics: There shall be at least four feet of soil between the bottom of an absorption bed or trench, seepage pit bottom, the lowest construction joint on a septic tank or any other component of a subsurface absorption system and a limiting soil characteristic such as a seasonal high water table, ground water, bedrock

formation, or soil layer with a percolation rate slower than one or faster tha 120 minutes per inch. The presence of a seasonal high water table shall be determined by either the presence of saturated conditions, the presence of 10 percent or more of mottling in the soil profile, or soil colors with a chroma of 2 or less whichever is higher in the profile. An example of mottling percentages is shown in Figure 3-1. When this separation cannot be maintained with a conventional system, an alternative system such as an unconventional system or a mound system is required.

Section 3.03. Soil Conditions: The soil textures and profile shall be evaluated by making at least one boring or excavation to a depth at least four feet deeper than the bottom of the planned system or until bedrock or the seasonal high water table is encountered, whichever is less. The soil profile characteristics (colors and textures) and the test hole location must be noted on the permit application forms. Absorption systems shall not be constructed in soils rated as having severe or very severe limitations for septic systems by the Soil Conservation Service, U.S. Department of Agriculture, unless that limitation is not present as shown by the field investigation.

Section 3.04. Soil Textures: Soil texture refers to the relative proportions of the various soil grain size groups in a mass of soil. Specifically, it refers to the proportions of sand, clay and silt (Figures 3-2, 3-3). These sized groups of particles are referred to as soil separates and are described in Table 3-1.

Table 3-1

Soil Separates

Name of Separate	Size Range (in mm)
Very Coarse Sand	2.00 - 1.00
Coarse Sand	1.00 - 0.50
Sands Medium Sand	0.50 - 0.25
Fine Sand	0.25 - 0.10
Very Fine Sand	0.10 - 0.05
Silts	0.05 - 0.002
Clays	< 0.002

Section 3.05. Percolation Test Required: The installer of an on-site wastewater treatment system shall ensure that a percolation test is conducted in accordance with Section 3.06 prior to applying for a permit for the system.

Section 3.06. Procedure for Conducting Percolation Tests: A soil percolation test shall be made in at least 3 test holes within 5 feet of where the proposed absorption system is to be located. The holes shall be randomly located in soil representative of the rest of the area where the system will be placed.

1. Test Hole Form - Each test hole shall be six to twelve inches in diameter, have vertical sides, and shall extend to the maximum planned depth of the absorption system. The bottom and sides of the hole shall be carefully scratched to remove any smearing and provide a natural soil surface into which water may penetrate. All

loose material shall be removed from the bottom of the test hole and two inches of 1/4 - 3/4 inch gravel shall be added to protect the bottom from scouring.

2. Soil Swelling and Saturation - The hole shall be carefully filled with clear water to a depth of at least 50 percent of the depth of the hole. The soil shall then be allowed to swell for at least 8, but no more than 16 hours prior to measuring the percolation rate.
3. Percolation Rate Measurement - Immediately before making the test, each hole shall be refilled with water to at least 50 percent of the hole depth. When the water reaches the lower 25 percent of the test hole, the test shall begin. From a fixed reference point, the drop in water level shall be measured in inches to the nearest 1/8 inch at approximately 10-minute intervals.

   As an alternative method, the original water depth in the hole shall be adjusted to eight inches of depth and the water drop recorded at approximately 10-minute intervals, refilling between measurements to maintain an eight-inch starting head.

   With either method the test shall continue until three consecutive percolation rate measurements vary by a range of no more than ten percent. An example of a percolation rate measurement device is shown in Figure 3-4.
4. Percolation Rate Computation - Divide the time interval by the drop in water level to obtain the percolation rate in minutes per inch. Percolation rates determined for each test hole shall be averaged to determine the percolation rate for the site. All percolation rates and calculations shall be fully recorded on the permit application forms.
5. Restrictions on Percolation Test - A percolation test shall not be run where frost exists at a level below the depth of the proposed soil treatment system.

Section 3.07. Ground Slope: The average percentage and direction of ground slope on the site shall be recorded on the permit application sheets.

Section 3.08. Setbacks to Site Features: All on-site wastewater system components shall be located and maintained in accordance with minimum distance requirements from pertinent ground and terrain features on or near the site. The location of all pertinent features shall be recorded on the permit application forms. The minimum required horizontal distances, in feet, between system components and site features are shown in Table 3-2.

Table 3-2

Setbacks to Pertinent Site Features

Wastewater System Components	Ground and Terrain Features (A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)
Septic tank, aerobic system or holding tank	50	75	50	50	25	10	10	0
Absorption field, mound seepage pit, or graywater system	100	150	100	100	25	20	10	10
Sewer lines of tightly-jointed tile or equivalent material	50	75	50	50	10	0	0	0
Sewer lines - materials construction and	30	30	25	3	10	0	0	0

testing comply with AWWA standards for water mains								
Unconventional systems	50	75	50	50	25	0	10	0

(A) - Wells with casing over 100 feet deep
(B) - Wells with casing less than 100 feet deep, springs, or water suction lines
(C) - Cisterns or reservoirs
(D) - High water line on lakes, streams or impoundments (meandered or ordinary, whichever is higher)
(E) - Pressurized water lines
(F) - Dwelling or occupied building
(G) - Property line - all sides
(H) - Trees or dense shrubs (see section 7.05)

ARTICLE 4. WASTEWATER FLOWS

Section 4.01. Wastewater Treatment System Capacity: All on-site wastewater treatment systems shall be designed to have a capacity at least equal to the estimated maximum daily flow. For existing facilities where the average daily flow is measured, the maximum daily flow shall be computed by multiplying the average daily measured flow by 150 percent.

