Boulder County, Colorado

ONSITE WASTEWATER TREATMENT SYSTEM (OWTS) REGULATIONS

ADOPTED: April XX, 2026

EFFECTIVE: June XX, 2026

REVISION HISTORY:
Revised March 2026
Revised May 24, 2018
Revised May 24, 2014
Revised October 14, 2002
Revised May 13, 2003
Revised April 22, 2004
Revised June 21, 2006 (effective September 2006)
Revised September 2008

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Onsite Wastewater Treatment System (OWTS) Regulations

Section 1. Title and Authority

A. These regulations are promulgated pursuant to the Onsite Wastewater Treatment System Act, Colorado Revised Statutes (C.R.S.) §25-10-101, et seq., hereinafter "OWTS Act."
B. These requirements shall be known as the "Boulder County Onsite Wastewater Treatment Systems Regulations."
C. These requirements have been adopted by the Boulder County Board of Health, acting as the board of health pursuant to and under authority contained in the Onsite Wastewater Treatment System Act, C.R.S. §25-10-101, et seq., and has designated Boulder County Public Health to implement these regulations on behalf of the Boulder County Board of Health.

Section 2. Scope and Purpose

2.1 Declaration

A. In order to preserve the environment; protect public health and water quality; eliminate and control causes of disease, infection, and aerosol contamination; and reduce and control pollution of the air, land, and water, it is declared to be in the public interest to establish minimum standards and regulations for onsite wastewater treatment systems (OWTS) in Boulder County and to provide the authority for the administration and enforcement of such minimum standards and regulations.
B. These regulations apply to all onsite wastewater treatment systems in Boulder County, Colorado, as defined in C.R.S. §25-10-103.

2.2 Purpose

The purpose of these regulations is to establish the minimum standards for the location, design, construction, performance, installation, alteration, and use of OWTS with a design capacity of 2,000 gallons per day or less within Boulder County.

2.3 Jurisdiction

The jurisdiction of Boulder County Public Health ("BCPH") extends over all unincorporated areas and over all municipal corporations within the territorial limits of Boulder County, Colorado, but not over the territory of any municipal corporation that maintains its own public health agency.

2.4 Effluent Discharged to Surface Waters

A. Any OWTS system ("system") that will discharge into State of Colorado ("State") waters must be designed by a professional engineer.
B. A discharge permit application must be submitted for preliminary approval to Boulder County Public Health. Once approved by Boulder County Public Health, the application must be submitted to the Colorado Water Quality Control Division ("Division") for review, in accordance with the Water Quality Control Act, C.R.S. §25-8-101, et seq., and all applicable regulations of the Water Quality Control Commission ("Commission"). Compliance with such a permit will be deemed full compliance with these regulations.

2.5 Prohibition of OWTS Where Public Sewer Service is Available and Feasible

An OWTS permit will not be issued to any person when the subject property is located within a municipality or special district that provides public sewer service, except where such sewer service to the

property is not feasible in the determination of the municipality or special district, or the permit is otherwise authorized by the municipality or special district per 5 CCR-1002-43.4(B)(11).

2.6 Regulation Coverage

A. An OWTS with design capacity less than or equal to 2,000 gallons per day ("gpd") must comply this regulation and the OWTS Act. Within the jurisdiction of BCPH, the regulations promulgated by the Board govern all aspects of OWTS permits, performance, location, construction, alteration, installation, and use.
B. An OWTS with design capacity greater than 2,000 gpd must comply with this regulation, site location, and design approval in C.R.S. §25-8-702, and the discharge permit requirements in the Water Quality Control Act, C.R.S. §25-8-501, et seq.

2.7 Procedures to Adopt or Revise Regulations

A. The Board must submit its proposed regulations to the Division for preliminary review at least 30 days prior to a public hearing before the Board.
B. The Board must hold a public hearing on the proposed regulations before adopting final regulations.
C. The Board must give notice of the time and place of the public hearing at least once and at least 20 days in advance in a newspaper of general circulation within its area of jurisdiction.
D. The Board may make changes or revisions to the proposed regulations after the public hearing and prior to final adoption, and no further public hearing is required regarding the changes or revisions.
E. All local regulations must be transmitted to the Division no later than five days after final adoption and become effective 45 days after final adoption unless the Division notifies the Board before the 45th day that the regulations or any portions of the local regulations determined by the Division are not as stringent as the OWTS Act or with this regulation. Any portions of the local regulations determined by the Division to not be in compliance with the OWTS Act and Regulation 43 will not take effect or be published as regulations of the Board. For those portions of its regulations that do not comply, the Board may submit revisions to the Division. Only after the Division has determined the Board's revised regulations comply with the OWTS Act and this per 5 CCR-1002-43may the Board's revised regulations take effect and be published. Until the Division makes this determination, this regulation controls the unapproved portions of the local regulations.

Section 3. Definitions

The following definitions are used in these regulations:

1. *Absorption System:* A leaching field and adjacent soils or other system for the treatment of sewage in an onsite wastewater treatment system by means of absorption into the ground. See "soil treatment area."
2. *Accessible:* Easily reached, attained, or entered by the necessary equipment or maintenance provider.
3. "Alteration" (Alter) means to change in character or composition of the OWTS. A modification to
4. something different in a small yet significant way.
5. *ANSI:* American National Standards Institute, which establishes national consensus standards and conformity assessment systems.
6. *Applicant:* A person who submits an application for a permit for an onsite wastewater treatment system.
7. *Basal Area:* The effective surface area available to transmit the treated effluent from the filter media in a mound system into the in-situ receiving soils. The perimeter is measured at the interface of the imported fill material and in-situ soil. On sloping sites, only the area down-gradient from the up-slope edge of the distribution media may be included in this calculation.
8. *Bed:* A below-grade soil treatment area with a level sub-base, consisting of a shallow excavation greater than three feet wide containing distribution media and more than one lateral.

9. *Bedrock:* Continuous rock that underlies the soil or is exposed at the surface. Bedrock is generally considered impervious, but if fractured or deteriorated, it may allow effluent to pass through without adequate treatment.
10. *Bedroom:* A room with an egress window, a closet, and/or is intended for sleeping purposes; or as defined by the local board of health, as stated in the local OWTS regulation.
11. *Biochemical Oxygen Demand, Five-Day (BOD):* Quantitative measure of the amount of oxygen consumed by bacteria while stabilizing, digesting, or treating biodegradable organic matter under aerobic conditions over a five-day incubation period; expressed in milligrams per liter (mg/L).
12. *Biochemical Oxygen Demand, Carbonaceous Five Day" (CBOD):* Quantitative measure of the amount of oxygen consumed by bacteria while stabilizing, digesting, or treating the organic matter under aerobic conditions over a five-day incubation period while in the presence of a chemical inhibitor to block nitrification; expressed in milligrams per liter (mg/L).
13. *Building Sewer:* Piping that conveys wastewater to the first system component or the sewer main.
14. *Carbonaceous Biochemical Oxygen Demand:* See "biochemical oxygen demand, carbonaceous five day."
15. *CCR:* Rules and regulations of the Colorado Code of Regulations.
16. *CDPHE:* The Colorado Department of Public Health and Environment, which was created by C.R.S. §25-1-102.
17. *Cesspool:* An unlined or partially lined underground pit or underground perforated receptacle into which raw household wastewater is discharged and from which the liquid seeps into the surrounding soil. Cesspool does not include a septic tank.
18. *Chamber:* An arch-shaped structure providing an open-bottom soil interface with permeable sidewalls used for distribution of effluent in a soil absorption system.
19. *Cistern:* An enclosed unpressurized reservoir or tank for storing water as part of a potable water supply system.
20. *Cleaning:* The act of removing septage or other waste from a wastewater treatment system component or grease/waste from a grease interceptor.
21. *Colorado Plumbing Code:* Rules and Regulations of the Colorado State Plumbing Board (3 CCR 720-1).
22. *Commission:* The State of Colorado Water Quality Control Commission, which was created by C.R.S. §25-8-201.
23. *Competent Technician:* A person who has the appropriate expertise and is able to conduct and interpret the results of soil profile test pit excavations, percolation tests, and site evaluations. This individual has also met the required competencies for a "Competent Technician," as defined in Section 9.8.
24. *Component:* A subsection of an onsite wastewater treatment system; a component may include multiple devices.
25. *Composting Toilet:* A self-contained waterless toilet designed to decompose non-water-carried human wastes through microbial action and to store the resulting matter for disposal.
26. *Consistence:* The degree and kind of cohesion and adhesion that soil exhibits and/or the resistance of soil to deformation or rupture under an applied stress to an extent that the soil density would restrict permeability. Aspects of consistency are used to determine if the horizon will have permeability lower than that of the defined soil type. Additional insight to consistence can be found in the USDA-NRCS* Field book for Describing and Sampling Soils; Version 3.0, Sept. 2012 (*-United States Department of Agriculture – National Resources Conservation Service).
27. *Crest:* The highest point on the side of a dry gulch or cut-bank.
28. *C.R.S.:* Rules and regulations of the Colorado Revised Statutes.
29. *CSA:* Canadian Standards Association, which provides product testing and certification services for a variety of products, including electrical, mechanical, plumbing, and gas products.
30. *Cut-bank:* A nearly vertical slope caused by erosion or construction that has exposed historic soil strata.

31. *Deep Gravel System:* A soil treatment area for repairs only where the trenches utilize a depth of gravel greater than six inches below the distribution pipe and sidewall area is allowed according to a formula specified in this regulation.
32. *Deficiency:* See “malfunction.”
33. *Department:* The Colorado Department of Public Health and Environment, created by C.R.S. §25-1-102.
34. *Design:* 1) the process of selecting, sizing, locating, specifying, and configuring treatment train components that match site characteristics and facility use, as well as creating the associated written documentation; and 2) written documentation of size, location, specification, and configuration of a system.
35. *Design Capacity:* See “flow, design.”
36. *Design Flow:* See “flow, design.”
37. *Designer, Onsite Wastewater Treatment System:* A practitioner who utilizes site evaluation and investigation information to select an appropriate OWTS and prepares a design document in conformance with this regulation.
38. Disinfection means the process of destroying pathogenic microorganisms in sewage through the application of ultraviolet light, chlorination, or ozonation.
39. *Distribution:* The process of dispersing wastewater or effluent to one or more components, devices, or throughout a soil treatment area.
40. *Distribution Box:* A watertight component that receives effluent from a septic tank or other treatment unit and distributes effluent via gravity in approximately equal portions to two or more distribution laterals in the soil treatment area.
41. *Division:* The division of administration of the department of which the Colorado Water Quality Control Division is a part.
42. *Domestic Wastewater:* See “wastewater, domestic.”
43. *Domestic Wastewater Treatment Works:* A system or facility for treating, neutralizing, stabilizing, or disposing of domestic wastewater which system or facility has a designed capacity to receive more than 2,000 gallons of domestic wastewater per day. The term "domestic wastewater treatment works" also includes appurtenances to such system or facility, such as outfall sewers and pumping stations and equipment related to such appurtenances. The term "domestic wastewater treatment works" does not include industrial wastewater treatment plants or complexes whose primary function is the treatment of industrial wastes, notwithstanding the fact that human wastes generated incidentally to the industrial process are treated therein. C.RS. §25-8-103(5).
44. *Dosing:* A high-rate periodic discharge into a soil treatment area.
45. *Dosing, Demand:* Configuration in which a specific volume of effluent is delivered to a component based upon patterns of wastewater generation from the source.
46. *Dosing, Pressure:* A uniform application of wastewater throughout the intended portion of the soil treatment area through small diameter pipes and orifices, under pressure. For this definition, the term “pressure” indicates that the system is capable of creating upward movement of effluent out of the distribution system piping.
47. *Dosing, Timed:* A configuration in which a specific volume of effluent is delivered to a component based upon a prescribed interval, regardless of facility water use.
48. *Dosing Siphon:* A device used for demand dosing effluent; which stores a predetermined volume of water and discharges it at a rapid rate from a tank at a given elevation to a component at a lower elevation. This is accomplished by means of atmospheric pressure and the suction created by the weight of the liquid in the conveying pipe.
49. *Dosing Tank:* A tank, compartment, or basin that provides for storage of effluent from a septic tank or other treatment unit intended to be delivered to a soil treatment area at a high-rate periodic discharge.
50. *Drainfield:* See “soil treatment area.”

51. *Drop Box:* A device used for sequential distribution of effluent by gravity flow to a lateral of a soil treatment area.
52. *Dry Gulch:* See "gulch, dry."
53. *Drywell:* An unlined or partially lined underground pit (regardless of geometry) into which drainage from roofs, basement floors, water softeners, or other non-wastewater sources is discharged and from which the liquid seeps into the surrounding soil.
54. *Effective Size:* The size of granular media, such that 10% by weight of the media is finer than the size specified.
55. *Effluent:* The liquid flowing out of a component or device of an onsite wastewater treatment system.
56. *Effluent Filter:* a removeable, cleanable (or disposable) device installed on the outlet piping of a septic tank for the purposes of retaining solids larger than one-eigth (1/8) inch and/or modulating effluent flow rate. An effluent filter may be a component of a pump installation. An effluent filter may also be installed following the septic tank but before higher level treatment components or a soil treatment area.
57. *Effluent Pipe:* Non-perforated pipe that conveys effluent from one onsite wastewater treatment system component to the next.
58. *Environmental Health Specialist:* A person trained in physical, biological, or sanitary science to carry out educational and inspectional duties in the field of environmental health.
59. *Evapotranspiration/Absorption System:* An unlined onsite wastewater treatment system component that uses evaporation, transpiration, and absorption for the dispersal of effluent.
60. *Evapotranspiration System:* An onsite wastewater treatment system component with a continuous, impermeable liner that uses evapotranspiration and transpiration for the dispersal of effluent.
61. *Experimental System:* A design or type of system based upon improvements or development in the technology of sewage treatment that has not been fully tested. This definition is retained for historical reference as experimental systems in Boulder County were allowed and installed. These are no longer permitted, please see product development.
62. *Failure:* A condition existing within any component of an OWTS that prevents the system from functioning, as intended, and which results in the discharge of untreated or partially treated wastewater onto the ground surface, into surface water or groundwater, or which results in the backup of sewage into the building sewer. Other conditions within a component that are deemed by BCPH to be a threat to public health and/or safety may also be deemed a failure.
63. *Field Performance Testing:* Data gathering on a system in actual use that is being proposed for Division acceptance.
64. *Flood Fringe:* The portion of the floodplain overlay district that are not in the floodway.
65. *Floodplain (100-year):* An area of land susceptible to being inundated as a result of the occurrence of a one-hundred-year flood.
66. *Floodplain Overlay District:* is defined as the FEMA Floodplain combined with the Boulder County floodplain as defined in Section 4-403(A) of the Boulder County Land Use Code.
67. *Floodway:* The portions of the Floodplain Overlay District required for the passage or conveyance of the 1% annual-chance (100-year) flood in which waters will flow at significant depths or with significant velocities, including the channel of a river or other watercourse and any adjacent floodplain areas that must be kept free of development and other encroachments in order to protect the health and safety of the residents of and visitors to Boulder County, and to discharge the 100-year flood without cumulatively increasing the water surface elevation more than a designated height (also called 'surcharge' and described in Section 4-404.2(E)(3)).
68. *Flow, Daily:* The measured volume of wastewater generated from a facility in a 24-hour period expressed as gallons per day.
69. *Flow, Design:* The estimated volume of wastewater per unit of time for which a component or system is designed. Design flow may be given in the estimated volume per unit, such as person per unit time

that must be multiplied by the maximum number of units that a facility can accommodate over that time.

70. *Flow Equalization:* A system configuration that includes sufficient effluent storage capacity to allow for regulated flow on a daily or multi-day basis to a subsequent component despite variable flow from the source.
71. *Flow Equalizer:* An adjustment device to evenly distribute flow between outlets in a distribution box or other device that may be out of level.
72. *Grease Interceptor Tank:* A watertight device located outside a facility designed to intercept, congeal, and retain or remove fats, oils, and grease from sources (e.g. commercial food service) that will generate high levels of fats, oils, and greases.
73. *Groundwater:* That part of the subsurface water that is at or below the saturated zone.
74. *Groundwater condition:* means a condition in the soil profile where a seasonal or current ground water surface has been identified, thus creating a vertical separation requirement to the infiltrative surface of a soil treatment area.
75. *Groundwater Surface:* The uppermost limit of an unconfined aquifer at atmospheric pressure.
76. *Guidelines:* Colorado State Board of Health Guidelines on Individual Sewage Disposal Systems, 5 CCR-1003-6 – predecessor of per Onsite Wastewater Treatment System Regulation, 5 CCR-1002-43.
77. *Gulch, Dry:* A deep, narrow ravine that receives discontinuous storm influenced flows, for a short duration, in direct response to a rain event and is not interconnected to a groundwater source.
78. *Health Officer:* The Executive Director (ED) of BCPH or otherwise appointed by the ED or the board of health.
79. *Higher-level Treatment:* Designated treatment levels other than Treatment Level 1 (see Table 6-3).
80. *HOA:* Hand/off/auto switch
81. *Holding Tank:* See “vault.”
82. *Infiltrative Surface:* Designated interface where effluent moves from distribution media or a distribution product into treatment media or original soil. In standard trench or bed systems, this will be the interface of the distribution media or product and in-situ soil. Two separate infiltrative surfaces will exist in a mound system and an unlined sand filter, one at the interface of the distribution media and fill sand, and the other at the interface of the fill sand and in-situ soil.
83. *Inspection Port:* An access point in a system component that enables inspection, operation, and/or maintenance.
84. *Invert:* Elevation of the bottom of the inside pipe wall or fitting.
85. *Lateral:* A pipe, chamber, or other component used to transport and distribute effluent.
86. *Leachfield:* See “soil treatment area.”
87. *Limiting Layer:* A horizon or condition in the soil profile that exhibits a limited capability for treatment of wastewater but will readily accept the effluent. This includes fractured bedrock and type R-0 soils (see Table 10-1A).
88. *Liner:* An impermeable synthetic or natural material used to prevent or restrict infiltration and/or exfiltration. For the purposes of this regulation, the minimum thickness of a liner must be 30 ml.
89. *Linear Loading Rate:* The amount of effluent applied per linear foot along the contour (gpd/linear ft.).
90. *Long-term Acceptance Rate (LTAR):* Design parameter expressing the rate that effluent enters the infiltrative surface of the soil treatment area at equilibrium, measured in volume per area per time (e.g. gallons per square foot per day).
91. *Malfunction:* The condition in which a component is not performing as designed or installed and needs repair or modification to function as originally intended.
92. *Manufactured Media:* See “media, other manufactured.”
93. *Media:* Solid material that can be described by shape, dimensions, surface area, void space, and application.

94. *Media, Enhanced Manufactured:* An accepted proprietary manufactured distribution product that includes synthetic media contained within one or more external permeable outer layers that promote the movement of the effluent, and is placed on a specified sand base or media that does not mask the infiltrative surface of the in-situ soil.
95. *Media, Other Manufactured:* An accepted proprietary manufactured distribution product made of synthetic media for distribution of effluent that is placed directly on the in-situ soil.
96. *Media, Treatment:* Non- or slowly-degradable media used for physical, chemical, and/or biological treatment in an onsite wastewater treatment system component.
97. *Mound:* A soil treatment area whereby the infiltrative surface is at or above original grade at any point.
98. *Nitrogen Reduction:* A minimum 50% reduction of influent nitrogen strength, which is the minimum objective of NSF/ANSI Standard 245 – Wastewater Treatment Systems – Nitrogen Reduction.
99. *NRTL:* Nationally Recognized Testing Laboratory.
100. *NSF:* National Sanitation Foundation/, which sets public health standards and certification programs to protect the world's food, water, consumer products and the environment.
101. *Onsite Wastewater Treatment System (OWTS, aka "system"):* An absorption system of any size or flow or a system or facility for treating, neutralizing, stabilizing, or dispersing sewage generated in the vicinity, which system is not a part of or connected to a sewage treatment works.
102. *OWTS Act:* The Onsite Wastewater Treatment System Act, C.R.S. §25-10-101, et seq.
103. *Percolation Test:* A subsurface soil test at the depth of a proposed absorption system or similar component of an OWTS 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. The rate is expressed in minutes per inch.
104. *Performance Standard:* Minimum performance criteria for water quality and operation and maintenance established by the regulatory authority to ensure compliance with the public health and environmental goals of the State or public health agency.
105. *Permeability:* The property of a material which permits movement of water through the material.
106. *Permit:* A permit for the construction or alteration, installation, and use or for the repair of an onsite wastewater treatment system.
107. *Person:* An individual, partnership, firm, corporation, association, or other legal entity and also the state, any political subdivision thereof, or other governmental entity.
108. *Pressure Distribution:* See "dosing, pressure."
109. *Privy:* An above-grade structure allowing for the disposal of excreta not transported by a sewer and which provides privacy and shelter and prevents access to the excreta by flies, rodents, or other vectors.
110. *Privy, Pit:* Privy over an unlined excavation.
111. *Privy, Vault:* Privy over a vault.
112. *Professional Engineer:* An engineer licensed in Colorado in accordance with C.R.S. §12-120-201, et seq., C.R.S. and practicing within their areas of expertise, consistent with 4 CCR 730-1.
113. *Professional Geologist:* A person who is a graduate of an institution of higher education that is accredited by a regional or national accrediting agency, with a minimum of 30 semester (45 quarter) hours of undergraduate or graduate work in a field of geology and whose post-baccalaureate training has been in the field of geology with a specific record of an additional five years of geological experience to include no more than two years of graduate work. CR.S. §23-41-208.
114. *Proprietary Product:* A manufactured component or other product that is produced by a private person. It may be protected by patent, trademark, or copyright.
115. *Public Domain Technology:* A system that is assembled on location from readily available components and is based on well-established design criteria and is not protected by patent, trademark, or copyright.

116. *Record Drawing:* Construction drawings provided to illustrate the progress or completion of the installation of an OWTS, or components of the OWTS; typically based on field inspections by the designer.
117. *Redoximorphic:* A soil property that results from the reduction and oxidation of iron and manganese compounds in the soil after saturation with water and subsequent desaturation.
118. *Remediation System:* A treatment system, chemical/biological additive, or physical process that is proposed to restore the soil treatment area of an OWTS to intended performance.
119. *Repair:* Restoration of functionality and/or treatment by reconstruction, relocation, or replacement of an Onsite Wastewater Treatment System or any component thereof in order to allow the system to function as intended.
120. *Replacement System:* See "repair."
121. *Riser:* A watertight vertical cylinder and lid allowing access to an OWTS component for inspection, cleaning, maintenance, or sampling.
122. *Restrictive layer*: means a condition in the soil profile that restricts the vertical movement of the effluent. This may include impervious bedrock, glacial till, platy soils, sodic soils, or soils with a cementation class of "strongly cemented" or greater.
123. *Rock-Plant Filter:* A designed system which utilizes treatment media and various wetland plants to provide treatment of wastewater through biological, physical, and chemical processes; also called a "constructed wetland."
124. *Sand Filter:* An engineer-designed OWTS that utilizes a layer of specified sand as filter and treatment media and incorporates pressure distribution.
125. *Sand Filter, Lined:* An engineer-designed OWTS that has an impervious liner and under-drain below the specified sand media. Lined sand filters may be intermittent/single pass where the effluent is distributed over the sand bed a single time before distribution to a soil treatment area, or re-circulating where part of the effluent is returned to an earlier component for additional treatment before distribution to a soil treatment area.
126. *Sand Filter, Unlined:* An engineer-designed OWTS that includes a layer of specified sand used as a treatment media without a liner between the sand and the existing soil on which it is placed.
127. *Seepage Pit:* An excavation deeper than it is wide that receives septic tank effluent and from which the effluent seeps from a structural internal void into the surrounding soil through the bottom and openings in the side of the pit.
128. *Septage:* A liquid or semisolid that includes normal household wastes, human excreta, and animal or vegetable matter in suspension or solution generated from a residential septic tank system. Septage may include such material issued from a commercial establishment if the commercial establishment can demonstrate to the Division that the material meets the definition for septage set forth in this subsection. Septage does not include chemical toilet residuals.
129. *Septic Tank:* A watertight, accessible, covered receptacle designed and constructed to receive sewage from a building sewer, settle solids from the liquid, digest organic matter, store digested solids through a period of retention, and allow the clarified liquids to discharge to other treatment units for final disposal.
130. *Sequential Distribution:* A distribution method in which effluent is loaded into one trench and fills it to a predetermined level before passing through a relief pipe or device to the succeeding trench. The effluent does not pass through the distribution media before it enters succeeding trenches.
131. *Serial Distribution:* A distribution method in which effluent is loaded into one trench and fills it to a predetermined level before passing through a relief pipe or device to the succeeding trench. The effluent passes through the distribution media before entering succeeding trenches which may be connected to provide a single uninterrupted flow path. This definition is retained for historical reference. Serial distribution is no longer permitted under current regulations.

132. *Sewage:* A combination of liquid wastes that may include chemicals, house wastes, human excreta, animal or vegetable matter in suspension or solution, and other solids in suspension or solution, and that is discharged from a dwelling, building, or other establishment. See also "wastewater."
133. *Sewage Treatment Works:* Same meaning as "domestic wastewater treatment works" under C.R.S. §25-8-103.
134. *Site Evaluation:* A comprehensive analysis of soil and site conditions for an OWTS.
135. *Site Evaluator:* A practitioner who conducts preconstruction site evaluations, including visiting a site and performing soil analysis, a site survey, or other activities necessary to determine the suitability of a site for an OWTS.
136. *Slit Trench Latrine:* A temporary shallow trench for use as disposal of non-water-carried human waste.
137. *Soil:* 1) unconsolidated mineral and/or organic material on the immediate surface of the earth that serves as a medium for the growth of plants and can potentially treat wastewater effluent; 2) unconsolidated mineral or organic matter on the surface of the earth that has been subjected to and shows effects of: a) pedogenic and environmental factors of climate (including water and temperature effects) and b) macro and microorganisms, conditioned by relief, acting on parent material over a period of time.
138. *Soil Evaluation:* A percolation test, soil profile, or other subsurface soil analysis at the depth of a proposed soil treatment area or similar component or 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 or as an application rate of gallons per square foot per day.
139. *Soil Horizon:* Layers in the soil column differentiated by changes in texture, color, redoximorphic features, bedrock, structure, consistence, and any other characteristic that affects water movement or treatment of effluent.
140. *Soil Morphology:* 1) physical constitution of a soil profile, as exhibited by the kinds, thickness, and arrangement of the horizons in the profile, and by the texture, structure, consistence, and porosity of each horizon; and 2) visible characteristics of the soil or any of its parts.
141. *Soil Profile Test Pit Excavation:* A trench or other excavation used for access to evaluate the soil horizons for properties influencing effluent movement, bedrock, evidence of seasonal high ground water, and other information to be used in locating and designing an OWTS.
142. *Soil Structure:* The naturally occurring combination or arrangement of primary soil particles into secondary units or peds; secondary units are characterized on the basis of type, size class, and grade (degree of distinctness).
143. *Soil Texture:* Proportion by weight of sand, silt, and clay in a soil.
144. *Soil Treatment Area:* The physical location where final treatment and dispersal of effluent occurs. Soil treatment area includes drainfields, mounds, and drip fields.
145. *Soil Treatment Area, Alternating:* Final treatment and distribution component that is composed of two soil treatment areas that are independently dosed.
146. *Soil Treatment Area, Sequencing:* A soil treatment area having more than two sections that are dosed on a frequent rotating basis.
147. *State:* State of Colorado.
148. *State Waters:* Any and all surface and subsurface waters contained in or that flow in or through the state of Colorado; it does not include waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed.
149. *Storm Drainage System*: Publicly owned facilities by which stormwater is collected and conveyed, including, but not limited to, any roads and drainage systems, streets, gutters, curbs, catch basins, inlets, piped storm drains, pumping facilities, retention and detention basins, and natural and

manmade or altered drainage, ditches/culverts/channels/lakes/reservoirs, and other drainage structures.

