



ARAPAHOE COUNTY

ON-SITE WASTEWATER TREATMENT SYSTEM REGULATION

**PROMULGATED BY THE BOARD OF HEALTH
OF ARAPAHOE COUNTY**

Effective Date

May 7, 2026

**Pursuant to Title 25-10-101, et seq. Colorado Revised Statutes
and the Colorado Department of Public Health and
Environment Water Quality Control Commission On-Site
Wastewater Treatment System Regulation #43, 5 CCR 1002-43**

This document describes the rules and regulations for the use and permitting of On-Site Wastewater Treatment Systems in Arapahoe County. This Regulation should be used by anyone seeking a permit, designing a system, installing a system, repairing a system, or using a system.

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SECTION 1 AUTHORITY, SCOPE, AND APPLICABILITY

1.1 Authority

This Regulation is promulgated pursuant to the On-Site Wastewater Treatment System Act, C.R.S. §25-10-101, et seq.

1.2 Declaration

- A. In order to preserve the environment and protect the public health; to eliminate and control causes of disease, infection, and aerosol contamination; and to reduce and control the pollution of the air, land and water, it is declared to be in the public interest to establish standards, rules and regulations for On-Site Wastewater Treatment Systems (OWTS) in Arapahoe County, State of Colorado, and to provide the authority for the administration and enforcement of such minimum standards, rules and regulations.
- B. The Board of Health of Arapahoe County finds, determines and declares these Regulations and standards to be necessary for the preservation of the public health and welfare of the inhabitants of Arapahoe County, State of Colorado. These Regulations are adopted by the Board of Health of Arapahoe County on the 18th day of March, 2026 and shall become effective the 7th day of May, 2026.
- C. This Regulation will apply to On-Site Wastewater Treatment Systems as defined in C.R.S. §25-10-103(12).

1.3 Purpose

The purpose of these Regulations, as authorized by C.R.S. §25-10-101, et seq., is to provide guidance and establish minimum standards (including the enforcement thereof) for the location, construction, performance, installation, alteration and use of OWTS within Arapahoe County, State of Colorado, and concerning the application for and issuance of permits, the inspection, testing, and supervision of installed systems, the use, maintenance, and cleaning of systems and the disposal of waste material.

1.4 Severability

Should any section, paragraph, sentence, clause or phrase of these Regulations be declared unconstitutional or invalid for any reason, such portion shall be deemed separate and distinct and will not affect the validity of the remaining portion of these Regulations.

1.5 Effluent Discharged to Surface Waters

Any system that will discharge into State Waters must be designed by a professional engineer. The discharge permit application must be submitted for preliminary approval to Arapahoe County Public Health. Once approved by Arapahoe County Public Health, the application must be submitted to the Water Quality Control 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. Compliance with such a permit will be deemed full compliance with this Regulation.

1.6 Applicability

A. Regulation Coverage

- 1) An OWTS with design capacity less than or equal to 2,000 gallons per day (gpd) must comply with these Regulations and the OWTS Act. These Regulations govern all aspects of OWTS permits, performance, location, construction, alteration, installation, and use.
- 2) An OWTS with design capacity greater than 2,000 gallons per day (gpd) must comply with CDPHE Regulation 43, site location and design approval requirements 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.

B. Applicable Commission regulations include, but are not limited to, the following:

- 1) Regulation 22 - Site Location and Design Approval Regulations for Domestic Wastewater Treatment Works (5 CCR 1002-22); and associated policies.
- 2) Regulation 41 - The Basic Standards for Ground Water (5 CCR 1002-41).
- 3) Regulation 42 - Site-Specific Water Quality Classifications and Standards for Ground Water (5 CCR 1002-42).
- 4) Regulation 43 - On-Site Wastewater Treatment System (5 CCR 1002-43).
- 5) Regulation 61 - Colorado Discharge Permit System Regulations (5 CCR 1002-61).
- 6) Regulation 62 - Regulations for Effluent Limitations (5 CCR 1002-62).

C. The requirements for maintenance and standards of performance for systems greater than 2,000 gallons per day (gpd) shall be determined by the site application approval and discharge permit.

D. In the interest of facilitating communication of Department concerns regarding a design being reviewed by the Division, the Department can provide comments to the Division for consideration during the Division's review of the proposed design and discharge permit application. Under such a coordinated process, the Division retains final authority for approval or denial of each domestic wastewater treatment works that is regulated under the site location approval and Colorado Discharge Permit System Regulations. Prior to approval or denial of each OWTS domestic wastewater treatment works, the Division must acknowledge and consider local OWTS regulations when they are more stringent and restrictive than in Regulation 43.

1.7 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 June 15, 2025, and do not include later amendments to the incorporated material.

SECTION 2 DEFINITIONS

Absorption System - a leaching field and adjacent soils or other system for the treatment of sewage in an On-Site Wastewater Treatment System by means of absorption into the ground. See Soil Treatment Area.

Accessible - easily reached, attained or entered by the necessary equipment or maintenance provider.

Accessory Dwelling Unit - A subordinate dwelling unit added to, created within, or detached from a single-family structure with a separate entrance that provides basic requirements for living, sleeping, eating, cooking, and sanitation. For the purposes of OWTS design and permitting, an ADU is considered a dwelling unit. The total design flow shall be based on the combined number of bedrooms and total occupancy potential of both the principal dwelling and any ADU served by the system.

Alteration - (Alter) to change in character or composition of the OWTS. A modification to something different in a small yet significant way.

Act or OWTS Act - the On-Site Wastewater Treatment Systems Act, C.R.S. 25-10-101, et seq.

Applicant - a person who submits an application for a permit for an On-Site Wastewater Treatment System.

Auxiliary Building - a non-residential structure, located on the same lot or parcel as the principal structure, and for an incidental use to the principal structure.

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.

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.

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.

Bedroom - a room with an egress window, a closet, and/or is intended for sleeping purposes; or as defined by the Board of Health.

Board of Health - the Board of Health of Arapahoe County.

Biochemical Oxygen Demand, Five-Day (BOD₅) - the quantitative measure of the amount of oxygen consumed by bacteria while stabilizing, digesting, or treating biodegradable organic matter under aerobic conditions over a five (5) day incubation period; expressed in milligrams per liter (mg/L).

Biochemical Oxygen Demand, Carbonaceous Five Day (CBOD₅) - quantitative measure of the amount of oxygen consumed by bacteria while stabilizing, digesting, or treating the organic matter under aerobic conditions over a five (5) day incubation period while in the presence of a chemical inhibitor to block nitrification; expressed in milligrams per liter (mg/L).

Building Sewer - piping that conveys wastewater to the first system component or the sewer main.

Carbonaceous Biochemical Oxygen Demand - See Biochemical Oxygen Demand, Carbonaceous

Cementation – used to describe the rupture resistance of a soil unit; additional insight to cementation can be found in the Natural Resources Conservation Service Field Book for Describing and Sampling Soils, National Soils Survey Center USDA - NRCS, Sept. 2012 (NRCS Field Book).

Cemented Sands - Soil, having a sand, loamy sand or sandy loam texture having a cementation class of NC, EW, VW, W, M, ST, VS or I as described in the table on page 2-63 of the Natural Resources Conservation Service Field Book for Describing and Sampling Soils, National Soils Survey Center NRCS-USDA, 2012 (NRCS Field Book).

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.

Cherry Creek Basin - the basin consisting of the drainage basin of Cherry Creek, as defined in C.R.S. §25-8.5-104.

Cherry Creek Basin Water Quality Authority - a quasi-municipal corporation and political subdivision of the state, created pursuant to C.R.S. §25-8.5-103.

Cherry Creek Reservoir Control Regulation - Water Quality Control Commission Regulation Number 72 (5 CCR 1002-72), promulgated by the Colorado Water Quality Control Commission pursuant to C.R.S. §25-8-202 (1) (c) and C.R.S. §25-8-205.

Chamber - an arch-shaped structure providing an open-bottom soil interface with permeable sidewalls used for distribution of effluent in a soil absorption system.

Cistern - an enclosed unpressurized reservoir or tank for storing water as part of a potable water supply system.

Cleaning - the act of removing septage or other wastes from a wastewater treatment system component or grease/waste from a grease interceptor.

CDPHE - the Colorado Department of Public Health and Environment created by C.R.S. §25-1-102.

Colorado Plumbing Code - Rules and Regulations of the Colorado State Plumbing Board (3 CCR 720-1).

Commission - the Water Quality Control Commission created by C.R.S. §25-8-201.

Competent Technician - a person who has the appropriate expertise and is able to design OWTS and/or 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 8.12.

Component - a subsection of an On-Site Wastewater Treatment System; a component may include multiple devices.

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.

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 consistence 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 Natural Resources Conservation Service Field Book for Describing and Sampling Soils, National Soils Survey Center USDA - NRCS, Sept. 2012 (NRCS Field Book)

Crest –the highest point on the side of a dry gulch or cut bank.

Cut-bank - a nearly vertical slope caused by erosion or construction that has exposed historic soil strata.

Dawson Arkose - the Dawson Arkose formation of the Front Range of Colorado within the hydrogeological area known as the “Denver Basin”. Although cementation of the Dawson Arkose can vary from non-cemented to indurated, in some locations, the Dawson Arkose has the characteristics of Type 3A and 4A soils, from Table 10 in Appendix A. A moist sample of Dawson Arkose will typically exhibit cohesive behavior which allows the Dawson Arkose to form into a mass, which has low to high compressive strength when dried.

Deep Gravel System - a soil treatment area for repairs only where the trenches utilize a depth of gravel greater than six (6) inches below the distribution pipe and sidewall area is allowed according to a formula specified in this Regulation.

Deficiency - See Malfunction.

Department - as used in these Regulations, means the Arapahoe County Public Health.

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.

Design Capacity - See Flow, Design

Design Flow - See Flow, Design

Designer, On-Site 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.

Disinfection - the process of destroying pathogenic microorganisms in sewage through the application of ultraviolet light, chlorination, or ozonation.

Distribution - the process of dispersing wastewater or effluent to one (1) or more components, devices, or throughout a soil treatment area.

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.

Division - the division of administration of the department of which the Water Quality Control Division is a part.

Domestic Wastewater - See Wastewater, domestic

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 to 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.R.S. §25-8-103 (5)

Dosing - a high-rate periodic discharge into a soil treatment area.

Dosing, Demand - a configuration in which a specific volume of effluent is delivered to a component based upon patterns of wastewater generation from the source.

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.

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.

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, accomplished by means of atmospheric pressure and the suction created by the weight of the liquid in the conveying pipe.

Dosing Tank - a tank, compartment, or basin that provides 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.

Drainfield - See Soil treatment area

Drop Box - a device used for sequential distribution of effluent by gravity flow to a lateral of a soil treatment area.

Dry Gulch - See Gulch, dry

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.

Effective Size - the size of granular media such that 10 percent (10%) by weight of the media is finer than the size specified.

Effluent - the liquid flowing out of a component or device of an On-Site Wastewater Treatment System.

Effluent Filter - a removable, cleanable (or disposable) device installed on the outlet piping of a septic tank for the purpose of retaining solids larger than a specific size 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.

Effluent Pipe - non-perforated pipe that conveys effluent from one On-Site Wastewater Treatment System component to the next.

Effluent Pump – a pump designed to handle wastewater with minimal solids and less than ¾-inch in size. Typically, this type of pump is used to move wastewater from the septic tank to the soil treatment area when the system cannot use gravity. These pumps are not designed to handle movement of wastewater to the septic tank, due to the higher solids content.

Ejector Pump – a pump specifically designed to move wastewater and soft solids from a lower level to a higher sewer or septic line. Typically, an ejector pump can pass up to a 2-inch solid and has a lower head than a grinder pump.

Environmental Health Specialist (EHS) - a person trained in physical, biological, or sanitary science to carry out educational and inspectional duties in the field of environmental health.

Evapotranspiration/Absorption System - an unlined On-Site Wastewater Treatment component that uses evaporation, transpiration, and absorption for dispersal of effluent.

Evapotranspiration System - an On-Site Wastewater Treatment component with a continuous, impermeable liner that uses evapotranspiration and transpiration for dispersal of effluent.

Failure - a condition existing within any component of an OWTS which 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 ground water, or which results in the back-up of sewage into the building sewer. Other conditions within an OWTS component that are deemed by the Department to be a threat to public health and/or safety may also be deemed a failure.

Field Performance Testing - data gathering on a system in actual use that is being proposed for Division acceptance.

Floodplain (100-year) - an area adjacent to a stream which is subject to flooding as the result of the occurrence of a 100 year flood, and is so adverse to past, current or foreseeable construction or land use as to constitute a significant hazard to public or environmental health and safety or to property or is designated by the Federal Emergency Management Agency (FEMA) or National Flood Insurance Program (NFIP). In the absence of FEMA/NFIP maps, a professional engineer must certify the floodplain elevations.

Floodway - the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one (1) foot or as designated by the Federal Emergency Management Agency or National Flood Insurance Program. In the absence of FEMA/NFIP maps, a professional engineer must certify the floodway elevation and location.

Flow, Daily - the measured volume of wastewater generated from a facility in a twenty-four (24) hour period expressed as gallons per day.

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.

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.