Section 4.02. Residential Water Use: Designs for residential on-site wastewater treatment systems shall consider 75 gallons per day as an average per capita water use, or 120 gallons per bedroom per day for a Type II residence, or 150 gallons per bedroom per day for a Type I residence. Estimated residential water use may be obtained from Table 4-1.

Table 4-1
Estimated Residential Sewage Flows
in gallons per day (gpd)

Number of Bedrooms	Type I Home *	Type 2 Home**
2	300	240
3	450	360
4	600	480
5	750	600
6	900	720
7	1050	840
8	1200	960

* Type 1 Home: The total floor area of the residence divided by the number of bedrooms equals 800 square feet per bedroom or more; or more than three of the following water-use appliances are installed: automatic washer, dishwasher, garbage disposal, hot tub/spa, water softener, self-cleaning furnace.

* Type II Home: Design based on a estimated sewage flow of 120 gallons times number of bedrooms. Less than 800 square feet of total residence per bedroom.

Section 4.03. Commercial, Industrial and Recreational Wastewater Flows: Estimated gallons of maximum daily wastewater flows for commercial, industrial or recreational facilities may be obtained by using Table 4-2. If a known average daily flow can be measured, the design flow shall be 150 percent of the average measured daily flow.

Table 4-2
Estimated Commercial, Industrial and Recreational
Wastewater Flows

Source of waste and sewage unit	Gallons of sewage per unit per day
Dwelling Units	
Apartments, per person	75
or per bedroom (does not include laundry)	120
Hotels, per guest	50
plus per employee	11
or per square foot	0.25
Motels without kitchenettes	
per guest	40
plus per employee	11
or per square foot	0.23
Motels with kitchenettes	
per guest	60
plus per employee	11
Rooming or Boarding House (with food service)	
per resident	50
plus for non-resident meals	
per meal	2.5
Commercial/Industrial	
Retail Stores, per square foot	0.1
or per customer	2.5
plus per employee	11
or per toilet room	530
Shopping Center, per square foot	0.18
or per parking place	2
Office Building, per square foot	0.1
or per employee	15
Medical Office, per square foot	0.6
Industrial Building, per employee	15*
*-does not include process water or cafeteria	
Construction Camp	
per employee (without flush toilet)	25
per employee (with flush toilet)	50
Visitor Center, per visitor	5
Laundromat, per machine	600

or per load	50
or per square foot	3.68
Warehouse, per square foot	0.03
Barber shop, per square foot	0.20
or per chair	55
Beauty Shop, per station	270
or per square foot	0.9
Car Wash, per square foot	5*
*-does not include wash water	
Auto Service Station, per square foot	0.25
or per public restroom	500
or per vehicle served	11
plus per employee	13
Transportation - Airport, Bus or Rail Depot	
per passenger	5*
or per square foot	3.33
or per public restroom	500
*-does not include food service	
Eating and Drinking Establishments	
Restaurant, per seat	40
plus per employee	11
or per meal served	2.6*
*-does not include bar or lounge	
Restaurant on Interstate or through highway	
per seat	180
Dining Hall, per meal served	4
Cafeteria or Coffee Shop, per square foot	0.1
or per customer	2
plus per employee	11
Drive-In Restaurant, per car stall	110
Bar or Lounge, per customer	2
plus per employee	13
or per seat	35
Institutional	
Medical Hospitals, per bed	250
plus per employee	15
Mental Hospital, per bed	125
plus per employee	15
Prison or Jail, per inmate	125
plus per employee	15
Nursing Home, per bed space	100
plus per employee	15
Schools and Churches	
Schools-No gym, cafeteria or showers	
per student	15
Cafeteria only, per student	20

Cafeteria, gym and showers per student	25
Boarding Schools, per student	100
Churches, per santuary seat	5
with kitchen add, per seat	2
with Sunday School add, per student	0.14
Recreational	
Campground, recreational vehicle	
per RV site (with hookup)	100
Campground, with central bathroom and showers	
per person	32
or per site	75
Campground, undeveloped	
per site	25
Day Camp (no meals), per person	15
Resort Cabin, per person	60
Resort Lodge, per person	60
YMCA/YWCA, per member	33
Golf Course or Country Club, no meals	
per resident member or guest	25
With Meals and showers	
per resident member or guest	100
plus per employee	15
Parks/Swimming Pools, per guest	10
Picnic Park, with toilet only, per person	5
Movie Theater, does not include food	
per seat	5
Drive-In Theater, per car space	10
Skating Rink/Assembly/Dance Hall	
per customer	7
Bowling Alley, per alley	135

ARTICLE 5: SEWAGE TANKS

Section 5.01. Design and Construction of Septic Tanks: The minimum design and construction requirements for septic tanks are as follows (see figure 5-1):

1. Tank Materials - Septic tanks shall be watertight and constructed of durable materials designed to withstand expected physical loads. Such tanks shall be capable of supporting a static vertical load of at least 1,000 pounds per square foot when bedded and backfilled to the top of the tank. The septic tank, including baffles or tees, shall be constructed of materials resistant to acid, decay, and corrosion. Prefabricated, coated metal tanks shall meet the requirements of the State plumbing code, 20:54:03:03. Coated metal tanks are not permitted for wastewater systems when the usage will be longer than seven years. Concrete septic tanks shall be constructed of portland type II sulfate resistant cement with a minimum strength of 3,000 pounds per square inch. The walls, floors, and covers of concrete septic tanks

poured on-site shall be at least 3.5 inches thick with reinforcing bars and welded wire mesh. Fiberglass or plastic septic tanks shall have a minimum wall thickness of .25 inches. All special reinforced precast concrete, concrete block, plastic, or fiberglass septic tanks shall meet the minimum static vertical load requirements of 1,000 pounds per square foot when bedded and backfilled to the top of the tank. The interior of concrete block septic tanks shall be surfaced with two 1/4" coats of portland cement/sand plaster and shall have mortar joints. Septic tank keyways or construction joints shall be made watertight by grouting with cement or corrosion resistant sealants.