150. *Local Drainage System:* The storm drainage system that conveys the minor and major storm run-off to the Major Drainage System and serves only the property within the development in question
151. *Major Drainage System*: The storm drainage system that conveys the minor and major storm run-off and serves areas both within and outside the development in question
152. *Strength, Wastewater:* The concentration of constituents of wastewater or effluent; usually expressed in mg/L.
153. *Suitable Soil:* A soil which will effectively treat and filter effluent by removal of organisms and suspended solids, which meets long-term acceptance rate requirements as defined in Table 10-1, and has the required vertical thickness below the infiltrative surface and above a limiting layer.
154. *System:* Onsite wastewater treatment system.
155. *Systems Cleaner:* A person engaged in and who holds himself or herself out as a specialist in the cleaning and pumping of OWTS and removal of the residues deposited in the operation thereof.
156. *Systems Contractor:* A person engaged in and who holds himself or herself out as a specialist in the installation, renovation, and repair of OWTS.

157. *Systems Maintenance Provider*: means a person engaged in and who holds himself or herself out as a specialist in routine or periodic actions taken to assure that the On-site Wastewater Treatment System is functioning as intended, and/or that the On-site Wastewater Treatment System is meeting performance requirements.
158. *Total Suspended Solids:* Measure of all suspended solids in a liquid; typically expressed in mg/L.
159. *Transfer of Title:* Change of ownership of a property.

160. *Transfer of Title Inspector: means* a person engaged in and who holds himself or herself out as a specialist in conducting evaluations and observations of an existing Onsite Wastewater Treatment System serving a structure that is proposed for property transfer, to assess if the system is functioning as intended.
161. *Treatment Level:* Defined concentrations of pollutants to be achieved by a component or series of components of an OWTS.
162. *Treatment Media:* See “media, treatment.”
163. *Treatment Unit:* A component or series of components where solids or pollutants are removed from wastewater or effluent from a preceding component.
164. *Trench:* 1) below-grade soil treatment area consisting of a shallow excavation with a width of three feet or less containing distribution media and one lateral; and 2) excavation for placement of piping or installation of electrical wire or conduit.
165. *UL:* Underwriters Laboratories, a safety consulting and certification company.
166. *Uniformity Coefficient:* A value which is the ratio of D60 to D10, where D60 is the soil diameter of which 60% of the soil weight is finer and D10 is the corresponding value at 10% finer (a soil having a uniformity coefficient smaller than four would be considered "uniform" for purposes of this regulation).
167. *Vault:* A watertight, covered receptacle, which is designed to receive and store excreta or wastes either from a building sewer or from a privy and is accessible for the periodic removal of its contents. If the vault is intended to serve a structure or structures that are projected to generate a domestic wastewater flow of greater than 2,000 gallons per day at full occupancy, the vault would be considered a domestic wastewater treatment works. Vaults are Onsite Wastewater Treatment Systems.

168. *Visual and Tactile Evaluation of Soil:* Determining the properties of soil by standardized tests of appearance and manipulation in the hand.
169. *Volume, Effective:* The amount of effluent contained in a tank under normal operating conditions; for a septic tank, effective volume is determined relative to the invert of the outlet. For a dosing tank, the effective volume under normal conditions is determined relative to the invert of the inlet and the control off level.
170. *Wastewater, Domestic:* Combination of liquid wastes (sewage), which may include chemicals, household wastes, human excreta, animal or vegetable matter in suspension or solution, or other solids in suspension or solution that are discharged from a dwelling, building, or other structure.
171. *Wastewater, High Strength:* 1) wastewater from a structure having BOD_5 greater than 300 mg/L; and/or total suspended solids (TSS) greater than 200 mg/L; and/or fats, oils, and grease greater than 50 mg/L; or 2) effluent from a septic tank or other pretreatment component (as defined by NSF/ANSI Standard 40 testing protocol) that has BOD_5 greater than 180 mg/L; and/or TSS greater than 80 mg/L; and/or fats, oils, and grease greater than 25 mg/L and is applied to an infiltrative surface.
172. *Wastewater Pond:* A designed pond that receives exclusively domestic wastewater from a septic tank, and which provides an additional degree of treatment.
173. *Watercourse*: a natural or artificial channel through which water flows, either continuously or intermittently, and exhibits a connection to an actual or elevated groundwater table. A watercourse includes the bed of a channel that flows only seasonally (e.g., creek, stream, irrigation ditch). Hollows, ravines, or roadside ditches that are normally dry are not considered a watercourse.
174. *Water Quality Control Commission:* See "Commission."
175. *Water Quality Control Division:* See "Division."
176. *Wetland, constructed:* See "rock-plant filter."
177. *Wetlands:* Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

(Also see Table 3-1, Acronyms, in the appendix)

Section 4. New, Repair, and Product Development Permits and Inspections

4.1 Permit Required, Application Requirements and Procedures

A. Before installing, altering, or repairing an onsite wastewater treatment system (OWTS) in Boulder County, Colorado, the property owner/occupants ("applicant") must obtain a permit from BCPH.
B. The applicant must submit a complete application to BCPH that is consistent with Section 4.1.C of these regulations before installing, altering, or repairing the OWTS.
C. Minimum OWTS permit application requirements include provision of the following:
    1. Owner name and contact information.
    2. Property address.
    3. Property legal description.
    4. Type of permit.
    5. Report from site and soil evaluation (see Section 9).
    6. System design with a legible and accurate site plan showing pertinent physical features on the subject property and adjacent properties, as noted in Table 7-1.
    7. Any other information, data, plans, specifications, and tests required by BCPH, such as:
        a) Additional hydrological, geological, engineering, or other information provided by a professional engineer or geologist, which may be required if specific evidence suggests undesirable soil conditions exist. Note: This requirement will not prejudice the

right of BCPH to develop its own information from its own source at its own expense.

b) A completed current BCPH permit application to install, construct, alter, or repair an OWTS.

8. The issuance of a permit and specifications of terms and conditions therein will not constitute assumption of liability, nor create a presumption that BCPH or its employees may be liable for the failure or malfunctioning of any system. Permit issuance will not constitute a certification that the system, the equipment used in the system, or any component used for system operation will ensure continuous compliance with the provision of the OWTS Act, the regulations adopted thereunder, or any terms and conditions of a permit.

4.2 Fees

A. Permit Fees:

1. The Board may set permit fees and fees for continued use of an OWTS (Use Permit) which shall be no greater than is required to offset the actual indirect and direct costs of BCPH (C.R.S. §25-10-107).
2. Applicants must submit the applicable OWTS permit application fees with their completed OWTS permit applications, as permit fees are due and payable upon submission of the OWTS permit applications.
3. The Board has the authority to make provisions for waving local permit fees normally required for an OWTS.

B. **Other Fees:** The Board may require additional fees for inspections, soil evaluation, and other services performed by BCPH; however, the fees shall be no greater than is required to offset actual indirect and direct costs of the services provided by BCPH and must not exceed maximum amounts that have been specified in C.R.S. §25-10-107.

C. **Surcharge:** BCPH will collect a surcharge fee of $23 for all permits issued for new, repaired, or upgraded OWTS. BCPH will retain $3 of the fee to help cover BCPH's administrative costs, and the remaining $20 must be transmitted to the Colorado Department of Public Health and Environment for use in funding the State's OWTS Program.

4.3 Application and Permit Terms and Changes in Condition after Permit Issuance

A. Applications that have not had a permit issued will expire 1 year after submitting date.

1. If new regulations have not been adopted since submittal, applications can be renewed for a renewal fee.
2. If new regulations have been adopted since submittal, a new application and permit fee may be required.

B. OWTS construction permits expire one year after date of issuance if construction has not yet commenced.

1. OWTS renewals may be requested in writing prior to expiration of OWTS construction permits. Extensions can be granted for up to a total of 36 months for extenuating circumstances, including but not limited to site conditions preventing construction or new construction of dwelling or structures.
2. Regulation revisions made before renewal requests are submitted may also be applicable to the renewal and may require submission of a revised OWTS design.
3. Renewal fees may be applicable.

C. OWTS construction permits expire three years after date of the last inspection if construction has commenced and is pending further inspections.

D. OWTS construction permits with approval of final inspection(s) that are still pending documentation will expire one year after the last inspection.

E. Any changes to OWTS plans or specifications after a permit is issued will invalidate the permit unless the permittee receives written approval from BCPH of the changes.

4.4 Repair Permits for Noncompliant OWTS

A. The owner or occupant ("applicant") of a property that has a non-compliant OWTS must obtain a repair permit from BCPH. If they received a notice from BCPH that their OWTS is not functioning in compliance with the OWTS Act or other applicable regulations or their OWTS constitutes a nuisance or hazard to public health or water quality, the applicant must apply for a repair permit within two (2) business days after receiving such notice from BCPH.

B. The repair permit must provide a reasonable amount of time for the applicant to make the necessary repairs. At the end of that period, BCPH must inspect the OWTS to ensure it is functioning properly. Concurrently with the issuance of a repair permit, BCPH may issue an emergency use permit to authorize continued use of the malfunctioning system on an emergency basis; however, the emergency use permit may not exceed the period stated in the repair permit. Emergency use permits may be extended, for good cause shown, if the repairs can't be completed by the date noted on the repair permit through no fault of the owner or occupant and only if the owner or occupant continues making repairs to the OWTS.

C. Change of use or expanded use:
A permit is required for a change of use or the expanded use of an OWTS where it has been determined that an existing OWTS is not sized or designed to accommodate the expected additional hydraulic or organic load. The OWTS must be replaced or modified to handle such an increase unless it is determined that the existing system is adequately designed and constructed for the higher design flow rate. See section 6 of this regulation.

4.5 Denial of Permits and Appealing Denial

A. If BCPH denies an OWS permit, BCPH must send written notice to the applicant that outlines details why the permit was denied and requirements for reconsideration of the application.

B. Any applicant denied an OWTS permit may appeal to the health officer in accordance with the following:
    1. The appeal must be filed in writing with BCPH within 30 days after the denial was mailed.
    2. If the health officer determines that BCPH erred in its decision to deny the permit, the health officer shall approve the permit.
    3. Upon finding that strict enforcement of these regulations would cause undue hardship to the applicant and upon further finding that non-compliance with the regulations would not be injurious to public health or the environment or be less restrictive than State Guidelines, the health officer may authorize issuance of a permit despite non-compliance.
        a) In such a case the burden of proof is upon the applicant to show that the system will not injure adjacent properties, will not conflict with the purposes of these regulations, and will not adversely affect anyone's health or the environment.
    4. The denial will become final upon expiration of the 30-day appeal timeframe or when final action is rendered, whichever occurs first.

C. In the event the health officer denies the appeal request, the applicant may request the Board to reconsider the health officer's denial. Such request for reconsideration must be submitted within 30 days after the decision of the health officer's denial.

4.6 Determination

BCPH must determine if the information provided in the permit application, site and soil evaluations, assumptions and calculations, and design of the proposed OWTS are in compliance with the

requirements of the OWTS Act and the regulations adopted pursuant thereto. If the submittal is determined to be in compliance, authorization to begin installation may be given by BCPH.

4.7 Authorization to Enter Upon Property

For the purpose of inspecting and enforcing applicable regulations and the terms and conditions of all OWTS permits issued in Boulder County, and to appropriately investigate and respond to OWTS complaints, BCPH shall be authorized to enter upon private property at reasonable times and upon reasonable notice to the property owner or occupant. The property owners and occupants must allow BCPH officials to gain access to the property in order to conduct inspections, conduct required tests, collect samples, and monitor compliance to determine if the system is functioning in compliance with the OWTS Act and applicable regulations and permit requirements.

4.8 Inspection Stages

A. **Site inspections:** BCPH will conduct site inspections for all OWTS permit applications to verify soil observations, determine presence of a limiting layer, identify physical features requiring setbacks, and assess other site-specific details required to evaluate proposed OWTS design documents.

B. **Open-hole inspections:** When required, BCPH will inspect the open hole for the soil treatment area to determine if there are any limiting conditions and to document the dimensions of the soil treatment area.

C. **Final inspections:** Before a system is placed in use, the owner, the owner's agent, or the systems contractor must provide BCPH and the engineer, if the OWTS is engineer-designed, with notice that the progress of the work has been sufficiently completed. BCPH will conduct an inspection to ensure that the work was performed satisfactorily in compliance with the OWTS Act, applicable OWTS regulations and permit requirements.

    1. **Standard systems:**
        a) The system contractor must notify BCPH once construction of the OWTS is completed and before replacing soil over the system.
        b) Once notified, BCPH will conduct a final inspection of the system as soon as it is practicable.
        c) Upon final inspection, if BCPH finds that the OWTS was properly installed in accordance with applicable regulations and permit requirements, BCPH will issue final approval for the completed OWTS. The BCPH inspector will leave written notice at the site informing the property owner or systems contractor that the installation was approved.
        d) Such notice of approval shall be considered permission for the property owner or systems contractor to replace the soil or fill over the inspected system components.
        e) Final approval of the OWTS will be withheld until all components of the system, including building sewer and house connections, have been inspected.
    2. **Registered professional engineer (RPE)-designed systems:**
        a) During construction of an OWTS designed by an RPE, the systems contractor must notify BCPH and the design engineer regarding all inspections specified in the permit and in the design.
        b) Once construction of an OWTS requiring engineer design has been completed and before replacing soil over the system, the systems contractor must notify both BCPH and the design engineer.
        c) Once notified, BCPH will conduct a final inspection of the system as soon as it is practicable.
        d) Upon final inspection, if BCPH finds that the OWTS was properly installed in accordance with applicable regulations and permit requirements, BCPH will issue final

approval of the completed OWTS. The BCPH inspector will leave written notice at the site to inform the property owner or systems contractor that the installation was approved.

e) Permission to replace the soil or fill over the inspected system components will not be granted until BCPH and the design engineer have both examined and declared the installation to be satisfactory.

f) Final approval for the system will be withheld until all components of the system, including building sewer and house connection, have been inspected and the design engineer or engineering firm provides written notice to BCPH that they've inspected and determined that the OWTS was installed in accordance with the approved design.

1) Such written notice must include:

i. Date of inspection(s).

ii. Details of observations during inspection.

iii. Specifics verifying installed components and materials.

iv. Verification of the suitability of final cover soil when using manufactured media.

3. **Failure to pass inspections:** If the any inspections by BCPH discloses significant departure from the description or design of the system outlined in the OWTS application or permit, or if any aspect of the system fails to comply with any applicable requirements, BCPH will withhold approval and:

a) Leave written notice of the denial at the site that details the deficiencies responsible for the failed inspection.

b) An additional inspection must be scheduled with BCPH after the deficiencies have been corrected and the system is brought into compliance with all applicable OWTS requirements.

4.9 Permit Final Approval Requirements

A. Final approval by BCPH of the OWTS permit must include, but is not limited to, the following:

1. If the OWTS was designed by an engineer, a letter from the engineer to certify that the OWTS was constructed per the approved design. The letter must include documentation of any modifications to the permitted and approved design, general observations noted during the inspection(s), and the corresponding dates of all inspections.

a) For designs that include a pressurized distribution system, a residual head test (squirt height), at the distal end of each lateral, must be conducted to determine the adequacy of system design and construction. Results from this inspection must be included within both the engineer's certification and the final permit acceptance documents.

2. Receipt of record drawing, including but not limited to the following:

a) A scale drawing showing all components of the OWTS, including its location from known and findable points.

b) Dimensions and size.

c) Depths.

d) Tank size(s) and manufacturers' names and models.

e) Setbacks.

f) Other information related to locating and maintaining the OWTS components.

3. A final inspection by BCPH prior to backfilling the OWTS that confirms the OWTS was installed according to permit requirements and applicable regulations and regulation variances.

4. Identification of the system contractor.

4.10 Division Authority to Administer and Enforce

Wherever the terms "Board" or "BCPH" are used in these regulations, the terms also infer the "Division" under its designated authority for the purposes of administering and enforcing the provisions of these regulations where necessary to protect the public health and environment.

4.11 Primary Enforcement Responsibility

A. The primary responsibility for enforcing the provisions of the OWTS Act and applicable OWTS regulations lies with the Board.
B. In the event the Board fails to administer and enforce the provisions of these regulations and the OWTS Act, the Division may assume such functions of BCPH or the Board, as may be necessary to protect the public health, per C.R.S. §25-10-110.

4.12 Product Development Permit

A. For products that have not received Division acceptance under 5 CCR-1002-43.13.D, the manufacturer may apply to BCPH for a product development permit. Requirements for proprietary treatment product acceptance are in said Section 5 CCR-1002-43.13.D.
B. For products or types of systems which have not been otherwise accepted by the Division pursuant to 5 CCR-1002-43.13.D, BCPH may approve an application for product development permit only if the system has been designed by a professional engineer, and only if the application meets all requirements of section 43.4.I. in per 5 CCR-1002-43.
    1. Before BCPH can issue a product development permit, the Division must determine that the product to be tested qualifies for testing under the product development evaluation that is based on information submitted to the Division.
        a) The applicant must provide evidence of nationally accepted third-party testing of the product to be evaluated, OR
        b) Provide test data from multiple single-family homes under normal working conditions that meet the following criteria:
            1) Test data must be provided from a minimum of four sites.
            2) Each system must be tested over a period of at least one year.
            3) Each system must be sampled at least three times during the year with at least one sample obtained during cold weather conditions.
            4) Laboratory results for all parameters for which acceptance is being requested must be submitted.
    2. BCPH will not arbitrarily deny any person the right to consider an application for such a system and will apply reasonable performance standards in determining whether to approve such an application, per C.R.S. §25-10-108 (2).
    3. A completed application for a product development permit must be submitted to BCPH at least 30 days in advance of installation of the product.
    4. Applications for product development permits must include the following:
        a) Proof of the ability to install a replacement OWTS in compliance with all local requirements in a timely manner in the event of a failure or malfunction of the system under testing.
        b) A description of the product under development including performance goals.
        c) Documentation signed by the owner of the proposed product development site allowing access to BCPH and Division for inspection of the site.
        d) Design documents, as required in 5 CCR-1002-43.5.G.

5. Other than the performance standards identified in 5 CCR-1002-43.4.I(3), BCPH may stipulate additional requirements for the product development permit, as necessary to ensure that the system performs as intended.
6. A product development permit is a site-specific permit. Product development testing at multiple sites will require a product development permit for each site.
7. During the term of the product development permit, all data collected must be submitted to the Division and BCPH.
8. BCPH may revoke or amend a product development permit if the continued operation or presence of the product under development:
    a) Presents a risk to the public health or environment;
    b) Causes adverse effects on the proper function of the OWTS on the site;
    c) Leaks or discharges effluent on the surface of the ground; OR
    d) The developer of the product fails to comply with any requirements stipulated on the permit by BCPH or the Division.
9. If the product development permit is revoked, the product developer must install a replacement OWTS within the timeframe established by BCPH.
10. Once the system is installed and approved, BCPH must supply the Division with a copy of the completed permit.

4.13 Prohibition of OWTS in Unsuitable Areas

A. The Boulder County Board of Health ("Board") may conduct a public hearing – after providing public notice posting on the BCPH website and Boulder County official public notice board at least 20 days prior to the hearing – to consider the prohibition of OWTS permits in defined areas that contain or are subdivided for a density of more than one dwelling unit per acre.
B. The Board may order such prohibition upon a finding that the construction and use of additional OWTS within the defined area will constitute a hazard to the public health or the environment.
C. For such public hearing, the Board may also request affected property owners to submit engineering and geological reports concerning the defined area and provide a study of the economic feasibility of constructing a community sewage treatment system.

4.14 Variance Procedures

A. **General variance requirements:**
    1. The Board is required to hear all OWTS variance cases in a public hearing, and approval of the variances requires a majority vote of the Board.
    2. The Board may set fees for processing OWTS permits with variances in accordance with C.R.S. §25-10-107. Such permit fees may be the standard OWTS permit fee or they may be a separate fee based upon the cost of processing an OWTS permit with a variance.
B. **Variance procedures:**
    1. Before rendering a decision on a variance request, a public hearing with the Board is required. The hearing must include the posting public notice on the BCPH website and Boulder County official public notice board at least 20 days prior to date of the public hearing.
    2. Variance requests must be accompanied by:
        a) Site-specific request identifying the specific criteria for which the variance is being requested.
        b) Technical justification from a professional engineer or professional geologist indicating what specific conditions exist and/or measures that will be taken to support the finding that the requested variance won't result in greater risk than what is associated with compliance with regulation requirements.

1) Examples of such conditions or measures include, but are not limited to, the following:
    i. Evidence of a natural or manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested;
    ii. Placement of a manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested; and
    iii. Soil replacement with sand filter media to reduce the infiltration rate of the effluent such that the travel time of the effluent from the absorption field to the physical feature is no less than the travel time through the native soils at the prescribed setback and higher-level treatment.
c) A discussion of alternatives considered in lieu of the requested variance.
d) Technical documentation for selected alternatives, which may include a testing program, which confirms that the variance does not increase the risk to public health and the environment.
e) A statement of the hardship creating the necessity for variance.

3. The applicant will have the burden of proof to demonstrate that the variance is justified and will pose no greater risk to public health and the environment than a system that would meet the regulations.

C. **Site-specific variance requirements:** The Board has the authority to impose site-specific requirements and conditions on any variance granted.

D. **Variance proceeding outcomes:**
1. The applicant must be notified, in writing, of the Board's decision regarding the request for a variance.
2. Any notice of denial of a variance must include the reasons that formed the basis for the denial.
3. Any notice of approval of a variance must include the conditions of the variance approval.
4. The variance, and any conditions thereof, must be recorded on the deed to the property, and any expenses associated with such recording will be the responsibility of the party obtaining the variance.

E. **Unaccepted variance requests:** No variance will be granted under the following circumstances:
1. When the property can accommodate a conforming OWTS.
2. To mitigate an error in construction involving any element of property improvements.
3. If solely for economic gain.
4. If it results in a setback reduction to an offsite physical feature that does not conform to the minimum setbacks defined in Table 7-1 of this regulation without the Board considering any concerns of the owner of property containing said feature; property lines are considered offsite features. The property owner containing said features must be notified of the time and date of the public hearing.
5. If it reduces the separation to groundwater or bedrock based on the level of treatment in Table 7-2.
6. From the horizontal setback from a well unless it meets the variance requirements of the Board of Examiners of Water Well Construction and Pump Installation Contractors.

F. **Variance for repair of failing OWTS**:
1. When a proposed variance for an OWTS repair or upgrade would result in encroachment on minimum distances to physical features on neighboring properties required by the Division, the public hearing procedures outlined in Section 4.14 must be followed.

2. For the repair of or upgrade to an existing OWTS where the existing system does not meet the required separation distances, and where the conditions other than lot size precludes adherence to the required distances, a variance to the separation distances may be requested. The repairs or upgrade must be no closer to features requiring setbacks than the existing facilities. Variances requesting setbacks no closer than existing setbacks do not have to provide technical justification from a professional engineer or professional geologist.

G. **Variance decision appeals:**
   1. Any request to appeal the Board's decision to deny a variance request must be made within 60 days following denial by the Board of OWTS variance application.
   2. The appeal applicant shall bear the burden of supplying the Board with sufficient evidence documenting that the denied system would:
      a) Be constructed and used in a manner that would result in no greater risk than that associated with compliance with the requirements of all applicable OWTS regulations and requirements.
      b) Comply with the declaration and intent of these regulations.
      c) Comply with all applicable state and local regulations and required OWTS permit terms and conditions.

4.15 General Prohibitions, per C.R.S. §25-10-112

A. No city, county, or "city and county" shall issue to any person:
   1. A permit to construct or remodel a building or structure that is not serviced by a sewage treatment works until BCPH has issued a permit for an OWTS.
   2. An occupancy permit for the use of a building that is not serviced by sewage treatment works until BCPH makes a final inspection of the OWTS, provided for in C.R.S. §25-10-106(1)(h), and BCPH approves the installation.

B. No person shall:
   1. Construct or maintain any dwelling or other occupied structure which is not equipped with adequate facilities for the sanitary disposal of sewage. "Adequate facilities" do not include OWTS that are deemed to be failed, or any such condition that BCPH determines to be a public health and/or safety concern.
   2. Construct a new structure without connecting to domestic wastewater treatment works or obtaining an OWTS permit issued by BCPH and installing a compliant OWTS.
   3. Repair, replace, or alter an existing OWTS, or accessory components, without obtaining authorization, or an OWTS permit, from BCPH.

C. The construction of new or repair of existing cesspools is prohibited. Where an existing cesspool is failing, a conforming OWTS must be installed. Where space is not available for a conforming OWTS, the criteria for repairs established within Section 14.9 of these regulations must be followed.

D. More than one dwelling, commercial, business, institutional, or industrial unit cannot be connected to the same OWTS unless the multiple connection was specified in the application submitted to BCPH and is included in the permit issued by BCPH for the system.

E. All OWTS must receive only such biodegradable wastes for treatment and distribution as are compatible with those biological treatment processes that occur within the septic tank, any additional treatment unit, and the soil treatment area. This does not include non-residential wastewater such as industrial, animal, or process waste.
   1. Roof drains, evaporative cooler water, water softener, swimming pool/hot tub backwash, and similar non-sanitary waste waters must not be conveyed to the OWTS and must be disposed or directed to a component designed for that purpose.

F. The disposal of septage removed from systems in the process of maintenance or cleaning must be done so at an approved site and in an approved manner.

4.16 Cease-and-Desist Orders

A. The health officer may issue an order to cease and desist from the use of any OWTS or sewage treatment works if it is found by the health officer that the OWTS is not functioning in compliance with the OWTS Act or applicable OWTS regulations or permit requirements; is found to constitute a hazard to public health or the environment; or the OWTS has not otherwise received timely repairs under the provisions of C.R.S. §25-10-106(1)(j).

B. Such cease-and-desist order may be issued only after an administrative hearing is conducted by the health officer. The hearing must be held not less than 48 hours after written notice is given to the owner or occupant of the property where the OWTS is located.

C. The order must require that the property owner or occupant must bring the OWTS into compliance or eliminate the health hazard within thirty days or thereafter cease and desist from using the system.

D. Any cease-and-desist order issued by the health officer must be reviewable in the district court for the county wherein the system is located and upon a petition filed not later than ten days after the order is issued.

4.17 Penalties, per C.R.S. §25-10-113

A. Any person who commits any of the following acts or violates any of the provisions of this section commits a civil infraction and shall be punished as provided in C.R.S. §18-1.3-503:

1. Constructs, alters, installs, or permits the use of any OWTS without first applying for and receiving a permit as provided for in C.R.S. §25-10-106.
2. Constructs, alters, or installs an OWTS in a manner which involves a knowing and material variation from the terms or specifications contained in the application, permit, or variance.
3. Violates the terms of a cease-and-desist order that has become final under the terms of C.R.S. §25-10-106(1)(k).
4. Conducts a business as a systems contractor without having obtained the license provided for in C.R.S. §25-10-109(1), in areas which the Board has adopted licensing regulations pursuant to that section.
5. Conducts a business as a systems cleaner without having obtained the license provided for in C.R.S. §25-10-109(2), in areas which the Board has adopted licensing regulations pursuant to that section.
6. Falsifies or maintains improper records concerning system cleaning activities not performed or performed improperly.
7. Willfully fails to submit proof of proper maintenance and cleaning of a system, as required by regulations adopted by the Board.