Flow Equalizer - an adjustment device to evenly distribute flow between outlets in a distribution box or other device that may be out of level.

Grease Interceptor Tank - a watertight device located outside a facility designed to intercept, congeal, and retain or remove fats, oils, and grease from sources such as commercial food-service that will generate high levels of fats, oils and greases.

Grinder Pump – a sewage pump designed to handle larger solids. The cutting blades macerate the wastewater, and it has a higher head than an ejector pump. See Section 12.2.B.5 for specific requirements when using this type of pump.

Ground Water - that part of the subsurface water that is at or below the saturated zone.

Groundwater Condition - 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

Ground Water Surface - the uppermost limit of an unconfined aquifer at atmospheric pressure.

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.

Health Officer - the chief administrative and executive officer of the Department, or the appointed health officer of the Board of Health. Health officer includes a director of the Department.

Higher-Level Treatment - designated treatment levels other than treatment level 1 (see Table 4).

Holding Tank - See Vault.

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, the other at the interface of the fill sand and in-situ soil.

Inspection Port - an access point in a system component that enables inspection, operation and/or maintenance.

Invert - elevation of the bottom of the inside pipe wall or fitting.

Lateral - a pipe, chamber, or other component used to transport and distribute effluent.

Leach Field - See Soil Treatment Area

Limiting Layer - a horizon or condition in the soil profile that exhibits a limited capability for treatment, but will readily accept the effluent. Generally speaking, this includes fractured bedrock and type R-0 soils (see Table 11).

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 thirty (30) mil.

Linear Loading Rate - the amount of effluent applied per linear foot along the contour (gpd/linear ft.).

Long-Term Acceptance Rate - (LTAR) –a 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 (gal/ ft²/day).

Malfunction - the condition in which a component is not performing as designed or installed and is in need of repair or modification in order to function as originally intended.

Manufactured Media - See Media, other manufactured and Media, enhanced manufactured

Media - solid material that can be described by shape, dimensions, surface area, void space, and application.

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.

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.

Media, Treatment - non-or slowly-degradable media used for physical, chemical, and/or biological treatment in an On-Site Wastewater Treatment System component.

Mound - a soil treatment area whereby the infiltrative surface is at or above original grade at any point.

Nitrogen Reduction - a minimum 50 percent (50%) reduction of influent nitrogen strength which is the minimum objective of NSF/ANSI Standard 245 - Wastewater Treatment Systems - Nitrogen Reduction (2023 version).

NDDS - a Non-Pressurized Drip Dispersal System.

On-Site Wastewater Treatment System - or Onsite Wastewater Treatment System or **OWTS** and, where the context so indicates, the term **System** - means 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.

Operating Permit - a renewable permit that addresses specific operation and/or maintenance requirements for an existing OWTS that includes mechanical or electrical treatment components, or a system that is designed to meet specific wastewater treatment levels as set forth in these Regulations.

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 (1) inch of water is absorbed. The rate is expressed in minutes per inch.

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.

Permeability - the property of a material which permits movement of water through the material.

Permit - a permit for the construction or alteration, installation, and use or for the repair of an On-Site Wastewater Treatment System.

Person - an individual, partnership, firm, corporation, association, or other legal entity and also the state, any political subdivision thereof, or other governmental entity.

Pressure Distribution - See Dosing, pressure

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.

- A. **Pit Privy** - privy over an unlined excavation.
- B. **Vault Privy** - privy over a vault.

Professional Engineer - an engineer licensed in Colorado, in accordance with C.R.S. Section 12-120-202(7) and practicing within their areas of expertise, consistent with 4 CCR 730-1.

Professional Geologist - a person who is a graduate of an institution of higher education which is accredited by a regional or national accrediting agency, with a minimum of thirty semester (forty-five 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 (2) years of graduate work.
C.R.S. §23-41-208.

Proprietary Product - a manufactured component or other product that is produced by a private person. It may be protected by patent, trademark or copyright.

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.

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 or the department.

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.

Regulations - this On-site Wastewater Regulation, adopted by the Board of Health of Arapahoe County.

Regulation 43 - the CDPHE Water Quality Control Commission On-Site Wastewater Treatment System Regulation 43, 5 CCR 1002-43, Effective June 15, 2025.

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.

Repair - restoration of functionality and/or treatment by reconstruction, relocation, or replacement of an On-Site Wastewater Treatment System or any component thereof in order to allow the system to function as intended.

Replacement System - See Repair.

Restrictive Layer - 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.

Riser - a watertight vertical cylinder and lid allowing access to an OWTS component for inspection, cleaning, maintenance, or sampling.

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.

Rupture Resistance – the force required to break a soil unit; additional insight to rupture resistance can be found in the Natural Resources Conservation Service Field Book for Describing and Sampling Soils, National Soils Survey Center USDA - NRCS, Sept. 2012 (NRCS Field Book).

Sand Filter - an engineer designed OWTS that utilizes a layer of specified sand as filter and treatment media and incorporates pressure distribution.

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.

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.

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.

Sensitive Areas - locations that are particularly vulnerable to contamination. This vulnerability may result from natural geologic features, lot sizes, or areas that have been historically impacted by OWTS or other human-caused contamination.

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.

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.

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.

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.

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.

Sewage Pump – a pump rated to handle sewage. This includes grinder pumps, ejector pumps, and effluent pumps. The specific use determines which type of pump to install. See Effluent pump, Ejector pump, and Grinder pump.

Sewage Treatment Works - has the same meaning as “domestic wastewater treatment works” under C.R.S. §25-8-103.

Site Evaluation - a comprehensive analysis of soil and site conditions for an OWTS.

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.

Slit Trench Latrine - a temporary shallow trench for use as disposal of non-water-carried human waste.

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.

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 (1) inch of water is absorbed or as an application rate of gallons per square foot per day.

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.

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.

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 On-Site Wastewater Treatment System.

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).

Soil Texture - proportion by weight of sand, silt, and clay in a soil.

Soil Treatment Area - the physical location where final treatment and dispersal of effluent occurs. Soil treatment area includes drainfields, mounds, and drip fields.

Soil Treatment Area, Alternating - final treatment and distribution component that is composed of two soil treatment areas that are independently dosed.

Soil Treatment Area, Sequencing - a soil treatment area having more than two (2) sections that are dosed on a frequent rotating basis.

State Waters - has the meaning set forth under C.R.S. §25-8-103.

Strength, Wastewater - the concentration of constituents of wastewater or effluent; usually expressed in mg/L.

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, and has the required vertical thickness below the infiltrative surface and above a limiting layer.

Sump Pump – a pump designed to move storm water, groundwater, and rainwater. This type of pump is not rated for sewage.

System - See On-Site Wastewater Treatment System

Systems Cleaner - a person licensed by the Department and engaged in and who holds themselves out as a specialist in the cleaning and pumping of On-Site Wastewater Treatment Systems and removal of the residues deposited in the operation thereof.

Systems Contractor - a person licensed by the Department and engaged in and who holds themselves out as a specialist in the installation, renovation, and repair of On-Site Wastewater Treatment Systems.

Systems Maintenance Provider - a person engaged in and who holds themselves out as a specialist in routine or periodic actions taken to ensure that the On-site Wastewater Treatment System is functioning as intended, and/or that the On-site Wastewater Treatment System is meeting performance requirements.

Tiny Home - a structure (a non-recreational vehicle) that has only one bedroom and has 400 square feet or less of livable space, including lofts. In this instance, the OWTS may be sized for only one bedroom.

Total Suspended Solids - measure of all suspended solids in a liquid; typically expressed in mg/L.

Transfer of Title - change of ownership of a property.

Transfer of Title Inspector - a person engaged in and who holds themselves out as a specialist in conducting evaluations and observations of an existing On-site Wastewater Treatment System serving a structure that is proposed for property transfer, to assess if the system is functioning as intended.

Treatment Level - defined concentrations of pollutants to be achieved by a component or series of components of an OWTS.

Treatment Media - See Media, treatment

Treatment Unit - a component or series of components where solids or pollutants are removed from wastewater or effluent from a preceding component.

Trench - 1) below-grade soil treatment area consisting of a shallow excavation with a width of three (3) feet or less containing distribution media and one (1) lateral; and 2) excavation for placement of piping or installation of electrical wire or conduit.

Uniformity Coefficient - a value which is the ratio of D60 to D10 where D60 is the soil diameter of which 60 percent (60%) of the soil weight is finer and D10 is the corresponding value at 10 percent (10%) finer. (A soil having a uniformity coefficient smaller than four (4) would be considered "uniform" for purposes of this Regulation.).

Use Permit - a permit authorizing the use of an OWTS as more fully set forth in Section 4 herein.

Use Permit, Higher-Level Treatment - a permit authorizing the use of a Higher-Level Treatment system as more fully set forth in Section 5 herein.

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 two thousand gallons per day at full occupancy, the vault would be considered a domestic wastewater treatment works. Vaults are On-Site Wastewater Treatment Systems.

Visual and Tactile Evaluation of Soil - the determination of the properties of soil by standardized tests of appearance and manipulation in the hand.

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.

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 which are discharged from a dwelling, building or other structure.

Wastewater, High Strength - 1) wastewater from a structure having BOD₅ greater than 300 mg/L; and/or 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 BOD₅ 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.

Wastewater Pond - a designed pond which receives exclusively domestic wastewater from a septic tank and which provides an additional degree of treatment.

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.

Water Quality Control Commission - See Commission

Water Quality Control Division - See Division

Wetland, Constructed - See rock-plant filter.

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.

SECTION 3 NEW, REPAIR, EXPANSION, AND PRODUCT DEVELOPMENT PERMITS, AND INSPECTIONS

3.1 Permit Required

No person or persons shall install, alter, repair or use an On-Site Wastewater Treatment System (OWTS) within Arapahoe County, State of Colorado, unless such person holds a valid permit, issued by the Department in the name of the property owner for the specific construction, remodeling, installation, or use, proposed at the location described on the permit. A permit must be required for a change of use, or the expanded use of an OWTS where it has been determined that the existing OWTS is not sized 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.

3.2 Fees

- A. A non-refundable fee shall be required of applicants for accepting and processing an application for a permit to construct and install any new system, for the repair or alteration of any existing system, or the use of any system as set forth in Sections 4 and 5, herein. The fee shall be payable to the Department at the time the application is made to the Department.
- B. The Board of Health shall establish the amount of fees for each type of permit by resolution, as amended from time to time, which shall be available upon request. Fees are established pursuant to the provisions of the Act.
- C. The Board of Health may make provision for the waiver of any fee required for an OWTS.
- D. Surcharge - The Department must collect a surcharge fee for each permit issued for a new, repaired, or upgraded OWTS and transmit funds to the Colorado Department of Public Health and Environment (CDPHE) with a portion of the fee retained to cover local administrative costs and the remainder must be transmitted to CDPHE for use in funding the state's OWTS program. The surcharge fee is identified in Regulation 5 CCR 1002-102, Section 102.5(3)(d).

3.3 Permit Application Requirements and Procedures Information Required

Minimum Permit Application Requirements:

- A. Owner name and contact information;
- B. Property address;
- C. Property legal description;
- D. Type of permit;
- E. Report from Site and Soil Evaluation (Section 8.1);
- F. System design with a legible, accurate site plan which shows pertinent physical features on subject property, and on adjacent properties, as noted in Table 6 in Appendix A;
- G. Other information, data, plans, specifications and tests as required by the Department;
- H. When specific evidence suggests undesirable soil conditions exist, additional hydrological, geological, engineering or other information provided by a professional engineer or geologist may be required to be submitted by the applicant. This requirement shall not prejudice the right of the Department to develop its own information from its own source at its own expense.

3.4 Permit Expiration

Permits to install and construct an OWTS shall expire at the end of 12 months from date of issue unless the permit is extended to a fixed date upon written request by the applicant and at the discretion of the Department.

3.5 Changes in Condition after Permit Issuance

- A. Any changes or relocation of proposed structures or additions to the site and soil evaluation report without approval by the Department may void the permit.
- B. No change of design of an OWTS after the permit has been issued shall be made unless authorized in writing by the Department.

3.6 Denial of a Permit

- A. Denials of permits shall be made in writing by the Department stating reasons for the denial and requirements for reconsideration of the application.
- B. The Department may refuse to issue a permit for the construction of an OWTS where a sewage treatment works is available within 400 feet of the nearest property line and connection can be made thereto. In order for the Department to issue a permit, the applicant shall provide a letter from the sewer district, municipality or county having jurisdiction, stating whether it is permissible for the Department to issue a permit for installation, alteration or repair of an OWTS.
- C. Any applicant who is denied a construction permit, or any person who is adversely affected by the denial or issuance of a permit, within 30 days following such denial, may request a hearing before the Board of Health.
- D. Upon a finding, by the Board of Health after the review of a denial of a permit as provided by C.R.S. §25-10-111, that an applicant for OWTS has demonstrated that said system will be constructed and used in such a manner as to comply with the declaration and intent of these Regulations and all applicable state and local rules and regulations and required terms and conditions in any permit issued pursuant thereto, a permit may be issued therefor.

3.7 Disclaimer

The issuance of a permit and the specification of terms and conditions therein shall not constitute an assumption of liability, nor create a presumption that the Department or its employees are liable for the failure or malfunction of any system, nor act as certification of the equipment used in the system or any component thereof, nor certify that the system for which the permit was issued will ensure continuous compliance with the provisions of the OWTS Act, rules and regulations adopted thereunder, or any terms and conditions of a permit.