2. Dual-Compartment Tanks - Septic tanks larger than 3,000 gallon capacity and fabricated as a single unit shall consist of two or more compartments, with 1/2 to 2/3 of the tank capacity in the first compartment. The minimum dimension of any interior compartment shall be 2 feet (see Figure 5-2).
3. Access - Each compartment of a tank shall have at least one access hole with a minimum dimension of 20 inches located within 6 feet of all walls of the tank. The access holes shall extend through the top of the tank to a point within 12 inches but not closer than 6 inches below finished grade, and the access hole covers shall be covered with at least 6 inches of earth unless the cover is airtight and equipped with a hasp and lock, in which case the cover may be shallower or above grade. If the access hole to the tank is covered with more than 12 inches of earth backfill, the access hole to the tank is covered with more than 12 inches of earth backfill, the access hole shall be extended to within 6 inches of the finished grade.
4. Inspection Pipes - There shall be inspection pipes of at least 4 inches diameter over both the inlet and outlet devices. The inspection pipes shall extend through the top of the tank and be capped flush or above finished grade with a removable watertight cap or cover. A downward projection of the center line of the inspection pipe shall be directly in line with the center line of the inlet or outlet device. The tank inlet and outlet devices shall consist of baffles or sanitary tees.
5. Minimum Tank Dimensions - The minimum dimension or diameter of septic tanks shall be 4 feet. The tank shall have a liquid depth of between 30 inches and 72 inches and shall have a uniform horizontal flow throughout its length.
6. Inlet/Outlet Baffles - The inlet elevation shall be at least 3 inches higher than the outlet elevation of the tank. The outlet elevation shall be at least 9 inches beneath the underside of the top of the tank or 20 percent of the total liquid depth, which ever is greater. The inlet baffle or the tee shall penetrate at least 6 inches, but not more than 20 percent of the total liquid depth below the liquid level in the tank and not lower than the outlet baffle or tee. The outlet baffle or tee shall penetrate at least 12 inches, but not more than 35 percent of the total liquid depth in horizontal cylindrical tanks or 40 percent of the total liquid depth in rectangular tanks, below the liquid level in the tank. The inlet and outlet baffle or tee devices shall extend above the liquid level at least 8 inches or to within approximately 1 inch of the underside of the tank top. At least 1 inch of vent space shall be provided between the baffle or tee devices and the underside of the top of the tank. The separation distance between the inlet or outlet opening at the tank wall to the nearest point on baffles or tees shall not be less than 6 inches nor more than 12 inches.

7. Tank Partition Walls - When a partition wall is used to form a multicompartment tank, the partition wall opening shall be not less than 4 inches in diameter and not smaller than the diameter of the inflow and outflow pipes. The opening shall be located at the same elevation as the outflow pipe with sanitary tees or baffles having the same size and location requirements as for the inlet and outlet devices. The top of the partition wall, including baffles or tees, shall be set at least 1 inch below the underside of the tank top to provide adequate venting. All partitions, tees, and baffles shall be permanently and securely attached to the tank.
8. Outlet Pipe - The outflow pipe exiting the unit shall be at least 6 feet in length and unperforated until the first tee, distribution box, or drop box before the absorption field is encountered.

Section 5.02. Installation Requirements for Septic Tanks: The installation requirements for septic tanks are as follows:

1. Access and Depth - Septic tanks shall be installed on a solid, level base, with access hole covers 6 inches to 12 inches below the finished grade. If the cover is airtight, equipped with a hasp, and kept locked to prevent unauthorized access, the cover may be shallower or above grade. The tank shall be installed at a depth that provides adequate gravity flow from the building or facility sewer which meets the requirements of the South Dakota state plumbing code, 20:54:11:09.
2. Base for Tank - The tank shall be installed on undisturbed soil. If over-excavation occurs, it shall be backfilled with sand to the correct elevation and compacted. Back filling around the tank shall be accomplished in a manner to prevent settlement and to prevent undue stresses on the tank and to the inlet and outlet pipes. Plastic and fiberglass tanks should be filled with water prior to backfilling.
3. Multiple Tanks - When multiple tanks are used to obtain the required liquid volume capacity, the tanks shall be connected in series. The interconnecting pipes between tanks shall be at least 6 feet in length and unperforated. No more than 4 tanks in series are permitted to obtain the required liquid volume capacity. The first tank shall not be smaller than any of the subsequent tanks in the series.
4. Ease of Maintenance - All tanks shall be located in an area which is accessible for the pumping of their contents. There shall be no constructed building or facility of any kind covering any of the tanks.
5. Flotation Collars - Flotation collars shall be used in areas with high ground water potential.
6. Inlet and Outlet Pipes - The inlet and outlet pipes shall be made watertight by grouting with cement or corrosion-resistant sealants. The pipes shall be supported on the outside of the tank to prevent failures due to settling. All outlet pipes must be of sound, durable, corrosion-resistant construction and must meet the strength requirements of the American Society for Testing and Materials
7. Any damage to the watertight coating or interior of a tank shall be repaired and tested by filling with water.