B. Upon a finding by the Board that a person is in violation of this regulation, or of rules adopted and promulgated pursuant to section C.R.S. §25-10-104, the Board may assess a penalty of up to $50 for each day of violation. In determining the amount of the penalty to be assessed, the Board shall consider the seriousness of the danger to the health of the public that is caused by the violation, the duration of the violation, and whether the person has previously been determined to have committed a similar violation.

C. A person who is subject to a penalty assessed pursuant to Section 4.17 may appeal the penalty to the Board by requesting a hearing before the appropriate body. The request must be filed within 30 days after the penalty assessment is issued. The Board will conduct a hearing upon the request in accordance with C.R.S. §24-4-105.

Section 5. Regulation of Systems Contractors, Systems Cleaners, Systems Inspectors, and Systems Maintenance Providers

5.1 Systems Contractors

A. No person may engage in business as a systems contractor without possessing a valid Boulder County systems contractor license:
   1. The initial fee for a systems contractor license is payable to BCPH and must be submitted at the time the systems contractor license application is submitted to BCPH.
   2. The licenses will be valid for two years and will expire on the license issuance anniversary date, at which time the renewal fee shall be due.
   3. A license that lapses because of failure to renew or because it is revoked will be subject to the fees established for new licenses upon reapplication.
   4. Employees of licensed systems contractors will not be required to be individually licensed.

B. The application for a systems contractor license or renewal must be made using forms supplied by BCPH. Prior to the issuance or renewal of such license, BCPH may require the applicant to demonstrate adequate knowledge of these regulations and experience installing OWTS.
   1. Systems contractors must provide proof of adequate training and certification approved by BCPH.
   2. A total of eight hours of ongoing refresher training and continuing education will be required for the renewal of licenses. BCPH may require certain training hours be acquired from a Boulder County OWTS class.
   3. In accepting a license, a systems contractor must agree that all work performed in the construction, installation, alteration, or repair of OWTS will be done in compliance with the OWTS Act and all applicable regulations and permit requirements.

5.2 Systems Cleaners

A. No person may engage in business as a systems cleaner without possessing a valid Boulder County systems cleaner license.
   1. Systems cleaners must provide proof of adequate training and certification approved by BCPH.
   2. A total of eight hours of ongoing refresher training and continuing education will be required for the renewal of licenses. BCPH may require certain training hours be acquired from attending a Boulder County OWTS class.
   3. The initial fee for a systems cleaner license is payable to BCPH and must be submitted at the time the systems cleaner license application is submitted to BCPH.
   4. The licenses will be valid for two years and will expire on the license issuance anniversary date, at which time the renewal fee shall be due.
   5. A license that lapses because of failure to renew or because it is revoked will be subject to the fees established for new licenses upon reapplication.
   6. Employees of a validly licensed systems cleaner business will not be required to be individually licensed.

B. All systems cleaners will be required to dispose of septic tank waste at a site approved by BCPH for accepting or treating such wastes and in a manner that is not injurious to the public health or the environment.
   1. Systems cleaners must maintain their pumping and disposal records for a period of one year and produce records at the request of BCPH.

C. All systems cleaners will be required to maintain their vehicles such that leakage and spillage does not occur. Discharge valves must be drip-tight.
D. Systems cleaners' trucks must bear the business name and address with two-inch or larger letters in a color that contrasts with the truck color.
E. In the event of a spill, septage must be immediately cleaned up to the satisfaction of BCPH.

5.3 Systems Inspectors

A. No person may engage in business as a systems inspector without possessing a valid Boulder County systems inspector license.
B. Systems inspectors must provide proof of adequate training and certification approved by BCPH. BCPH may require certain training hours be acquired from attending a Boulder County OWTS class.
C. The initial fee for a systems inspector license is payable to BCPH and must be submitted at the time the systems inspector license application is submitted to BCPH.
D. The licenses will be valid for two years and will expire on the license issuance anniversary date, at which time the renewal fee shall be due.
E. A license that lapses because of failure to renew or is revoked will be subject to the fees established for new licenses upon reapplication.

5.4 Systems Maintenance Providers

A. No person may engage in business as a systems maintenance provider without possessing a valid Boulder County systems maintenance provider license.
B. Systems maintenance providers must provide proof of adequate training and certification approved by BCPH. BCPH may require certain training hours be acquired from attending a Boulder County OWTS class.
C. The initial fee for a systems maintenance provider license is payable to BCPH and must be submitted at the time the systems maintenance provider license application is submitted to BCPH.
D. The licenses will be valid for two years and will expire on the license issuance anniversary date, at which time the renewal fee shall be due.
E. A license that lapses because of failure to renew or is revoked will be subject to the fees established for new licenses upon reapplication.
F. Systems maintenance providers must comply with section 7 of this regulation.

5.5 Revocation of Licenses

A. Licenses for systems contractors, systems cleaners, systems inspectors, and systems maintenance providers may be revoked for failure to comply with these regulations:
B. Written notice of the proposed license revocation that details the regulation violations will be sent by BCPH to the licensee by certified mail, return receipt requested.
C. Revocation may take place only after a hearing before the Board is conducted. The licensee shall be given not less than 20 days' notice of the public hearing and may be represented at the hearing by counsel.

Section 6. Permits for Continued Use of OWTS (i.e. Use Permits).

6.1 Use Permit Requirements

A. The owner of a property served by an OWTS must obtain a use permit, or renewal of a use permit, as applicable upon the occurrence of one or more of the following events:
    1. Upon final approval of an OWTS construction permit.

2. A remodel that includes an additional source of wastewater including adding a structure with plumbing fixtures.
3. Reconnecting a structure to a previously permitted and installed OWTS.
4. A change in use of the property from residential to commercial (non-residential).
5. Change in commercial operation or tenant.
6. Connection of a modular unit or mobile home to the system.
7. Other conditions that BCPH may deem appropriate.

B. Renewable use permits are subject to term limits and renewal requirements. The following OWTS types or property uses require renewable use permits:
1. Higher-level treatment systems that fall under section 7.4 requirements.
2. A property being used as a vacation rental
3. Community OWTS seeking property transfer exemption in section 8.4.A.8.
4. Continued use of an existing OWTS for a new use while capturing wastewater data for wastewater flow and/or strength.
5. Other conditions that BCPH may deem appropriate.

6.2 Use Permit Issuance

A. For OWTS installed on or after May 24, 2018, BCPH will issue a use permit upon final approval that authorizes use of the OWTS.
B. For OWTS permitted and installed before May 24, 2018, final approval of the completed OWTS will constitute as issuance of a use permit for purposes of these regulations.
C. As of May 24, 2018, OWTS that never completed the BCPH permitting or approval process will be deemed operating without a valid use permit.
D. The use permit sets forth the following terms and conditions:
1. Statement of the size, type, and capacity of the OWTS and a record drawing.
2. Documentation of repair or remediation of past failures.
3. System meets BCPH permitting requirements.
4. Other information as deemed appropriate by BCPH.

E. Use permits will remain valid until OWTS failure, malfunction, or the expiration date for renewable use permits, per these regulations.
F. Renewable use permits must be renewed as outlined in current use permit requirements.

6.3 Use Permit Application Requirements

A. The applicant must submit the following items to BCPH when applying for or renewing an OWTS use permit:
1. Completed application on forms provided by BCPH that include:
a) Owner's name and contact information.
b) Physical address of property.
c) Legal description of property.
d) Full name, company name, and contact information of OWTS inspector.
e) Date and time of the inspection(s).
f) Septic tank inspection report completed within the previous 12 months, which must include a septic tank pumping receipt, when applicable, based on the inspection report.
g) Inspection report completed within the previous 12 months for any mechanical components (e.g. pumps, alarms, or higher-level treatment systems).
h) Engineer evaluation of wastewater design flow for changed commercial operation, when applicable.

2. Completed inspection report(s) on BCPH forms from an approved systems inspector, as defined in section 5.3.
3. All applicable non-refundable fees as established by the Board. The fee shall be payable to BCPH and is due at the time of application.

6.4 Minimum Criteria for Use Permit Renewals

A. For OWTS systems (new or repair) permitted and approved by BCPH where a use permit is required to be renewed, an OWTS inspection is required. The inspection must meet, at a minimum, the following criteria and conditions:
    1. Submittal of an inspection report on approved BCPH forms.
    2. Verification that the OWTS was originally permitted and approved by BCPH and the property continues to conform to the conditions in the previous use permit and design for the construction permit.
    3. Verification that all deficiencies identified in the inspection, as outlined in the inspection report, have been corrected in accordance with these regulations.
B. If it is determined that the OWTS meets the foregoing criteria, BCPH will issue a use permit renewal, which sets forth the approval terms and conditions.

6.5 Use Permit Revocation

A. A use permit may be revoked under the following circumstances:
    1. Failure to comply with the terms of the use permit.
    2. Failure to obtain a property transfer certificate, as outlined in section 8.

6.6 Use Permit Penalties

A. Failure to obtain a use permit for a covered transaction, as outlined in these regulations, will subject the property owner who failed to obtain the required document to a penalty.
B. BCPH will issue a notice of violation (NOV) to the property owner that provides the owner 30 days to comply with the NOV. If a use permit has not been acquired after the 30 days have expired, a hearing will be convened per section 4.16. The owner can be assessed a penalty of up to $50/day of violation. Assessment of the penalties will cease once the owner obtains a use permit, as required in these regulations.

6.7 Malfunctioning Systems

OWTS found to be malfunctioning during inspection by the use permit inspector must be repaired in accordance with the terms of these regulations.

Section 7. Operation and Maintenance

7.1 Responsibility

The owner must be responsible for maintenance of an OWTS unless the responsibility has been contractually assigned to a tenant or third party or a public, quasi-public, or political subdivision.

7.2 Service Label

For higher-level treatment systems, vaults, vault privies, or other components under a service contract, a clearly visible, permanently attached label or plate giving instructions for obtaining service must be placed in a conspicuous location.

7.3 Inspection, Maintenance and Cleaning

A. For proprietary systems, inspection and maintenance of the system must be performed by a service provider in accordance with the manufacturer's recommendations or section 7.3.B, whichever is more stringent. For older proprietary systems where manufacturer recommendations are unavailable, inspection and maintenance must be performed in accordance with section 7.3.B.

B. For public domain systems, inspection and maintenance must be as determined by the professional engineer or the following requirements, whichever is more stringent. Not all requirements will apply to all types of systems.

1. Tanks must be inspected to assure that they are structurally sound and that all components such as lids, baffles, tees, vents, etc. are present and in good condition. The scum and sludge level in the tanks must be measured and tanks must be pumped if the scum or sludge depth exceeds 25% of the operating volume of the treatment tank or is less than four (4) inches from the bottom of the treatment unit. The liquid level in the tank must not be lower than the outlet invert.
2. Effluent screens must be inspected and cleaned at an appropriate interval to ensure proper function.
3. Each motor, pump and all associated appurtenances must be inspected to ensure that they are operating properly.
4. Internal electrical connections must be inspected to ensure that they are not damaged or otherwise subject to corrosion or damage that could cause a failure or electrical short circuit.
5. The control panel and its appurtenances must be inspected to assure that all components such as timers, event recorders or counters, audible and visual alarms, auto-dialers, etc. are functioning properly. Batteries must be checked and replaced as needed.
6. The STA must be inspected to verify that no wastewater is being discharged onto the surface of the ground and that it is not being impacted by erosion, runoff, excess or improper vegetation, or compaction.
7. The service provider must also note any unusual or abnormal conditions such as excessive or strong odors, noise, improper wastewater color and odor, etc. that may indicate an operational problem with the system.
8. Upon completion of the service inspection the service provider must close and secure all inspection or access ports, reset the control panel and restore the system for normal operation.

7.4 Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher-Level Treatment

A. **Purpose:** Reductions in requirements for soil treatment areas, vertical separation distances to limiting layers or reductions in horizontal separation distances by using higher level treatment systems are based on the criteria that these systems are functioning as designed. If these criteria are not met, failure or malfunction is likely, which could result in impairment to public health and water quality.

B. Types of OWTS required to obtain a Renewable Operation and Maintenance (O&M) Use permit may include:

1. OWTS designed and permitted with a reduction in the size of the soil treatment areas.
2. reduction in horizontal and vertical setback distances based on higher level treatment of effluent.
3. NDDS systems.
4. Disinfection component.

5. Vaults and vault privies.
6. OWTS serving non-residential or multi-family structures.

C. BCPH requires inspections, maintenance, and recordkeeping to ensure and document that the systems are meeting the designed higher-level treatment standards. At a minimum, this includes:
    1. Maintaining accessible records that indicate:
        a) Owner and contact information.
        b) Address and legal description of property.
        c) Location of OWTS specifying location of septic tank, higher-level treatment system, soil treatment area, and other components.
        d) Description of installed OWTS.
        e) Level of treatment to be provided.
        f) Copy of current contract with service provider.
        g) Inspection and maintenance performed, including:
            1) Dates the system has been inspected and/or maintained.
            2) Name and contact information of inspector and/or maintenance provider.
            3) Condition of system at inspection.
            4) Maintenance tasks performed.
            5) Service provider.
            6) Permits, if required by BCPH for the work performed.
            7) Condition of system at completion of any maintenance activity.
        h) Frequency of inspection and maintenance must be the most frequent of:
            1) Manufacturer's recommendations for proprietary systems or design criteria requirements for public domain technology.
            2) BCPH or Division requirements.
            3) For higher-level treatment systems, two inspections at six-month intervals for the first year of operation, followed by annual inspections for the life of the system.
            4) Only a service provider meeting all manufacturer's requirements may be utilized for providing operation and maintenance of any higher-level treatment systems.
    2. **Owner responsibilities:**
        a) Ensure that OWTS is operating, maintained, and performing according to the required standards for the designated treatment level.
        b) Maintain an active operation and maintenance renewable use permit.
        c) Always maintain an active service contract with a maintenance provider.
            1) Service provider contracts are limited to a maximum of 5 years.
        d) Any time the current contract with the maintenance provider is renewed or replaced, a copy must be sent to BCPH within 30 days of signature.
    3. **Maintenance provider responsibilities:**
        a) Must notify BCPH when a service contract has been terminated.
        b) Must obtain appropriate training/certification for specific proprietary treatment products, as provided by the manufacturer necessary to provide the required operation and maintenance for said products.

7.5 Monitoring and Sampling

A. Sampling may be required by BCPH in conjunction with an enforcement action or to ensure compliance with the provisions of this regulation, as provided in section 7.5.B.

1. Sampling and analysis must be performed according to American Public Health Association, American Water Works Association, and Water Environment Federation: Standards Methods for the Examination of Water and Wastewater, 24nd edition, 2022 (International Standard Book Number: ISBN-10: 0875532993, ISBN-13: 978-0875532998)

B. Any owner or occupant of property on which an OWTS is located may request BCPH to collect and test an effluent sample from the system. BCPH may perform such collection and testing services, but the owner or occupant must pay for the cost of these services.
    1. If BCPH or a delegated third party collects and tests effluent samples, a fee not to exceed that as allowed by the OWTS Act, may be charged for each sample collected and tested. Payment of such charge must be stated in the permit as a condition for its continued use.
    2. Conditions that provide for BCPH to require routine water quality monitoring include:
        c) Indications of inadequate performance.
        d) Location in sensitive areas.
        e) Systems designed to meet TL3ND standards
        f) Treatment systems other than those discharging through a soil treatment area or sand filter system (section 16).
        g) Remediation systems.
        h) Systems under Use Permits or product development permits (per 5 CCR-1002-43.4.I).

Section 8. Property Transfer Inspections

8.1 Applicability

A. Prior to the sale or transfer of a property served by an OWTS, the new property owners must obtain, or have in their possession, a property transfer of title certificate (i.e. property transfer certificate) for the OWTS unless they have been exempted or waived per section 8.4.

B. The purpose of a property transfer inspection is to verify the adequacy of the existing OWTS at the time of property transfer (i.e. sale of property), that the OWTS was previously approved and permitted or to assure that an unapproved OWTS will be permitted and approved in compliance with these regulations, and to demonstrate that the system is functioning according to design and approved permit.

8.2 Property Transfer Requirements

A. When a property with an approved OWTS is transferred (e.g. sold), the OWTS must pass a new property transfer inspection to confirm the OWTS is continuing to operate appropriately. If the OWTS does not pass the inspection, the property owner must obtain an OWTS repair permit and correct the deficiencies, or the new property owners must submit a notarized agreement, using the current BCPH form, to acknowledge that they have accepted responsibility for repairing the identified deficiencies.

B. BCPH will issue a property transfer certificate when the property owner submits a property transfer inspection report with required documents that verify the OWTS is functioning in compliance with applicable OWTS regulations and permit requirements and according to design.

C. All properties must have an existing approved OWTS permit from BCPH; therefore, property owners without a current permitted and approved OWTS must apply for an OWTS repair permit or obtain a conditional property transfer certificate.

D. Property owners that have an OWTS permit but haven't received final approval from BCPH must contact BCPH to determine the necessary steps for obtaining OWTS approval.

E. If a property is being sold that has an advanced treatment unit (ATU) requiring operation and maintenance, the licensed systems inspector must also be licensed as a systems

maintenance provider and have specific training or provide supplemental operation and maintenance inspection from a licensed systems maintenance provider that is no older than 1 year.

8.3 Additional requirements for non-residential systems

A. Properties with approved OWTS serving non-residential uses being transferred must complete a title transfer inspection for all OWTS on the property and meet change of use requirements for any new, proposed uses for the OWTS. Requirements may include:
    1. Engineer report demonstrating calculated design flow of proposed use (in accordance with requirements in section 9) will be properly treated by existing OWTS.
        a. If the existing OWTS is not adequate, a repair permit may be required.
    2. Soil test pit excavations to evaluate soil conditions.
        a. Typically required when an amendment to design flow is proposed.
    3. Statement that all U.S. Environmental Protection Agency (EPA) Class V injection well requirements have been met.
    4. Overview of the business operation, including but not limited to:
        a. Number of employees.
        b. Business type.
        c. Anticipated number of non-employee visits, if applicable.
        d. Biochemical oxygen demand (BOD), where applicable.
    5. Any other information BCPH deems necessary to evaluate adequacy of OWTS to properly treat wastewater.

B. A signed affidavit certifying business operation will not be changing may be accepted in lieu of the Engineer report requirements. This only applies when the tenant or non-residential use of the system has previously received approval.

C. Undocumented commercial OWTS are subject to the same title transfer requirements as all other undocumented systems.

8.4 Exemptions from Property Transfer Requirements

A. A property transfer certificate will not be required under the following circumstances:
    1. The entire OWTS serving the dwelling or structure was installed and given final BCPH approval less than five years before the property sale closing date. An inspection will be required if any part of the OWTS is more than five years old (building sewer line is excluded).
    2. The change in property ownership is solely to include or exclude a spouse.
    3. The property transfer is creating or ending a joint ownership if at least one person is an original owner of the property and/or the spouse of an original property owner.
    4. All building or buildings connected to an OWTS will be demolished (or already have been), and the building/buildings will not be occupied after the property transfer occurs.
    5. The property transfer is being made to a trust that's in the same name as the property owner.
    6. The property transfer is to effect the foreclosure or forfeiture of real property.
    7. The property owner will connect the dwelling or occupied building to a sanitary sewer or shared wastewater treatment system within two years following transfer of title, provided that such agreement has been disclosed to and is binding on the subsequent owner(s).
    8. The property owner is part of a community plan or management district for which their OWTS has received written approval from BCPH, and the OWTS's been inspected, per plan requirements or a renewable use permit.

B. If the OWTS is not functioning according to design, the system must be repaired so it is functioning appropriately. Photo documentation of all malfunctions and failures must be submitted to BCPH with the applicable inspection report.

8.5 Property Transfer Certificate Application and Inspection Report Requirements

A. Applications for property transfer certificates must meet the following requirements:
    1. Completed BCPH Property Transfer Application with the following information completed:
        a. Name, address, and phone number of current owner.
        b. Property street address.
        c. Property legal description.
        d. Property size in acres, rounded to the nearest tenth (1/10) acre.
        e. All water supply types, including irrigation wells, and their location on the property.
        f. Type(s) of all existing buildings or structures; if commercial, list all uses or tenants.
        g. Inspection date and time.
        h. Number of bedrooms in the dwelling(s).
    2. Statement from current property owner regarding the present OWTS operational status. Non-refundable property transfer certificate fee, as established by BCPH.
    3. Septic tank pumping receipt from a cleaner licensed by BCPH.
    4. Where required, copy of current maintenance contract if the OWTS contains any mechanical components, such as an aeration or secondary treatment system, and an inspection report from the service provider.
        a. All ATUs must be inspected and cleaned by a technician certified to maintain that specific unit/brand.
    5. BCPH Inspection report completed by an inspector licensed by BCPH as outlined in section 5.3. It must meet the following requirements:
        a. Must use the current BCPH Inspection Report Form
        b. Statement of the size, type and capacity of the septic tank, pump chamber (when applicable), and soil treatment area;
        c. Inspection must be completed less than 12 months prior to application date
        d. Drawing documenting the location of the dwelling or structure with two-point triangulated distance measurements to the septic tank lid(s) or global positioning system (GPS) coordinates.
        e. All sections of the BCPH form must be completed and document current condition of each component of the OWTS. Any components found to be in a state of malfunction must be noted and disclosed in the inspection report.
        f. To the extent possible, the inspector must identify if the OWTS may be encroaching on the required setback to the onsite water supply. Buried wells, snow cover, or other circumstances may prevent the inspector from making this determination. If such circumstances are encountered, they must be stated in the report; and
        g. BCPH may require a water quality analysis of the drinking water supply (i.e.: nitrates, *E. coli,* etc.). For example, in cases where the OWTS encroaches on required setbacks to onsite or adjacent water supplies, or localized water quality concerns have been identified.
        h. Statement of length of the vacancy if the property is unoccupied.
        i. Inspector's NAWT or other applicable certification number, full name, company name, and contact information.
        j. Any other information required by BCPH.

8.6 Inspection Minimum Criteria

A. The existing OWTS must meet the following criteria and conditions, at a minimum:
    1. A primary (and secondary, where applicable) tank must be structurally sound, watertight, and in good working order and provided with safe and secure lids. Metal tanks will not be approved.
    2. The number of bedrooms in the house must be the same as listed on the permit.
    3. All internal devices and components (e.g. tees, effluent screens, and baffles) that were originally provided with the tank or added later must be intact and in good working order.
    4. Alarms, control devices, and components necessary for the operation of the OWTS must be present and in good working order.
    5. A soil treatment area or other means of subsurface wastewater treatment must be present and not in a state of failure.
    6. If the system utilizes mechanical components, operating permits and service contracts must be current.
    7. There cannot be any unapproved wastewater discharges from the OWTS, dwelling, or structure.
    8. The OWTS has not been significantly altered from its original design and configuration, as documented by BCPH.
    9. To the extent possible, the inspector must identify if the OWTS may be encroaching on any required setbacks to the onsite water supply. If site conditions prevent the inspector from making this determination (i.e. snow cover, etc) they must document this limitation on the report.
    10. BCPH may require water quality analysis of the water supply (i.e. nitrates, *E. coli*, etc.).
    11. Any items meeting the conditions of a "failure," as defined in these regulations, have been corrected to the acceptance of BCPH.
    12. Cesspools must be properly abandoned and a conforming OWTS must be installed. Where site conditions preclude the installation of a conforming OWTS, the criteria for repairs established within section 4.15 must be followed.

8.7 Issuance and Term of Property Transfer Certificates

A. Once the above criteria have been met, BCPH will issue a property transfer certificate using terminology adopted by BCPH, that sets forth the terms and conditions of OWTS approval, including the following, as appropriate:
    1. Statement of the size, type, and capacity of the OWTS and a record drawing from the inspection report.
    2. Evidence of past system failures, as documented in BCPH records.
    3. Circumstances or factors that may have affected the ability of the inspector to evaluate the OWTS.
    4. Whether the system meets BCPH's permitting requirements.
    5. The existence of any OWTS permits in BCPH files.
    6. Any other information deemed appropriate by BCPH.
    7. A copy of the inspection report must be included with the certificate.

B. The property transfer certificate will remain valid until the date of real estate closing, or for a period of 12 months, whichever occurs first.

8.8 Issuance of Conditional Property Transfer Certificates

A. If BCPH determines that an OWTS does not meet the requirements for the issuance of a property transfer certificate, a conditional property transfer certificate may be issued, provided that the purchaser of the property agrees to obtain an OWTS permit and complete all necessary repairs to the

system within one year of the closing date. The property buyer must use the current BCPH form, sign the agreement, and have it notarized.

B. If conditions are such that they limit the property owner's ability to complete the necessary repairs within one year, BCPH may extend the OWTS repair agreement on a case-by-case basis if good cause is shown.

8.9 Revocation of Property Transfer Certificates

A property transfer certificate will be revoked if BCPH determines that the OWTS is no longer functioning in accordance with applicable OWTS regulations permit requirements, or if false or misleading statements were made on any OWTS applications or inspection reports.

8.10 Penalties

A. If a property owner fails to obtain a property transfer certificate, as required in this section, BCPH will issue a notice of violation (NOV) to the property owner of record that provides the owner 30 days to comply with the NOV. If a property transfer certificate has not been acquired after the 30 days have expired, a hearing will be convened per section 4.16.

B. The owner can be assessed a penalty of up to $50/day of violation.

C. Assessment of the penalties will cease once the owner obtains a property transfer certificate, as required in these regulations.

Section 9. Site and Soil Evaluation

9.1 Requirements for Site and Soil Evaluation

A. A site and soil evaluation must be conducted for each property for which an OWTS is being proposed in order to determine the suitability of a location to support the OWTS and to provide the designer with sound basis for selecting the most appropriate OWTS design for that particular location and OWTS application.

B. Each site evaluation must contain:
    1. Preliminary investigation.
    2. Reconnaissance.
    3. Detailed soil investigation, including a soil log.
    4. Report and site plan.

9.2 Preliminary site investigation

A. Research of information relative to the site and anticipated conditions will be conducted. The information that will be gathered as part of the preliminary investigation will include, but is not limited to:
    1. Property information:
        a. Address.
        b. Legal description.
        c. Existing structures.
        d. Location of existing or proposed wells on the property.
    2. BCPH records.
    3. Published site information:
        a. Topography.
        b. Soil data.
    4. Location of physical features, on and off the property that will require setbacks, as identified in Table 7-1.

5. Preliminary soil treatment area size estimate based on information on the existing or planned facility and local regulations.
6. Other information required by BCPH.
7. Additional published information that may be useful to the site-specific evaluation may include:
    a. Soil information
    b. Topography
    c. Survey.
    d. Easements.
    e. Floodplain maps.
    f. Geology and basin maps and descriptions.
    g. Aerial photographs.
    h. Climate information.
    i. Delineated wetlands maps.

9.3 Reconnaissance

A. A visit to the property to evaluate the topography and other surface conditions that will impact the location and design of the OWTS must be conducted. The information that will be gathered as part of the site reconnaissance may include, but is not limited to:
    1. Landscape position.
    2. Topography.
    3. Vegetation.
    4. Natural and cultural features.
    5. Current and historic land use.
    6. Use and plumbing information for every structure on the property.

Note: The reconnaissance evaluation may be conducted concurrently with the detailed soil investigation.

9.4 Detailed Soil Investigation

A. Soil test pit excavations and investigations to determine the long-term acceptance rate (LTAR) of a soil treatment area must be conducted per the following criteria:
    1. Visual and tactile evaluation of two or more soil profile test pit excavations to determine soil type, as well as whether a limiting layer is encountered.
    2. Percolation testing is not required but may be conducted to obtain additional information regarding the LTAR of the soil.
    3. If the site evaluation includes both visual and tactile evaluation of soil profile test pit excavations and percolation tests, and the results from the two evaluations do not coincide with the same LTAR noted in Table 10-1, the designer must use the more restrictive LTAR in determining the size of the soil treatment area.
    4. The minimum depth of the soil profile test pit excavation must be to any limiting layer, or four feet below the infiltrative surface of the in-situ soil, whichever is encountered first.
    5. The excavation must be of sufficient width to permit evaluation of soil types throughout the excavations.