3.8 Primary Enforcement Responsibility

- A. The primary responsibility for enforcement of the provisions of the OWTS Act, Regulation 43 and these Regulations will lie with the Board of Health.
- B. In the event that the Board of Health fails to administer and enforce the provisions of said Section and the regulations adopted under the OWTS Act, the Division may assume such functions of the Department or Board of Health as may be necessary to protect the public health and environment. C.R.S. §25-10-110.

3.9 Repair Permits

- A. Application to repair and for emergency use of a malfunctioning system shall be made within two (2) business days by any owner or occupant after receiving notice from the Department that the system serving their property is not functioning in compliance with these Regulations. The date of expiration for repair permits shall not extend beyond 30 days from the date of issuance and shall not be renewed unless such person can show good cause in writing to the Department and can demonstrate that no hazard or nuisance exists on the property.
- B. Concurrently with the issuance of a repair permit, the Department may issue an emergency use permit authorizing continued use of a malfunctioning system on an emergency basis for a period not to exceed the period stated in the repair permit. Such an emergency use permit may be extended, for good cause shown, in the event repairs may not be completed in the period stated in the repair permit through no fault of the owner or occupant and only if the owner or occupant will continue to make repairs to the system.
- C. A Major Repair Permit shall be required for the following types of repairs or alterations:
 - 1) Replacement of an existing soil treatment area with or without the addition of a lift station.
 - 2) Addition of a soil treatment area with or without the addition of a lift station.
 - 3) Expansion of an existing soil treatment area with or without the addition of a lift station.
 - 4) Implementation of a soil-based remediation system.
- D. A Minor Repair Permit shall be required for the following types of repairs or alterations:
 - 1) Addition or replacement of a septic tank.
 - 2) Implementation of a septic tank-based remediation system.
 - 3) Addition of a lift station or pump and associated piping, where a lift station, pump or piping were not part of the original OWTS system.

3.10 Variance Procedure

A. Request for Variance

- 1) An applicant for a permit to construct a new OWTS or to repair or expand an existing OWTS may request a variance from any provision of this Regulation, except as prohibited in Section 3.10.C.

B. Variance requests must be accompanied by:

- 1) Site-specific request identifying the specific criteria from which a variance is being requested;
- 2) Technical justification by a professional engineer or professional geologist, which indicates the specific conditions which exist and/or the measures which will be taken that support a finding that the variance will result in no greater risk than that associated with compliance with the requirements of the Regulation. Examples of conditions which exist, or measures which might be taken, include but are not limited to the following: evidence of a natural or manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested; placement of a manmade physical barrier to the movement of effluent to or toward the feature from which the variance is requested; soil replacement with sand filter media to reduce the infiltration rate of the effluent such that the travel time of the effluent from the soil treatment area to the physical feature is no less than the travel time through the native soils at the prescribed setback, and Higher-Level Treatment;
- 3) A discussion of alternatives considered in lieu of the requested variance;
- 4) Technical documentation for selected alternative, which may include a testing program, which confirms that the variance does not increase the risk to public health and to the environment;
- 5) A statement of the hardship that creates the necessity for the variance; and
- 6) The Department has the authority to impose site-specific requirements and conditions on any variance granted.

C. Prohibitions on the Granting of Variance Requests

- 1) No variance shall be issued where the property can accommodate a conforming OWTS.
- 2) No variance shall be issued to mitigate an error in construction involving any element of property improvements.
- 3) No variance shall be allowed solely for economic gain.

- 4) No variance shall be issued if it will result in a setback reduction to an offsite physical feature that does not conform to the minimum setbacks defined in Table 6 in Appendix A of this Regulation without the Board of Health considering any concerns of the owner of property containing said feature. Property lines are considered offsite features. The owner of the property containing said feature must be notified of the time and date of the hearing.
- 5) No variance shall be issued if it reduces the separation to ground water or bedrock based on the level of treatment in Table 7 in Appendix A.
- 6) No variance from the horizontal setback from a well shall be issued unless it also meets the variance requirements of the Board of Examiners of Water Well Construction and Pump Installation Contractors.

D. Variances for Repair of Failing Systems

- 1) When a proposed variance for a system repair or upgrade would result in encroachment on minimum distances to physical features on neighboring properties required by the Department, the requirements in 3.10.B and 3.10.C.4 above must be followed.
- 2) For the repair of or upgrade to an existing system where the existing system does not meet the required separation distances and where 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.

E. Burden of Proof

The applicant has the burden of proof to demonstrate that the variance is justified and will pose no greater risk to public health and the environment than would a system meeting this Regulation.

F. Public Hearing

Upon receipt of the request for a variance and the required information in Section 3.10.B, the Department shall schedule a public hearing before the Board of Health. The Department will issue a Public Notice of the Hearing and send notice via certified mail, with a minimum 20-day reply time from the date of mailing, to all adjacent property owners. The applicant and the applicant's engineer may attend the hearing and present testimony regarding the request for a variance. Applicants may be represented by legal counsel at any public hearing or meeting.

G. Outcome of the Variance Proceeding

- 1) Following the Public Hearing, the Board of Health shall vote on the proposed variance. Approval of the variance shall require a majority vote of the Board of Health. The applicant will receive written notification of the decision regarding the request for a variance.
- 2) The Board of Health may impose requirements and conditions on any variance granted, and the notice of an approval of the variance will include any conditions of the approval. The notice of a denial of a variance shall include the basis for the denial.
- 3) Variances and any conditions thereof shall be recorded on the deed to the property and any expenses associated with that recording shall be the responsibility of the party obtaining the variance.

H. Findings on Appeal

- 1) A request for review must be made within 60 days after denial of an application by the Department.
- 2) The applicant must bear the burden of supplying the Board of Health with sufficient evidence to document that the denied system will be constructed and used in such a manner that will result in no greater risk than that associated with compliance with the requirements of Regulation 43, comply with the declaration and intent of this Regulation, and comply with all applicable state and local regulations and required terms and conditions in any permit.
- 3) Such review must be conducted pursuant to the requirements of C.R.S. §24-4-105.

3.11 Site Inspection Following Permit Application and Prior to Permit Issuance

After receiving an application as required in Section 3.3 for an OWTS permit, the application shall be reviewed by the Department and an inspection of the premises (site visit), unless previously made, shall be made by the Department. A determination may be made by the Department as to the suitability of the site and of the proposed design based upon observation of a test pit as required in Section 8.5 to verify depth of the ground water table, suitable soil, depth to bedrock, in addition to ground slope and pertinent physical features.

3.12 Department Review and Determination

The Department shall review each application along with test results and other required information. The Department will determine if the proposed system design is in compliance with the Act, and these Regulations adopted thereunder after which a permit may be issued.

3.13 Final Inspection-Non-Engineered (Conventional System)

- A. It is the responsibility of the system contractor to notify the Department when construction, installation, alteration, or repair has been sufficiently completed to allow inspection of the conventional system before the system is placed in use.
- B. Inspection of the system by the Department shall be made after being notified that the conventional system is ready for inspection.
- C. Final inspection and approval of conventional OWTS shall be made by the Department before fill is placed to cover any part of the system to confirm that it was installed according to the permit requirements.
- D. The Department will determine if work has been performed in accordance with the permit requirements and will determine if the system complies with the Act, and these Regulations adopted thereunder.
- E. A scaled record drawing showing all components of the OWTS including their location from known and findable points, dimensions, depths, sizes, manufacturers' names and models as available, and other information relative to locating and maintaining the OWTS components, shall be prepared and submitted to the Department.
- F. If the property line is within 15 feet of any system component, the line must be marked before final inspection by the Department.
- G. At the completion of the installation of the OWTS, the designer shall submit to the Department a letter stating that the system has been installed in conformance with the plans and specifications approved by the Department and a scaled record drawing of the system as required in Section 3.13.E. The letter shall include a list of all inspections made and whether those inspections were satisfactory. This letter must also include any modifications to the permitted and approved design, general observations noted during the inspection(s), and the corresponding dates of all inspections.
 - 1) 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.

3.14 Final Inspection-Engineered System

- A. It is the responsibility of the systems contractor to notify the professional engineer and the Department when construction, installation, alteration, or repair has been sufficiently completed to allow inspection of the engineered system before the system is placed in use. The system installer shall notify the professional engineer to make all specified inspections during the course of construction.

- B. Final inspection and approval of all engineered OWTS shall be made by the professional engineer before fill is placed to cover any part of the system.
- C. Final inspection and approval of the engineered OWTS shall be made by the Department before fill is placed to cover any part of the system confirming that it was installed according to the permit requirements.
- D. Engineered systems shall be inspected by or under the supervision of the professional engineer responsible for the design. If the professional engineer is not available, another Registered Professional Engineer may provide the inspections and will become the professional engineer of record and be responsible for the system.
- E. A scaled record drawing showing all components of the OWTS including their location from known and findable points, dimensions, depths, sizes, manufacturers' names and models as available, and other information relative to locating and maintaining the OWTS components, shall be prepared and submitted to the Department.
- F. The Department will determine if work has been performed in accordance with the permit requirements and will determine if the system complies with the Act and these Regulations adopted thereunder.
- G. If the property line is within 15 feet of any system component, the line must be marked before final inspection by the Department.
- H. At the completion of the installation of an engineered system, the engineer shall submit to the Department a letter stating that the system has been installed in conformance with the plans and specifications approved by the Department and a scaled record drawing of the system as required in Section 3.14.E. The engineer's letter shall include a list of all inspections made and whether those inspections were satisfactory. This letter must include any modifications to the permitted and approved design, general observations noted during the inspection(s), and the corresponding dates of all inspections.
- I. 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.

3.15 Authorization to Enter Upon Property

For the purpose of inspection and enforcing applicable rules and regulations and the terms and conditions of any permit issued in these Regulations, authorized members of the Department may enter upon private property at reasonable times and upon reasonable notice for the purpose of determining whether operating OWTS are functioning in compliance with the Act, Regulation 43, with these Regulations and with the terms and conditions of any permit issued thereunder, as well as to inspect and conduct tests in evaluating any permit application. The owner or occupant of the property having an OWTS shall permit authorized members of the

Department access to the property to conduct required tests, take samples, monitor compliance, and make inspections.

3.16 Product Development Permit

- A. For products that have not received Division acceptance under Section 16.4, the manufacturer may apply to the Department for a product development permit. Requirements for proprietary treatment product acceptance are located in Section 16.4 of this regulation.
- B. For products or types of systems which have not been otherwise accepted by the Division pursuant to Section 16.4, the local board of health may approve an application for a product development permit only if the system has been designed by a professional engineer, and only if the application meets all requirements of Regulation 43 Section 43.4.I, items 3 through 11.
- C. Before a product development permit is issued by the Department, the Division must determine that the product qualifies for testing under the product development evaluation based on information submitted to the Division.
 - 1) Applicant must provide evidence of nationally accepted third-party testing of the product to be evaluated; or
 - 2) Provide test data from multiple single-family homes under normal working conditions that meet the following criteria:
 - a) Test data must be provided from a minimum of four (4) sites.
 - b) Each system must be tested over a period of at least one (1) year.
 - c) Each system must be sampled at least three (3) times during the year with at least one (1) sample obtained during cold weather conditions.
 - d) Laboratory results for all parameters for which acceptance is being requested must be submitted.
 - e) The Board of Health must not arbitrarily deny any person the right to consideration of an application for such a system and must apply reasonable performance standards in determining whether to approve such an application; C.R.S. §25-10-108 (2).
- D. A completed application for a product development permit must be submitted to the Department at least 30 days in advance of installation of the product.
- E. An application for a product development permit must include the following:

- 1) 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;
 - 2) A description of the product under development including performance goals;
 - 3) Documentation signed by the owner of the proposed product development site allowing access to the Department and Division for inspection of the site; and
 - 4) Design documents as required in Section 8.10 of this Regulation.
- F. The Department may stipulate additional requirements for the product development permit necessary to ensure that the system performs as intended.
- G. A product development permit is a site-specific permit. Product development testing at multiple sites requires a product development permit for each site.
- H. During the term of the product development permit, all data collected is to be submitted to the Division and the Department.
- I. The Department may revoke or amend a product development permit if the continued operation or presence of the product under development:
- 1) Presents a risk to the public health or environment;
 - 2) Causes adverse effects on the proper function of the OWTS on the site;
 - 3) Leaks or discharges effluent on the surface of the ground; or
 - 4) If the developer of the product fails to comply with any requirements stipulated on the permit by the Department or the Division.
- J. If the product development permit is revoked, the product developer must install a replacement OWTS in compliance with this Regulation and within the time frame established by the Department.
- K. Once the system is installed and approved, the Department must supply the Division with a copy of the completed OWTS permit.

SECTION 4 TRANSFER OF TITLE AND USE PERMITS

4.1 Initial Issuance of Use Permit

As of the effective date of this Regulation, systems that have never completed the permitting or approval process established by the Department shall be deemed to be operating without a valid Use Permit, until a Use Permit has been issued as more fully set forth in this Section 4.