Section 5.03. Minimum Tank Capacities: The minimum capacities for septic tanks serving individual on-site systems shall be determined as follows:

1. Residential and Small Commercial Tanks - All septic tanks receiving less than 1500 gallons per day of residential wastewater shall be sized according to Table 5-1. Non-residential establishments with daily flows of 750 gallons per day or less shall have a minimum tank capacity of 1000 gallons. If a septic tank receives wastes from a garbage disposal, the overall capacity of the tank shall be increased by an addition 20 percent.

Table 5-1
Minimum Septic Tank Capacities
in gallons

Number of Bedrooms	Min. Liquid Capacity	Min. Liquid Capacity with garbage disposal
2	1000	1200
3	1000	1200
4	1250	1500
5	1500	1800
6	1750	2100
7	2000	2400
8	2250	2700

2. Medium Sized Commercial - Septic tanks serving premises other than housing units or receiving wastewater flows of more than 750 gallons per day but equal to or less than 1,500 gallons per day shall have a minimum liquid volume capacity to permit retention of incoming sewage at 150 percent of the average daily flow.
3. Large Tanks - Septic tanks receiving wastewater flows greater than 1,500 gallons per day shall have a minimum liquid volume capacity (V) equal to at least 1,125 gallons plus 75 percent of the daily wastewater flow (Q), or $V = 1,125 + 0.75Q$.
4. Grease Interceptors - Septic tanks serving premises where high amounts of oil or grease are anticipated shall be preceded by grease interceptors. Wastewater from garbage disposals may not be discharged to grease interceptors. Grease interceptors shall be a minimum of 750 gallons. Constructions and installation of interceptors shall meet the requirements of chapter 20:54:06 of the State plumbing code.
5. Restaurants and Laundromats - Septic tanks serving restaurants or laundromats shall have twice the computed liquid capacity.

Section 5.04. Holding Tanks: The requirements for holding tanks are as follows:

1. Minimum Capacity - The minimum liquid holding capacity shall be 1,000 gallons or the wastewater flow generated over a period of 7 days, whichever is greater. There shall be no discharge of effluent from the tank.
2. Alarm - The tank shall be equipped with a high-water alarm positioned to allow at least 3 days of storage after the alarm is activated.
3. General Requirements - Holding tanks shall conform to the requirements for septic tanks under Section 5.01 inclusive, with the exception of outlet devices.

Section 5.05. Aerobic Tanks: Aerobic tanks shall comply with the general requirements for sewage tanks in Section 5.01 and with the following requirements. An example of an aerobic tank is shown in Figure 5-3.

1. Trash Trap - The raw sewage from from the building shall be intercepted by a trash trap prior to its entering the aeration compartment. The trash trap shall have a holding capacity of not less than 20 percent of the average daily flow. The invert level to the trap shall be above the liquid level and discharge directly into the trap. The outlet from the trap to the aeration compartment shall be deep baffled or equipped with a tee or long elbow. The trap must be readily accessible for inspection and effective cleaning and shall be constructed to prevent unauthorized entry.
2. Aeration Compartment - The aeration compartment shall have a minimum holding capacity of 500 gallons or 120 gallons per bedroom, whichever is greater. The method of aeration shall be by mechanical action diffused air, or both. The method shall maintain aerobic conditions at all times.
3. Settling Compartment - The settling compartment shall have a minimum holding capacity equal to 20 percent of the volume of the aeration compartment. The design shall provide for effective settling and continuous return of settled sludge to the aeration compartment.
4. Other Features - A minimum of one year warrantee and an initial two year service contract which specifies regular inspection calls and effluent quality checks shall be provided as a part of the purchase agreement. All other features of the aerobic tank not specifically noted above shall comply with National Sanitation Foundation Standard No. 40 (November 1970).

ARTICLE 6. DISTRIBUTION OF EFFLUENT

Section 6.01. Gravity Distribution: The pretreated effluent from a septic tank shall be distributed to the absorption field using the following criteria:

1. Interconnected Pipes - On relatively flat terrain where the elevation difference of the ground surface does not exceed 6 inches in any direction within the absorption field, the septic tank effluent may be directed to the absorption field through a system of interconnecting distribution pipes.
2. Distribution Boxes - On slightly sloping terrain where the elevation difference of the ground surface does not exceed 28 inches in any direction within the absorption field, the septic tank effluent may be distributed by a distribution box (Figures 6-1, 6-2) provided the final ground surface elevation of the lowest trench is at least one foot higher than the invert elevation of the outlets of the distribution box. The inverts of all outlets shall be at the same elevation as measured from a liquid surface which is at least 4 inches above the distribution box floor. The inlet pipe invert shall be at least 1 inch higher than outlet inverts. Each absorption line shall be connected separately to the distribution box and shall not be subdivided. When the septic tank effluent is pumped to the distribution box, either a baffle wall shall be installed in the distribution box or the pump discharge shall be directed against a wall of the box on which there is no outlet. The baffle shall be secured to the box and shall extend at least 1 inch above the crown of the inlet pipe. The distribution box shall be

watertight with a removable cover, constructed of durable materials resistant to corrosion or decay and shall have sufficient capacity to handle the maximum daily flow rate.