B. The procedure for performing visual and tactile evaluations of soil to determine a LTAR is as follows:
    1. Evaluation of two or more soil profile test pit excavations must be performed to determine soil types, limiting layers, restrictive layers, groundwater conditions, and the best depth for the infiltrative surface. The total number of soil profile test pit excavations beyond two will be based on the judgement of the competent technician. At BCPH's discretion, additional soil profile test pit excavations may be required.

2. At least one of the soil profile test pit excavations must be performed in the portion of the soil treatment area anticipated to have the most limiting or restrictive conditions.
3. Layers and interfaces that interfere with the treatment and dispersal of effluent must be noted. Thus, any restrictive soil characteristic such as consistence, as defined by a cementation class, must also be evaluated.
4. When cemented soils are encountered, the evaluation must identify the cementation class from rupture resistance as provided in Table 5-1, "Rupture Resistance".
    a) Per the "Rupture Resistance" Table (Table 5.1) noted in item 3a above, when the "Cementation Class" is identified within the soil profile as "strongly", "very strongly cemented", or "indurated" that layer will be classified as a "restrictive layer".
    b) Note: Cemented soils will typically have characteristics of Type 3A or 4A soils (Table 10-1). Long term acceptance rates should coincide with the appropriate soil type classification or be adjusted to address the level of cementation.
5. Soil observations must be conducted at or immediately adjacent to the location of the proposed soil treatment area, but if possible, not under the final location of a trench or bed.
6. Each soil profile test pit excavation observed at the proposed soil treatment area must be evaluated under adequate light conditions with the soil in an unfrozen state.
7. The soil observation method must allow observation of the different soil horizons that constitute the soil profile.
8. Soil profile test pit observations must be conducted prior to percolation tests to determine whether the soils are suitable to warrant percolation tests, and if suitable, at what depth the percolation tests must be conducted.
9. The soil type at the proposed infiltrative surface of the soil treatment area or a more restrictive soil type within the treatment depth must be used to determine the long-term acceptance rate from Table 10-1 or Table 10-1A. The treatment depth is 2-4 feet, depending on the required thickness for the treatment level below the infiltrative surface, as shown in Item 4, Table 7-2.
10. At the discretion of BCPH, soils data previously collected by others at the site can be used for the purposes of an OWTS design. It is recommended that the data be verified, at a minimum, by performing an evaluation of a soil profile test pit excavation.

C. Soil descriptions for determination of a limiting layer must include:
    1. The depth of each soil horizon measured from the ground surface, a description of the soil texture, and structure of each soil horizon.
    2. Depth to the bedrock.
    3. Depth to the periodically saturated soil, as determined by:
        a) Redoximorphic features and other indicators of water levels; or
        b) Depth of standing water in the soil observation excavation measured from the ground surface, if observed, unless redoximorphic features indicate a higher level.
    4. BCPH may require that a groundwater test hole be monitored for a maximum period of one year prior to issuing a permit for OWTS installation in a suspected high groundwater area in order to determine the maximum seasonal high groundwater table.

D. If a percolation test is determined to be necessary to obtain additional information regarding soil permeability, the following procedures for performing percolation tests must be followed:
    1. The percolation testing must be performed by a professional engineer, a trained person under the supervision of a professional engineer, or by a competent technician.
    2. **Number of test holes and location:**

a) Soil percolation tests must be performed in at least three test holes in the area the soil treatment area will be located, and they must be spaced evenly over the proposed area.
b) If the likely depth of a proposed infiltrative surface is uncertain, percolation tests must be performed at more than one depth to determine the depth of the infiltrative surface.

3. **Dimensions:** The percolation test hole must have a diameter of 8-12 inches and be terminated a minimum of six inches and a maximum of 18 inches below the proposed infiltrative surface.
4. **Change in soil:** If there is a change of soil type, color, or structure present within those soils comprising the depth of soil below the infiltrative surface, as required in Table 7-2 for vertical separation, a minimum of two soil percolation holes must be terminated in the changed soil, and percolation tests must be conducted in both holes.
5. **Percolation tests:**
   The percolation tests must be conducted using the hole preparation, soil saturation, and rate measurement procedures described below:
   a) Preparation of percolation test holes:
      1) Excavate the hole to the depth and diameter required.
      2) Carefully scrape the bottom and sides of the hole with a knife blade or sharp instrument to remove any smeared soil surfaces and provide a natural soil interface into which water may percolate.
      3) Remove all loose soil from the hole.
      4) Add two inches of very coarse sand or fine gravel to protect the bottom of the hole from scouring and sediment.

   b) Presoak:
      1) The hole must be presoaked adequately to accomplish both saturation (i.e. filling the void spaces between the soil particles) and swelling (i.e. the intrusion of water into the individual soil particles).
      2) To presoak the hole, carefully fill the hole with clean water to a minimum depth of 12 inches over the gravel placed in the bottom of the hole. In most soils it will be necessary to refill the hole by supplying a surplus reservoir of clean water, possibly by means of an automatic siphon, to maintain water in the hole for at least four hours and preferably overnight.
      3) Determine the percolation rate 24 hours after water is first added to the hole. This is to ensure that the soil has been given ample time to swell and approach the condition it will be in during the wettest season of the year. In type 1 soils (sand and loamy sand; Table 10-1), the swelling procedure is not essential, and the test may be conducted after the water from one filling of the hole has completely seeped out of the hole.

   c) **Percolation rate measurement:**
      1) With the exception of type 1 soils, percolation rate measurements must be made on the day following the presoak procedure.
      2) If water remains in the percolation test hole after the swelling period, adjust the depth to approximately six inches above the gravel in the bottom of the hole. From a fixed reference point, measure the drop in water level over a 30-minute interval. The drops are used to calculate the percolation rate.
      3) If no water remains in the hole after the swelling period, carefully add clean water to bring the depth of water in the hole to approximately six inches above the top of the gravel in the bottom of the hole. From a fixed

reference point, measure the drop in water level at 30-minute intervals for four hours, refilling to six inches over the top of the gravel, as necessary. The drop in water level that occurs during the final 30-minute period is used to calculate the percolation rate. If the water level drops during prior periods provide sufficient information, the procedure may be modified to suit local circumstances. The requirement to conduct a four-hour test under this section is waived if three successive water-level drops do not vary by more than 1/16 inch; however, in no case shall a test under this section be less than two hours in duration.

d) **Sandy soils:**
   1) In sandy soils or other soils in which the first six inches of water seeps out of the hole in less than 30 minutes, after the 24-hour swelling period, the time interval between measurements must be ten minutes and the test conducted for one hour. The drop that occurs during the final ten minutes must be used to calculate the percolation rate.
   2) If the soil is so sandy or coarse-textured that it will not retain any water, the infiltration rate must be recorded as less than one minute per inch.

e) **Special soil types:**
   1) BCPH may identify soil types in the areas for which different procedures, such as extra presoaking or an extended testing time to obtain a valid percolation rate, will be required.

f) **Percolation rate determination and reporting:**
   1) The field percolation rate will be the average rate of the percolation rates determined for all percolation test holes observed in the proposed soil treatment area in minutes per inch. The average percolation rate determined by the tests must be used in determining the long-term acceptance rate for the proposed system (see Table 10-1). If the tests in the area vary by more than 20 minutes per inch, variations of soil type are indicated, and the percolation rates will not be averaged. Use of the slowest percolation rate may be allowed, or additional percolation tests may be required.
   2) The technician performing the percolation tests must furnish an accurate scale drawing showing the location of the soil profile test pit excavations and percolation holes tied to lot corners or other permanent objects. The drawing must meet the criteria in section 9.5.A.7. The information in Subsections 9.5.A.7(a-e) may be included but not required for this drawing. All holes must be clearly labeled to relate to the information provided for the profile test pits and percolation tests. Percolation test data sheets must be submitted to show entire test data.

g) **Alternate percolation testing:**
   1) Alternate percolation test procedures may be approved, provided that the test results of alternate procedures are substantially equivalent to those determined using the test procedures described in this section.
   2) Prior approval from BCPH of alternate percolation test procedures will be required.

E. **Evaluation and marking of soil profile test pit excavations or percolation holes:**
   1. The engineer or technician conducting the soil profile test pit excavations or percolation tests must, upon completion of the tests, adequately mark and identify each excavation or hole to allow easy location by others.

2. The objective of the regulation is to ensure a detailed and accurate identification of the soils on each site, while concurrently ensuring the safety of the practitioner, general public, and wildlife. In order to accomplish this, the following items are noted:
    a. In order to address public safety concerns, the regulatory intent is to backfill all soil profile test pits promptly after the soil evaluation is complete.
    b. The excavator must communicate their intent to backfill with BCPH prior to the date of the excavation.
        i. If test pits are backfilled without inspection by BCPH, the installation of inspection ports is required to confirm that the elevation of an actual or seasonal water table (a groundwater condition) does not encroach on the vertical separation requirement to the proposed infiltrative surface of the soil treatment area.
    c. BCPH may require a joint evaluation of the soils with the engineer or competent technician.
        i. BCPH publishes a guidance document outlining criteria for when joint soil evaluation may be required.
    d. BCPH may identify additional requirements.

9.5 Soil Reports and Site Plans

A. A written report must describe the results of the preliminary investigation, reconnaissance, and detailed evaluations. This report may be in text and/or tabular form and must include a drawing locating features relative to the proposed OWTS location and test locations, and it may be included as part of the OWTS design document. The report must include, but is not limited to:
    1. Company name, address, telephone number, e-mail address, as well as the name, credentials, and qualifications of the individual conducting the site evaluation.
    2. Preliminary and detailed evaluations that provide information from the surface site characteristics assessment and soils investigation.
    3. Dates of preliminary and detailed evaluations.
    4. A graphic soil log, to scale, indicating depth of the soil profile test pit excavation, soil description and classification, depth to any limiting layer encountered, type of equipment used to excavate the soil profile test pit, and date of soils investigation.
    5. Setback distances to features listed in Table 7-1.
    6. Setback distances to features listed in Table 7-2 that exist on-site or within applicable setback limits, whichever is greater.
    7. A drawing created to a scale that provides the complete property boundary lines. The minimum drawing size is 8.5” x 11”, and the maximum drawing size is 11” x 17”. If the property is too large to adequately indicate and label the profile test pits and percolation test holes, a detail of the portion of the site containing the soil profile test pits and percolation test holes must be submitted. If the property is too large to adequately show site evaluation information, a detailed drawing including that information will be required from the site and soil evaluation that will impact the location of the OWTS. Drawings must indicate dimensions, have a north arrow and graphic scale, and include:
        a. Fixed, non-degradable temporary or permanent benchmark, horizontal, and vertical reference points of the proposed soil treatment area; soil observations; percolation testing results; and pertinent distances from the proposed OWTS to all required setbacks, lot improvements, easements; ordinary high water mark of a pond, creek, stream, lake, wetland, other surface waters, and detention or retention ponds; and property lines.
        b. Contours or slope direction and percent slope.

c. The location of any visible or known unsuitable, disturbed, or compacted soils.
d. The estimated depth of periodically saturated soils and bedrock, or flood elevation, if applicable.
e. The proposed elevation of the infiltrative surface of the soil treatment area, from an established datum (either ground surface or a benchmark).

8. Anticipated construction-related issues, if applicable.
9. An assessment of how known or reasonably foreseeable land use changes are expected to affect the system performance, including but not limited to changes in drainage patterns, increased impervious surfaces, and proximity of new water supply wells, if applicable.
10. A narrative explaining difficulties encountered during the site evaluation, including but not limited to identifying and interpreting soil and landform features and how the difficulties were resolved, if applicable.

9.6 Design Documents

A. Design documents must include the following:

1. The report and site plan attached to the design document, or the report and site plan may be combined with the design information as a single document.
2. A brief description of the facility and its proposed use, basis and calculations of design flow, and influent strength.
3. All plan details necessary for permitting, installation, and maintenance, which include:
   a. Assumptions and calculations for each component, including dose volume, total dynamic head (TDH), and gallons per minute (GPM) for all dosing systems.
   b. A fixed, non-degradable temporary or permanent benchmark (North America Vertical Datum or assumed elevation is acceptable).
   c. A scale drawing showing location of each OWTS component and distances to water supplies, surface water, easements, physical and health impact features on both the subject and adjacent properties requiring setbacks.
   d. Layout of soil treatment area, dimensions of trenches or beds, distribution method and equipment, distribution boxes, drop boxes, valves, or other components used.
   e. Contours or slope direction and percent slope for the area of the OWTS.
   f. Elevation or depth of infiltrative surface of the soil treatment area, septic tank invert, and all other components of the OWTS. For sites with minimal elevation change, providing the depth of the components from grade is acceptable. However, where the site has noticeable elevation changes, it is the expectation that the proposed elevations of all components, relative to a site benchmark, be provided.
   g. Special structural design considerations, as applicable, to ensure the long-term integrity of each component.
4. References to all design manuals or other technical materials used.
5. Installation procedures, as applicable.
6. Operation and maintenance manuals or instructions.
7. Other information that may be useful to BCPH (e.g. photos, cross-section drawings, etc.).

9.7 Site Protection

Prior to and during construction, the proposed soil treatment area and replacement area, if any, must be protected from disturbance, compaction, or other damage by means of staking, fencing, posting, or other effective site protection methods.

9.8 Qualifications for a Competent Technician

A. Percolation tests.

1. Required competencies include the ability to:
    a. Set up equipment.
    b. Perform and run percolation tests according to the procedures identified in 9.4.D of this regulation.
    c. Record results and calculate percolation rates.
    d. BCPH may approve training for percolation testing.

B. Visual and tactile evaluation of soil.

1. Required competencies include the ability to:
    a. Identify soil types by hand texturing and observation.
    b. Identify presence or absence of soil structure.
    c. Identify type and grade of soil structure.
    d. Identify soil consistence/cementation.
    e. Recognize evidence of highest seasonal water surface.
    f. Identify limiting layers, restrictive layers, and groundwater conditions.
    g. Determine the appropriate depth for infiltrative surface of OWTS, soil profile test pits, and for percolation tests, if used.
    h. Understand basic principles of OWTS siting and design.
2. Possible demonstrations of competence in visual and tactile evaluation of soil include:
    a. A degree in soil science, agronomy, geology, other majors if a course(s) in soil morphology.
    b. Attendance at training or an OWTS workshop for soil evaluation that includes both class and field work.
    c. If the training or workshop includes an exam to verify acceptable completion of the course, a passing grade on the exam is required.
    d. The Division must approve training for visual and tactile evaluation of soil.

Section 10. Wastewater Flow and Strength

10.1 Wastewater Flows

BCPH may require the installation of a meter to measure flow into the facility or the OWTS.

10.2 Single-Family Residential Homes

A. Design flow per person must be 75 gallons per day (gpd).
B. BCPH may increase the wastewater design flow per person to 100 gpd on a case-by-case basis, where justified.
C. The minimum design flow for a new home must be for a two-bedroom house unless otherwise noted in this regulation. The minimum design flow for the repair or replacement of an OWTS of an existing one-bedroom home must, at a minimum, be for one bedroom unless bedrooms have been added.
D. For homes up to and including three bedrooms, the assumed number of persons per bedroom is two for design purposes.
E. For homes with more than three bedrooms, the assumed number of persons will be six persons (i.e. first three bedrooms X two persons per bedroom) plus one additional person for each bedroom in excess of three bedrooms.
F. Table 6-1 summarizes the design flows for single-family residential homes up to six bedrooms.
G. If a new home has unfinished areas, BCPH may increase the number of bedrooms used for the design of the OWTS by one or two bedrooms based on an assumption that 150 square feet of unfinished space can be converted into a bedroom, if the space can meet building code requirements for a bedroom.

H. BCPH may increase the design flows per bedroom by 50 gallons per additional bed, where there are provisions for more than two occupants within a bedroom, such as bunk beds, etc. The intent of this section is to address short-term rental units and other similar uses.

I. Accessory Dwelling Units
    a. An "accessory dwelling unit" is considered a smaller, independent residential dwelling located on the same lot or parcel as a stand-alone single-family home.
    b. A new or expanded OWTS must be sized for the number of bedrooms proposed within the accessory dwelling unit.

10.3 Auxiliary Buildings

A. An "auxiliary building" is a non-residential structure, located on the same lot or parcel as the principal structure, and for an incidental use to the principal structure.

B. If a single-family home has an auxiliary building, such as a non-commercial shop with plumbing fixtures, the flow may be conveyed to the OWTS of the home, or to a separate OWTS constructed to handle the flow from the auxiliary facility.

C. If the flow from the auxiliary building is only generated by residents of the home, it will be assumed that the OWTS for the home will be adequately sized to include the auxiliary building if the flows are combined.

D. If the auxiliary building will have users in addition to residents and the flow from the auxiliary building will flow to the OWTS of the home, the design flow of the home must include the increased use of each fixture proposed.

E. If the auxiliary building has a separate OWTS, the system must be sized on the basis of Table 6-2 and a septic tank detention time of 48 hours.

10.4 Multi-Family and Commercial Onsite Wastewater Treatment Systems

A. Design flow values and strengths for multi-family and commercial systems must be determined from:
    1. Table 6-2; or
    2. An analysis of peak flows and strengths from at least three comparable facilities or from the facility, if it is an existing facility, must be submitted to BCPH for approval. The analysis must include:
        a) Metered water flows for inside use only for at least one year, or if use is seasonal, for a full season. If metered flows are less than full capacity, they must be paired with actual use in units of persons present or meals served or other units as appropriate so that an actual daily rate per unit can be determined. The daily rate per unit times the number of units at full occupancy will be the design flow.
        b) Total suspended solids and biochemical oxygen demand, five-day (BOD_5) or biochemical oxygen demand, carbonaceous five-day ($CBOD_5$) tests at times of full use. At least three samples taken at least one week apart are required. Sampling that provides equivalent and representative data through "composite sampling" may be allowed.
        c) Explanation and justification for the comparability of the tested facilities with the proposed facility.
    3. When a specific use is proposed which is not addressed within Table 6-2, and where flow data from similar facilities is not available, the design document must provide a reference to an alternate regulatory or industry standard for OWTS from where the proposed flow data was obtained. Estimates must include peak flows relative to full occupancy.

10.5 Flow Equalization

A. Flow equalization may be used if a facility has flows that vary from day to day by more than four times the average flow.
B. The highest peak assumed must be at least equal to the full capacity of the facility.
C. The stored flow must be distributed to the soil treatment area before the next greater-than-average peak.
D. Flow equalization may be used only if:
    1. The facility is non-residential.
    2. The facility is only used for one purpose.
    3. Flows will follow a predictable pattern.
    4. There is a long-term expectation that size and pattern of the flows will remain the same.
E. Timed-dosed pressure distribution or timed-dosed non-pressurized drip dispersal systems (NDDS) must be used. The soil treatment area reduction for pressure distribution (Table 10-2) must not be used in addition to the flow equalization reduction.
F. Contingency plans must be specified for expanding the capacity of the OWTS in the event of changed use at the facility.

10.6 Wastewater Strength

A. Table 6-3 includes levels of treatment that can be achieved by various OWTS components, excluding the soil treatment area. Systems qualifying for these treatment levels, except Treatment Level 1 (TL1) produced by a septic tank alone, must be approved by CDPHE. If soil treatment area or vertical separation distance reductions are permitted, it must meet requirements of BCPH maintenance oversight program under Section 7 of these regulations.
B. High-strength waste must be reduced to at least TL1 quality or lower before applying to a soil treatment area. Waste strength levels defined in Table 6-3 and 6-4 must be used to determine compliance.

Section 11. Minimum Distances Between Components of OWTS and Physical Features

11.1 Required Minimum Horizontal Distances-Applicability

A. Horizontal distances from the various components of a system to pertinent terrain features, such as streams, lakes, water courses, springs, wetlands, wells, subsurface drains, cisterns, water lines, suction lines, dry gulches, cut banks, dwellings, and other occupied buildings and property lines, must be in accordance with Table 7-1.
B. The setback requirements are applicable for minimum system performance and treatment levels with specific modifications allowed for higher treatment levels (see Table 7-2).
C. All distance setback modifications must be analyzed and approved by the Board or BCPH and must be in complete compliance with the variance or administrative procedures outlined in section 4.14.
D. Acceptable methods of analyzing horizontal separation distances with higher treatment levels include but are not limited to:
    1. Analyzing the intended uses of impacted surface and/or groundwaters.
    2. Contacting adjacent property owners for potential conflicts with property line encroachments.
    3. Analyzing potential impacts that system locations may have on building foundations and other potentially affected features.

11.2 Reduction in Minimum Distances – Operation and Maintenance Required

Reductions in separation distances with higher-level treatment must include provisions for operation and maintenance for the life of the system, as described in section 7.

11.3 Dry Gulches, Cut Banks, and Fill Areas

A. Separation distances to dry gulches, cut banks, and fill areas in Table 7-1 must apply unless the designer or design engineer determines, by observation of the exposed slope of the dry gulch or cut bank or by soil profile test pit excavations, that a limiting layer is present that will direct or allow effluent from the soil treatment area to move laterally and surface. In this instance, a greater distance may be required.

B. A shorter distance may be allowed if a professional engineer or professional geologist is able to demonstrate that the use of a barrier (e.g. minimum 30 mil PVC liner placed between the soil treatment area and slope of the dry gulch, cut bank, or fill area) would prevent effluent from surfacing laterally.

C. The separation distance between a component and the crest of a dry gulch or cut bank will be evaluated for potential erosion or slope instability if the component and the slope are in close proximity. If there is potential for erosion or instability, the separation distance must be increased until the risk is minimized.

11.4 Additional Considerations for Use of Table 7-2

A. Components of an OWTS listed in Table 7-1 must be installed or located in accordance with the minimum distance requirements provided in Table 7-1 or increased distances as outlined in these regulations.

B. The Board approves BCPH to permit the installation of an OWTS at a reduced property line setback in accordance with the following criteria:

1. If a property can accommodate the installation of an OWTS no closer than the required minimum 10-foot property line setback, it must do so. If the proposal complies with the requirements of this section and is deemed acceptable, BCPH may administratively allow a reduction to the setback.
2. The property line setback must not be reduced to any less than 3 ft., unless a variance by the Board of Health is provided.
3. The property line setback encroachment must be proposed at the time of permit application and must include the following information:
    a) A statement from the applicant and/or design engineer providing the reason for the reduced property line setback request.
    b) The applicant must demonstrate that the allowance of encroachment of the property line setback will not inhibit the development of surrounding properties (i.e. by allowing the encroachment of the property line setback, a neighboring property would not be able to meet the minimum setback requirement between the subject OWTS and a proposed adjacent well).
    c) The applicant must demonstrate that all activities associated with the installation of the proposed OWTS will not encroach on a neighboring property, and/or provide written permission from the adjacent owner or property manager of said property allowing the encroachment of machinery or excavated materials in order to install the proposed OWTS.
    d) The proposed OWTS must comply with all other required setbacks noted in Table 7-1. This approval is only applicable to the encroachment for the referenced property line setback.

e) The applicant must submit a survey of the property line(s) that the proposed setback encroachment will impact. The survey must include:
   (1) A survey completed by a Colorado registered professional land surveyor in accordance with section 12-120-301 *et seq*., C.R.S.
   (2) A legal description and drawing of the subject property. Said drawing must also include the location of the proposed OWTS, onsite and adjacent wells.
   (3) The surveyor must clearly mark the surveyed property line(s) in a manner that is clearly defined and will not degrade over time due to exposure to the elements. The markings must remain in place until after system construction and final approval by BCPH.

f) Prohibitions
   (1) Approval of an encroachment of the property line setback must not be provided after installation of the OWTS. Any post-construction reduction will require a variance by the Board of Health.
   (2) A reduction in the setback to a property line may only be granted where a minimum separation of six feet between soil treatment areas on all adjacent properties is provided.
   (3) The size of the soil treatment area must comply with section 14.3.
   (4) Property line setback reductions are prohibited where multiple systems on the subject property are proposed and the combined capacity of the systems exceeds 2,000 GPD.

C. Table 7-2 provides the required site evaluation, design, and treatment level considerations necessary to evaluate the site and to design and locate the soil treatment area component of an OWTS.
   1. Items 1, 2, and 3 in Table 7-2 address the allowable horizontal setback distance between the soil treatment area and the following physical features:
      a) Setback distance from the soil treatment area to the onsite well (Item 1).
      b) Setback distance from the soil treatment area to water features (Item 2).
      c) Setback distance from the soil treatment area to a dry gulch or cut bank (Item 3).
   2. Item 4 in Table 7-2 addresses the required vertical separation distance between the infiltrative surface of the soil treatment area and the limiting layer or the required depth of soil comprising the soil treatment area.
   3. The designer may select the level of treatment from Table 7-2 to be applied to the soil treatment area that is necessary to accommodate the site conditions, if higher-level treatment for that purpose is permitted by BCPH.

Section 12. Design Criteria: General

12.1 General

A. The OWTS for single-family homes must be designed to accommodate the proposed flows from the structure, as defined in section 10.2. Flow estimates for multi-family or commercial OWTS must comply with section 10.4. Expected waste strength, as noted in Tables 6-3 and 6-4, must also be addressed, where applicable. Installation of low-flow fixtures or the separation of toilet waste or other sources of wastewater does not allow for the reduction in the size of an OWTS, except as provided in section 16.

B. The OWTS must be designed and constructed to achieve the treatment level specified by the design.

C. The OWTS must be designed and constructed so each component will function, once installed and operational, in a manner that will not adversely be affected by normal operating conditions (e.g. erosion, corrosion, vibration, shock, climatic conditions, and usual household chemicals). Each component must be free of non-functional protrusions or sharp edges or other hazards that may cause injury to persons, animals, or property. The design must provide for efficient operation and

maintenance and prevent access by flies, rodents, and other vectors, and prevent other nuisances and public health hazards.

A. Spray-type foams that harden are not acceptable as a sealant for OWTS components.

12.2 Accessibility for Inspection, Maintenance, and Service

A. All septic tanks must have watertight risers over each access manhole. All risers must be a minimum of 20 inches inside diameter and extend to be at or above final grade, unless otherwise specified in this regulation.

B. For new construction, the top of any septic tank, dosing tank, or vault must be no deeper than four feet below finished grade.

C. Each treatment component of an OWTS, other than the septic tank and soil treatment area, must be equipped with access manholes with risers that extend to be at or above final grade, and they must be located to easily accommodate periodic physical inspection, collection, and testing of samples, as well as maintenance of all components and compartments.

D. **Riser lids:**

1. Each riser lid must be watertight, brought above the surface, and have a secure closing mechanism (e.g. lock, special headed bolts or screws, or sufficient weight – defined as 59 lbs.) to prevent unauthorized access.

E. Access risers for all new septic tanks, seepage pits, or vaults, must include a structurally sound interior grate, or other similar secondary safety feature, securely installed below the tank lid to prevent persons, pets, or wildlife from falling into the tank. Components that require access for maintenance must be accessible from the ground surface. This includes, but is not limited to, maintenance of pumps, siphons, valves, distribution boxes, drop boxes, cleanouts, effluent filters, inlet and outlet baffles, aerators, treatment equipment, and other devices.

F. Components must be designed and constructed so that when installed, they will be easily maintained, sampled, and serviced according to the manufacturers' recommendations. Easy physical access to treatment components by maintenance personnel and equipment must be provided.

12.3 Plumbing Codes

A. Plumbing fixtures, building sewers, vents, sewer lines, and other appurtenances must be designed, operated, and maintained to comply with minimum requirements of the most recently revised locally enforceable plumbing code.