4.2 Events Requiring a Transfer of Title or Use Permit

- A. The owner or seller of a property served by an OWTS shall obtain an inspection report and the issuance of a Use Permit, as applicable, dated within 12 months prior to the occurrence of one (1) or more of the following events:
 - 1) The sale of the property, as more fully defined in Section 4.3, herein;
 - 2) A remodel that includes the addition of one (1) or more bedrooms;
 - 3) A change in use of the property from residential to commercial;
 - 4) Connection of a modular unit or mobile home to the system; and
 - 5) Other conditions that the Department may deem appropriate.
- B. In the case of a sale, as indicated in Section 4.3, if the property owner does not obtain a use permit prior to a covered transaction, the purchaser of the property shall then be required to obtain a Use Permit.

4.3 Sale

For the purposes of these Regulations, the term “sale” shall mean the transfer, sale or conveyance of any real property served by an OWTS, and therefore subject to these Regulations, but shall exclude the following types of transfers:

- A. Change in ownership solely to include or exclude a spouse or child;
- B. Transfer subject to life estate;
- C. Transfer to effect foreclosure or forfeiture of real property, provided, however, the subsequent sale of the foreclosed property by the foreclosing entity shall require the issuance or renewal of a Use Permit;
- D. Transfer by redemption from a tax sale, provided, however, the subsequent sale of the redeemed property by the redeeming entity shall require the issuance or renewal of a Use Permit;

- E. Transfer creating or ending joint ownership if at least one person is an original owner of the property and/or his or her spouse or children;
- F. Transfer of property containing premises that have been demolished or are otherwise uninhabitable;
- G. Transfer for the vacation or granting of a public right of way;
- H. Transfer from a person to a trust or to themselves as trustee(s) of a trust estate; and
- I. New homes that have not yet been occupied.

4.4 Application Requirements

- A. The applicant must submit the following items to the Department when applying for a Use Permit or Renewal of a Use Permit:
 - 1) Completed application on the forms provided by the Department, including:
 - 2) Owner's name and contact information;
 - 3) Physical address of property;
 - 4) Legal description of property;
 - 5) Name of Inspector and the inspector's NAWT or other applicable certification number;
 - 6) Date and time of the inspection(s); and
 - 7) An inspection report completed within the previous 12 months of the event in Section 4.2.A., above, noting the size, type, capacity, condition of the septic tank; any mechanical components such as pumps, alarms, or higher-level treatment systems; and the condition of the soil treatment area, including a septic tank pumping receipt, when applicable, based on the inspection report. 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
 - 8) A record drawing, either from the Department records (verified by the inspector) or from the site inspection.
- B. All components that are found to be in a state of malfunction must be noted and disclosed within the inspection report.
- C. Completed "Inspection Report(s)" on forms provided by the Department must be completed by a Department-approved Use Permit Inspector, as hereinafter defined in Section 4.9.

- D. A non-refundable Use Permit fee or Renewal of a Use Permit fee in the amount established by resolution of the Board of Health, as amended from time to time. The fee will be payable to the Department at the time the application is made.

4.5 Minimum Criteria for Renewal of a Use Permit

- A. In order to obtain a Renewal of a Use Permit, the inspection of the existing OWTS system shall verify that the system meets, at a minimum, the following criteria and conditions:
 - 1) Submittal of an inspection report on Department approved forms; and
 - 2) Verification that all deficiencies identified during the inspection, as set forth in the "Inspection Report" have been corrected in accordance with these Regulations.
- B. If it is determined that the OWTS system meets the foregoing criteria, the Department shall issue a Renewal of a Use Permit, setting forth the terms and conditions of approval.

4.6 Minimum Criteria for Issuance of a Use Permit

Items noted in the inspection report that do not comply with the following criteria and conditions must be corrected along with necessary permits and inspections prior to the issuance of a Use Permit:

- A. A structurally sound and watertight septic tank, in good working order, and provided with safe and secure lids;
- B. All internal devices and appurtenances such as tees, effluent filter and baffles that were originally provided with the tank or added later must be intact and in working order;
- C. Alarms, control devices, and components necessary for the proper operation of the system are present and in good working order;
- D. The scum and sludge level in the tanks shall be measured and the tanks shall be pumped if the scum and sludge depth exceeds 25% of the operating volume of the tank. The liquid level in the tank shall not be lower than the outlet invert;
- E. A soil treatment area, or other means of subsurface wastewater treatment, must be present and not in a state of failure, and of sufficient size for the number of bedrooms present;
- F. 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 13.8 must be followed.
- G. There are no unapproved wastewater discharges from the system or structures; and
- H. Any items meeting the conditions of a "Failure", as defined in this Regulation, have been corrected to the acceptance of the Department.

4.7 Issuance of a Use Permit

- A. The Use Permit shall set forth the terms and conditions of approval, as follows:
 - 1) Statement of the size, type, and capacity of the system and a record drawing, either from the Department's records (verified by the inspector) or from the inspection reports;
 - 2) Evidence of past system failures as shown in the Department's records;
 - 3) Circumstances or factors that may have affected the ability of the inspector to evaluate the system;
 - 4) Whether the system meets the permitting requirements of the Department; and
 - 5) Other information the Department may deem appropriate
- B. A copy of the inspection report that was provided to the Department can be available upon request.
- C. The Use Permit will remain valid until the date of real estate closing or for a maximum period of twelve months, whichever comes first.
- D. Waiver of a Use Permit
 - 1) If it is determined by the Department that an OWTS does not meet the requirements for issuance of a Use Permit, a conditional Use Permit may be issued, provided that the purchaser of the property agrees to obtain a permit and complete all necessary repairs to the system (or connect to a sanitation district, if appropriate) within 30 days after occupancy of the structure. If a permitted repair is required, the repair must be completed by the expiration date of the permit.
- E. Revocation of a Use Permit
 - 1) A Use Permit must be revoked if it is determined that the system is no longer functioning in accordance with this Regulation or that false or misleading material statements were made on the application or inspection reports.
- F. Penalties
 - 1) Failure to obtain a Use Permit for a covered transaction as provided by this Regulation will subject the owner who failed to obtain the Use Permit to the penalties as more fully set forth in C.R.S. §25-10-113.

4.8 Malfunctioning Systems

Systems found to be malfunctioning during inspection by the Use Permit Inspector shall be repaired in accordance with the terms of these Regulations.

4.9 Use Permit Inspectors

A Use Permit Inspector shall be a person currently licensed or certified through a nationally recognized inspector training and certification program such as the National Association of Wastewater Technicians (NAWT), National Sanitation Foundation (NSF), or approved equivalent certification.

SECTION 5 USE PERMITS – RECURRING AND HIGHER-LEVEL TREATMENT

5.1 Applicability

- A. A Use Permit under this Section shall mean:
 - 1) A Use Permit for a higher-level treatment (HLT) system;
 - 2) A Use Permit for a NDDS system;
 - 3) Chemical, composting, or incinerating toilets, as further described in Section 15.5; or:
 - 4) Other conditions that the Department may deem appropriate.
- B. A Use Permit shall be required for any system that includes a HLT unit or systems described in Sections 15.5, as defined by these Regulations.
- C. A Use Permit shall be maintained and renewed until the system is either abandoned or the Department authorizes the decommissioning or removal of the HLT unit.
- D. The Department shall not authorize the removal of a HLT unit unless the OWTS would conform to the requirements for TL1 systems, including minimum distance setbacks set forth in Table 6 in Appendix A, and vertical separation from the STA infiltrative surface to any limiting layer as set forth in Table 7 in Appendix A.
- E. The Board of Health shall adopt fees for the administration of HLT Use Permits.

5.2 Minimum Application Requirements

An application for a Use Permit shall include:

- A. Owner name and contact information;
- B. Property address and legal description;
- C. Location of OWTS specifying location of septic tank, higher-level treatment system, soil treatment area, and other components;
- D. Description of OWTS installed;
- E. Level of treatment to be provided;
- F. Type of higher-level treatment system, or composting, chemical, or incinerating system;
- G. Name of service provider;
- H. Copy of operation and maintenance service contract of at least one year duration; and
- I. A non-refundable Use Permit fee or Renewal of a Use Permit fee in the amount established by resolution of the Board of Health, as amended from time to time. The fee will be payable to the Department at the time the application is made.

5.3 Use Permit Requirements

A Use Permit shall specify the following for each HLT or composting, chemical, or incinerating component that requires routine maintenance, including:

- A. Type, make and model of the component(s) requiring maintenance;
- B. Name and qualifications of the service provider;
- C. Length of service contract;
- D. Required service intervals per Section 5.5;
- E. Reporting requirements; to include, as a minimum:
 - 1) Dates system was 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
- F. Sampling requirements, if applicable.

5.4 Inspection and Maintenance Requirements

- A. For proprietary systems, inspection and maintenance of the system shall be performed by a service provider in accordance with the manufacturer's recommendations or Section 5.4.B, whichever is more stringent. For older proprietary systems where manufacturer recommendations are unavailable, inspection and maintenance shall be performed in accordance with Section 5.4.B.
- B. For public domain systems, inspection and maintenance shall be as performed as determined by the professional engineer or the following requirements, whichever is more stringent. Not all requirements will apply to all types of higher-level treatment systems.
 - 1) Tanks shall 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 shall be measured and the tanks shall 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 shall not be lower than the outlet invert.
 - 2) Effluent filters shall be inspected and cleaned at an appropriate interval to ensure proper function.
 - 3) Each motor, pump and all associated appurtenances shall be inspected to assure that they are operating properly.
 - 4) Internal electrical connections shall be inspected to assure 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 shall 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 shall be checked and replaced as needed.
 - 6) Components intended to agitate or introduce air into the wastewater such as impellers, air jets, bubblers, air diffusers, aspirators, paddles, etc. shall be inspected to assure that they are functioning properly and are free from lint, hair and other debris. Blowers or compressors shall be inspected to assure they are operating properly and that vents are clear and air filters are cleaned or replaced. If so equipped, the ammeter or voltage regulator shall be checked to verify that the motor is not drawing excess current.
 - 7) All components such as media filters, sand filters, suspended growth media, etc. shall be inspected to verify that there is no damage, excess sludge buildup, clogging, filter bridging, etc. and that spray or dispersal nozzles are free from debris and functioning properly.

- 8) The STA shall 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.
- 9) The service provider shall 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.
- 10) Upon completion of the service inspection the service provider shall close and secure all inspection or access ports, reset the control panel and restore the system for normal operation.

5.5 Frequency of Inspection and Maintenance

The Department requires system inspection and maintenance on a schedule that is the most frequent of the following:

- A. Manufacturer recommendations for proprietary systems or design criteria requirements for public domain technology; or
- B. Department requirements; or
- C. For higher-level treatment systems and disinfection systems, two inspections at six-month intervals for the first year of operation; followed by annual inspections for the life of the system.

5.6 Renewal of a Use Permit

Upon expiration of a Use Permit, the owner shall submit an application to renew the permit.

5.7 Revocation of a Use Permit

The Department may revoke a Use Permit for non-compliance with the permit conditions or the requirements of these Regulations.

5.8 Penalties

The Department may assess penalties for non-renewal of a Use Permit or non-compliance with the terms of the permit as provided for in Sections 18.3 and 18.4 of these Regulations.

5.9 Maintenance Provider Requirements

A maintenance provider shall, at a minimum:

- A. Perform inspection, maintenance, and sampling as set forth in the Use Permit;
- B. Provide a copy of their inspection report and sampling results to the owner;

- C. Report the findings of their inspection and sample test results, if required, in a manner acceptable to the Department;
- D. Report any additional alarm conditions or service calls to the Department;
- E. Notify the Department within seven (7) days if an operations and management (O&M) service contract is terminated prior to the original termination date as set forth on the Use Permit;
- F. Must obtain certification as a NAWT Operation and Maintenance Level 1 and 2 service provider or approved equivalent within two (2) years from the effective date of this Regulation and shall be responsible to complete all necessary requirements to maintain certification(s); and
- G. 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.

5.10 Owner Responsibilities

An owner shall, at a minimum:

- A. Ensure the OWTS is operating, maintained and performing according to the required standards for the designated treatment level;
- B. Maintain an active O&M service contract with a maintenance provider at all times; and
- C. Each time the contract with a maintenance provider is renewed or replaced, send a copy to the Department within 30 days of signing.

SECTION 6 OPERATION AND MAINTENANCE

6.1 Responsibility

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

6.2 Rules and Regulations-Board of Health Authority to Adopt

The Board of Health may adopt rules and regulations for:

- A. The scheduling of maintenance and cleaning of systems;
- B. Practices adequate to ensure performance of an OWTS; and/or

- C. Submission of proof of maintenance and cleaning to the Department by the owner of the system.

6.3 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. The Board of Health may permit reductions in the size of soil treatment areas and horizontal and vertical separation distances based on higher-level treatment of effluent, subject to the requirements for a Use Permit – Higher-Level Treatment in Section 5 of this Regulation. The Department may designate a separate entity to conduct and maintain the oversight of this program. However, enforcement of the requirements of this Regulation will remain with the Board of Health. System monitoring may be required.