3. Drop boxes - On sloping terrain where the elevation difference of the ground surface exceeds 28 inches in any direction within the absorption field, a serial distribution system shall be installed. The serial distribution system shall be connected with drop boxes (Figures 6-3, 6-4, 6-5) or closed pipe relief lines in such a manner that each trench is completely filled with septic tank effluent to the full depth of the gravel before effluent flows to succeeding trenches. The drop boxes or relief lines shall be placed on an undisturbed section of ground. The first drop box or relief pipe arrangement encountered shall not have the crown of the outlet pipe at its highest point above the invert of the septic tank outlet. At each drop box or relief arrangement, the invert of the inlet pipe shall be between 1 and 2 inches higher than the invert of the outlet pipe to the succeeding trench. The slope of the trench between the invert of the outlet and the invert of the inlet of a successive drop box or relief pipe arrangement shall be 1 inches per 100 feet. When septic effluent is delivered to the drop box by a pump, the pump discharge shall be directed against a baffle wall or against a wall of the box on which there is no outlet. The drop box shall be watertight with a removable cover, constructed of durable materials resistant to corrosion or decay, and shall have ample capacity to handle the maximum daily flow rate.

Section 6.02. Pressure Distribution - When Required: A dosing or pressure system shall be installed with a siphon or pump when the total length of absorption lines exceeds 750 feet, the area of the absorption system exceeds 1200 square feet, the topography and location is such that any absorption line will exceed 100 feet in length, or it is necessary to elevate the wastewater effluent from the septic tank to the absorption field (Figure 6-6, 6-7). Any mound-type absorption system shall require a pressure system with a pump. Absorption fields exceeding 1000 feet in total length or 1800 square feet in area shall be divided into at least two equal sections with each section dosed alternately. All pressure system designs shall be included on the permit application forms.

Section 6.03. Pressure Systems - Dosing Chamber:

1. Dosing Chamber - A pressure system shall consist of a water tight dosing chamber, located after the septic tank, which is equipped with an automatic siphon or pump with liquid level control switches and an alarm system to warn of pump failure. All electrical components in the dosing chamber shall be waterproof and corrosion resistant. The alarm and electrical panel shall be located outside of the dosing chamber and shall be weatherproof. Flotation collars shall be used in areas with high groundwater levels. An example of a dosing chamber is illustrated in Figure 6-8.
2. Tank and Dose Sizes - The dosing chamber shall be at least 30 inches in diameter and have a capacity to hold a total liquid volume at least equal to the maximum daily wastewater flow of the establishment or residence for which the system is being installed. The chamber and the dosing device shall be sized so that wastewater is discharged 4-5 times per day. The actual size of the effluent dose shall be

determined by the design of the soil treatment component of the system, but in no case shall the chamber be sized to provide a dose of less than 70 gallons.

3. Tank Access - There shall be at least one manhole, at least 20 inches in diameter and preferable located over the dosing device for ease of maintenance. The manhole shall extend through the chamber cover to within 12 inches of final grade and be so constructed so as to prevent unauthorized entry.

Section 6.04. Pump: All pumps shall be constructed of sound, durable and corrosion-resistant materials. The pump discharge capacity shall be based upon the perforation discharges for an average head of 1.0 feet for residential systems and 2.0 feet for other establishments. Perforation discharge will be determined by the following formula or from Table 6-1.

Q = 19.65 c(d squared)(h to the 1/2 power) where:

Q = discharge in gpm c = coefficient of discharge = 0.60

d = perforation diameter in inches h = head in feet

Table 6-1

Perforation Discharges in gpm

	Perforation diameter (inches)		
Head	3/16	7/32	1/4
1.0	0.41	0.56	0.74
2.0	0.59	0.80	1.04

Use 1.0 foot of head for residential systems

Use 2.0 feet of head for other establishments

The pump discharge head shall be at least five feet greater than the head required to overcome pipe friction losses and the elevation difference between the pump and the distribution device. The pump shall be elevated above the floor of the dosing chamber on a riser in order to prevent the intake of solids. The height of the riser shall be included in the total pump height when computing the required size of a dosing chamber.

Section 6.05. Pressure Distribution Pipes:

1. Pipes and Fittings - Pipes used for pressure distribution must be constructed of sound and durable material not subject to corrosion or decay, or to a loss of strength under continuously wet conditions. All pipes and fittings must be properly joined together and all connections able to withstand at least 40 psi.
2. Pipe Sizes - The pipe from the dosing chamber to a mound shall be 1 1/4 to 3 inch diameter pipe with a manifold to connect it to the perforated distribution pipes. Distribution pipes may be from 1 to 2 inches in diameter.
3. Perforations - Perforations will be from 3/16-1/4 inches in diameter and should have all burs removed. The number of perforations, perforation spacing, and pipe size for pressure distribution laterals shall conform to the restrictions shown in Table 6-2. The friction loss in any individual perforated lateral must not exceed 20 percent of the average pressure head on the perforations. Perforation holes must be drilled straight into the pipe and not at an angle.