B. In absence of a local plumbing code, the designs must adhere to the Colorado Plumbing Code (3 CCR 720-1). A local plumbing permit may be required.

12.4 Electrical Equipment

A. Requirements for electrical equipment, if used, include the following:

1. All electrical work, equipment, and material must comply with the requirements of the currently applicable National Electrical Code, as designated by the State Electrical Board Rules and Regulations (3 CCR 710-1).
2. A local electrical permit.
3. Electrical components must be protected from moisture and corrosive gases.

12.5 Indicators of Failure or Malfunctioning for Systems Utilizing Mechanical Apparatus

A. A signal device must be installed that will provide a recognizable indication or warning to the user that the system or component is not operating as intended.

B. The indication or warning must be a visual signal, an audible signal, and must be located in a centralized area within visual and audible range of the system user. A signal or message may also be sent remotely to a maintenance provider.

12.6 Sampling Access

A. If sampling for testing or as a requirement for a permit is required of effluent from a component other than the soil treatment area, an accessible sampling point must be provided.
B. If sampling of the treated wastewater from the soil treatment area is required for testing or of permit, a monitoring well or wells must be constructed. Monitoring wells must be located down gradient from the soil treatment area, be accessible, and must be provided with a properly securable cover at or above the ground surface. Monitoring wells up-gradient of the system may also be required. Lysimeters or other collection devices under the soil treatment area may be used instead of a monitoring well, if approved by BCPH or other issuer of the permit.

12.7 Component Operating Instructions

A. The manufacturer of proprietary treatment units utilizing mechanical components must provide clear, concise, written instructions covering the components that, when followed, will ensure proper installation and safe and satisfactory operation and maintenance.
B. If the OWTS uses public domain technology, the design engineer must provide clear, concise, written instructions covering the components that, when followed, will ensure proper installation and safe and satisfactory operation and maintenance.

12.8 Surface Activity

A. Activity or use on the surface of the ground over any part of the OWTS must be restricted.
B. The soil treatment area must not be subject to damage or soil compaction from livestock, vehicular traffic, recreational use, or other site development activity. Construction equipment not necessary to install the OWTS must be kept off of the soil treatment area to prevent undesirable compaction of the soils. If compaction occurs, the disturbed or compacted soil must be re-evaluated and/or new soil evaluations must be conducted.
C. The OWTS must be redesigned if the soil permeability has changed.

12.9 Floodplains and Floodways

A. New or repair/replacement of an OWTS located in the Boulder County Floodplain Overlay District as defined in section 4-403 of the Boulder County Land Use Code must meet the requirements in section 4-405(G) of the Boulder County Land Use Code or other applicable municipal code. A floodplain development permit from Boulder County Community Planning and Permitting or another applicable jurisdiction will be required before an OWTS permit will be issued.
    1. The OWTS must be designed by a registered professional engineer (RPE). The system, as approved by BCPH, must be designed to minimize or eliminate infiltration of floodwaters into the system and discharge from the system into the floodwaters.
    2. No new or expanded OWTS may be installed in a floodway designated in a 100-year floodplain.

12.10 Commercial, Industrial, Institutional, or Multi-Family Dwelling Wastewater Systems

A. All OWTS that will serve a business, commercial, industrial, or institutional property, or a multi-family dwelling must:
    1. Be designed by an RPE.
    2. Receive only such biodegradable wastes for treatment and distribution that are compatible with the biological treatment processes occurring within the septic tank, any additional treatment units, and the soil treatment area. This does not include industrial, animal, or process waste.

3. Receive authorization by rule or a Class V underground injection permit from the EPA before an application for an OWTS permit is approved if the system may receive non-residential wastewater or is otherwise covered by the EPA underground injection control program. Subsequent to acceptance by the EPA, BCPH may choose to also issue a permit for this type of use.

Section 13. Design Criteria: Components

13.1 Tanks and Vaults

A. **Watertightness:**
   1. Septic tanks, vaults, dosing tanks, other treatment components, risers, and lids cannot allow infiltration of groundwater or surface water and must not allow the release of wastewater or liquids through other than designed openings. This regulation applies to onsite wastewater treatment systems defined in C.R.S. §25-10-103(12).
   2. When the final compartment of a tank is being proposed for use as a pump or siphon chamber, the wall between the chamber and the previous chamber must be watertight except for the intended hydraulic opening.
   3. Acceptable watertightness testing methods performed at a manufacturer's site or in the field must include water filling the tank or vacuum testing.

B. **Tank Installation**: All tanks are to be installed level, placed on a uniform surface or bedding which does not contain rocks, roots, or other items that could create point loading on the tank.
   1. If imported bedding is needed, common options include a 5" depth of compacted CL III sand or pea gravel.

C. **Tank anchoring:** In locations where groundwater or floodwaters may cause instability problems to the septic tank, vault, or other treatment unit in the OWTS due to flotation, then the tank, vault, or unit must be anchored in a manner that will be sufficient to provide stability when the tank is empty. Risers must be included in the buoyancy calculations.
   1. If a manufacturer provides recommendations for anchoring designs, they may be used if they meet the conditions present at the site.
   2. If a manufacturer does not provide recommendations for provisions to compensate for buoyancy, or if the professional engineer chooses to provide their own design, then the anchoring system design must be prepared by the professional engineer.

D. **Identification and data marking:** All tanks and treatment units must be permanently and legibly marked in a location that is readily visible before backfilling. The inscription must include:
   1. Name of manufacturer.
   2. Model or serial number, if available.
   3. Effective volume and unit of measure.
   4. Maximum depth of earth cover and external loads the tank is designed to resist.
   5. Inlet and outlet identifications, if relevant.

13.2 Septic Tanks

A. All septic tanks must have received acceptance by CDPHE.

B. The manufacturer must provide sufficient information to demonstrate that the tank will meet the design specification.

C. **Sizing requirements:**
   1. Sizing for residential capacity for new installations must be based upon the number of bedrooms, per Table 9-1:
   2. For multi-family and non-residential applications, the septic tanks must be sized to permit detention of incoming wastewater design flows for a minimum of 48 hours.

3. For systems that remove toilet waste for separate treatment, tank capacity may be less than 1,000 gallons, as long as there is a minimum of 48 hours detention time.
4. The minimum tank size for new installations other than for a single-family residence is 400 gallons.
5. If a proprietary aerobic treatment component is installed, the minimum septic tank (or trash tank) volume may be reduced to the volume as determined by the manufacturer. This volume will typically be provided on the CDPHE product acceptance document, which can be found on the CDPHE OWTS webpage.

D. **Inspection and testing of septic tank watertightness:**
1. Testing of septic tanks must be performed and evaluated as specified in section 9 of American Society for Testing and Materials (ASTM) C1227-22 (Standard Specification for Precast Septic Tanks) for concrete tanks or in Standard International Association of Plumbing and Mechanical Officials (IAPMO)/ American National Standards Institute (ANSI) Z1000(American Standards for Prefabricated Septic Tanks) for other prefabricated septic tanks.
2. Each unit must be inspected in the field for conditions that could compromise its watertightness.
3. The field inspection must be conducted by BCPH and be performed after tank installation but before backfilling.
4. If the field inspection indicates the tank may be damaged or is not watertight, the BCPH inspector may require the tank be tested for watertightness by the tank manufacturer or the system contractor.

E. **Septic tank design and dimension criteria:**
1. A septic tank must have two or more compartments, or more than one tank may be used in series, unless otherwise noted in this regulation. The first compartment of a two-compartment tank or the first tank in a series must hold no less than one-half of the required effective volume.
2. Inlet invert must be at least two inches higher than the outlet invert.
3. Inlet tee or baffle must extend above the surface of the liquid at least 5 inches and must extend a minimum of 8 inches below the liquid surface; however, the inlet tee or baffle must not extend to a depth of more than 40% of the liquid depth measured from the liquid surface.
4. Outlet tee or baffle must extend at least 5 inches above and 14 inches below the outlet invert; however, it must not extend to more than 40% of liquid depth measured from the liquid surface. The outlet tee or baffle that accommodates an effluent filter must be located so that the effluent filter has sufficient clearance to be removed through the access opening with a riser in place.
5. The distance from the outlet invert to the underside of the tank top must be at least ten inches.
6. Liquid depth must be a minimum of 30 inches, and the maximum depth must not exceed the tank length.
7. The transfer of liquid from the first compartment to the second or successive compartment must be made at a liquid depth of between 35-40% of the liquid depth measured from the liquid surface.
8. At least 1 access opening no less than 20 inches across must be provided in each compartment of a septic tank.
9. A septic tank must have a minimum of 25 square feet of liquid surface area and have at least a 6-foot separation between inlets and outlets. Septic tanks in series, combined, must have a minimum of 25 square feet of liquid surface area, and the sum of the distances between inlets and outlets of all tanks must be at least 6 feet. The requirements for liquid surface

area and separation between inlet and outlet may be waived for tanks with less than 750-gallon effective volume.

10. Tanks proposed to be located below vehicular traffic areas must have the appropriate AASHTO H-20 or HS-20 ratings for such use.

F. **Concrete septic tank structural design:**
    1. Concrete septic tanks must comply with the structural design criteria of ASTM C1227-22 (Standard Specification for Precast Septic Tanks).
    2. The design for each tank model and size by each manufacturer must be certified by a professional engineer as complying with these design and structural requirements and the watertightness standard of these regulations.
    3. Certification by an RPE must be submitted to the Division for acceptance.
    4. Tank slab lids, mid-seam tanks, and the connections between the tank and risers must be designed so they provide a watertight seal.

G. **Fiberglass, fiberglass-reinforced polyester, and plastic tanks:**
    1. All fiberglass, fiberglass-reinforced polyester, and plastic tanks must meet the minimum design and structural criteria of IAPMO/ANSI Z1000 and be certified by a professional engineer that such standards are being met. The professional engineer certifying the criteria must be registered or licensed in the United States but is not required to be registered in Colorado.
    2. All tanks must be sold and delivered by the manufacturer or manufacturer's designated representative, preferably completely assembled. Onsite tank assembly will be allowed on an as-needed basis.
    3. Tanks must be structurally sound and able to support external forces, as specified in the standard referenced above when empty and internal forces when full. Tanks must not deform or creep resulting in deflection of more than 5% in shape as a result of loads imposed.
    4. All tanks must be constructed of sound, durable materials and not be subject to excessive corrosion, decay, frost damage, or cracking.
    5. All seams or connections, including to risers, must be sealed so they are watertight.

H. Metal tanks are prohibited.

13.3 Abandonment of Tank

A. After a tank is pumped, it may be completely removed and the parts disposed of safely.

B. If the tank is to remain in place:
    1. The tank must be pumped to remove as much waste as possible.
    2. The bottom of the tank must be broken so tank neither floats nor fills with water.
    3. The top must be collapsed and the sides may be broken into the void.
    4. The remaining void must be filled with gravel, sand, or compacted soil.
    5. The filled excavation will be graded to surroundings, allowing for settling.

C. BCPH may require abandonment of a tank that is deemed to be a hazard.

13.4 Pipe Standards and Bedding Requirements

A. **Pipe standards:**
    1. All wastewater pipes to be used in portions of an OWTS that are pressurized must be constructed of compatible pipe, primer, bonding agent, and fittings. Flexible couplings to connect pipes may only be used in portions of the OWTS intended for gravity flow of wastewater.
    2. Where unperforated plastic pipe and fittings are used for gravity flow, the minimum wall thickness of the pipe must conform to ASTM Standard D 3034-21 or equivalent or greater strength. Schedule 40 pipe is preferred.

3. Perforated distribution pipe that is surrounded by rock within a soil treatment area must have a minimum wall thickness and perforations conforming to ASTM Standard D 2729-21 or equivalent or greater strength. Corrugated polyethylene pipe with a smooth interior that meets ASTM F667/F667M or AASHTO M252-24 specifications or equivalent may also be used.
4. Schedule 40 or pipe of equivalent or greater strength must be used where pipe is installed in the following locations:
    A. Under driveways, roadways, or other areas where vehicular traffic is expected. Properly compacted select bedding material must be installed in such cases. Additional frost protection, such as installing 2" foam board or double-encasement of the pipe, is recommended. If engineer has concerns with frost line, they must address in design and provisions shall be used.
    B. Five feet prior to and beyond all tanks.
    C. In instances where sewer line setback distances were granted a variance for any reason.
5. Tile pipe, open-joint pipe, and cast iron pipe may not be used in an OWTS.
6. Pressure pipe must be rated for the intended use to accommodate pump discharge pressure. Cellular (foam) core piping must not be used in pressurized systems.
7. Frost protection, such as 2" foam board, is required where sewer and effluent pipe are not installed below frost level. The standard frost level in Boulder County is 30-32" and may be deeper at higher elevations.

B. **Bedding:** All system piping, except for distribution laterals within the soil treatment area, must be bedded with select material before final inspection by BCPH:
1. Select bedding material must consist of loose, granular material that is free of stones, clods, frozen soil, or other deleterious material.
2. Select material may consist of onsite job-excavated or imported material.
3. Bedding material must be mechanically compacted to support piping.

C. **Excavation:**
1. Excavations for pipelines, fittings, and appurtenances must be open trench to the depth, grade and in the necessary direction.
2. The trench bottom must be graded to provide a smooth, firm and stable foundation at every point throughout the length of the pipe, fitting, or appurtenance. If large gravel, cobbles, rocks, clods, or other unsuitable material are encountered at the trench bottom, they must be removed.
3. Where necessary, approved fill as specified in section 13.4.B shall be placed to provide uniform support between the pipe, fitting, or appurtenance and undisturbed trench bottom.
4. The area of the trench at pipe joints (bells) shall be over-excavated, as necessary, to provide uniform bearing of the bells on undisturbed ground.
5. Each joint shall be recessed in undisturbed soil or approved fill in such a manner as to relieve the bell of the pipe of all load and to ensure continuous bearing along the pipe barrel upon the pipe subgrade (trench bottom).

D. **Approved fill:**
1. Approved fill must be as specified section 13.4.B.
2. All voids between the pipe and undisturbed soils must be filled with approved fill.
3. Approved fill must be worked into place or tamped, as necessary, to consolidate the fill material and completely fill all void space between the pipe and undisturbed trench bottom.
4. Alternate fill materials and/or methods may be allowed upon prior approval from BCPH. BCPH may require that an alternate fill material or method be specified and approved by a RPE.

E. **Cleanouts:**
    1. Cleanouts are required between buildings and the septic tank for new construction.
    2. Cleanouts must have a secure cap and a riser extending to or easily accessible from grade. The installation of a straight tee or sanitary tee is acceptable.
    3. If a cleanout is not already provided outside of the building, a two-way cleanout must be installed between the building and the septic tank, as close to the home as practical, but no further than 50 feet of the outside wall. Boulder County Building Codes may also apply.
    4. Where a sewer has a change of horizontal direction greater than 45 degrees, a cleanout must be installed at the change of direction unless a cleanout already exists within 50 feet upstream of the fitting. Where more than one change of direction greater than 45 degrees occurs within 50 feet of a developed length of piping, the cleanout for the first change of direction may serve as the cleanout for all changes within that 50 feet of developed length of pipe.
    5. Cleanouts must match the size of the building sewer and be provided at intervals within the building sewer from the structure to the tank of not more than 100 feet. The effluent pipe between the septic tank and soil treatment area is exempt from this requirement.

F. **Pipe grade:** The grade of the building sewer must be at least 2% (i.e. 2-foot fall per 100 feet or ¼ inch per foot). Buildings must be planned so a proper slope can be obtained. Where the terrain is extremely flat, BCPH may allow a slope of only 0.5% (i.e. 6-inch fall per 100 feet or 1/16 inch per foot).

G. **Bends:** Bends upstream of the septic tank should be limited to 45 degrees or less whenever possible. If 90 degree bends cannot be avoided, they should be made with two 45 degree ells or a long sweep quarter curve.

13.5 Distribution Box

A. A distribution box, if used, must be of sufficient size to distribute effluent equally to the laterals of a trench or absorption bed system.
B. The distribution box must be constructed with the inlet invert at least one inch above the level of the outlet inverts.
C. Flow equalizers or similar devices must be used to adjust the flow between laterals.
D. Access to the distribution box must be provided with a manhole riser with access lid at or above grade if the top of the box does not reach final grade.
E. If two or more distribution pipes exit the distribution box in parallel, perforated pipe must be used on only one line and solid pipe on the remaining lines until there is three-foot separation between the lines.

13.6 Drop Box

A. In sequential distribution, a watertight box may be used to transfer the effluent to the following trench when the effluent in a trench has received the designed level for overflow to the next trench. A drop box must have a riser at or above final grade if the top of the drop box does not reach final grade.
B. Outlet pipes in sequential distribution must be designed and installed so they can be capped off for resting periods.

13.7 Stepdown/Relief Pipe

In sequential distribution, an unperforated pipe may be used to transfer the effluent to the following trench when the effluent in a trench has received the designed level for overflow from that trench.

13.8 Wastewater Pumping and Dosing Siphon Systems

A. **Pumps:**
   1. Non-clog pump openings must have at least two-inch diameter solids handling capacity where raw wastewater is pumped. A pump opening cannot have more than 3/4-inch diameter solids handling capacity if previously settled effluent is pumped.
   2. Pumps must be certified to the applicable Underwriters Laboratories (UL) or Canadian Standards Association (CSA) electrical safety standard, bear the seal of approval of CSA, UL, or an equivalent testing program and be constructed of corrosion resistant materials.
   3. Grinder pumps must be certified to National Sanitation Foundation International / American National Standards Institute (NSF/ANSI) Standard 46 and bear the seal of approval of the NSF or equivalent testing and certification program.

B. **Floats and switches:**
   1. Automatic liquid level controls must be provided to start and shut off pumps at a frequency or level specified in the design.
   2. Floats must be mounted on a stem separate from the pump discharge piping to allow for removal, adjustment, and replacement of the float from grade without removing the pump.
   3. Float switches must be certified to the applicable UL or CSA electrical safety standard; bear the seal of approval of CSA, UL, or an equivalent certification program; and be constructed of corrosion resistant materials.
   4. Dosing siphons for pressure dosing and higher-level treatment systems must provide for a means of determining the number of dosing events.

C. **Location of pump or siphon:**
   1. A pump or a siphon may be installed in a separate tank following the septic tank, and the tank must be of sufficient volume to allow pump or siphon cycling commensurate with the design capacity.
   2. The second compartment of a 2-compartment septic tank may only be used as the pump tank when the tank is specifically designed for this purpose and the 48-hour detention time will not be decreased. The pump must be screened or provided with an approved filtering devise to ensure that only liquid effluent will be discharged. The transfer of liquid from the first to the second compartment must be at an elevation that is between the inlet and outlet invert elevations, and through a standard tee designed and located as per the requirements of section 13.2. Siphons must not be installed in the second compartment of a two-compartment tank.
   3. The use of a three-compartment septic tank, sized to provide the required effective volume in the first two compartments with the pump or siphon in the third compartment, is acceptable for tanks specifically designed for this purpose. The transfer of liquid from the second to the third compartment must be at an elevation that is between the inlet and outlet invert elevation and through a standard tee designed and located, per section 13.2.

D. **Pump or siphon discharge piping:**
   1. The discharge pipe from the pumping or siphon chamber must be protected from freezing by burying the pipe below frost level or sloping the pipe to allow it to be self-draining. Drainage must be provided through the bottom of the pump or through a weep hole located in the discharge pipe prior to exiting the tank.
   2. The pump discharge piping must have a quick disconnect that is accessible from grade to allow for easy pump access and removal.
   3. The pipe must be sized to maintain a velocity of two or more feet per second.
   4. Pressure pipes must be designed to prevent air or vacuum locking and allow self-draining pipes.

E. **Access:**

1. The pump or dosing system tank, chamber, or compartment must have a minimum 24-inch inside diameter access riser made of corrosion-resistant material extending above ground level. A smaller diameter riser may only be installed if it is accepted by the Division as an integral component of a specific product during the product review process.
2. The access riser must have a watertight connection to the pump or dosing chamber / compartment to prevent infiltration or exfiltration. All other intrusions to the riser for the electrical or other component access must also be watertight.

F. **Splice box (Junction Box):**
   1. Any splice box must be located outside the pump system access riser and be accessible from the ground surface.
   2. Wire splices are prohibited inside the tank, dosing chamber, or riser. Wire splicing must be completed with corrosion-resistant, watertight connectors.

G. **Controls:**
   1. Control panels or other electrical boxes used to control the functions of an OWTS must comply with the following, as appropriate:
      1. The pump system must have an audible and visual alarm notification in the event an excessively high-water condition occurs.
      2. The pump must be connected to a control breaker separate from the alarm breaker and any other control system circuits.
      3. An electrical disconnect must be provided within the line of sight of the pump chamber.
      4. The pump system must be provided with a means that will allow the pump to be manually operated; such as an HOA (Hand/Off/Auto) switch.
      5. The pump system for pressure dosing and higher-level treatment systems must have a mechanism for tracking both the amount of time the pump runs and the number of cycles the pump operates.
      6. They must bear the seal of a Nationally Recognized Testing Laboratory (NRTL), such as UL or ETL.
      7. The bottom of the control panel must be at least 30 inches above grade.

13.9 Effluent Filters

A. Effluent screens must be installed in all septic tanks in new installations and repairs where the septic tank is replaced. This provision may be waived by BCPH for advanced treatment tanks that provide higher-level solid removal.

B. The septic tank outlet, or the outlet of the last septic tank in series, must include an effluent filter that retains solids greater than 1/8 inch in size. Effluent filters must be certified to ANSI/NSF Standard 46 or be approved by the division. Effluent filters must be sized to meet the estimated daily design flow and waste strength.

C. If a pump or dosing siphon is used to remove septic tank effluent from the final compartment of the septic tank, the effluent must be filtered prior to dispersal into the soil treatment area. An effluent filter, pump vault equipped with a filter cartridge, or a filter on the discharge pipe are all acceptable.

D. The effluent filter must be cleaned at manufacturer-recommended intervals, or more often, if use patterns so indicate.

E. An alarm may be installed on an effluent filter indicating need for maintenance. BCPH may require effluent filters to be equipped with alarms.

F. Where an ejector pump, grinder pump, or non-clog pump is proposed for use prior to the septic tank, an effluent filter must be installed on the outlet of the septic tank.

G. The handle of the effluent filter must extend within 12 inches of the top of the riser.

13.10 Grease Interceptor Tanks

A. All commercial food service facilities and other facilities generating fats, oils, and greases in their waste must install a grease interceptor tank.
B. Grease interceptor tanks must only treat those portions of the total wastewater flow in which grease and oils are generated.
C. The grease interceptor must have a minimum of two compartments and must be sized proportionate to the amount of fats, oils, and grease it receives; the peak flow rate through the tank; and the expected cleaning frequency.
D. The inlet and outlet tees or baffles must extend into the bottom 1/3 of the liquid volume but must be at least 12 inches off the inside floor of the interceptor.
E. The inlet and outlet tees or baffles must extend at least five inches above the liquid level and must provide for a free vent area across the liquid surface.

Section 14. Design Criteria: Soil Treatment Area

14.1 Size and Design

The size and design of the soil treatment area must be based on the results of the site and soil evaluation, design criteria, and construction standards for the proposed site and OWTS selected.

14.2 Engineered Systems

A. At proposed soil treatment area locations where any of the following conditions are present, the OWTS must be designed by a professional engineer and approved by BCPH:
    1. For OWTS installed in soil types 3A, 4, 4A, 5, FBR, DBR, R-0, R-1, R-2, and R-3, as specified in Tables 10-1 and 10-1A of this regulation.
    2. For OWTS that include components which provide Treatment Levels TL2, TL2N, TL3, TL3N, and TL3ND; or an NDDS.
    3. The maximum seasonal level of the groundwater surface is less than four feet below the bottom of the proposed infiltrative surface.
    4. Where a limiting layer, restrictive layer, or groundwater condition exists less than four feet below the bottom of the proposed infiltrative surface.
    5. In floodplains or floodways, as required in section 12.9.
    6. The ground slope is more than 30%.
    7. There is any part of the existing distribution system that is raised above existing grade.
    8. The system will serve commercial, business, institutional, or industrial properties or multi-family dwellings that are more than a single-family dwelling.
    9. The system requires a lift station or sewage pumping system.
    10. The system requires an open hole inspection or replacement of fill soils.
    11. Pressure distribution is used.

14.3 Calculation of Infiltrative Surface of Soil Treatment Area

A. The infiltrative surface of a trench or bed receiving any treatment level of effluent is only the bottom area. No sidewall credit is allowed except in deep gravel trenches, where the trenches utilize a depth of gravel greater than six inches below the distribution line and seepage pits that are permissible in repairs (see section 14.9.E and F).
B. Long-term acceptance rates (LTARs) are shown in Table 10-1 and 10-1A.
C. Factors for adjusting the size of the soil treatment area are in Tables 10-2 and 10-3.
D. The required area for a soil treatment area is determined by the following formula:

Soil Treatment Area in square feet required = $\frac{\text{Design Flow (in gallons per day)}}{\text{LTAR (in gallons per day per square foot)}}$

1. Adjusted Soil Treatment Area = Required Soil Treatment Area x Size Adjustment Factor(s).
2. Size adjustment factors for methods of application are in Table 10-2.
3. Size adjustment factors for types of distribution media are in Table 10-3.
4. A soil treatment area receiving TL1 effluent may be multiplied by the size adjustment factors from Table 10-2, Table 10-3, or both.
5. The distribution media options within Table 10-3 may be used for distribution of higher-level treatment system effluent (TL2 – TL3ND), however, the size reduction factors within Table 10-3 must not be used. Sizing reductions for higher-level treatment systems are achieved through increased LTAR's provided in Table 10-1 and as defined in section 7.4

E. A soil treatment area receiving TL2, TL2N, TL3, TL3N, or TL3ND effluent must be pressure-dosed.
   A. For products that combine distribution and higher-level treatment within the same component, pressure distribution of the effluent over the soil treatment area must be used.
   B. TL2-TL3ND effluent may be applied by gravity flow in soil types 3, 3A, or 4, for designs where reductions in the soil treatment area size or vertical/horizontal separation reductions are not being requested.
   C. The distribution media in Table 10-3 may be used for distribution of higher-level treatment system effluent, but an additional reduction factor from Table 10-3 must not be used. Sizing reductions for higher-level treatment systems are achieved through increased LTAR's, as provided in Table 10-1.

14.4 Allowable Soil Treatment Area Sizing Adjustments

A. The soil treatment area size determined by dividing the design flow rate by the LTAR may be adjusted by factors for method of treatment, soil treatment area design, and type of distribution media.
B. For the purpose of Table 10-1, a "baseline system" (i.e. adjustment factor of 1.00) is considered to be Treatment Level 1 (TL1) applied by gravity to a gravel-filled trench.
C. Sizing adjustments are not allowed for systems placed in type "R" soils. The maximum LTARs are provided in section 15.3.C.2
D. Long term acceptance rates for use of the higher-level treatment categories listed in Tables 10-1 and 10-1A will only apply if the system is inspected and maintained as specified in the requirements of section 7.4, *Permitting and Oversight of Maintenance for Soil Treatment Area Reductions and Vertical and Horizontal Separation Distance Reductions Based on Use of Higher-Level Treatment*.

14.5 Design of Distribution Systems

A. **General:**
   1. The infiltrative surface and distribution lines must be level.
   2. The infiltrative surface must be no deeper than four feet below grade unless TL2 or higher effluent is applied to the distribution media and the system is inspected and maintained, as specified in section 14.4. The depth of the infiltrative surface will be measured on the upslope side of the trench or bed.
   3. The soil treatment area must not be placed below a paved surface, or an area where vehicular traffic occurs or is expected, unless all of the following apply:
      a. The effluent must be treated to TL2 or higher prior to being applied to the distribution media.
      b. The distribution system must be designed to accommodate the vehicular loading.

c. Size adjustment factors identified in Table 10-3 must not be applied.