6.4 Service Label

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

6.5 Maintenance and Cleaning

To ensure good working order, all septic tanks shall be inspected once every four (4) years and pumped when the accumulation of sludge and scum is greater than 25% of the operating volume of the treatment tank; as established in Section 5.4.B.1. Dosing tanks shall be inspected and pumped if sludge accumulation is observed. Effluent filters must be inspected, maintained, and cleaned at a frequency recommended by the manufacturer and in accordance with types of use.

6.6 Monitoring and Sampling

- A. Sampling may be required by the Department in conjunction with an enforcement action or to ensure compliance with the provisions of this regulation, as provided in Section 6.6.C.
 - 1) Sampling and analysis must be performed according to American Public Health Association, American Water Works Association, and Water Environment Federation: Standard Methods for the Examination of Water and Wastewater, 24th 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 the Department to collect and test an effluent sample from the system. The Department may perform such collection and testing services. The owner or occupant must pay for the cost of these services.
 - 1) If the Department or a delegated third party collects and tests effluent samples, a fee not to exceed that which is 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.
- C. Conditions that provide for the Department to require routine water quality monitoring include:
 - 1) Indications of inadequate performance;
 - 2) Location in sensitive areas;
 - 3) Systems designed to meet TL3ND standards;
 - 4) Treatment systems other than those discharging through a soil treatment area or sand filter system (15.8);
 - 5) Remediation systems; and/or
 - 6) Systems under use permits (Sections 4 and 5), or product development permits (3.16).

6.7 Disposal of Waste Materials

All material pumped from an OWTS during a cleaning procedure shall be disposed at a site approved by local county officials or the Department in a manner which does not create a hazard to the public health, a nuisance, or an undue risk of pollution and which complies with all applicable state and local rules and regulations.

6.8 Termination of Use or Abandonment of an OWTS

- A. The Department shall be notified, in writing, when a tank, vault, seepage pit, pit privy, or cesspool is abandoned, and a pump receipt shall be provided.
- B. The contents of a septic tank, vault, seepage pit, pit privy, or cesspool, the use of which has been terminated, shall be removed and properly disposed of.
- C. A tank may be completely removed and the parts disposed of safely.
- D. If the tank will 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 the 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; and
 - 5) The filled excavation will be graded to surroundings, allowing for settling.
- E. The Department may require abandonment of a tank that is deemed to be a hazard.
- F. A pit privy shall be abandoned by pumping any liquid material from the privy pit, treatment with quicklime, or other approved disinfectant, then backfilling the pit with soil. The privy structure may remain in place provided the stool is removed or securely covered, or a solid floor placed in the structure.

SECTION 7 REGULATION OF SYSTEMS CONTRACTORS AND CLEANERS

7.1 Systems Contractor License

- A. No person shall install, alter, or repair an OWTS without a valid Systems Contractor License issued by the Department.
- 1) Each systems contractor shall have a minimum of one (1) owner or employee with a valid systems contractor license at all times. Should a licensed employee change employment, the owner or another employee will be required to obtain licensure prior to installing, altering, or repairing an OWTS.
 - 2) The licensed individual is responsible for the work of all those working under their license and maintaining compliance with these regulations.
- B. A system contractor license is issued to the individual who provides documentation of completion of the National Association of Wastewater Technicians (NAWT) Installers Course or approved equivalent. The license shall follow the individual if they change employment.
- 1) Successful completion of the CDPHE Part A Systems Contractor Examination may be substituted until the next NAWT Installer Course is available. Licenses issued to systems contractors who qualify on the basis of passing the Part A examination and providing proof of enrollment in an approved certification course shall be issued as conditional licenses. A conditional license shall expire on the earlier of:
 - a) Six months/ (180) days from the date of issuance; or

- b) The date of the next scheduled certification course for which the applicant is enrolled, if the applicant does not successfully complete that course.
- C. A conditional license shall convert to a full license upon the Department's receipt of proof of successful completion of the approved certification course.
- D. Application for Systems Contractor's Licenses or renewals shall be made on forms supplied by the Department.
- E. Prior to the issuance or renewal of a license, the Department may require the applicant to demonstrate adequate knowledge of these Regulations. This may include, but is not limited to, passing an exam prepared by the Department or attending educational conferences conducted by the Department.
- F. Licenses shall expire on December 31st of each year. A license which lapses because of failure to renew shall be subject to the fee established for a new license upon reapplication.

7.2 Systems Cleaner License

- A. No person shall engage in the cleaning of OWTS Systems or the transportation of sewage to a disposal site without a valid Systems Cleaner License issued by the Department.
 - 1) Each systems cleaner shall have a minimum of one (1) owner or employee with a valid systems cleaner license at all times. Should a licensed employee change employment, the owner or another employee will be required to obtain licensure prior to cleaning or maintaining an OWTS.
 - 2) The licensed individual is responsible for the work of all those working under their license and maintaining compliance with these regulations.
- B. Application for a Systems Cleaner's License or renewals shall be made upon forms supplied by the Department. In addition to the application form, the Systems Cleaner shall submit to the Department the following information:
 - 1) Copies of contracts with facilities approved by local county officials or the Department for accepting septage;
 - 2) A record of the total volume of septage disposed at each facility in the past year; and
 - 3) Documentation of completion of the NAWT Vacuum Truck Course or NAWT Operation and Maintenance 1 Course or approved equivalent.
- C. Prior to the issuance or renewal of a license, the Department may require the applicant to demonstrate adequate knowledge of these Regulations. This may include, but is not limited to, passing an exam prepared by the Department or attending educational conferences conducted by the Department.

- D. Licenses shall expire on December 31st of each year. A license which lapses because of failure to renew shall be subject to the fee established for a new license upon reapplication.

7.3 License Fees

A non-refundable fee in the amount established by resolution of the Board of Health, as amended from time to time, shall be required of applicants for systems contractor and systems cleaner licenses. The fee shall be payable to the Department at the time the license application is made.

7.4 Revocation of a Systems Contractor or Systems Cleaner License

- A. A license may be revoked for failure to comply with these Regulations and/or violations of the applicable provisions of the OWTS Act, or for other good cause shown. Revocation shall take place only after a hearing before the Board of Health. The license holder shall be given not less than ten (10) days' notice of the hearing and may be represented at the hearing by counsel.
- B. Written notice of revocation, specifying the violations, shall be served upon the holder of the license. Service of notice as required in this section shall be provided by the Colorado Rules of Civil Procedure, or by registered or certified mail, return receipt requested, deliverable to addressee only.
- C. Failure of a systems cleaner to keep records, submit records or quarterly reports upon request, show evidence of proper disposal or violation of any of the other terms or conditions of these Regulations or the Act, shall be cause for the Department to initiate revocation of license proceedings.
- D. A person who has previously had a license revoked may be denied renewal by the Board of Health.

7.5 Standards of Performance Required of Holders of Systems Contractor License

- A. The systems contractor shall be responsible for proper installation of the OWTS. Installation, alteration, or repair of any OWTS shall be in compliance with these Regulations and with the conditions set out in the application and installation permit.
- B. Notice of a requested inspection shall be given by the license holder not less than 48 hours before the inspection is to be made.
- C. A license holder shall have made certain that an installation permit has been obtained prior to starting construction and the installer shall install the system in compliance with all plans and specifications as submitted by the applicant and approved by the Department.

- D. System contractors shall have a copy of the permit, plans, and specifications on the property at all times that construction of the system is occurring and at the time of final inspection if so requested by the Department.
- E. The Systems Contractor shall provide the Department or system designer, prior to or at the time of the Department's or system designer's final inspection of the system installation, a scaled record drawing accurately locating all parts of the system in relationship to the dwelling and/or property lines and give at least two (2) measured points from a fixed location to the first compartment of the septic tank and two (2) corners of the longest dimension of the soil treatment area with the measurements indicated on the drawing. (See Diagram 1 in Appendix B). The record drawing shall be drawn to scale on forms provided by the Department. Final approval of the system installation may be withheld for failure to submit the record drawing.
- F. The Systems Contractor shall be required by the Department, upon completion of the system installation, to appropriately mark and flag the system so as to identify its location in order to prevent vehicles or persons building the structure from driving over any part of the system. The contractor should also notify the general contractor of the above information.
- G. The licensed Systems Contractor shall be responsible for maintaining certification as a Certified Installer through the NAWT or certification from an approved equivalent.

7.6 Standard of Performance Required of Holders of Systems Cleaner License

- A. A license holder, when cleaning tanks or aeration plants, shall remove the liquid, sludge and scum from both compartments of divided tanks and both tanks that are in series, leaving only enough sludge to act as a seed for continuing operation. Three (3) inches of remaining residue is recommended. Tanks should not be washed or disinfected after pumping. The outlet tees or baffles of tanks shall be checked for proper installation and/or damage to the extent they can be observed as part of the routine pumping process. Missing or damaged tees or baffles on the outlet side of tanks shall be reported to the owner and the Department for immediate repair.
- B. A license holder shall maintain his equipment so as to ensure that no spillage of sewage will occur during transportation, and that his employees are not subjected to undue health hazards.
- C. A license holder shall dispose of the collected sewage only at sites approved by local county officials, or the Department in a manner which does not create a hazard to the public health, a nuisance, or an undue risk of pollution and which complies with state and local rules and applicable Regulations.
- D. For each tank pumped, a license holder shall be required to keep a record of location serviced, volume of septage pumped, disposal facility, and condition of tank tees or baffles. These records shall be kept on forms approved by the Department. When requested by the Department, the license holder shall submit records for review by the Department. No later

than December 31 of each year, the Systems Cleaner shall submit to the Department copies of contracts with facilities approved by local county officials or the Department for accepting septage.

- E. The licensed Systems Cleaner shall be responsible for maintaining certification as a Certified NAWT Vacuum Truck Operator or Certified NAWT Operation and Maintenance 1 Provider or certification from an approved equivalent.

SECTION 8 SITE AND SOIL EVALUATION

8.1 Requirements for a Site and Soil Evaluation

- A. A site and soil evaluation must be conducted for each property on which an OWTS is proposed, to determine the suitability of a location to support an OWTS, and to provide the designer a sound basis to select the most appropriate OWTS design for the location and application.
- B. Each site evaluation must consist of:
 - 1) Preliminary site investigation;
 - 2) Reconnaissance visit;
 - 3) Detailed soil investigation; and
 - 4) Report and site plan.

8.2 Preliminary Site Investigation

Research of information relative to the site and anticipated conditions must be conducted. Information gathered as part of the preliminary investigation must include, but is not limited to:

- A. Property Information:
 - 1) Address;
 - 2) Legal description;
 - 3) Existing structures; and
 - 4) Location of existing or proposed wells on the subject and adjacent properties.
- B. Department records

- C. Location of physical features, on and off the property that will require setbacks as identified in Tables 6 and 7 in Appendix A.
- D. Preliminary soil treatment area size estimate based on information on existing or planned facility and this Regulation.
- E. Other information required by the Department.
- F. Additional published information that may be useful to the site specific evaluation as available:
 - 1) Soil information;
 - 2) Topography;
 - 3) Surveys;
 - 4) Easements;
 - 5) Floodplain maps;
 - 6) Delineated wetland maps;
 - 7) Geology and basin maps and descriptions;
 - 8) Aerial photographs; and
 - 9) Climate information

8.3 Reconnaissance Visit

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. Information gathered as part of the site reconnaissance may include, but is not limited to:

- A. Landscape position;
- B. Topography;
- C. Vegetation;
- D. Natural and cultural features; and
- E. Current and historic land use.

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

8.4 Detailed Soil Investigation

- A. Soil investigations to determine the long-term acceptance rate of a soil treatment area must be conducted per the following criteria:
- 1) Visual and tactile evaluation of two (2) or more soil profile test pit excavations must be conducted to determine soil type as well as to determine whether a limiting layer is encountered;
 - 2) In addition to the two soil profile test pit excavations, percolation testing may be conducted to obtain additional information regarding the long-term acceptance rate of the soil;
 - 3) If the site evaluation includes both a visual tactile evaluation of soil profile test pit excavations and percolation tests, and the results from these two evaluations do not correspond with the same LTAR as noted in Table 10, the designer must use the more restrictive LTAR in determining the size of the soil treatment area;
 - 4) The engineer or technician conducting the soil profile test pit excavations or percolation tests must, upon completion of the percolation test or pit evaluation, adequately mark and identify each excavation or hole to allow easy location by others.
 - 5) 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, all soil profile test pits must be backfilled promptly after the soil evaluation is complete.
 - b) The Department may require a joint evaluation of the soils along with the engineer or competent technician.
 - c) The Department may require additional soil profile test pit excavations
 - d) The Department may require the installation of inspection ports in order to confirm 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.

8.5 Visual and Tactile Soil Evaluation

- A. Procedure for performing visual and tactile evaluations of soil in order to determine a long-term acceptance rate:
- 1) Evaluation of two (2) 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 the required two shall be based on the judgment of the competent technician.