Table 6-2
Maximum Number of Perforations Per Lateral
To Guarantee <10% Discharge Variation (1/4" perfs)

Perf spacing (ft)	1.25 inch	1.5 inch	2.0 inch
2.5	14	18	28
3.0	13	17	26
3.5	12	16	25
4.0	11	15	23
5.0	10	14	22

4. Placement of Laterals (Figures 6-9, 6-10) - All perforated pipe laterals must be installed level with the perforations downward. Laterals may be spaced no further than 60 inches apart and must be spaced no further than 30 inches from the bottom edge of a Drainfield rock layer. The laterals must be designed and installed in such a way that no perforations are located closer than 12 inches from the edge of the drainfield rock. An additional perforation shall be drilled into the endcap near the crown of the pipe on each lateral (note Figure 6-11). Laterals must be connected to a header or manifold pipe (Figure 6-12) that is of a diameter such that the friction loss in the header or manifold will be no greater than 5 percent of the average head at the perforations. The header or manifold pipe must be connected to the supply pipe from the dosing chamber.

ARTICLE 7. ABSORPTION AREAS

Section 7.01. Sizing Absorption Systems: All absorption systems shall be designed to treat the maximum daily wastewater flow from the residence or establishment. The minimum area of the absorption system shall be calculated by multiplying the maximum daily flow by the soil sizing factor from Table 7-1.

Table 7-1
Soil Characteristics and Sizing Factors for Absorption System

Perc. Rate in m.p.i.	Soil Texture	Sq. Ft. per gallon per day
1-5.9	Sand	see section 7.02
6-15.9	Sandy Loam	1.27
16-30.9	Loam	1.67
31-45.9	Silt Loam	2.00
46-55.9	Clay Loam	2.50
56-60	Clay	see section 7.03

Section 7.02. Rapidly Permeable Soils: Rapidly Permeable Soils: For soils with a percolation rate faster than 6 minutes per inch, a soil absorption system may be used only if a soil liner system (Figure 7-1) is constructed to place a minimum of 12 inches of a soil having a percolation rate between 16 and 24 minutes per inch between the bottom of the rock layer and the high

percolation rate soil. The system shall be sized using the soil sizing factor for sandy loam soil 1.67 square feet per gallon per day (amended MC20-05-09).

Section 7.03. Slowly Permeable Soils: For soils with a percolation rate slower than 60 minutes per inch, a final treatment system other than a standard soil absorption system must be used. Alternatives may include mound systems or holding tanks. With the mound system, the soil under the mound must not be compacted by equipment causing an even slower infiltration rate.

Section 7.04. Large Systems: Large systems with more than 750 feet of absorption lines or with more than 1200 square feet of absorption area must comply with the requirements of section 6.02. Soil treatment systems which are designed to treat a wastewater flow greater than 3000 gallons per day must be separated from other similarly sized systems by at least 300 feet.

Section 7.05. Absorption Trenches: An absorption trench system shall have at least 2 absorption trenches of approximately equal length. The length of a trench with gravity flow may not exceed 100 feet. The width of a trench may not exceed 3 feet (Figure 7-2). The bottom of the trench shall be at least 18 inches below the ground surface, but the depth shall not exceed four feet. The bottom of the trench shall be uniformly graded to a slope ranging from a minimum of 1/2 inch per 100 feet to a maximum of 4 inches per 100 feet. There shall be at least 6 feet of undisturbed soil between trenches. Any closed-loop absorption trench shall be level (Figure 7-3). to minimize sidewall compaction, trench excavation shall be made with bucket equipment having side cutters or raker teeth. When the soil does not exceed the plastic limit, the trench walls and bottoms shall be scarified before graded material is added.

The trench shall be constructed with a fill material consisting of washed gravel, crushed stone, slag, or clean bank run gravel ranging in size from 3/4 to 2 1/2 inches in diameter. An absorption line shall be placed within each trench and shall run along the length of the trench. All absorption lines shall have the ends capped. There shall be at least 6 inches of rock below the line and 2 inches of rock above the line, except if there are presently trees or dense shrubs within 10 feet of the line, or it can be reasonably anticipated that such vegetation will be present during the expected life of the system, then a minimum of 12 inches of rock will be placed beneath the line. The area of an absorption field may be reduced as shown in Table 7-2 when greater depths of gravel are placed beneath the absorption line.

Table 7-2
Absorption Field Area Reductions
When Using Absorption Lines

depth of rock below pipe (in inches)	required percentage of absorption area
greater than 6, but less than 12	100%
12 or more, but less than 18	80%
18 or more, but less than 24	66%
24 or more	60%

The absorption field rock above the distribution line shall be covered with geotextile fabric or with untreated building paper and a 4-inch layer of loose hay or straw. The fabric or hay/paper

layer shall then be covered with soil to fill in the remainder of the trench and allow for settling. The minimum depth of the soil fill shall be six inches and the maximum depth shall be 36 inches.

Section 7.06. Absorption Beds: Seepage beds may not be constructed where the soil percolation rate is 30 or more minutes per inch. An absorption bed may be designed and constructed for gravity or pressure flows in accordance with the following criteria:

1. Gravity Distribution - A gravity absorption bed system (Figure 7-4) shall consist of a level bed not exceeding 100 feet in length, 15 feet in width, and 3 feet in depth. Each distribution line shall extend the length of the bed and be spaced not greater than 5 feet on center across the bed width. The distribution lines shall be preceded by a distribution box to provide uniform distribution of effluent. The outermost distribution lines may not be closer than 12 inches and no farther than 30 inches from the bed walls and all ends shall be capped if it is not a closed-loop system.
2. Pressure Distribution - A pressurized absorption bed system may exceed the length and width requirements in Section 7.05.1, but must not be more than 3 feet in depth. The bed bottom shall be level. Each distribution line shall be installed within the perimeter limits of the bed and spaced not greater than 10 feet on center across the bed. The bed shall be center-fed by a manifold pipe. The outermost distribution lines may not be closer than 5 feet to the bed wall perimeter. The distribution system shall be closed-loop or have all ends capped.
3. Additional Requirements - Additional requirements for gravity and pressurized absorption bed systems are as follows:
    a. A pressure distribution pipe network shall meet the requirements of Section 6.05.
    b. Distribution lines shall be placed in at least a 12-inch layer of 1/2 inch to 1 1/2 inch diameter washed gravel with at least 6 inches of gravel beneath and 2 inches of gravel above each line.
    c. The gravel above the distribution line shall be covered with untreated building paper, then a 6 inch layer of loose marsh hay or straw, and then a top layer of 12 inches of soil over the entire bed. Flax straw may not be used.