4. Trenches must follow the ground surface contours so variations in infiltrative surface depth are minimized. Beds must be oriented along contours to the degree possible.
5. The pipe for gravity distribution must be at least three inches in diameter.
6. A final cover of soil suitable for vegetation at least ten inches deep must be placed from the top of the geotextile or similar pervious material in a rock and pipe system, chamber, or manufactured media up to the final surface grade of the soil treatment area. The backfill material must be void of cobbles, boulders, building debris, or other non-permeable material. The preferred soil cover is a sandy loam textured material, topped with 2-3 inches of topsoil.
7. Following construction, the ground surface must be graded to divert stormwater runoff or other outside water from the soil treatment area. The area must be protected against erosion. Subsurface drains upslope of the soil treatment area may be installed to divert subsurface flow around the area.
8. Backfilling and compaction of soil treatment areas must be accomplished in a manner that does not impair the intended function and performance of the storage/distribution media and soil and distribution laterals, allows for the establishment of vegetative cover, minimizes settlement, and maintains proper drainage.

B. **Distribution laterals:**

Must meet the requirements of section 13.4, as applicable.

1. Distribution between laterals in a soil treatment area must be as level as possible. Uneven settling of portions of the distribution system following construction must be addressed by provisions in the design to adjust flows between laterals.
2. The maximum length of distribution lateral must not exceed 150 feet.
3. Distribution laterals longer than 100 feet must be pressure-dosed or the application of the effluent must be at the center of the lateral through a distribution box.
4. For absorption beds, the separating distance between parallel gravity distribution laterals must be a minimum of three feet but not exceed six feet (center-to-center), and a distribution lateral must be located within three feet of each sidewall and endwall.
5. The end of a distribution lateral must be capped unless it is in a bed or trenches in a level soil treatment area, where the ends of the lines may be looped.
6. To promote equal distribution to the soil treatment area, the effluent pipe on a gravity flow system must be connected to as near to the middle of the distribution header as possible. However, it must be offset from any distribution lateral so as to not provide a direct pathway into a single lateral. Note that the installation of a distribution box with flow levelers is preferred, as this will further assist in better distribution of the effluent.
7. Orifices must be oriented downward unless pressure distribution is used and provision for pipe drainage is included.

C. **Pressure distribution:**

1. Design plans for pressure distribution systems must identify the exact specifications for the following items:
    a) General design parameters: Not all combinations of the variables noted below will result in a proper distribution system design. The design engineer must justify through calculations &/or design software that the selected values will concur with the requirements noted below.
        i. Distribution pipe size: ¾ inch -1.5 inch (PVC Class 200, min.) 2-inch distribution pipe may only be used where other design modifications cannot overcome a greater than 10% variation in pressure head between the initial and distal orifices.

ii. Distribution pipe spacing: 18 inches to 48 inches
iii. Orifice size: 1/8 inch to 3/8 inch
iv. Orifice spacing:18 inches to 48 inches
v. Proposed dose volume: Will vary with design (0.25 – 1.0) gallons/orifice/dose, or 3 -5 times distribution pipe.
vi. To promote equal distribution within the soil treatment area, the forcemain within a pressure distribution system must be connected to as near to the middle of the distribution header as possible. This connection must be offset from any distribution lateral to prevent preferential flow to a single lateral. An allowable alternative to this configuration is provided below:
    a. Connections to the end of the distribution header are only allowed for soil treatment areas having a width of 12' or less, and no more than 4 laterals. For such configurations, a minimum 2" diameter manifold is required.
vii. Operating head at the distal end orifice:
    a. For systems with orifices 5/32 inch or less, the minimum squirt height is five feet.
    b. For systems with orifices 3/16 inch or greater, the minimum squirt height must be at least 12 inches above final grade, but never less than 30 inches above the lateral invert.
    c. As part of the final inspection of an OWTS installation with pressure distribution, a residual head test (squirt height), at the distal end of each lateral, must be conducted to determine the adequacy of system design and construction. Results from this inspection must be included within both the engineer's certification and the final permit acceptance documents.

b) Pump/siphon information; Total Dynamic Head; gallons/minute.
c) Drain-back volume from forcemain, when applicable.

2. The separating distance between parallel distribution pipes in a pressure distribution absorption bed must be a minimum of two feet but cannot exceed four feet, and the outer distribution pipe must be located within two feet of each sidewall and endwall. Additional requirements for the design of sand filters are noted in section 15.3.B and C.
3. Flushing assemblies must be installed at the distal end of each lateral and be accessible from finished grade. A sweeping 90 degree or bends limited to 45 degree are suggested.
4. An effluent filter must be located in the septic tank or pump chamber or a filter placed on the discharge pipe from the pump or siphon.

14.6 Soil Treatment Area Requirements

A. **Trenches:**
1. Trenches must be no more than three feet wide.
2. The separating distance between trenches must be at least four feet sidewall to sidewall.
3. Distribution laterals used in a trench must be as close to the center of the trench as possible.

B. **Beds:**
1. The maximum width for a bed is 12 feet unless the bed receives effluent meeting Treatment Level 2 quality or better.
2. The separating distance between beds must be at least six feet sidewall to sidewall.
3. Evapotranspiration beds and evapotranspiration-absorption beds may be wider than 12 feet. OWTS utilizing non-pressurized drip dispersal systems (NDDS) may also be wider than 12 feet and must be designed following the Colorado Professionals in Onsite Wastewater

(CPOW) Guidelines for the Design and Installation of Non-Pressurized Drip Dispersal Systems (February 24, 2014).

C. **Serial and sequential distribution:**
   1. New serial distribution systems, where effluent must pass through the first trench in order to access subsequent trenches, are prohibited.
   2. A sequential distribution system may be used where the ground slope does not allow for suitable installation of a single-level soil treatment area unless a distribution box or dosing chamber is used.
   3. The horizontal distance from the side of the absorption system to the surface of the ground on a slope must be adequate to prevent lateral flow and surfacing.
   4. Adjacent trenches or beds must be connected with a stepdown/relief pipe or a dropbox arrangement so that each trench fills with effluent to or near the top of the gravel or chamber outlet before flowing to succeeding treatment areas. Note that in a sequential distribution configuration, effluent does not pass through the first trench before it enters the succeeding trenches.

D. **Alternating systems:**
   1. An alternating system must have two or more zones that must be alternated on an annual or more frequent basis, or as required by the BCPH permit.
   2. For repairs, each section must be a minimum of 50% of the total required soil treatment area. For new installations, each separate soil treatment area must meet the minimum sizing requirements outlined in sections 14, 15 and 16, as applicable.
   3. A diversion valve or other approved diversion mechanism that requires the owner or operator to manually alternate zones of the OWTS may be installed on the septic tank effluent line allowing soil treatment area sections to be alternated.
   4. The diversion mechanism must be readily accessible from the finished grade.

E. **Sequencing zone systems:**
   1. Sequencing zone systems have two or more soil treatment area sections that are dosed on a frequent rotating basis.
   2. Where soil conditions are similar between the sections, each section area must be the same size. If soil conditions are such that long-term acceptance rates are different, each section may be sized for the same dose but different long-term acceptance rates.
   3. An automatic distribution valve must be used.
   4. Dosing of each system must be evaluated by the design engineer based on projected daily flow rates, number of zones, and soil types.

F. **Inspection ports:**
   1. A four-inch inspection port accessible from ground surface must be installed at the terminal end of each lateral in a trench system and at each corner of a bed system. The bottom of the inspection port must extend to the infiltrative surface and not be connected to the end of the distribution lateral.
   2. Inspection ports in chambers may be installed according to manufacturers' instructions if the infiltrative surface or can be observed from the inspection port.
   3. Additional inspection ports connected to distribution laterals may be installed.
   4. In addition, BCPH may require an inspection port at the initial end of each lateral in the system.
   5. The top of the inspection ports may be terminated below the final grade if each is housed in a component, such as a valve box for a lawn irrigation system, and has a removable cover at the ground surface.

6. Perforations/slots in the inspection ports of a rock and pipe installation shall be provided from near the base of the pipe and extending to at least eight inches above the infiltrative surface. Multiple slots or orifices must be provided.

14.7 Storage/Distribution Media

A. **Rock and pipe:**
   1. The perforated pipe must be surrounded by clean, graded gravel, rock, or other material of equal efficiency which must range in size from ½-2½ inches. AASHTO M 43 size No. 3 coarse aggregate meets this specification.
   2. At least six inches of gravel, rock, or other material must be placed below the pipe. The gravel, rock, or other material must fill around the pipe and be at least two inches above the top of the distribution pipe.
   3. The top of the placed gravel or other material used must be covered with non-woven permeable geotextile meeting a maximum thickness rating of 2.0 ounces per square yard or equivalent pervious material. An impervious covering cannot be used.

B. **Chambers:**
   a. Chambers must be installed with the base of the unit on in-situ soil or, if placed on acceptable media, the manufacturer's installation instructions must be followed in order to prevent chambers from settling into the media.
   b. Effluent pipes from the distribution box or manifold must enter the chamber at least six inches above the base of the chamber on standard height chambers, and at least 3 inches above the base of the chamber on the low profile models.
   c. Installation must be done according to manufacturer's instructions.
   d. Effluent may be distributed by gravity, pump, or siphon.
   e. As per section 16 (per 5 CCR-1002-43.13) if the total area covered by chambers is at least 90 percent of the excavated area, it may be approved as being the equivalent square footage of the total excavation.
      i. The area below the chamber endcaps must not be included in the calculations of the soil treatment area.

C. **Media, enhanced, or other manufactured:**
   1. Manufactured media must be installed with the base on the in-situ soil or placed on acceptable media meeting the manufacturer's specifications for proprietary distribution products or combined treatment/distribution products.
   2. Installation must be done according to manufacturer's instructions.
   3. Pressure distribution is required for TL2-TL3N effluent, unless otherwise noted in these regulations.

D. **Drip, Dispersal Systems:**
   1. The infiltrative surface area must be calculated using the LTAR for the site or a more conservative value if recommended by the manufacturer. Adjustment factors in Tables 10-2 and 10-3 may not be used.
   2. Driplines must be installed per the manufacturer's spacing recommendations.
   3. Drainback must be provided for all drip lines, pipes, and pumps.
   4. Provisions must be made to minimize freezing in the distribution pipes, driplines, relief valves, and control systems.
   5. Provisions must be made for filtering, back-flushing, or other required maintenance.

E. **Tire chips:**
   1. The pipe may be surrounded with clean, uniformly-sized tire chips.
   2. Tire chips must be nominally two inches in size and may range from ½ inch to a maximum of four inches in any one direction.

3. Wire strands must not protrude from the tire chips more than ¾ inches.
4. Tire chips must be free from balls of wire and fine particles less than two mm across.
5. The top of the tire chips used must be covered with non-woven permeable geotextile meeting a maximum thickness rating of 2.0 ounces per square yard or equivalent pervious material. An impervious covering may not be used.

14.8 Soil Replacement Systems

The construction of a soil replacement system is permitted to bring the soil treatment area into compliance with the requirements of these regulations.

A. When a soil type "R" is removed, the following requirements must be met:
    1. All added soil must comply with the following specifications:
        a) Added soil must meet the specifications of imported treatment sand media, as specified in section 15.3.B.2.c.
        b) The LTAR specified in section 15.3.C.2 must be used. No additional sizing adjustments are allowed.
        c) The depth of the added media must comply with the requirements in Table 10-1A.
        d) All added soil must be completely settled prior to installation of components as specified and approved by the design engineer.
        e) Pressure distribution must be used.
B. When a sand media is added to soil treatment area or to an excavation where a soil type 1-3 (Table 10-1) is the underlying soil, the following requirements must be met:
    1. Added soil must meet the specifications of imported treatment sand media, as specified in section 15.3.B.2.c.
    2. Unless the design follows the criteria for a sand filter or mound system design where ≥24 inches of sand is installed as required in section 15.3, or a higher-level treatment system has been installed, the TL1 long-term acceptance rate of the most restrictive soil within 12" below the sand base must be used.
    3. For sites where the proposed soil treatment area had been previously filled, the existing fill material must be removed and replaced with imported treatment sand meeting the specifications of section 15.3.C. The excavation must also extend at least 12" below the original grade (grade prior to fill). Only existing fill material meeting the requirements of a soil type 1 will be allowed to remain.
    4. All added soil must be completely settled prior to installation of components.

14.9 OWTS Repairs

A. When space is not available, or if there are other site limitations that preclude other soil treatment area options for OWTS repairs, wide beds, deep gravel trenches, deep beds and seepage pits may be considered for repairs only. Other options are vaults or higher-level treatment systems.
B. Repairs to failing systems must conform to setbacks identified in Table 7-1 when possible. When this is not possible using all available methods described above, the jurisdiction with authority may permit reductions to setbacks. At no point will a setback reduction be approved by the jurisdiction less than what the existing separation is to the existing OWTS. In maximizing this setback distance, all methods available in section 14.9 must be utilized including but not limited to the use of higher level treatment, wide beds, seepage pits, etc., where allowed. Any setback reduction beyond what the existing failing system presents must be approved by the Board, as outlined in Section 4.14.
C. Soils information obtained for the previous OWTS installation may be used if the information meets the requirements of section 9.4. Otherwise, soils investigation will be required.
D. **Wide beds:** For repairs, beds may be wider than 12 feet without being required to receive effluent meeting Treatment Level 2 quality or better.

E. **Deep beds:** For repairs, the infiltrative surface of a bed may be no deeper than five feet. Size adjustments as provided for in Tables 10-2 and 10-3 must not be applied. System sizing will be based strictly on the soil type and corresponding LTAR.

F. **Deep gravel trenches:**
   1. Deep gravel trenches may only be installed in soil types 1, 2, 2A or 3. Installations in soil types 3A, 4A, 5 or R are prohibited.
   2. The length of an absorption trench may be calculated by allowance for the sidewall area of additional depth of gravel in excess of six inches below the bottom of the distribution pipe according to the following formula:

$$\text{Adjusted Length} = L \times \frac{(W+2)}{(W+1+2D)}$$

Where: L = length of trench prior to adjustment for deep gravel

W = width of trench in feet

D = additional depth in feet of gravel in excess of the minimum required six inches of gravel below the distribution pipe

   3. Vertical separation requirements provided in Table 7-2 must be met.
   4. Maximum allowable depth from existing grade to the trench bottom is five feet.
   5. Evaluation of soild profile test pit excavation or percolation tests must be performed at the proposed infiltrative surface depth.
   6. Size adjustments as provided for in Tables 10-2 and 10-3 must not be applied to deep gravel trenches.

G. **Seepage pits:**
   1. For repairs, the potential risk to public health and water quality may be evaluated by BCPH. If risk is low, in the determination of BCPH, a seepage pit without higher level treatment may be used.
   2. If the risks are not low, higher-level treatment of at least TL2N must be attained prior to discharge to these systems for final dispersal.
   3. Reductions in the vertical, horizontal separation or system sizing requirements for the use of higher-level treatment systems with seepage pits are not allowed.
   4. A seepage pit must consist of a buried structure of precast perforated concrete, cinder or concrete block laid dry with open joints.
      a) Pits must be provided with both vertical sidewall and top supporting structural concrete or other material of equal structural integrity.
      b) The excavation must be larger than the structure by at least 12 inches on each side and may not exceed 5 feet beyond the structure wall.
      c) The over-excavated volume must be filled with clean, graded gravel or rock, which may range in size from ½ inch to 2½ inches. AASHTO M 43 size No. 3 coarse aggregate meets this specification.
      d) The capacity of the pit must be computed on the basis of long-term acceptance rates determined for each stratum penetrated. The weighted average of the results must be used to obtain a design figure.
      e) Soil strata in which the percolation is slower than 30 minutes per inch must not be used for absorption or seepage. These strata must not be included in the weighted average to determine the long-term acceptance rate.
      f) The infiltrative surface of the pit is the vertical wall area (based on dug perimeter) of the pervious strata below the inlet plus the bottom of the excavated area.
      g) The bottom of the pit excavation must be greater than four feet above a limiting layer, restrictive layer, or groundwater condition.

5. Pits must be separated by a distance equal to three times the greatest lateral dimension of the largest pit. For pits over 20 feet in depth, the minimum space between pits must be 20 feet.
6. The requirements for the design and construction of seepage pits for the treatment and dispersal of onsite wastewater on new sites is defined in 1.2.

H. **Vaults:**
1. Criteria for vaults are in section 16. of these regulations.

I. **Higher-level treatment options:**
1. Reduction in required soil treatment area for repairs is possible with higher level treatment.
2. Design criteria for higher level treatment systems are in section 14 of these regulations.

J. **Remediation systems:**
1. The intent of a remediation technology or process is to sufficiently increase the infiltration rate through the infiltrative surface at the bottom of an existing trench or bed and restore permeability to the soil below. Treatment levels as defined in Table 6-3 are not granted to remediation technologies.
2. BCPH may permit the use of remediation technologies or processes to address an existing failure or malfunction within a soil treatment area.
3. The use of remediation technology or process constitutes an alteration to the OWTS, and therefore the owner must obtain a permit for this work from BCPH.
4. Upon approval of BCPH, a system owner may choose to try a remediation technology or process to see if an existing problem with the soil treatment area will be resolved. The system owner bears the risk and cost of this attempt and is aware that an additional repair may be required.
5. Remediation technologies and processes must not adversely affect groundwater, surface water, any existing components, the long-term effectiveness of the soil treatment area, or the environment.
6. If the remediation technology or process does not correct the problem with the system, a conforming OWTS must be installed per the requirements in this regulation within a time frame determined by BCPH.
7. BCPH may require monitoring and/or maintenance of the remediation technology or process as a stipulation of permit issuance.

Section 15. Design Criteria: Higher-Level Treatment Systems

15.1 General

A. Higher-level treatment systems must be designed by an RPE.

B. Higher-level treatment systems may be public domain technology systems or proprietary systems.
1. Public domain technology systems must be designed, installed, and maintained according to established criteria and any additional criteria established by BCPH. When design criteria are not specifically provided in this regulation, the criteria used in the design must be from a reference commonly used as an industry standard, and the criteria must be cited in the design.
2. Proprietary systems must be designed, installed, and maintained according to manufacturers' instructions and additional criteria identified in the technology review and acceptance process (per 5 CCR-1002-43.13).

C. Soil treatment areas for higher-level treatment systems must be pressure dosed.

D. Systems must be capable of accommodating all anticipated flows and organic loads.

E. **Ventilation and air systems:** Mechanical components must be installed in a properly vented location, and all vents, air intakes, and air hoses must be protected from snow, ice, or water vapor accumulations.

F. **Covers, barriers, or other protection:** All systems must be installed to include protection of openings against entry of insects, rodents, other vectors, and unauthorized people.

15.2 Treatment Levels

The treatment levels identified in Table 6-3 are specified in this section for public domain technology. Proprietary treatment systems will be assigned a treatment level by the technology review and acceptance process in section 17. Adequate maintenance for each system must be required and documented as in section 7.

15.3 Sand Filters

A. A lined intermittent sand filter or a recirculating sand filter, may be used as a higher level treatment system prior to dispersing the effluent into a soil treatment area

B. Intermittent (single pass) sand filters; general requirements:
   1. The treatment level for intermittent sand filters is considered TL3.
   2. Size adjustment factors provided in Tables 10-2 and 10-3 are not applicable for sand filters.
   3. Pressure distribution is required. The design of the distribution system must comply with the requirements of section 14.5.C.

C. Sand filter treatment media:
   1. The depth of the sand media below the distribution system must be at least 24 inches unless otherwise noted in Table 10-1A for type "R" soils.
   2. "Imported treatment sand" media requirements:
      a. Effective size: 0.15-0.60 mm.
      b. Uniformity coefficient: ≤ 7.0.
      c. Percent fines passing #200 sieve: ≤ 3.0.
      d. 100% must pass the 3/8" sieve; ≥95% must pass the # sieve; >65% must pass the #10 sieve.

D. Gradation verification
   1. A gradation of the sand media used must be provided.
      a. The gradation must be dated no more than four months prior to the installation date; however, a gradation of the actual material placed in the excavation is recommended.
      b. The gradation must be provided to BCPH on letterhead from either the source gravel pit, or independent materials testing laboratory.

E. Gravel requirements:
   1. Clean, graded gravel or rock must range in size from ½-2½ inches. AASHTO M 43 (2005 version) size No.3 coarse aggregate meets this specification.
      a. The gravel must surround the distribution pipes used to disperse the effluent and must be at least 6 inches below and 2 inches above the pipes.
      b. Division accepted manufactured media may be used as an alternative to specified gravel.

F. Filter fabric requirements:
   1. The top layer of gravel must be covered with a non-woven permeable geotextile fabric meeting a maximum thickness rating of 2.0 ounces per square yard or equivalent pervious material.

G. Final Cover Material:
   1. 8-10 inches of Type 1 or 2 soil with an additional 2 inches of top soil.

H. Sand filters must not be used to treat wastewater that does not conform to TL1 treatment level or better.

I. Unlined (open bottom) sand filters:

1. All requirements of 15.3.B.2.a-h of this regulation will apply to unlined sand filters.
2. Application rates:
    a. Distribution media where a minimum of 24 inches of imported treatment sand is installed**:**
        i. Maximum hydraulic loading rate for TL1 effluent applied to "imported treatment sand" in an unlined sand filter is 0.8 gal./sq. ft./day.
        ii. Maximum hydraulic loading rate for TL2, TL2N, TL3, TL3N or TL3ND effluent applied to "imported treatment sand" is the soil type 1 LTAR for the treatment level of the effluent received, TL2 or TL3 (Table 10-1).
    b. In-situ soil where a minimum of 24 inches of imported treatment sand is installed:
        i. Maximum hydraulic loading rate for the in-situ soil when TL1 – TL3ND effluent is applied to the "Imported treatment sand" is TL3 LTAR, (Table 10-1) of the most restrictive soil within 12 inches below the sand base.
3. The upper infiltrative surface of an unlined sand filter receiving TL1 effluent must be at least three feet above a limiting layer or groundwater condition.
4. The upper infiltrative surface of an unlined sand filter receiving TL2 or TL2N effluent must be at least two and one-half feet above a limiting layer, or groundwater condition.
5. The upper infiltrative surface of an unlined sand filter receiving TL3, or TL3N effluent must be at least two feet above a limiting layer, or groundwater condition.
6. The upper infiltrative surface of an unlined sand filter receiving TL3ND effluent must be at least one foot above a limiting layer, or groundwater condition.
7. Where adjacent sand filters are installed, the base of the excavation for each sand filter must be no closer than six feet, sidewall to sidewall.

J. Lined, single-pass sand filters:
1. All requirements for application rates provided within section15.3.B.2 of this regulation will apply to lined sand filters.
2. The minimum depth of the sand media in a lined sand filter must be two feet.
3. An intermediate layer of pea gravel, two inches in thickness, must be placed between the sand filter media and the course under-drain media to prevent the migration of sand into the lower layer of under-drain gravel. ASTM C 33-23 (2023 version), No. 8, coarse aggregate meets this specification.
4. A minimum four-inch diameter slotted SCH40 PVC [ASTM standard D2729-21 (2021 version)] under-drain pipe must be used to collect the treated effluent. The under-drain pipe must be installed in the center of a 5 inches thick bed of washed, graded gravel or rock ranging in size from ½-2½ inches. AASHTO M 43 (2005 version), No.3 coarse aggregate meets this specification.
5. Lined sand filters must have an impervious liner on the sides and bottom of the filter. The liner must consist of a minimum 30 mil thick PVC material or equivalent.
6. Effluent collected by the under-drain must be dispersed to a soil treatment area. The soil treatment area may be sized with a maximum long-term acceptance rate of the receiving soil for TL3 effluent.
7. The base of the liner must be at least 2 feet above an actual or seasonal high groundwater elevation

K. Lined, recirculating sand filters:
1. Treatment level:
    a. Treatment level provided within recirculating sand filters is TL3.

2. General design parameters: Not all combinations of the variables noted below will result in a proper distribution system design. Engineer must justify through calculations or design software that the selected values will concur with industry standards.
    a. Distribution pipe size: ¾-2 inches (PVC Class 200, min.).
    b. Distribution pipe spacing: 18-36 inches (24 inches typ.).
    c. Orifice size: 1/8-1/4 inch.
    d. Orifice spacing: 18-36 inches (24 inches typ.).
    e. Pressure head at end of distribution pipe: 24-72 inches (60 inches typ.)
3. Dosing:
    a. Timed dosed, pressure distribution is required. The design of the distribution system must comply with the requirements of section 12.E.3.a of these regulations.
    b. Recirculation ratio: 3:1-5:1.
    c. Gallons/orifice/dose: 1-3 (2.0 typ.).
    d. Hydraulic loading: 3-5 gal./sq. ft./day (4-5 typ.).
    e. Dosing time “ON”; <2.5 min. (<2.0 typ.).
    f. Number of cycles/day: 48-120.
4. Top gravel requirements:
    a. Washed, graded gravel or rock must range in size from ½-2½ inches. AASHTO M 43, No.3 coarse aggregate meets this specification.
    b. The gravel must surround the distribution pipes used to disperse the effluent and must be at least 6 inches below and 2 inches above the pipes.
    c. State accepted manufactured media may be used as an alternative to specified gravel.
    d. Soil cover is prohibited. The upper gravel layer must be open to the atmosphere.
5. Filter media requirements:
    a. Effective size: 1.5-2.5 mm
    b. Uniformity coefficient: ≤ 3
    c. Fines passing #200 sieve: ≤ 1.0
    d. Media depth (min.): ≥24 inches
6. Intermediate gravel layer:
    a. An intermediate layer of pea gravel, two inches in thickness, must be placed between the coarse underdrain media and the sand filter media to prevent the migration of sand into the lower layer of under-drain gravel (ASTM C 33, No. 8, coarse aggregate).
7. Under-drain requirements:
    a. A minimum four-inch diameter slotted SCH40 PVC [ASTM Standard D 2729-21 (2021 version)] under-drain pipe must be used to collect the treated effluent. The under-drain pipe must be installed in the center of a 5 inches thick bed of washed, graded gravel or rock ranging in size from ½-2½ inches. AASHTO M 43-05 (version 2005), No.3 coarse aggregate meets this specification.
8. PVC liner requirements:
    a. Lined sand filters must have an impervious liner on the sides and bottom of the filter. The liner must consist of a 30 mil thickness PVC material or equivalent.
    b. The base of the liner must be at least 2 feet above an actual or seasonal high groundwater elevation.
9. Effluent collected from the recirculating sand filter must be discharged to a soil treatment area. The soil treatment area may be sized with a maximum long-term acceptance rate of the receiving soil for TL3 effluent.

15.4 Mound Systems

A. When the infiltrative surface area of the imported sand media receiving wastewater effluent is at or above the natural ground surface at any point, it shall be considered a mound system. Mound designs can include a variety of parameters.
    1. A mound installation where all of the imported sand is installed above existing grade.
    2. A mound installation where the top of the imported sand is installed entirely above existing grade but the base of the imported sand is installed below existing grade.
    3. A mound installation where the top of the imported sand is installed both above and below existing grade.