- 2) At least one (1) 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) The minimum depth of the soil profile test pit excavation must be to any limiting layer, groundwater condition, or four feet below the proposed infiltrative surface of the in-situ soil, whichever is encountered first.
- 4) Layers and interfaces that interfere with the treatment and dispersal of effluent must be noted. Thus, any limiting or restrictive soil characteristic such as consistence, as defined by a cementation class, also needs to be evaluated. The evaluation of consistence may also include an evaluation of excavation difficulty, rupture resistance, and/or penetration resistance.
 - a) When cemented soils are encountered, the evaluation must identify the cementation class from rupture resistance as provided in Regulation 43, Table 5-1, "Rupture Resistance".
 - b) Per the "Rupture Resistance" (Regulation 43, Table 5-1) when the "Cementation Class" is identified within the soil profile as "strongly cemented", "very strongly cemented", or "indurated" that layer will be classified as a "restrictive layer".
 - c) Note: Cemented soils will typically have characteristics of Type 3A or 4A soils (Table 10). Long-term acceptance rates should coincide with the appropriate soil type classification or be adjusted to address the level of cementation.
- 5) The 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 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 or Table 11. The treatment depth is two (2) to four (4) feet depending on the required thickness for the treatment level below the infiltrative surface from Table 7, Item 4A or 4B.

- 10) Soils data previously collected by others at the site can be used for the purposes of an OWTS design at the discretion of the Department. It is recommended that the data be verified, at a minimum, by performing an evaluation of a soil profile test pit excavation.

8.6 Soil Descriptions for Determination of a Limiting Layer

Soil descriptions for determination of a limiting layer must include:

- A. The depth of each soil horizon measured from the ground surface and a description of the soil texture, and structure of each soil horizon;
- B. Depth to the bedrock;
- C. Depth to the periodically saturated soil as determined by:
 - 1) Redoximorphic features and other indicators of water levels, or
 - 2) Depth of standing water in the soil observation excavation, measured from the ground surface, if observed, unless redoximorphic features indicate a higher level.

8.7 Dawson Arkose and Cemented Sands

- A. Dawson Arkose (DA) and cemented sands (CS) have characteristics of Type 3A and 4A soils, from Table 10 in Appendix A. In addition, DA may be cemented to varying degrees. If DA or CS are present on the site, the site evaluator will determine if the DA or CS is suitable soil.
- B. At a minimum, the site evaluator will evaluate the following characteristics:
 - 1) Whether the material is fractured and jointed.
 - 2) The cementation class of the DA or CS, as applicable. Using the cementation classes from the Rupture Resistance Table on page 2-63 of the Natural Resources Conservation Service Field Book for Describing and Sampling Soils, National Soils Survey Center NRCS-USDA, 2012, ver. 3.0 (NRCS Field Book), the following cementation classes will be considered suitable: Non-Cemented (NC), Extremely Weakly Cemented (EW), Very Weakly Cemented (VW), Weakly Cemented (W). If the DA or CS has the following cementation classes, it will be considered a limiting layer: Moderately Cemented (M), Strongly Cemented (ST), Very Strongly Cemented (VS), Indurated (I).
 - 3) The DA or CS material is within four feet of the deepest infiltrative surface of the trenches.
 - 4) At a minimum, Dawson Arkose and cemented sands will be classified as a Type 3A soil, unless, based on additional data or information, the professional engineer recommends it be classified as Soil Type 4, 4A or 5.

The table below summarizes characteristics 1 and 2 above. A “yes” answer to either question below means the material is unsuitable.

CHARACTERISTIC	ANSWER (A YES ANSWER MEANS THE DA OR CS IS A LIMITING LAYER)
Is material fractured and/or jointed?	Yes / No
Is the cementation class, M, ST, VS, or I?	Yes / No

8.8 Percolation Test Procedure

A. When 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 shall be performed by a professional engineer or by 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 shall be performed in at least three (3) test holes in the area in which the soil treatment area is to be located, 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 eight (8) to 12 inches and be terminated a minimum of six (6) inches and a maximum of 18 inches below the proposed infiltrative surface.

4) Change in Soil

If a change of soil type, color or structure is present within those soils comprising the depth of soil below the infiltrative surface as required in Table 7 in Appendix A 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.

- B. The percolation tests must be conducted using the test hole preparation, soil saturation, and rate measurement procedures described below.
- C. 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 (2) inches of very coarse sand or fine gravel to protect the bottom of the hole from scouring and sediment.
- D. Presoak
 - 1) The hole must be presoaked adequately to accomplish both saturation, which is filling the void spaces between the soil particles, and swelling, which is 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 is 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 (4) hours and preferably overnight. Determine the percolation rate 24 hours after water is first added to the hole. This procedure is to ensure that the soil is given ample time to swell and to approach the condition it will be in during the wettest season of the year. In Type 1 soils, (sand and loamy sand; Table 10 in Appendix A), 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.
- E. Percolation Rate Measurement
 - 1) With the exception of Type 1 Soils (sand and loamy sand) in Table 10 in Appendix A, 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 (6) 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 (6) 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 (4) hours, refilling to six (6) 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 (4) hour test under this section is waived if three (3) successive water-level drops do not vary by more than one-sixteenth (1/16) inch; however, in no case shall a test under this section be less than two (2) hours in duration.

F. Sandy Soils

- 1) In Type 1 soils or other soils in which the first six (6) 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 (10) minutes and the test conducted for one (1) hour. The drop that occurs during the final ten (10) 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, then the infiltration rate must be recorded as less than one (1) minute per inch.

G. Dawson Arkose

In Dawson Arkose, the test shall be a minimum of four (4) hours, or until the last three (3) successive drops vary by less than one (1) minute per inch, whichever is greater.

H. 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 from Table 10 in Appendix A.
- 2) The technician performing the percolation tests shall furnish an accurate scale drawing, showing the location of the soil profile test pit excavations and/or percolation holes tied to lot corners or other permanent objects. The drawing must meet the criteria in Section 8.9.G. The information in Sections 8.9.G.1) through 8.9.G.5) may be included but are 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.

I. Alternate Percolation Testing

- 1) Alternate percolation test procedures may be approved, provided the test results of alternate procedures are substantially equivalent to those determined using the test procedures described in this section.

- 2) Prior approval from the Department of alternate percolation test procedures is required.

8.9 Soils Report and Site Plan

A written report must describe the results of the preliminary investigation, reconnaissance visit, and detailed evaluations. The report may be in text and/or tabular form and must include a scale drawing locating features relative to the proposed OWTS location and test locations. The report may be included as part of the OWTS design document. The report must include, but is not limited to:

- A. The company name, address, telephone number, e-mail address, and name of individual, credentials and qualifications of the individual conducting the site evaluation;
- B. Preliminary and detailed evaluations, providing information from the surface site characteristics assessment and soils investigation;
- C. Dates of preliminary and detailed evaluations;
- D. A graphic soil log, to scale, indicating depth of the soil 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;
- E. Setback distances to features listed in Table 6 in Appendix A;
- F. Setback distances to features listed in Table 7 in Appendix A, existing on the site or within applicable setback limits, whichever is greater;
- G. A drawing created to a scale that provides the complete property boundary lines. The minimum drawing size is eight and one-half (8.5) inches by 11 inches. If the property is too large to adequately show site evaluation information, a detailed drawing that includes the information required from the site and soil evaluation that will impact the location of the OWTS must be submitted. Drawings must indicate dimensions, have a north arrow, a graphic scale, and include:
 - 1) 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 or other surface waters, and detention or retention ponds, and property lines;
 - 2) Contours or slope direction and percent slope;
 - 3) The location of any visible or known unsuitable, disturbed or compacted soils;

- 4) The estimated depth of periodically saturated soils and bedrock, or flood elevation, if applicable; and
- 5) The proposed elevation of the infiltrative surface of the soil treatment area, from an established datum (either ground surface or a benchmark);
- H. Anticipated construction-related issues, if applicable;
- I. 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; and
- J. 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.

8.10 Design Document

- A. The report and site plan may be attached to the design document or the report and site plan may be combined with the design information as a single document.
- B. The design document must include a brief description of the facility and its proposed use, basis and calculations of design flow and influent strength.
- C. The design document must contain all plan details necessary for permitting, installation, and maintenance, including:
 - 1) Assumptions and calculations for each component, including dose volume, total dynamic head (TDH), and gallons per minute (GPM) for all dosing systems;
 - 2) A fixed, non-degradable temporary or permanent benchmark (North America Vertical Datum or assumed elevation is acceptable);
 - 3) 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 (Tables 6 and 7 in Appendix A). Diagram 1 in Appendix B is an example of a scale record drawing of an OWTS;
 - 4) Layout of soil treatment area, dimensions of trenches or beds, distribution method and equipment, distribution boxes, drop boxes, valves, or other components used;
 - 5) Contours or slope direction and percent slope for the area of the OWTS;
 - 6) Elevation or depth of infiltrative surface of the soil treatment area, the 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.

- 7) Special structural design considerations, as applicable to ensure the long-term integrity of each component;
- 8) References to design manuals or other technical materials used;
- 9) Installation procedures, as applicable;
- 10) Operation and maintenance manuals or instructions; and
- 11) Other supporting documentation, such as photographs or cross-section drawings, as applicable.

8.11 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 method.

8.12 Qualifications for a Competent Technician

A. Design

- 1) Competencies needed:
 - a) Knowledge and ability to prepare required design documents;
 - b) Understand principles of OWTS siting and design;
 - c) Understand function and capacities of system components;
 - d) Understand sizing and design criteria of system components;
 - e) Identify and select appropriate components for site surface and subsurface conditions; and
 - f) Understand construction and installation methods and operation and maintenance requirements of OWTS.
- 2) Demonstrations of competence in design
 - a) Obtaining an approved designer certification through a certifying organization.
 - i) If the certification course includes an exam to verify acceptable completion of the course, a passing grade on the exam must be attained.

- 3) The Division or Department shall approve training for OWTS design.

B. Percolation Tests

- 1) Competencies needed:

- a) Set up equipment;
- b) Perform and run percolation tests according to the procedures identified in Section 8.8, Percolation Test Procedure, in this Regulation; and
- c) Record results and calculate percolation rates

- 2) Possible demonstrations of competence in percolation tests:

- a) Attend an approved training or workshop for soil evaluation for OWTS including both class and field work.
 - i) If the training or workshop includes an exam to verify acceptable completion of the course, a passing grade on the exam must be attained.

C. Visual and Tactile Evaluation of Soil

- 1) Competencies needed:

- 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 both soil consistence and 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; and
- h) Understand basic principles of OWTS siting and design.

- 2) Possible demonstrations of competence in visual and tactile evaluation of soil:

- a) Degree in soil science, agronomy, geology, other majors if a course(s) in soil morphology was included; or

- b) Attend an approved training or workshop for soil evaluation for OWTS including both class and field work.
 - i) If the training or workshop includes an exam to verify acceptable completion of the course, a passing grade on the exam must be attained.
- 3) The Division or Department must approve training for visual and tactile evaluation of soil.

SECTION 9 WASTEWATER FLOW AND STRENGTH

9.1 Wastewater Flows

- A. The Department may require the installation of a meter to measure flow into the facility or the OWTS.
- B. Single-Family Residential Homes:
 - 1) Design flow per person is at least 75 gallons per day (gpd).
 - 2) The minimum design flow for a new home must be for a two (2) 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 be, at a minimum, for one (1) bedroom unless bedrooms are added.
 - 3) For homes up to and including four (4) bedrooms, the assumed number of persons per bedroom is two (2) for design purposes.
 - 4) For homes with more than four (4) bedrooms, the assumed number of persons is eight (8) persons (first four (4) bedrooms x two (2) persons per bedroom) plus one (1) additional person for each bedroom more than four (4) bedrooms.
 - 5) Table 2 in Appendix A summarizes the design flows for single-family residential homes up to seven (7) bedrooms.
 - 6) For homes with unfinished areas, the Department may require an increase in the number of bedrooms based on the assumption that 150 square feet of unfinished space can be converted into a bedroom, if the space can meet building code requirements.
 - 7) The Department may require an increase in 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.
- C. Accessory Dwelling Units:

- 1) When an accessory dwelling unit is proposed or exists on a parcel served by an OWTS, the design flow shall be based on the total number of bedrooms across all dwelling units served by the system, including both the principal dwelling and any ADU.
- 2) A new or expanded OWTS must be sized for the aggregate number of bedrooms proposed. For ADUs, up to two (2) bedrooms, Table 9 may be used to determine tank sizing; however, the OWTS permit shall not be based solely on the ADU bedroom count if doing so would result in a design flow less than that required for the total number of bedrooms on the property served by the system.
- 3) Reductions in the number of bedrooms or habitable space within the principal dwelling shall not be accepted to offset or justify the addition of bedrooms in an ADU.
- 4) If an existing OWTS septic tank has a minimum of 1,000 gallons of available treatment capacity beyond the required capacity for the existing approved bedroom count, as determined by Table 9, no additional tank is required for an accessory dwelling unit containing up to two (2) bedrooms. If an existing OWTS septic tank provides at least 1,000 gallons of available treatment capacity, use Table 9 to size the tank for the ADU.

9.2 Auxiliary Buildings

- A. 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.
- B. 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.
- C. 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
- D. If the auxiliary building has a separate OWTS, the system must be sized on the basis of Table 3 in Appendix A and a septic tank detention time of 48 hours.
- E. A person must not connect more than one (1) dwelling, commercial, business, institutional or industrial unit to the same OWTS unless such multiple connection was specified in both the application submitted and in the permit issued for the system.