Section 7.07. Mound Systems:

1. Design - Any mound system designs must be submitted on the permit application forms. See Figures 7-5 and 7-6 for examples of basic mound configurations.
2. Limiting Soil Characteristics - Mounds must be constructed so that there is a minimum of 48 inches of separation between the bottom of the drainfield rock layer and any limiting soil characteristic. There must be at least 12 inches of original soil with a percolation rate faster than 120 minutes per inch above any limiting soil characteristic layer. Where the original soil has a depth of at least 12 inches to a limiting soil characteristic, but has a percolation rate greater than 1 but less than 5 minutes per inch, a layer of at least 12 inches of sandy loam textured soil with a percolation rate between six and fifteen minutes per inch at the original site must be placed before the clean sand layer may be constructed.
3. Sizing of Mound - The allowable absorption rate must be determined for all mound systems according to Table 7-3 by the percolation rate of the 12 inches of original or fill soil immediately under the sand layer.

Table 7-3

Allowable Absorption Area Loading Rates

Percolation rate of original soil under sand layer (mpi)	Gallons per day (gpd) per square foot
< 1	not allowed
1-4.9	see section 7.03
5-9.9	0.65
10-14.9	0.60
15-19.9	0.54
20-29.9	0.49
30-44.9	0.42
45-59.9	0.34
60-89.9	0.27
90-119.9	0.18
120	0.12
> 120	not allowed

4. Required Absorption Width of Mound - The required absorption width of mounds constructed on ground sloping from zero to 2.9 percent must include the width of the rock layer plus portions of the upslope and the downslope banks. The required absorption width for mounds constructed on ground sloping between three and 12 percent must include the width of the drainfield rock layer plus a portion of the width of the downslope bank. Mound systems may not be located on natural slopes exceeding 12 percent.
5. Rock Layer - The bottom area of the drainfield rock layer must be sized on a basis of 0.83 square feet per gallon of waste per day. This is the soil sizing factor for clean sand. The width of the rock layer must not exceed 10 feet.
6. Pump Discharge Pipe - The discharge pipe from the pump to the mound must be installed prior to the soil surface preparation. The trench must be carefully backfilled and compacted to prevent seepage of effluent. The line must be placed below the frost line or sloped back to the closing chamber.
7. Soil Surface Preparation - All vegetation in excess of four inches in length and dead organic debris must be removed from the surface of the total area selected for the mound, including the area under the banks. The total area must be roughened by plowing to a depth of at least eight inches or the sod layer broken and roughened by backhoe teeth. Rototilling or pulverizing must not be used. Furrows must be thrown uphill and there can be no dead furrow under the mound. In soils having percolation rates faster than 15 minutes per inch in the top 12 inches, disking may be used instead of plowing for surface preparation. No rubber tire wheel traffic should be allowed on the prepared surface if the percolation rate was slower than 15 minutes per inch. Mound construction must proceed immediately after surface preparation is complete.
8. Sand Layer (Figure 7-7) - A minimum of 12 inches of soil defined as clean sand must be placed where the drainfield rock is to be located. The sand layer must be placed using a technique that minimizes compaction. At least six inches of sand

must be kept beneath equipment to minimize compaction of the prepared surface layer. The sand layer upon which the rock bed will be placed must be level. The mound should be shaped to follow natural contours of the site and cannot be located in a swale or draw.

Clean sand can easily be determined by using the fruit jar test. Place exactly 2 inches of sand in the bottom of a quart jar and fill the jar 3/4 full of water. Place the cover on the jar and shake the contents vigorously. Allow the jar to stand for about an hour and observe if there is a layer of silt or clay on the top of the sand layers. If the layer of silt or clay particles is wider than 1/8 inch thick, the sand is likely not suitable for use in mound construction.

9. Rock Bed (Figure 7-8) - A depth of at least nine inches of drainfield rock must be placed over the sand layer and below the distribution pipe and shall completely encase the top and sides of the distribution pipes to a depth of at least two inches. The top of the rock bed must be level in all directions. The rock layer must then be covered with either a geotextile fabric or a 4-inch layer of hay or straw covered with untreated building paper. Construction vehicles must not be allowed on the drainfield rock bed until the backfill is placed.
10. Fill Over Rock Bed - Sandy loam soil must be placed on the fabric or paper/hay layer to a depth of one foot in the center of the mound and to a depth of six inches at the sides of the rock bed.
11. Multiple Rock Beds - A maximum of two ten-feet wide beds may be installed in a single mound if the original percolation rate is between 5 and 60 minutes per inch to a depth of at least 24 inches below the sand layer. The beds must be separated by four feet of clean sand. When two beds are installed, the sandy loam fill should be 18 inches deep at the center of the mound between the beds and six inches deep at the outer edges of the beds.
12. Final Cover and Landscaping (Figure 7-9) - Six inches of topsoil must be placed on the fill material over the entire area of the mound. Shrubs and trees must not be planted on the top of the mound, however, shrubs may be planted at the foot and on the side slopes of the mound.
13. Additional Grading Requirements - The side slopes of the mound must not be steeper than three to one, and whenever possible should be four to one slopes or flatter. Whenever mounds are located on slopes, a diversion must be constructed immediately upslope from the mount to intercept and direct runoff.
14. Pressure Systems Required - All mounds shall have a pressure distribution system with pumps and distribution pipes as specified in Article 6.