B. Sand Fill Loading Rate (Top of imported treatment sand)
    1. For mound systems that receive TL1 effluent and provides A MINIMUM OF 24 INCHES of imported treatment sand media, the LTAR for the imported treatment sand is 0.8 gal./sq/ft/day.
    2. For mound systems that receive TL2 – TL3ND effluent and provides A MINIMUM OF 24 INCHES of imported treatment sand media, the upper infiltrative surface of the imported treatment sand is to be sized on the soil type 1 LTAR for the treatment level of the effluent received, as provided in Table 10-1; TL2 or TL3.
    3. Where TL1 effluent dispersed to the distribution media in mound systems where LESS THAN 24 inches of sand is installed, the LTAR of the imported treatment sand is the TL1 LTAR of the most restrictive soil layer within 36 inches of the upper infiltrative surface (top of imported sand).
    4. Where TL2 – TL3ND effluent dispersed to the distribution media in mound systems where LESS THAN 24 inches of sand is installed, the system is to be sized on the LTAR of most restrictive soil layer within 36 inches of the upper infiltrative surface (top of imported sand), relative to the treatment level of the effluent received; TL2 or TL3.

C. Soil loading rate (base of imported treatment sand)
    1. Mound systems that provide a minimum of 24 inches of imported treatment media may use the TL3 application rates (Table 10-1) of the most restrictive layer within 12 inches of the imported sand base. Size adjustment factors within Table 10-3 must not be applied to mound designs where TL3 application rates are used; however, the adjustment factors may be applied if TL1 application rates are used.
    2. A mound system may **include less than 24 inches** of imported treatment sand media on a site where a lesser depth of sand media is sufficient to meet vertical separation requirements above a “limiting layer” or “groundwater condition”, as specified in Table 7-2. When less than 24 inches of treatment sand is imported, the following criteria apply:
        a. Where TL1 effluent is applied, TL1 application rates for the most restrictive in-situ soil layer within 36 inches of the top of the imported sand must be used. Size adjustment factors within Table 10-3 may be used.
        b. Where the effluent is treated to TL2 – TL3ND quality prior to dispersal into the distribution media, the LTAR is the soil loading rate of the most restrictive in-situ soil layer within 12 inches of the imported sand base for the treatment level of the effluent received, as provided in Table 10-1; TL2 or TL3. Vertical separation requirements of Table 7-2 must be met, relative to the treatment level of the effluent received. Size adjustment factors within Table 10-3 may not be used.

D. Linear loading rates
    1. The design engineer must evaluate many factors to achieve an accurate determination of the linear loading rate. While application rates for the in-situ receiving soil under the mound is a main component, placement on the slope and percentage of slope must also be addressed when defining the linear loading rate. If the movement of the effluent is primarily

vertical, then the linear loading rate is not as critical; however, if the movement of the effluent will be primarily horizontal, as would be expected in soil types 3 through 5 (Table 10-1), then the linear loading rate is extremely important and long narrow mounds are necessary.

2. When TL1 effluent is applied to the distribution media of a mound system installed above in-situ soil types with permeability less than 60 min/inch (Table 10-1 and 10-1A), the suggested linear loading rate is between 6 gpd/lin.ft. and 12 gpd/lin.ft. The maximum width of the distribution media in a mound system installed above these soil types is 12 feet when TL1 effluent is applied to the distribution media of a mound system.
3. When TL2 through 3ND effluent is applied to the distribution media of a mound system installed above in-situ soil types with permeability less than 60 min/inch (Table 10-1 and 10-1Athe linear loading rate may exceed 12 gpd/lin.ft.; subsequently the mound may be wider than 12 feet.
4. When TL1 through TL3ND effluent is applied to mound systems installed above in-situ soil types with permeabilities exceeding 60 min/inch (Table 10-1 and 10-1A), the suggested linear loading rate is between 3 gpd/lin.ft. and 5 gpd/lin.ft. The maximum width of the distribution media in a mound system placed above these soil types is 12 feet, however, once calculated, a lesser width may be required.

E. Mound systems must conform to the design requirements of section 15.4, unless otherwise specified within this section.
F. The basal area must be determined using the requirements for loading rate and linear loading rate provided above.
G. The final cover over a mound system must extend at least twelve inches horizontally beyond the perimeter of the distribution media prior to sloping down to existing grade. The final slope of the mound must be no greater than three feet horizontal to 1 foot vertical.
H. The surface of the mounded area must be planted with a suitable vegetative cover.
I. A suggested reference for the design and installation of mound systems is *"The Wisconsin Mound Soil Absorption System: Siting, Design, and Construction Manual*, *January 2000"* . Note that this is a suggested guidance, and where the requirements of this regulation differ from those in the referenced mound document, the requirements of this regulation will govern in those cases.

15.5 Rock Plant Filter (Constructed Wetland) Treatment before a Soil Treatment Area

A. A rock plant filter system must be designed by a professional engineer.
B. The design must be site specific and include specifications for: loading, capacity, dimensions, liner material, filter media, effluent depth and depth control mechanism, density and species of plant material, and other site specific information.
C. The treated effluent from a rock plant filter must be distributed to a soil treatment area.
D. Although producing higher level treatment, rock plant filters must not be assigned a treatment level higher than TL1 because of system and seasonal variability.

Section 16. Design Criteria: Other Systems

16.1 Evapotranspiration and Evapotranspiration/Absorption Systems

A. Non-pressurized drip dispersal system (NDDS):
    1. An NDDS is considered a type of evapotranspiration/absorption system; however, as specific design criteria are provided for an NDDS), they are exempt from the additional requirements of pressure distribution and items within section 16.1.A.1, 3, and 4.
    2. New NDDS installations require operation and maintenance in accordance with section 7.
    3. The design of the NDDS must follow the procedures stated in the document titled *Colorado Professionals in Onsite Wastewater Guidelines for the Design and Installation of Non-Pressurized Drip Dispersal Systems (NDDS), October 2024,* is the procedural guideline in the

design of an NDDS and must be followed when an NDDS is proposed. Available at www.cpow.net.

4. The width of an NDDS system may be wider than 12 feet.

B. The following section provides general criteria which must be followed when an evapotranspiration or evapotranspiration/absorption bed is proposed.
   1. The design may only be permitted in arid climates where the annual evaporation rate exceeds the annual precipitation rate by more than 20%, and where site characteristics dictate that conventional methods of effluent dispersal are not appropriate.
   2. The design may only be permitted in soil types, 4, 4A, and 5.
   3. The system must be designed by a professional engineer.
   4. If data for the pan evaporation rate is provided, it must be multiplied by 0.70 or less to obtain the equivalent lake evaporation rate.
   5. The width of the bed may be wider than 12 feet.
   6. The required capillary or wicking sand must meet the gradation requirements in Table 12-1 and be approved by the design engineer.
   7. The gradation information for the wicking sand must be provided to BCPH on letterhead from the source gravel pit or an independent materials testing laboratory. The gradation must be dated no more than 30 days prior to the installation date.
   8. This sand must be covered by a crowned, thin layer of loamy-sand mix and appropriate vegetation that will assist in drawing the water to the surface.
   9. Adjustment factors provided in Tables 10-2 and 10-3 may not be used.

C. For systems designed strictly as an evapotranspiration bed, the following criteria must be met:
   1. Design data to be furnished must include, but is not limited to: system dimensions; distribution system design; specifications of distribution media and wicking sand; liner material, if used; bedding; properties of the soil under the system; a vegetation cover; and a water balance calculation, including annual precipitation and storage requirements for periods of the year when evapotranspiration does not occur.
   2. The following formula must be used as a guide for determining the minimum area necessary for total evapotranspiration of septic tank effluent:

      $$\text{Area (in square feet)} = \frac{\text{Design Flow (in gallons per day)} \times 586}{\text{Lake Evaporation Rate at the Site (in inches per year)}}$$

      *Additional area may be required based on the annual water balance calculations.

   3. Designs will include a rock and pipe or other Division-approved proprietary distribution product, with the centerline of the distribution system laterals no more than 6 feet on center and within 3 feet of sidewall or endwall. A thin, non-woven fabric may be placed above the distribution system. Capillary wicking of the effluent is accomplished by a uniform depth layer of the specified sand media (capillary wicks), no more than 24 inches deep, placed between and above the distribution media. The base of the evapotranspiration bed may be no more than 30 inches below finished grade.
   4. Capillary wicks that penetrate between the distribution system to the bottom of the bed must be at least 15% of the bed surface area. The wicks must be uniformly spaced throughout the system.
   5. Except for dwellings, if the system is designed for summer use only, as determined by BCPH, the surface area may be multiplied by 0.6 to obtain the required area.

D. For systems designed as an evapotranspiration/absorption bed, the following criteria must be met:

1. Data to be furnished must include but is not limited to: system dimensions, distribution system design, specifications of wicking sand, properties of the soil under the evapotranspiration/absorption bed, provision for vegetation cover, and a water balance calculation including annual precipitation and storage requirements for periods of the year when evapotranspiration does not occur.
2. Design will include a rock and pipe or other Division-approved proprietary distribution product, with the centerline of the distribution system laterals no more than 6 feet on center. A thin, non-woven fabric as defined in section 15.3.F may be placed above the distribution media. Capillary wicking of the effluent is accomplished by a uniform depth layer of the specified sand media (capillary wicks) no more than 24 inches deep placed between and above the distribution media. The infiltrative surface may be no more than 30 inches below finished grade.
3. Capillary wicks that penetrate between the distribution system to the bottom of the bed must be at least 15% of the bed surface area. The wicks must be uniformly spaced throughout the bed.
4. Amount of storage and evapotranspiration capacities may be reduced by the volume of effluent absorbed by the underlying soil based on the LTAR for that soil type and the formulas provided in section 16.1.A.5 below.
5. The following formula must be used for determining the minimum area necessary for evapotranspiration/absorption of septic tank effluent:
    a. Area (sq. ft.)* = $\frac{\text{Flow (gpd)}}{\text{(LTAR + ETR)}}$
        i. LTAR refers to the long-term acceptance rate of the underlying soil as provided in Table 10-1 for TL1 effluent.
        ii. ETR refers to the evapotranspiration rate derived from the following formula:
    b. ETR (gal./day sq. ft.) = $\frac{\text{Lake Evaporation Rate at the Site (inches per year)}}{586}$

    * Additional area may be required based on the annual water balance calculations.

16.2 Seepage Pits

A. The construction of new seepage pits for the treatment and dispersal of onsite wastewater on new sites is prohibited unless:
    1. A trench or bed system will not meet the design, sizing, or setback requirements of this regulation on the proposed site.
    2. The seepage pit is designed by a professional engineer.
    3. The design includes higher level treatment of at least TL2.
B. The design requirements for new seepage pits must also comply with the requirements defined in section 14.9.
C. Pressure distribution is not required for dispersal into a seepage pit.

16.3 Wastewater Ponds

A. Construction of new wastewater ponds is prohibited.
B. For repairs of an existing wastewater pond, the potential for risk to public health and water quality may be evaluated by BCPH. If risk is low in the determination of BCPH, the repair of a wastewater pond may be permitted; however, the following criteria must be followed:
    1. A septic tank must precede the wastewater pond.
    2. The depth of the design volume of the wastewater pond must be at least five feet.
    3. The wastewater pond must have two feet of free board above the design volume of the pond.

4. The wastewater pond must be fenced to keep out livestock, pets, vermin, and unauthorized people.
5. The wastewater pond must be designed on the basis of monthly water balance, including design flow, precipitation, evaporation, and seepage.
6. The wastewater pond must be constructed so the seepage out of the bottom or sides does not exceed 1/32 of one inch per day. If this limit cannot be achieved using compacted natural soil materials, including soil additives, an impermeable synthetic membrane liner must be used.
7. Maintenance must include preventing aquatic and wetland plants from growing in or on the edge of the pond, protecting sides from erosion, and mowing grasses on the berm and around the pond.
8. The wastewater pond must be designed by a professional engineer.

16.4 Vaults Other Than Vault Privies

A. Vaults are prohibited where any of the following conditions exist:
   1. Property can accommodate an OWTS with a soil treatment area.
   2. Site cannot provide access for pumping and general system maintenance.

B. Vaults may be permitted where any of the following conditions exist:
   1. Full-time use when an existing OWTS is in a state of failure and cannot be replaced.
   2. Full time or limited use occupancy on a property that cannot accommodate an OWTS with soil treatment area
   3. If the dwelling does not have running water
   4. If the facility is on land where the installation of an OWTS with soil treatment area is not permitted.
   5. For systems where some of the wastewater flows are separated (e.g. toilet wastes only, recreational vehicle dump station) into a vault. The portion not retained in the vault must be treated in an OWTS that is sized per the requirements of these regulations.

C. The Board may allow vaults for use at a permanent facility, except where section 16.5 of this regulation applies.

D. Variances may be granted for specialized commercial uses.

E. Design and Capacity Requirements
   1. A vault must be accessible for routine pumping and maintenance.
   2. A vault must have a minimum 500-gallon effective volume or be capable of holding a minimum of the 48-hour design wastewater flow, whichever is larger.
   3. A vault must provide visual or an audible signal device or both, indicating filling to a maximum of 75 percent capacity, thus indicating when pumping is necessary.
   4. Concrete, fiberglass, and plastic tanks are allowed for use as a vault. All tanks must meet the structural design requirements of section per 5 CCR-1002-43.9.B.5 or 6 as applicable.
   5. Vaults must be watertight and meet the requirements of section per 5 CCR-1002-43.8.D and per 5 CCR-1002-43.9.A.1.a.
   6. Metal vaults are prohibited.

16.5 Privies

A. Vault Privy:
   1. The Board may prohibit the new construction of vault privies, depending on the site and intended use of the property. Vault privies that serve structures or dwellings without running water (e.g. bathroom facilities located at trailheads) will be allowed.
   2. The Board may prohibit the continued use of existing vault privies.

3. Effective volume of the vault must be no less than 400 gallons, and it must be constructed of concrete, fiberglass, or plastic. Vaults for privies must meet the structural and watertight requirements of per 5 CCR-1002-43.9.B.5 or 6, as applicable.
4. A vault privy must be built to include: fly- and rodent-tight construction, a superstructure affording complete privacy, an earth mound around the top of the vault and below floor level that slopes downward away from the superstructure base, a floor, and a riser of concrete or other impervious material with hinged seats and covers of easily cleanable, impervious material. All venting must be fly-proofed with No. 16 or tighter mesh screening.

B. Pit Privy: New construction of pit privies and continued use of existing pit privies is prohibited.

16.6 Incinerating, Composting, and Chemical Toilets

A. The Board may permit incinerating, composting, and chemical toilets. Chemical toilets are limited to situations defined in section 16.6.G below.

B. The use of an incinerating, composting, or chemical toilet will not reduce the required size of the OWTS, as noted in section 9, except under the following conditions:

1. Reductions in the size of soil treatment areas based on incinerating, or composting toilets, only if:
    a. There is no flush toilet available in the structure(s),
    b. The septic tank size must meet the requirements of Table 9-1 with no reductions allowed,
    c. Transfer of Title inspection report and acceptance documents must include a notation of the alternative toilet system that is installed;
    d. Must maintain a renewable use permit which may not be valid for greater than three years apart. Renewal inspections must confirm that no flush toilets have been installed and provide observations relative to general maintenance of the alternative fixtures.
    e. The reduction in the soil treatment area will be calculated by reducing the estimated wastewater flows (as provided in section 9) from the structure by no more than 25%, unless the structure has no water source or plumbing fixtures (e.g., remote access structure with composting toilet only).

C. Permitting of incinerating or composting toilets may also be subject to the jurisdiction of a local agency regulating plumbing or the Colorado Plumbing Board, whichever has jurisdiction over plumbing in the location.

D. An incinerating or composting toilet may be used for toilet waste where an OWTS is installed for treating wastewater remaining after removal of toilet waste. Subject to other applicable regulations or codes (e.g., Colorado Plumbing Code if a local code does not exist), the compartment may be located within a dwelling or building as long as the unit complies with the applicable requirements of these regulations, and provided that the installation will not result in conditions considered to be a health hazard, as determined by BCPH. Compartment and appurtenances related to the unit must include fly-tight and vector proof construction and exterior ventilation.

E. Incinerating toilets acceptance requirements:
1. Incinerating toilets must meet the requirements of the NSF Protocol P157 (April 28, 2000 version) and bear the seal of approval of the NSF or an equivalent testing and certification program.
2. An approved incinerating toilet must be designed and installed in accordance with all applicable federal, state, and local air pollution requirements and manufacturers' instructions.

F. Composting toilets:
1. Composting toilets must meet the requirements of NSF/ANSI Standard 41 and bear the seal of approval of the NSF or an equivalent testing and certification program.

2. An approved composting toilet must treat deposits of feces, urine, and readily decomposable household garbage that are not diluted with water or other fluids and are retained in a compartment in which aerobic composting will occur.
3. The effective volume of the receptacle must be sufficient to accommodate the number of persons served in the design of the unit installed. The effective volume of the unit must include sufficient area for the use of composting materials, which must not be toxic to the process or hazardous to persons and which must be used in sufficient quantity to assure proper decomposition.
4. Residue from the composting toilet must be removed when it is filled to 75% of capacity. Residue from the unit must be properly disposed of by methods recommended by the manufacturer and acceptable to BCPH. Disposal methods must prevent contamination of water and not cause a public health nuisance. Disposal using solid waste practices is recommended.
5. If a system is to be installed where low temperature may be a factor, design and installation must address the effects of low temperatures.
6. Composting toilets must be operated according to the manufacturer's specifications.

G. Portable chemical toilets:
1. The use of portable chemical toilets in permanently occupied buildings is prohibited except during construction or under emergency circumstances, as determined by BCPH. Proper ventilation of a chemical toilet used inside must be required.
2. Portable chemical toilets are not required to obtain a permit from BCPH.
3. Portable chemical toilets must be maintained in good physical condition and in sanitary condition to reduce the potential for disease transmission or nuisance conditions.
4. Portable chemical toilets must be staked or otherwise anchored or secured to prevent tipping over or spilling of contents.
5. Contents must be held within the unit and disposed of at a facility approved by BCPH.

16.7 Disinfection systems

A. Disinfection components must meet the requirements of NSF/ANSI Standard 385 (version 2022), or prior acceptance through NSF/ANSI Standard 46 – version 2022 or earlier and bear the seal of approval of the NSF or an equivalent testing program. This component may be installed between the higher-level treatment system and the pump tank, or within the pump tank.

1. All methods of disinfection shall effectively reduce the fecal coliform count to ≤200 organisms per 100 mL.

2. If chlorination is used as the disinfection method, a free chlorine residual of two tenths of a milligram per liter (0.2 mg/l) must be maintained in the pump tank.

3. The use of disinfection systems is only allowed provided the effluent is treated to TL3N quality prior to entering the disinfection system

16.8 Slit Trench Latrines

Slit trench latrines are prohibited.

16.9 Treatment Systems Other Than Those Discharging Through a Soil Treatment Area or Sand Filter System

A. For systems discharging to state waters, see section 2.4.
B. Systems that discharge other than through a soil treatment area or sand filter system must:

1. Be designed by a professional engineer.
2. Be reviewed by the Board.
3. Not pose a potential health hazard or private or public nuisance or undue risk of contamination.
4. Not allow drainage of effluent off the property of origin.

C. The following minimum performance criteria must be required for all permitted systems pursuant to this section:
    1. If effluent discharge is made into areas in which the possibility exists for occasional direct human contact with the effluent discharge, the effluent at the point of discharge must meet the minimum treatment criteria of TL3 effluent and specifically adhere to each of the following standards:
        a. The geometric mean of the *E. coli* density must not exceed 15 per 100 milliliters when averaged over any 5 consecutive samples, and no single sample result for *E. coli* can exceed 126 per 100 milliliters.
        b. The arithmetic mean of the standard five-day carbonaceous biochemical oxygen demand ($CBOD_5$) cannot exceed ten milligrams per liter when averaged over any three consecutive samples.
        c. The arithmetic mean of the total suspended solids cannot exceed ten milligrams per liter when averaged over any three consecutive samples.
    2. If the effluent discharge is made into an area so restricted as to protect against the likelihood of direct human contact with the discharged effluent, the effluent at the point of discharge must meet the treatment criteria of TL2 effluent and specifically adhere to each of the following standards:
        a. The geometric mean of the *E. coli* density must not exceed 126 per 100 milliliters when averaged over any 5 consecutive samples, and no single sample can exceed 325 *E. coli* per 100 milliliters.
        b. The arithmetic mean of the $CBOD_5$ cannot exceed 25 milligrams per liter when averaged over any 3 consecutive samples.
        c. The arithmetic mean of the total suspended solids cannot exceed 30 milligrams per liter when averaged over any 3 consecutive samples.

D. To determine compliance with the standards contained in this section, the required sampling frequency for *E.coli*, $CBOD_5$, and total suspended solid levels must be performed at least once per month that the system is operational, and the results must be submitted to BCPH for compliance with the permit requirements.

E. Methods of analysis – sampling points:
    1. All effluent samples must be analyzed according to the methods prescribed in the American Public Health Association, American Water Works Association, and Water Environment Federation: *Standard Methods for the Examination of Water and Wastewater, 24th t edition 2022 (international standard book number: ISBN-10: 0875532993, ISBN – 13: 978-0875532998). ion*.
    2. The sampling point must be a location that is representative of final discharge from the system.

Section 17. Technology Review and Acceptance

OWTS technologies must either be public domain, including but not limited to rock and pipe distribution media, sand filters with pressure distribution and mound systems, with criteria for design, installation, maintenance and use as described in this regulation or proprietary products that have received approval and acceptance by the Division pursuant to Section per 5 CCR-1002-43.13 before BCPH can permit them for use.

Section 18. Severability

The provisions of this regulation are severable, and if any provisions or the application of the provisions to any circumstances are held invalid, the application of such provision to other circumstances and the remainder of these regulations will not be affected thereby.

Section 19. Materials Incorporated by Reference

Throughout these regulations, standards and requirements by outside organizations have been adopted and incorporated by reference. The materials incorporated by reference cited herein include only those versions that were in effect as of March 10, 2024, and not later amendments to the incorporated material.

Materials incorporated by reference are available for public inspection during normal business hours from the Colorado Water Quality Control Division, 4300 Cherry Creek Drive South, Denver, Colorado 80246. Copies may be purchased from the source organizations. See list and contact information in Appendix

APPENDIX A: Tables

Table 3-1: Abbreviations and Acronyms

AASHTO	American Association of State Highway and Transportation Officials
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
BCPH	Boulder County Public Health
Board	Boulder County Board of Health
BOD	Biochemical Oxygen Demand
CCR	Code of Colorado Regulations
CIOWTS	Certified Installers of Onsite Wastewater Treatment Systems
C.R.S.	Colorado Revised Statutes
CBOD	Carbonaceous Biochemical Oxygen Demand
CDPHE	Colorado Department of Public Health and Environment
CSA	Canadian Standards Association
FEMA	Federal Emergency Management Administration
$g/ft^2/day$	Gallons Per Square Foot Per Day
Gpd	Gallons Per Day
IAPMO	International Association of Plumbing and Mechanical Officials
ISDS	Individual Sewage Disposal System
LPHA	Local Public Health Agency
LTAR	Long-term Acceptance Rate
mg/L	Milligrams Per Liter
MPI	Minutes Per Inch
NAWT	National Association of Wastewater Technicians
NDDS	Non-pressurized Drip Dispersal System
NEHA	National Environmental Health Association
NFIP	National Flood Insurance Program
NPCA	National Precast Concrete Association
NRCS	Natural Resources Conservation Service
NRTL	Nationally Recognized Testing Laboratory
NSF	National Sanitation Foundation
OWTS	Onsite Wastewater Treatment System(s)
RPE	Registered Professional Engineer
STA	Soil Treatment Area
TL	Treatment Level
TN	Total Nitrogen
TSS	Total Suspended Solids
UL	Underwriters Laboratories
USDA	United States Department of Agriculture

Table 5-1: Rupture Resistance. Blocks, Peds, Clods – Estimate the class by the force required to rupture (break) a soil unit.
Dry Rupture Resistance applies to soils that are moderately dry or drier

Dry Cementation Class	Specimen Falls Under
Loose	Intact specimen not obtainable
Non-cemented	Very slight force between fingers
Extremely weakly cemented	Slight force between fingers
Very weakly cemented	Moderate force between fingers
Weakly cemented	Strong force between fingers
Moderately cemented	Moderate force between hands
Strongly Cemented	Foot pressure by full body weight
Very Strongly Cemented	Blow of > 4.5 lbs., but not body weight
Indurated	Blow of ≥ 4.5 lbs. weight dropped at 6 inches

Source: NRCS Field Book for Describing and Sampling Soils, Version 3.0; 2021 Reprint; Consistence section, pg. 2-63.

Table 6-1: Single-Family Residential Design Flows

# Bedrooms	Occupancy (# of Persons)	Wastewater Flow Per Person (gallons/day)	Design Flow (gallons/day)
2	4	75	300
3	6	75	450
4	7	75	525
5	8	75	600
6	9	75	675

TABLE 6-2: For Design Purposes, the Estimated Daily Wastewater Flow and BOD_5 Load is "Per Person" Unless Otherwise Noted

RESIDENTIAL WASTEWATER	GPD	BOD_5 (pounds per day)
Single-family dwellings, Accessory dwelling units	75	.20
Auxiliary buildings, by fixture type		
Bath/Shower	14.7	.014
Dishwasher	1.8	.002
Kitchen sink with garbage grinder	5.8	.052
Laundry washer	19.5	.037
Lavatory	8.4	.021
Water closet (toilet)	24.8	.029
RESIDENTIAL, OTHER	**GPD**	**BOD_5 (pounds per day)**
Boarding and rooming houses (users absent during working hours)	50	.15
Hotels and motels per room	75	.15
Mobile home	75	.20
Multiple-family dwellings or apartments	75	.20
Mobile home park per space	300	.80
Tiny Homes[3], per unit	150	.40
Vacation home rental; per additional bed space provided; in addition to the 150 gal./bedroom[4]	50	.20
COMMERCIAL WASTEWATER	**GPD**	**BOD_5 (pounds per day)**
Day-use, or Transient Facilities		.15
Examples: Airports or bus stations per passenger; fairgrounds per person attending; ball parks, race tracks, stadiums, theaters or auditoriums per seat	5	.02
Airport per employee	10	.06
Banquet halls per seat with food preparation, per event	7.5	.06
Banquet halls per seat, no food preparation, per event	5	.02
Barber and beauty shops per chair	100	.70[1]
Bowling alleys per lane - toilet wastes only	5	.03
Convenience Stores with self-serve beverages	See footnote 7	See footnote 7
Country club per member	30	.02

County club per employee	20	.06
Dentist offices per non-wet chair	50	.14
Doctor offices per doctor	250	.80[1]
Farm workers, factories and plants, exclusive of industrial wastewater, per employee per eight-hour shift – no showers	20	.05
Farm workers, factories and plants exclusive of industrial wastewater per employee per eight-hour shift - showers provided	35	.08
Laundries, self-service per commercial washer	400	.75
Office buildings per employee per eight-hour shift	15	.06
Service stations per toilet fixture	250	.50[1]
Stores and shopping centers per square foot of retail space	.1	.01[1]
Work or construction camps semi-permanent with flush toilets	50	.17
Work or construction camps semi-permanent without flush toilets	35	.02
FOOD SERVICE ESTABLISHMENT	**GPD**	**BOD_5 (pounds per day)**
Coffee shop per customer	3.5	.15
Restaurant open 1 or 2 meals per seat	50	.06/meal
24-hour restaurant per seat	75	.07/meal served
Restaurant with paper service only per seat	25	.01/meal served
Additional for bars and cocktail lounges per seat	30	.02
Drive-in restaurant per car space	50	.02
INSTITUTIONAL WASTEWATER (without kitchens unless otherwise noted)	**GPD**	**BOD_5 (pounds per day)**
Churches per seat; without any food service, or other uses	3.5	.15
Churches, per seat; warming kitchen only, no major food service	5	.01
Churches, per seat; with food service, per meal served	7.5	.02
Hospitals per bed space	250	.20
Nursing homes; Group homes for developmentally disabled, per bed space	125	.20
Schools, Boarding per person	100	.17
Schools, Day without cafeteria, gym or showers	15	.04

Schools, Day with cafeterias, no gym or showers	20	.08
Schools, Day with cafeterias, gym and showers	25	.10
Schools, Day additional for school workers	15	.06
RECREATIONAL AND SEASONAL WASTEWATER USE	**GPD**	**BOD_5 (pounds per day)**
Camps, day, no meals served	15	.15
Children's camp, overnight with meals and showers	50	.12
Luxury resort[6]	125	.17
Resort night and day	50	.12
Campground per campsite[2]	50	.12
Public park flush toilet per fixture per hour when park is open	36	.04 lbs./ fixture
Public park urinal per fixture per hour when park is open	10	.01 lbs./fixture
Public park shower per fixture per hour when park is open	100	.10 lbs./ fixture
Public park faucet per fixture per hour when park is open	15	.04 lbs./ fixture
Swimming pools and bathhouses	10	.06
Travel trailer parks with individual water and sewage hookup per unit [2]	100	.24
Travel trailer park without individual water and sewage hookup per unit [2]	50	.12

1. BOD levels may require further verification depending on the specific use of the facility.
2. Laundry facilities are to be calculated on a per commercial washer basis in accordance with other elements of this table.
3. For a "tiny home" the OWTS may be sized as a one-bedroom home.
4. As stated in section 10.2.H, BCPH may increase the "per bedroom" design flows for vacation home rentals relative to the expected maximum occupancy of the home. These flows are in addition to the 150 gal./bedroom requirement.5. Note that discharges from non-domestic sources such as process waste, industrial waste, microbreweries, dog kennels, veterinary clinics, horse barns, etc. are not addressed in this regulation. Such discharges must obtain permitting as a Class V Injection Well through the EPA, as appropriate.
6. A "Luxury Resort" will typically include a spa, restaurant/bar, pool, etc.
7. Wastewater from convenience stores will likely meet the requirements of high strength waste. Studies indicate that BOD^5 effluent levels will range between 500 – 1500 mg/l. The exact levels will depend on products available (i.e.: coffee, soda, etc.), number of patrons, and how often the excess from each product is disposed. Flows from each facility can also vary substantially depending on location and the size of the store. Locations adjacent to freeways could have significantly more flow than a site located in a residential area. Subsequently, the design engineer must provide data from similar facilities in order to afford an estimation of projected peak daily flows.
8. Wastewater from coffee shops will likely meet the requirements of high strength waste. Studies indicate that BOD^5 effluent levels may exceed 500 mg/l. The exact levels will depend on the drink options (i.e.: latte, espresso, etc.), number of patrons, and how often the excess from each product is disposed. Flows

from each facility can also vary substantially depending on location and the size of the store. Subsequently, the design engineer must provide data from similar facilities in order to afford an estimation of projected peak daily flows.