9.3 Multi-Family and Commercial On-Site Wastewater Treatment System

Design flow values and strengths for multi-family and commercial systems must be determined from:

- A. Table 3 in Appendix A; or

- B. An analysis of peak flows and strengths from at least three (3) comparable facilities or from the facility, if it is an existing facility, must be submitted to the Department for approval. The analysis must include:
 - 1) Metered water flows for inside use only for at least a 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.
 - 2) Total Suspended Solids and BOD₅ or CBOD₅ tests at times of full use. At least three (3) samples taken at least one (1) week apart are required. Sampling that provides equivalent and representative data through “composite sampling” may be allowed.
 - 3) Explanation and justification for the comparability of the tested facilities with the proposed facility.
- C. When a specific use is proposed which is not addressed within Table 3, 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.

9.4 Flow Equalization

- A. Flow equalization may be used if a facility has flows that vary from day to day by more than four (4) 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 (1) 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 NDDS must be used. The soil treatment area reduction for pressure distribution (Table 12) 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.

9.5 Wastewater Strength

- A. Table 4 in Appendix A includes levels of treatment that can be achieved by various OWTS components, excluding the soil treatment area. Systems qualifying for these treatment levels, except TL1 produced by a septic tank alone, must be approved under Section 16.4 of this Regulation.
- 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 4 and Table 5 must be used to determine compliance.

SECTION 10 MINIMUM HORIZONTAL DISTANCES

10.1 Required Minimum Horizontal Distances - Applicability

Horizontal distances from the various components of a system to pertinent terrain features, including streams, lakes, water courses, springs, wetlands, wells, subsurface drains, cisterns, water lines, suction lines, dry gulches, cut banks, dwellings, other occupied buildings and property lines, must be in accordance with Table 6 in Appendix A. The setback requirements are applicable for minimum system performance and treatment levels with specific modifications allowed for higher treatment levels as provided in Table 7 in Appendix A. All distance setback modifications must be analyzed and approved by the Board of Health or the Department and be in complete compliance with the variance or administrative procedures identified within this Regulation and those of the Board of Health. Acceptable methods of analyzing horizontal separation distances with higher treatment levels include but are not limited to:

- A. Analyzing the intended uses of impacted surface and/or ground waters
- B. Contacting adjacent property owners for potential conflicts with property line encroachments
- C. Analyzing potential impacts that system locations may have on building foundations and other potentially affected features

10.2 Reduction in Minimum Distances – Higher-Level Treatment

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 5.

10.3 Dry Gulches, Cut Banks, and Fill Areas

- A. Separation distances to dry gulches, cut banks and fill areas in Table 6 in Appendix A must apply unless the designer or professional 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 the effluent from the soil treatment area to move laterally and surface. In this instance, a greater distance may be required.
- B. A lesser distance may be used if it can be demonstrated by a professional engineer or professional geologist that the use of a barrier, such as a minimum 30 mil PVC liner placed between the soil treatment area and the slope of the dry gulch, cut bank or fill area will prevent effluent 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.

10.4 Site Evaluation, Design, and Treatment Level Considerations for Use of Table 7

- A. Components of an OWTS listed in Table 6 in Appendix A must be installed or located in accordance with the minimum distance requirements provided in the table or such increased distances provided by the Board of Health Regulations.
- B. Table 7 in Appendix A 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 in Appendix A address the allowable horizontal setback distance between the soil treatment area and the following physical features:
 - a) Setback distance from soil treatment area to on-site well (Item 1)
 - b) Setback distance from soil treatment area to water features (Item 2); and
 - c) Setback distance from soil treatment area to a dry gulch or cut bank (Item 3)
 - 2) Item 4 in Table 7 in Appendix A 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 in Appendix A to be applied to the soil treatment area that is necessary to accommodate the site conditions.
 - 4) 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 by the Department, the Department may administratively allow a reduction to the setback, and it shall not be reduced below 5 feet.

- a) The property line setback must not be reduced to any less than 5 feet, unless a variance, to a minimum of 3 feet, is provided by the Board of Health.
- b) The property line setback encroachment must be proposed at the time of permit application and must include the following information:
 - i) A statement from the applicant and/or designing engineer that provides the reason for the reduced property line setback request.
 - ii) 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).
 - iii) 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.
 - iv) The proposed OWTS must comply with all other required setbacks noted in Table 6. The Department approval of the encroachment must only be for the referenced property line setback.
 - v) 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 the Department.
- c) Prohibitions

- i) Approval for 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.
- ii) 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.
- iii) The size of the soil treatment area must comply with Section 43.10.C of Reg. 43.
- iv) 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.

SECTION 11 DESIGN CRITERIA - GENERAL

11.1 Overview

- A. The OWTS for single-family homes shall be designed to accommodate the proposed flows from the structure as defined in Section 9.1. Flow estimates for multi-family or commercial OWTS must comply with Section 9.3. Expected waste strength as noted in Table 4 and Table 5 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.
- B. Diagram 5 in Appendix B shows a typical OWTS comprised of a single septic tank with gravity flow from the septic tank to a rock and pipe bed.

11.2 Performance

OWTS shall be designed and constructed to achieve the treatment level specified by the design.

11.3 Reliability

OWTS must be designed and constructed such that each component shall function, when installed and operated, in a manner not adversely affected by normal operating conditions including 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, which could cause injury to persons, animals, or properties. Design must be such as to exclude flies and rodents and other vectors and to prevent the creation of nuisances and public health hazards and must provide for efficient operation and maintenance. Spray-type foams that harden are not acceptable as a sealant for OWTS components.

11.4 Accessibility for Inspection, Maintenance and Servicing

- A. Where the top of the septic tank is below finished grade, septic tanks must have watertight risers over each access manhole. All risers must be a minimum of 20 inches inside diameter and extend to or above final grade, unless otherwise specified in this regulation. All risers, except concrete risers, must be connected to the top of the tank with a tank adapter ring. The tank adapter ring may be cast into the tank, bonded to the top of the tank, or bolted into the top of the tank.
- B. Concrete septic tanks and other concrete tanks containing treatment units must be installed no deeper than four (4) feet from the top of finished grade to the top of the tank. Fiberglass, Fiberglass-Reinforced Polyester, and Plastic Tanks must be no deeper than allowed by the manufacturer, or four (4) feet, whichever is less. This requirement may be waived for repairs or expansions.
- 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 or above final grade, located to permit periodic physical inspection, collection and testing of samples and maintenance of all components and compartments.
- D. Each riser lid must be watertight, brought to or above the surface, and must have a secure closing mechanism, such as a lock, special headed bolts or screws, or sufficient weight (defined as 59 pounds) to prevent unauthorized access.
- E. Access risers for all new septic tanks, tank replacement, riser replacements, 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.
- F. 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.
- G. Components must be designed and constructed so that, when installed, they must be easily maintained, sampled, and serviced according to the manufacturer's recommendations. Easy physical access to treatment components by maintenance personnel and equipment must be provided.

11.5 Plumbing Codes

Plumbing fixtures, building sewers, vents, sewer lines and other appurtenances must be designed, operated, and maintained so as to comply with at least the minimum requirements of the most recently revised locally enforceable plumbing code. In the absence of a local plumbing code, designs must adhere to the Colorado Plumbing Code (3 CCR 720-1). A local plumbing permit may be required.

11.6 Electrical Equipment - If Used

- A. 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). A local electrical permit shall be required.
- B. All electrical components must be protected from moisture and corrosive gases.
- C. Electrical wires must be a minimum of 24 inches below grade or as required in the local electrical requirements. If installed at a depth less than 24 inches, wires must be placed in conduit, a Ground Fault Interrupter must be present, or both be used.

11.7 Indicators of Failure or Malfunctioning for Systems Utilizing Mechanical Apparatus

A signal device must be installed which will provide a recognizable indication or warning to the user that the system or component is not operating as intended. This indication or warning must be a visual signal and an audible signal, and 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.

11.8 Sampling Access

- A. If sampling for testing or as a requirement for a permit will be 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 will be required for testing or as a requirement for a permit, a monitoring well or wells must be constructed. Monitoring wells must be located down gradient from the soil treatment area, accessible, and 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 the Department or other issuer of a permit.

11.9 Component Operating Instructions

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

11.10 Surface Activity

Activity or use on the surface of the ground over any part of the OWTS must be restricted. 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 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 performed. The system must be redesigned if the soil permeability has changed.

11.11 Floodplains and Floodways

- A. A new, expanded, or repair/replacement OWTS installed in a 100-year floodplain must meet or exceed the requirements of the Federal Emergency Management Agency and the local emergency agency. Additional requirements are provided below:
 - 1) OWTS installations in floodplain zones beginning with letters “A” or “V” are considered high-risk areas. Systems installed in these areas must be designed by a professional engineer.
 - 2) Repairs of an existing system must meet the requirements as feasible.
 - 3) The system as approved must be designed to minimize or eliminate infiltration from floodwaters into the system and discharge from the system into floodwaters. The OWTS must be located to avoid impairment to floodwaters of contamination from them during flooding
- B. A new or expanded OWTS must not be installed in a floodway designated in a 100-year floodplain where a conforming OWTS outside the floodway can be installed. For any new OWTS or system repair that may affect the floodway delineation, appropriate procedures must be followed including revision of the floodway designation, if necessary.
 - 1) Installations within a floodway requires a professional engineer to certify that an OWTS cannot be installed outside of the floodway.
 - 2) OWTS installations in a floodway must be designed by a professional engineer.
- C. See Section 17 for additional requirements for floodplains within the Cherry Creek Watershed in Arapahoe County.

11.12 Business, Commercial, Industrial, Institutional or Multi-Family Dwelling Wastewater Systems

An OWTS that will serve a business, commercial, industrial or institutional property, or a multifamily dwelling must:

- A. Be designed by a professional engineer;

- B. 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 industrial, animal, or process waste; and
- C. Receive authorization by rule or a class V underground injection permit from the United States Environmental Protection Agency (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, this Department may require a permit for this type of use.

SECTION 12 DESIGN CRITERIA - COMPONENTS

12.1 Tanks and Vaults

- A. Watertightness
 - 1) Septic tanks, vaults, dosing tanks, other treatment components, risers, and lids must not allow infiltration of ground water or surface water and must not allow the release of wastewater or liquids through other than designed openings.
 - 2) When the final compartment of a tank is being proposed for use as a pump or siphon chamber, the wall between this 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 include water filling the tank or vacuum testing.
- B. Tank Installation: All tanks must be installed level and 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, see Table 8.
- C. Tank Anchoring

In locations where ground water or floodwaters may cause instability problems to the septic tank, vault, or other treatment unit in the OWTS due to flotation, the tank, vault, or unit must be anchored in a manner 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 designs, 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 for the purpose of inspection that is readily visible when inspected before backfilling. The marking inscription must include the following:

- 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 tanks are designed to resist; and
- 5) Inlet and outlet identifications, if relevant.

12.2 Septic Tanks

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

B. Sizing Requirements:

- 1) Sizing for residential capacity for new installations must be based upon the number of bedrooms according to Table 9 in Appendix A.
- 2) For multi-family and non-residential applications, a septic tank 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, if it provides a minimum of 48 hours detention time.
- 4) Minimum tank size for new installations other than for a single-family residence is 500 gallons.
- 5) Where a grinder pump is installed prior to the septic tank, the required tank volume must be increased by at least 500 gallons above the required volumes provided in Table 9. An ejector pump should be used in place of a grinder pump wherever possible.
- 6) 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.

C. Inspection and Testing of Septic Tank Watertightness

- 1) Testing of septic tanks must be performed and evaluated as specified in the most current version of ASTM C1227-22 (2022 version or earlier) (Standard Specification for Precast Septic Tanks) for concrete tanks or in the most current version of IAPMO/ANSI Z1000 (2019 version) (American Standards for Prefabricated Septic Tanks) for other prefabricated septic tanks.
- 2) Each unit must be inspected in the field for conditions that may compromise its watertightness.
- 3) The inspection in the field must be conducted by the Department and be performed after the tank installation but before backfilling.
- 4) If the inspection in the field indicates that the tank may be damaged or is not watertight, the inspector may require that the tank be tested for watertightness by the tank manufacturer or the system contractor.

D. Septic Tank Design and Dimension Criteria

- 1) A septic tank must have two (2) or more compartments, or more than one (1) 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 (1/2) of the required effective volume.
- 2) Inlet invert must be at least two (2) inches higher than the outlet invert.
- 3) Inlet tee or baffle must extend above the surface of the liquid at least five (5) inches and must extend a minimum of eight (8) inches below the liquid surface. However, the inlet tee or baffle must not extend to a depth of more than 40 percent of the liquid depth measured from the liquid surface.
 - a) Inlet tee must consist of a sweeping bend.
- 4) Outlet tee or baffle must extend at least five (5) inches above and 14 inches below the outlet invert; however, it must not extend to more than 40 percent of the 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 10 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 and 40 percent (35-40%) of the liquid depth measured from the liquid surface.
- 8) At least one (1) access opening no less than 20 inches across must be provided in each compartment of a septic tank.
- 9) Risers must be installed in conformance with Section 11.4 of this Regulation.
- 10) A septic tank must have a minimum of 25 square feet of liquid surface area and have at least a six (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 six (6) feet. The requirements for liquid surface area and separation between inlet and outlet may be waived for tanks with less than 750 gallons effective volume.
- 11) Tanks proposed to be located below vehicular traffic areas must have the appropriate AASHTO H-20 or HS-20 ratings for such use.