Section 7.08. Gravelless Trench Systems:

1. Systems Allowed - Gravelless trench systems (example Figure 7-10) may be used when the original percolation rate of the soil is between 5 and 60 minutes per inch. All requirements of Section 3.02, 3.08 and 7.01 must be met. For conversion of required areas in Section 7.01, when using graveless trench systems, use Table 7-4.

Table 7-4

Gravelless Trench Comparisons

Inside Pipe Diameter	Equivalent Trench Width	Equivalent Rock Depth Below Pipe
10"	3'	6"
8"	2'	6"

2. Trench Requirements - The bottom of the trench must be level. The trench bottom and sidewalls must be scarified for at least 12 inches above the trench bottom to provide for adequate infiltration. No individual trench may exceed 100 feet in length. A trench should be approximately 24 inches in depth and 24 inches wide. Gravelless trench systems should be placed in an area where no vehicular traffic will travel over them.
3. Tubing - The top of the tubing must be level. The tubing shall be enclosed in a geotextile fabric sleeve. The percolation holes should be located at the 4 and 8 o'clock positions when viewing the pipe in cross section.

Section 7.09. Restrict Traffic on Absorption Area: All traffic shall be kept at a minimum on or over any absorption area both before, during and after construction in order to avoid soil compaction.

Section 7.10. Tracer Wire System Required: In order to aid in the location of below ground wastewater system components, all new or replacement septic systems shall have a tracer wire system installed. All tracer wire shall be No. 12 solid single strand type TW or THHN, or approved equivalent. The tracer wire shall be accessible at the tank clean out and shall extend along the sewer line from the house to the tank, around the septic tank access hole, and from the tank through all system trenches or around the perimeter of any infiltration bed. The tracer wire in all trenches shall be placed above the pipe(s) (Figure 7-11).

In order to prevent corrosion all buried ends of tracer wires and all wire splices shall be sealed with an approved direct bury splice kit.

All tracer wire installation, including all splices, shall be inspected by the county prior to backfilling. The contractor is responsible for ensuring that the tracer wire system has conductivity (Amended MC20-3-05).

ARTICLE 8. SYSTEM MAINTENANCE

Section 8.01. Pumping Septic Tanks: The owner of a septic tank or the owner's agent should regularly inspect and measure the accumulations of sludge and scum in the tank (Figure 8-1). This inspection should be performed at least once every three years. The tank shall be pumped whenever the top of the sludge layer is less than 12 inches below the bottom of the outlet baffle or whenever the bottom of the scum layer is less than three inches above the bottom of the outlet baffle. When a garbage disposal is used the septic tank should be pumped at least once per year.

Section 8.02. Prohibited Substances: Substances not commonly used for household cleaning, including but not limited to solvents, pesticides, flammables, photo finishing chemicals, or dry cleaning chemicals, must not be discharged into the system.

ARTICLE 9. DISPOSAL OF WASTEWATER OR SLUDGE

Section 9.01. Protection of Waters of the State and Public Health: Septic tank, holding tank, and vault privy contents shall be discharged in a manner that eliminates all possibility of pollution from entering any well, water-bearing strata, or surface water supply and that prevents the creation of a nuisance or menace to the health of any person. No part of the contents of a privy, holding tank, or septic tank may be discharged onto the surface of the ground or into any water of the state, nor shall it be transported in an unsanitary manner.

Section 9.02. Surface Disposal Not Allowed - Exception: Disposal of the contents pumped from septic tanks, privies, or holding tanks shall not be deposited on the land, buried or injected into the surface of the earth except as described in Section 9.03.

Section 9.03. Disposal of Wastewater or Sludge: Disposal of wastewater and sludge and all required monitoring and testing shall be according to South Dakota Department of Environment and Natural Resources Septic Disposal Guidelines (Revised, 1989 or subsequent revisions), and the Environmental Protection Agency sludge disposal regulations (40 CFR 503), by one of the following methods:

1. Incorporation of treated human waste or sludge into tillable soil in amounts determined by the limiting factors set forth in 40 CFR 503.
2. Injection of human waste, including but not limited to contents from privies or holding tanks, into a public wastewater treatment system.
3. In the event that a variance allows the spreading of septage on frozen ground, the variance shall be granted only after the applicant provides testing results, plans to ensure that the waste will not enter any waters of the state, and limiting factor information to show that the application meets all requirements of 40 CFR 503.

ARTICLE 10. PENALTIES

Section 10.01. Penalty for Violation of this Ordinance: Any person that violates any provision of this ordinance shall be punished pursuant to SDCL17-18A-2. Each and every day that such violation continues may constitute a separate offense. In addition, any person, firm, or corporation that violates any provision of this ordinance may be subject to civil penalties as set forth in SDCL 34A-2 *(Amended MC20-1-96, MC20-04-07 8-15-07).*