Table 6-3: Treatment Levels

Treatment Level	BOD_5 (mg/L)	$CBOD_5$[1] (mg/L)	TSS (mg/L)	Total Nitrogen (mg/L)	Fecal Coliform[5]
TL1 [2]	180	-	80	60-80	
TL 2	-	25	30	N/A[3]	
TL 2N	-	25	30	>50% reduction[4]	
TL 3	-	10	10	N/A[3]	
TL 3N	-	10	10	20 mg/L	≤200 per 100 mL

Shading indicates higher treatment levels.

1. Requirements for $CBOD_5$ are only related to effluent samples from a higher level treatment system.
2. Domestic septic tank effluent prior to soil treatment or higher level treatment has a wide range of concentrations. These values are typical, but values used for design must account for site-specific information.
3. Total Nitrogen does not apply to Treatment Levels TL2 and TL3. Processes intended to reduce total nitrogen are addressed in Treatment Levels TL2N and TL3N. Any total nitrogen reductions that may be observed for TL2 and TL3 are as a result of the treatment process for BOD_5 and TSS reductions.
4. NSF/ANSI Standard 245 – Wastewater Treatment Systems – Nitrogen Reduction requires reduction of 50 percent rather than an absolute value.
5. TL3ND requires effluent to be treated to TL3N standards prior to disinfection. The disinfection must meet the requirements of section 16.
6. With the exception of fecal coliform, treatment level requirements are based on values obtained from composite sampling.

Table 6-4: High Strength Wastewater[1]

	BOD_5 (mg/L)	TSS (mg/L)	Fats, Oils, Grease (FOG) (mg/L)
Septic Tank Influent	>300	>200	>50
Septic Tank Effluent	>180	>80	>25

1. High strength wastewater prior to a septic tank has a wide range of concentrations. These values are typical, but values used for design purposes must account for site-specific information.

Table 7-1: Minimum Horizontal Distances in Feet Between Components of OWTS Installed After November 15, 1973, and Water, Physical, and Health Impact Features

	Spring, Well,[1, 9] Suction Line, Underground Potable Water Supply Cistern[4]	Potable Water Supply Line [2]	Structure w/ basement, crawl space or footing drains	Structure without basement, crawl space or footing drains	Property Lines[11], upslope curtain drain	Subsurface Drain, Intermittent Agricultural Irrigation Lateral[7], Lined Pond or Irrigation Channel, Drywell, Storm sewer, Stormwater Structure	Surface Water, Lake, Water Course, Open Irrigation Channel[7], Stream, Wetland	Dry Gulch, Cut Bank, Fill Area (from Crest), in-ground pools	Septic Tank, Higher level treatment Unit, Dosing Tank, Vault or Privy
Septic Tank, Higher Level Treatment Unit, Dosing Tank, Effluent pipe[2], Vault or Vault Privy	50 [2]	10 [2]	5	5	10	10	50	10	--
Building Sewer	50 [2]	5 [6]	0	0	10 [2]	10 [2]	50 [2]	10 [2]	--
STA Trench, STA Bed, Unlined Sand Filter, Sub-surface Dispersal System, Seepage Pit	100 [3]	25 [2]	20	10	10	25	50 [3]	25	5
Lined Sand Filter	60	10 [2]	15	10	10	10	25	10	5

Lined Evapo-transpiration Field or Out-side of Berm of Lined Wastewater Pond	60	10 [2]	15	15	10	10	25	10	5
Open Unlined Sand Filter in Soil With a Percolation Rate Slower than 60 Minutes per Inch, Unlined Evapotranspi-ration System, Outside of Berm of Un-lined Wastewater Pond, or Sys-tem Not Rely-ing on STA for Treatment Other than Aerosol	100	25 [2]	20	10	10	25	25	15	10
Slit Trench La-trine, Pit Privy	100	50 [2]	25	25	25	25	100	25	N/A
System Not Relying on STA for Dispersal	100 [3]	10 [2]	125	125[5]	10	0	25 [3]	10	10

NOTE: The minimum distances shown above must be maintained between the OWTS components and the features described. Where soil, geological or other conditions warrant, greater distances may be required by the local board of health or by the Water Quality Control Commission pursuant to section 25-8-206, C.R.S. and applicable regulations. For repair or upgrading of existing OWTS where the size of lot precludes adherence to these distances, a repaired OWTS must not be closer to setback features than the existing OWTS, as reviewed and approved by BCPH.

1. Includes potable wells, irrigation wells and monitoring wells set within a potable aquifer and infiltration galleries permitted as wells by the Division of Water Resources. All horizontal setbacks to a potable water supply must be met unless a variance by the Board of Examiners of Water Well Construction and Pump Installation Contractors is granted per section 18.2 of the Water Well Construction Rules, 2 CCR 402-2, (Division of Water Resources). Setback requirements which may necessitate a variance are found within section 10.2 or 11.4 of the Water Well Construction Rules, as applicable. The minimum horizontal setback that may be granted for new construction through a variance is to 75 feet; and must meet the requirements of Table 7-2 of this regulation. Setbacks for existing wells must comply with requirements of section 14.9.
2. Crossings or encroachments may be permitted at the points as noted above provided that the potable water or wastewater conveyance pipe is encased for the minimum setback distance on each side of the crossing. A length of pipe with a minimum Schedule 40 rating [ASTM Standard D3034-24 (2024 version)] of sufficient diameter to easily slide over and completely encase the conveyance must be used. Rigid end caps of at least Schedule 40 rating [ASTM Standard D3034-24 (2024 version)] must be glued or secured in a watertight fashion to the ends of the encasement pipe. A hole of sufficient size to accommodate the pipe must be drilled in the lowest section of the rigid cap so that the conveyance pipe rests on the bottom of the encasement pipe. The area in which the pipe passes through the end caps must be sealed with an approved underground sealant compatible with the piping used. Piping of equal or higher strength may also be used. Other methods of separation between the potable water pipe and a component of the OWTS that provide equal protection are allowed. These may include, but are not limited to, concrete or controlled flowable fill encasement extending no less than 10 feet each side of the crossing, or an impermeable geo-membrane curtain extending at least two feet below the potable water pipe and no less than 10 feet each side of the crossing. These methods must be reviewed and approved by BCPH.
3. Add eight feet additional distance for each 100 gallons per day of design flows between 1,000 and 2,000 gallons per day, unless it can be demonstrated by a professional engineer or geologist by a hydrologic analysis or the use of a barrier, consisting of a minimum 30 mil PVC liner or equivalent, that contamination will be minimized. If effluent meets Treatment Level 3N the distance addition is not required. Flows greater than 2,000 gallons per day must be hydrologically analyzed for flow, velocity, hydraulic head, and other pertinent characteristics as means of estimating distances required to minimize contamination as part of the Division site application and permitting process.
4. All horizontal setbacks to an underground potable water supply cistern must be met unless a variance by the Board of Examiners of Water Well Construction and Pump Installation Contractors is granted per section 18.2 of the Water Well Construction Rules, 2 CCR 402-2. Setback requirements which may necessitate a variance are found within section.10.2 or 11.4 of the Water Well Construction Rules, as applicable. The minimum horizontal setback that may be granted through a variance is 25 feet. Noted setbacks are not required to above ground cisterns.
5. If the structure is not used as a habitable unit, the isolation may be reduced by the local board of health to no less than 50 feet.
6. Building sewer installations shall meet the design requirements of the Colorado Plumbing Code.
7. Ditch companies may have a specific right of easement for “reasonable and necessary use to access, operate, and maintain ditches”. Property owners are responsible for verifying requirements for these setbacks and easements with the ditch company. Above setbacks for all OWTS components must be maintained at a minimum.
8. Sites with multiple OWTS on a single property where the total flows are > 2,000 gpd must meet the increased required setbacks as provided in WQSA-6 (Policy 6).
9. Per 2 CCR 402-10 (6.4.2) Geothermal wells shall be located at least 100 feet to the nearest source or potential source of contamination, unless a variance has been obtained from the state engineer.
10. Setback from a utility easement: While a specific setback for components of an OWTS to a utility easement is not specifically identified, the intent of the regulation is provided herein. The setback from utility easements is dependent on whether the utility is above or below ground. For above ground utilities, components of an OWTS must not be installed in areas where construction or maintenance vehicles may be required to travel in order to gain access to the utility. For utilities installed below grade, the objective is to setback the utility far enough away from the soil treatment area so that sewage will not seep into a utility trench excavation. The setback is also necessary to prevent construction or maintenance vehicles from driving on any component of an OWTS. Where remote properties have a blanket utility easement, the owner/operator of the OWTS will be responsible for providing signage or physical barriers as needed to reduce the risk of vehicular traffic or other disturbance to the OWTS. In all instances, a five-foot setback will typically address most concerns.
11. In specific circumstances, BCPH may allow for a reduced setback from a property line to the OWTS; per the requirements of section 12. Property owners are responsible for verifying property boundaries and above-mentioned setbacks.

Table 7-2 Minimum Separation Distance Requirements in Feet from Soil Treatment Area, Relative to Treatment Level Provided[3]

ITEM	OWTS DESIGN CONSIDERATION	Treatment Levels 1 and 2	Treatment Level 2N[4]	Treatment Level 3[4]	Treatment Level 3N[4]	Treatment Level 3ND[4]
	Horizontal Separation Distances					
1	Distance from soil treatment area to wells[5]	100	100	100	100 [1]	100 [1]
2	Distance from effluent pipes & soil treatment area to pond, creek, lake, or other surface water feature	50	25	25	25	25
3	Distance from soil treatment area to dry gulch or cut bank	25	10	10	10	10
	Vertical Separation Distances					
4A	Treatment depth in feet from infiltrative surface to a limiting layer, or groundwater condition	4 feet[2] (3 feet with pressure dosing)	2.5	2.5	2	1
4B	Treatment depth in feet from infiltrative surface to a limiting layer, or groundwater condition with the inclusion of an unlined sand filter	3 (TL1) 2.5 (TL2)	2.5	2	2	1

NOTE: Treatment levels are defined in Table 6-3. Reductions in separation distances with higher level treatment may have included provisions for operation and maintenance.

1. All setback distance reductions to the 100-foot requirement for wells and soil treatment areas must be in full compliance with the minimum standards and variance requirements of the State of Colorado Division of Water Resources: Rules and Regulations for Water Well Construction, Pump Installation, Cistern Installation, and Monitoring and Observation Hole/Well Construction. For TL 3N and TL3ND effluent, a reduction to 75 feet is allowed if a variance from the Water Well Construction Regulations is obtained. Note that the Division of Water Resources does not address inquiries about existing wells. Local agencies must follow the same review principles, as provided within division's guidance document; "Variances for water wells"; March 2019.
2. Reductions in the vertical separation requirements for the use of higher-level treatment systems with seepage pits are not allowed. The bottom of the excavation of a seepage pit must be a minimum of four feet above a limiting layer.
3. Refers to the quality of effluent applied to the distribution media
4. Pressure dosing is required for all TL2N, TL3, TL3N, and TL3ND systems
5. Includes potable wells, irrigation wells and monitoring wells set within a potable aquifer and infiltration galleries permitted as a well by the Division of Water Resources.

Table 9-1: Minimum Septic Tank Size Based on Number of Bedrooms

Number of Bedrooms	Tank Capacity (gallons)
2 or 3	1,000
4	1,250
Each Additional	250

Table 10-1: Soil Treatment Area Long-term Acceptance Rates by Soil Texture, Soil Structure, Percolation Rate and Treatment Level

Soil Type, Texture, Structure and Percolation Rate Range					Long-term Acceptance Rate (LTAR); Gallons per day per square foot[2]		
Soil Type	**USDA Soil Texture**	**USDA Soil Structure-Type**	**USDA Soil Structure-Grade**	**Percolation Rate (MPI)**	**Treatment Level 1[1]**	**Treatment Level 2 and 2N[1]**	**Treatment Level 3, 3N and 3ND[1]***
R	>35% Rock (>2mm), or Fractured or Deteriorated Bedrock: See Table 10-1A					>35% Rock (>2mm), or Fractured or Deteriorated Bedrock: See Table 10-1A	
1	Sand, Loamy Sand	Single Grain	0 (Structureless)	5-15	0.80	1.40	1.55
2	Sandy Loam, Loam, Silt Loam	PR (Prismatic) BK (Blocky) GR (Granular)	2 (Moderate) 3 (Strong)	16-25	0.60	1.0	1.1
2A	Sandy Loam, Loam, Silt Loam	PR, BK, GR Massive	1 (Weak) 0 (Structureless)	26-40	0.50	0.80	0.90
3	Sandy Clay Loam, Clay Loam, Silty Clay Loam	PR, BK, GR	2, 3	41-60	0.35	0.55	0.65
3A	Sandy Clay Loam, Clay Loam, Silty Clay Loam	PR, BK, GR Massive	1 0 (Structureless)	61-75	0.30	0.45	0.55
4	Sandy Clay, Clay, Silty Clay	PR, BK, GR	2, 3	76-90	0.20	0.30	0.30
4A[3]	Sandy Clay, Clay, Silty Clay	PR, BK, GR Massive	1 0 (Structureless)	91-120	0.15	0.20	0.20
5[3]	Soil Types 2-4A	Platy	1, 2, 3	121+	0.10	0.15	0.15

NOTE: Shaded areas require system design by a professional engineer.

1. Treatment levels are defined in Table 6-3.
2. The determination of long-term acceptance rates must also include an evaluation of soil consistence (identification of "cementation class"). Refer to the Rupture Resistance chart, Table 5-1, in the appendix. Moderately to Very strongly cemented soils will typically have characteristics of Type 3A or 4A soils. Long-term acceptance rates should be reduced to coincide with the expected permeabilities.
3. Soil types 4A and 5 will require the effluent to be dispersed via pressure distribution, with a minimum of two alternately dosed zones.

* Higher long-term acceptance rates for Treatment Level 3N may be allowed for OWTS required to have a discharge permit, if the capability of the design to achieve a higher long-term acceptance rate can be substantiated.

Table 10-1A[1] Design Criteria for Soils with High Rock Content (Type "R" Soils) [2,5,6]

Soil Matrix Type, Percent of Rock, Size of Rock, Excavation Difficulty, and Soil Permeability[3]				Required sand depth relative to the quality of effluent applied to the distribution cell[7]			
Soil Type[1]	**Soil Matrix Type, Percent of Rock, and Size of Rock[3,4]**	**Excavation Difficulty[1]**	**Soil Permeability; Minutes Per Inch (MPI)[1, 2]**	**Treatment Level 1[7, 8]**	**Treatment Level 2 and 2N[7]**	**Treatment Level 3 and 3N[7]**	**Treatment Level 3ND[7]**
FBR	In-situ Fractured Bedrock (FBR)	**Low Moderate High Very High Extremely High**	0 – >90 Usually rapid in highly fractured bedrock.	Minimum 3-foot deep Unlined Sand Filter	Minimum 2.5-foot deep Unlined Sand Filter	Minimum 2-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter
DBR	In-situ Deteriorated Bedrock (DBR)	**Low Moderate High**	41 – >90 Typically slower than the material textures	Minimum 2-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter	Sand media not required	Sand media not required
R-0	Soil Type[3] 1 (Sand and Loamy Sand) where more than 35% rock is greater than 2 mm in size.	**Low-** Tile spade with arm pressure.	0 to 15	Minimum 3-foot deep Unlined Sand Filter	Minimum 2.5-foot deep Unlined Sand Filter	Minimum 2-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter
R-1	Soil Type[3] 2 – 4, with 35 - 65% rock (>2mm); where 50% or more of the rock is less than 20 mm (3/4 inch) in size	**Low** - Tile spade with arm pressure, To **Moderate -** Tile spade with foot pressure.	16 to 90 Varies relative to soil type and cementation class.	Minimum 2-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter	Sand media not required	Sand media not required
R-2	Soil Type[3] 2 – 4, with more than 65 Rock (>2mm); **OR** contains 35 - 65% rock (>2mm), where 50% or more of rock is more than 20 mm (3/4 inch)	**Low** - Tile spade with arm pressure, To **Moderate** - Tile spade with foot pressure.	16 to 90 Varies relative to soil type and cementation class.	Minimum 3-foot deep Unlined Sand Filter	Minimum 2.5-foot deep Unlined Sand Filter	Minimum 2-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter

Table 10-1 A Continued

Soil Matrix Type, Percent of Rock, Size of Rock, Excavation Difficulty, and Soil Permeability[3]				Required sand depth relative to the quality of effluent applied to the distribution cell[7]			
Soil Type[1]	**Soil Matrix Type, Percent of Rock, and Size of Rock[3,4]**	**Excavation Difficulty[1]**	**Soil Permeability; Minutes Per Inch (MPI)[1, 2]**	**Treatment Level 1[7, 8]**	**Treatment Level 2 and 2N[7]**	**Treatment Level 3 and 3N[7]**	**Treatment Level 3ND[7]**
R-3	Soil Type[3] 2 – 4 (Loam, Clay Loam, Clay) with 65% or more of the rock is greater than >2mm **OR** Soil Type[3] 4A and 5 (Structureless Clay, or other Platy Structured Soil) with more than 35% rock	**High** – Tile spade is difficult, pick using over-the-head swing is easy. **Very High** – Pick with over-the-head swing is moderate to markedly difficult. **Extremely High** – Pick with over-the-head swing is nearly impossible.	Greater than 90 Soil Type[3] 2 – 4 (Loam, Clay Loam, Clay) More than 65% of the Rock is greater than 2mm in size. **OR** 50% or more of Rock is greater than 20 mm (3/4 inch) in size.	Minimum 3-foot deep Unlined Sand Filter	Minimum 2.5-foot deep Unlined Sand Filter	Minimum 2-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter

1) General guidance for Table 10-1A:

a) FBR: Fractured Bedrock – As this category encompasses a variety of site conditions where the percentage of rock, excavation difficulty, and permeability may vary substantially, all information must be used by the design engineer to determine the proper long term acceptance rate. Table 10-1B provides guidance for this determination.

b) DBR: Deteriorated Bedrock – As this category encompasses a variety of site conditions where the percentage of rock, excavation difficulty, and permeability may vary substantially, all information must be used by the design engineer to determine the proper long term acceptance rate. Table 10-1C provides criteria for this determination.

c) Soil Type R-0 is a limiting layer due to rapid permeability and a high rock content that provides limited surface area for adequate treatment.

d) Soil Type R-2 and R-3 are restrictive layers due to reduced permeability and/or a high rock content, each providing a limited surface area for adequate treatment. In many cases, the only difference between an R-2 and R-3 soil type will be the "excavation difficulty" and/or soil permeability.

e) An OWTS installed in "Type R Soils" must disperse effluent through an unlined sand filter, unless one of the following conditions are met:
   i) Treatment Level 3ND is attained and the requirements of 16.7 are met.
   ii) Site conditions are determined to be a soil Type DBR, or R-1, and Treatment Level 3 or 3N effluent is attained prior to dispersal to the soil treatment area.

f) "Excavation Difficulty" is provided in Table 10-1C

2) Provisions for determining the long-term acceptance rates for soils referenced in this chart are provided in section 15.3.C. The design of systems in type "R" soils must conform to the requirements of sections 15.3.B and C.

3) The "Soil Matrix Type, Percentage and Size of Rock" column references the soil types described in Table 10-1.

4) The percentage of rock may be determined by a gradation conducted per ASTM standard D6913-17 (2017. version), or a visual determination as per pgs. 7-1 through 7-9 of the NRCS Field Book, Version 3, 2021 reprint.

5) All systems installed in a type "R" soil must be designed by a professional engineer.

6) Pressure distribution is required for all "R" Soil Types and shall comply with the requirements of sections 14.5.C.

7) Minimum imported sand depths are provided in this table. NOTE: AN ADDITIONAL VERTICAL SEPARATION ABOVE A LIMITING LAYER OR GROUNDWATER CONDITION MAY BE NECESSARY TO MEET THE REQUIREMENTS OF TABLE 7-2.

8) Type "R" soil treatment systems that are designed per the criteria noted in the Treatment Level 1 column of this table do not require operation and maintenance oversight by BCPH.

Table 10-1B: Fractured Bedrock (FBR), LTAR Guidance

FBR: Distance between fractures*	Code	LTAR
<4 inches	1	Soil Type 1
4 to < 18 inches	2	Soil Type 1
18 to < 40 inches	3	Soil Type 2
40 to < 80 inches	4	Soil Type 3
≥ 80 inches	5	Soil Type 4

Table 10-1B is intended to provide guidance to the design engineer in determining the appropriate LTAR for the soil treatment area. Fractured bedrock formations typically consist of many variables, resulting in a wide range of permeabilities. The design engineer should take all factors into consideration before identifying a specific LTAR for each site. In certain instances, percolation tests may be necessary to more accurately identify the appropriate LTAR.

*Describes the dominant (average) horizontal spacing between vertical joints (geogenic cracks or seams) in the bedrock layer.

Reference: NRCS Field Book for Describing and Sampling Soils, Version 3.0; 2021 Reprint; Geology section, pg. 1-24. Note: The LTAR identified in this table is not included in the NRCS Field Book.

Table 10-1C: LTAR Determination for Deteriorated Bedrock (DBR)

Excavation Difficulty: The relative force or energy required to excavate the soil/rock.

Class	Criteria
Low	Excavation by tile spade requires arm pressure only; impact energy or foot pressure is not needed
Moderate	Excavation by tile spade requires impact energy or foot pressure; arm pressure is insufficient
High	Excavation by tile spade is difficult but easily done by pick using over-the-head swing
Very High	Excavation by pick with overhead swing is moderately to markedly difficult. Backhoe excavation by 50 – 80 hp tractor CAN be made in moderate time.
Extremely High	Excavation by pick is nearly impossible. Backhoe excavation by 50 – 80 hp tractor CANNOT be made in a reasonable time.

Note: Depending on the "Excavation Difficulty" in a DBR soil, the proposed LTAR must increase by the following: one soil type for "moderate", two soil types for "high", and three soil types for "very high" or "extremely high" excavation difficulty from the soil type of the observed soil texture; with a maximum soil type 5 LTAR. Soil types provided in Table 10-1.

Source: NRCS Field Book for Describing and Sampling Soils, Version 3.0; 2021 Reprint; Consistence section, pg. 2-69.

Table 10-2: Size Adjustment Factors for Methods of Application in Soil Treatment Areas Receiving Treatment Levels 1, 2, 2N, 3, 3N and 3ND Effluent

Type of Soil Treatment Area	Method of Effluent Application from Treatment Unit Preceding Soil Treatment Area		
	Gravity	**Dosed (Siphon or Pump)**	**Pressure Dosed**
Trench	1.0	0.9	0.8
Bed	1.2	1.1	1.0

Table 10-3: Size Adjustment Factors for Types of Distribution Media in Soil Treatment Areas for Receiving Treatment Level 1 Effluent

Type of Soil Treatment Area	Type of Distribution Media Used in Soil Treatment Area1		
	Category 1	Category 2	Category 3
	Rock or Tire Chips	Other Manufactured Media	Chambers or Enhanced Manufactured Media
Trench or Bed; Soil Types 1 - 4	1.0	0.9	0.7
Trench or Bed; Soil Types 4A - 5	1.2	1.1	1.0

1. All proprietary distribution products must receive acceptance and the applicable size adjustments through Division review per the applicable requirements of section 17.

Table 12-1: Gradation of Wicking Sand for Evapotranspiration Beds (Fine Sand)

Sieve Size	Percent Passing
4	100
40	50-70
200	<15

Appendix B: Reference and Source Document Organizations

AASHTO, American Association of State Highway and Transportation Officials

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Washington, DC 20004

Phone: 202-624-5800

Email: info@aashto.org

www.transportation.org

ANSI, American National Standards Institute

1899 L Street, NW, 11th Floor
Washington, DC 20036
Phone: 212.642.4980
www.ansi.org

ASTM, American Society for Testing and Materials

ASTM International
100 Barr Harbor Drive
PO Box C700
West Conshohocken, PA 19428-2959
Phone: 610.832.9500
Email: service@astm.org
www.astm.org

CPOW, Colorado Professionals in Onsite Wastewater

P.O. Box 918
Strasburg, CO 80136
Phone: 720-626-8989
www.cpow.net

CSA, Canadian Standards Association

CSA Group Testing and Certification Inc.
178 Rexdale Boulevard
Toronto, Ontario M9W 1R3
Canada
Phone: 800-463-6727
Email: sales@csagroup.org
www.csagroup.org

ETL, Electrical Testing Laboratories

The ETL Listed Mark is from Intertek Testing Services NA, Inc. (ITSNA)
545 East Algonquin Road, Suite F
Arlington Heights, Illinois 60005
Phone: 800 967 5352
www.intertek.com

IAPMO, International Association of Plumbing and Mechanical Officials

International Association of Plumbing and Mechanical Officials EGS (IAPMO)

4755 East Philadelphia Street

Ontario, CA 91761

Phone: 909-472-4100

Email: iapmo@iapmo.org

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NPCA, National Precast Concrete Association

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NSF, International

NSF International (NSF)

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