E. Concrete Septic Tank Structural Design

- 1) Concrete septic tanks must comply with the structural design criteria of the most current version of ASTM C1227-22 (2022 version) (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 this Regulation.
- 3) Certification by a professional engineer 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 to provide for a watertight seal.

F. 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 the most current version of IAPMO/ANSI Z1000 (2019 version) (American Standards for Prefabricated Septic Tanks) and be certified by a professional engineer as meeting these standards. The professional engineer certifying the criteria must be registered or licensed in the United States, but need not be registered in Colorado.
- 2) All tanks must be sold and delivered by the manufacturer or manufacturer's designated representative, preferably completely assembled. On-site tank assembly will be allowed on an as-needed basis.

- 3) Tanks must be structurally sound and 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 five percent (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 to be watertight.

G. Septic Tank Depth

- 1) Concrete septic tanks and other concrete tanks containing treatment units shall be installed no deeper than four (4) feet from the top of finished grade to the top of the tank. This requirement may be waived for repairs or expansions.
- 2) Fiberglass, Fiberglass-Reinforced Polyester, and Plastic Tanks shall be no deeper than allowed by the manufacturer, or four (4) feet, whichever is less. This requirement may be waived for repairs or expansions.

H. Metal tanks are prohibited.

- I. For use in newly installed or replacement OWTS, septic tanks must have received approval from CDPHE.

12.3 Pipe Standards and Bedding Requirements

A. Pipe Standards

- 1) All wastewater pipes must be constructed of compatible pipe, primer, bonding agent, and fittings.
- 2) Flexible couplings to connect pipes may only be used in those portions of an OWTS that are intended for gravity flow of wastewater. Flexible couplings are not permitted for plastic pipe to plastic pipe connections on the inlet line to the primary treatment tank.
- 3) Where non-perforated plastic pipe and fittings are used for gravity flow, the minimum wall thickness of the pipe must conform to ASTM Standard D 3034-21 (2021 version) or equivalent or greater strength. Schedule 40 pipe is preferred.
- 4) Perforated distribution pipe surrounded by rock within a soil treatment area must have a minimum wall thickness and perforations conforming to ASTM Standard D 2729-21 (2021 version) or equivalent or greater strength. Corrugated polyethylene pipe with a smooth interior that meets ASTM F667/F667M (2021 version) or AASHTO M252-24 (2024 version) specifications or equivalent may be used.

- 5) Schedule 40 [ASTM Standard D3034-24 (2024 version)] or pipe of equivalent or greater strength must be used where pipe is installed under the following conditions:
 - 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 pipe, is recommended.
 - b) Five (5) feet prior to and beyond all tanks; and
 - c) In instances where sewer line setback distances are granted a variance for any reason.
- 6) Tile pipe, open-joint pipe, and cast-iron pipe must not be used in an OWTS.
- 7) 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.

B. Excavation

- 1) Excavations for pipelines, fittings, and appurtenances shall be open trench to the depth, grade, and in the direction necessary. The trench bottom shall be graded to provide a smooth, firm and stable foundation at every point throughout the length of the pipe, fitting or appurtenance. Should large gravel, cobbles, rocks, clods, or other unsuitable material be encountered at the trench bottom, they shall be removed. (See Diagram 3 in Appendix B). Where necessary, approved fill as specified in Section 12.3.C shall be placed to provide uniform support between the pipe, fitting or appurtenance and undisturbed trench bottom. 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 loads and to ensure continuous bearing along the pipe barrel upon the pipe subgrade (trench bottom).
- 2) Sewer line from the building to the tank shall be installed a minimum of 22 inches deep. If the sewer line is required to be installed shallower than 22 inches, design considerations must be included to prevent freezing.

C. Bedding and Approved Bedding Materials

- 1) All system piping, except for distribution laterals within the soil treatment area, must be bedded with select material before final inspection by the Department.
- 2) Approved bedding shall be as specified in Table 8 in Appendix A. All voids between the pipe and undisturbed soils shall be filled with approved bedding. Approved bedding shall 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. (See Diagram 3 in Appendix B). Alternate bedding materials and/or methods may be allowed upon prior approval from the Department. Bedding material may consist of on-site job-excavated or imported material. The Department may require that an alternate fill material or method be specified and approved by a Registered Professional Engineer.

D. Pipe Grade and Size

- 1) The grade of the building sewer shall be at least two percent (2%) (two [2] feet of fall per one hundred [100] feet or one-fourth [1/4] inch per foot), but the Department may require no greater than four percent (4%) (four [4] feet of fall per one hundred [100] feet or one-half [1/2] inch per foot). Buildings shall be planned so that a proper slope can be obtained. Where the terrain is extremely flat, the Department may allow a slope of only five-tenths percent (0.5%) (six [6] inch fall per one hundred [100] feet or one-sixteenth [1/16] inch per foot).
- 2) Building sewer pipe from the foundation to the septic tank must be no less than four (4) inches in diameter.

E. Cleanouts Required Between the Building and the Septic Tank:

- 1) Cleanouts must consist of a dual-direction sanitary wye, riser to grade, and secure cap. All cleanouts must extend to or be easily accessible from grade.
- 2) Cleanouts shall be provided at the following locations:
 - a) Within five (5) feet of the outside of the building, when possible, otherwise at a distance no further than 50 feet of the outside wall. Local Building Codes may also apply.
 - b) Upstream at each change of direction of the building sewer greater than 45 degrees and at any combination of bends greater than 45 degrees occurring within any ten (10) foot section of building sewer, except between the septic tank and soil treatment area.
 - c) At intervals of not more than 100 feet, except between the septic tank and soil treatment area.
- 3) If a cleanout is not already provided outside of the building, a dual-direction sanitary wye, no smaller than the building sewer, must be installed between the building and the septic tank, as close to the home as practical, but at a distance no further than 50 feet from the outside wall. Local Building Codes may also apply.
 - a) For long runs of piping, building sewers must have a cleanout installed at intervals of not more than 100 feet.
 - b) 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 this fitting.
 - c) 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.

4) Pipe requirements at 90-degree turns

a) A 90-degree turn may be accomplished using either two (2) 45-degree elbows or a single long-sweep 90-degree elbow.

b) A single 90-degree elbow (short or standard sweep) is not permitted.

12.4 Diverter Valve

A diverter valve, if used, shall consist of the following:

A. A pre-manufactured valve body

B. For manually activated valves, a valve key, of sufficient length to reach the valve body from the ground surface

C. A riser and watertight access lid or cap, installed at grade

12.5 Distribution Box

A distribution box, if used, must be of sufficient size to distribute effluent equally to the laterals of a trench or absorption bed system. The box must be constructed with the inlet invert at least one (1) inch above the level of the outlet inverts. Flow equalizers or similar devices must be used to adjust the flow between laterals. Access to the 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.

12.6 Drop Box

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 shall have a riser at or above final grade if the top of the drop box does not reach final grade. Outlet pipes in sequential distribution must be designed and installed so that they may be capped off for resting periods.

12.7 Stepdown/Relief Pipe

In sequential distribution, a non-perforated 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.

12.8 Wastewater Pumping and Dosing Siphon Systems

A. Pumps

- 1) A non-clog pump opening must have at least two (2) inch diameter solids handling capacity where raw wastewater is pumped. A pump opening must not have more than three-quarter (3/4) inch diameter solids handling capacity if previously settled effluent is pumped.
- 2) Pumps must be certified to the applicable UL or 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 also be certified to NSF/ANSI Standard 46 (2022 or earlier version) and bear the seal of approval of the NSF or equivalent testing and certification program.
 - a) Where a grinder pump or ejector pump is used prior to the septic tank, an effluent filter is required to be installed on the outlet of the septic tank. Additional tank requirements are provided in Section 12.2.B.5.
 - b) Where a grinder pump or ejector pump is used prior to the septic tank, the effluent pipe from the grinder pump must be connected to the sewer line prior to the inlet of the septic tank.
- 4) Pumps shall be installed at least two (2) inches off the floor of the tank.

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. Components used to hold the floats must be securely attached and of a material that is resistant to corrosion and will not absorb water.
- 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. The tank must be of sufficient volume to allow pump or siphon cycling commensurate with the design capacity.
- 2) The second compartment of a two-compartment septic tank may only be used as the pump tank when the tank is specifically designed for this purpose and it can be

demonstrated to the satisfaction of the Department that the minimum 48-hour detention time will not be decreased. The pump must be screened to remove solids greater than 1/8", assuring 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 in accordance with the requirements of Section 12.2.D.5. 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 elevations, and through a standard tee designed and located as per the requirements of Section 12.2.D.5.

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 (2) or more feet per second.
- 4) Pressure pipes must be designed to prevent air or vacuum locking and allow self-draining of the pipes.

E. Access

- 1) The pump or dosing system tank, chamber, or compartment must have a minimum of 24-inch nominal diameter access riser, made of corrosion-resistant material, extending to or 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 electrical or other component access must also be watertight.

F. Splice Box (Junction Box)

- 1) Splice boxes must be located outside and attached to the pump system access riser and be accessible from the ground surface. If no riser is present, splice boxes shall be located on an approved pedestal located adjacent to the pump access manhole.

- 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:
 - a) The pump system must have an audible and visual alarm notification in the event an excessively high water condition occurs;
 - b) The pump must be connected to a control breaker separate from the alarm breaker and from any other control system circuits;
 - c) An electrical disconnect must be provided within the line of sight of the pump chamber;
 - d) The pump system must be provided with a means that will allow the pump to be manually operated; such as an H.O.A. switch (Hand/Off/Auto);
 - e) 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; and
 - f) Must bear the seal of a Nationally Recognized Testing Laboratory (NRTL), such as Underwriters Laboratory (UL), Electrical Testing Lab (ETL), or Canadian Standards Association (CSA).
 - g) The bottom of the control panel must be at least 30-inches above grade.

12.9 Effluent Filter

- A. The Department requires that effluent filters be installed in the terminal septic treatment tank prior to distribution to the soil treatment area in new installations and repairs in which the septic tank is replaced.
- B. When effluent filters are required, the septic tank outlet or the outlet of the last septic tank in series must include an effluent filter that retains solids greater than one-eighth inch in size. Effluent filters must be sized to meet the estimated daily design flow and waste strength.
- C. If a pump is used to remove septic tank effluent from the final compartment of a two-compartment tank, in which the first compartment is utilized to provide treatment, and the second compartment only for dosing, 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 would all be considered acceptable.

- D. The effluent filter must be cleaned at manufacturer-recommended intervals, or more often, if use patterns indicate.
- E. An alarm may be installed on an effluent filter indicating the need for maintenance. An alarm is required on an effluent filter for pressure-dosed systems. The Department may require all 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 to within 12 inches of grade.

12.10 Grease Interceptor Tanks

- A. All commercial food service facilities and other facilities generating fats, oils, and grease in their waste must install a grease interceptor tank.
- B. Grease interceptor tanks shall treat only 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 one-third 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 5 inches above the liquid level and must provide for a free vent area across the liquid surface.

SECTION 13 DESIGN CRITERIA - SOIL TREATMENT AREA

13.1 Size and Design-Basis

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

13.2 Engineered Systems

At proposed soil treatment area locations receiving domestic wastewater, where any of the following conditions are present, the OWTS must be designed by a professional engineer and approved by the Department:

- A. For OWTS installed in soil types 3A, 4, 4A, 5, FBR, DBR, R-0, R-1, and R-2, and R-3, and Treatment Levels TL2, TL2N, TL3, and TL3N, as specified in Tables 10 and 11A of this regulation;
- B. For OWTS that include components which provide Treatment Levels TL2, TL2N, TL3, TL3N, and TL3ND effluent; or include an NDDS;
- C. The maximum seasonal level of the ground water surface is less than four feet below the bottom of the proposed infiltrative surface;
- D. Where a limiting layer, restrictive layer, or groundwater condition exists less than four feet below the bottom of the proposed infiltrative surface;
- E. Floodplains or floodways, as required in Section 11.11;
- F. The ground slope is in excess of 20%;
- G. Pressure distribution is used; or
- H. OWTS for business, commercial, industrial, institutional use, or multi-family dwellings.

13.3 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 and seepage pits that are permissible in repairs (see 13.8.F and G).
- B. Long-term acceptance rates (LTARs) are shown in Table 10 and Table 11A in Appendix A.
- C. If the site evaluation includes a percolation test in addition to a visual tactile evaluation of a soil profile test pit excavation, and the visual-tactile evaluation and percolation test results do not coincide with the same LTAR in Table 10 in Appendix A, the designer shall use the lesser LTAR in determining the size of the soil treatment area.
- D. The required area in square feet for a soil treatment area is determined by the following formula:
 - 1)
$$\text{Soil Treatment Area (sq. ft.)} = \frac{\text{Design Flow (in gallons per day)}}{\text{LTAR (in gallons per day per square foot)}}$$
 - 2) Adjusted Soil Treatment Area = Required Soil Treatment Area x Size Adjustment Factor(s).
 - 3) Size adjustment factors for methods of application are in Table 12 in Appendix A.
 - 4) Size adjustment factors for types of distribution media are in Table 13 in Appendix A.

- 5) A soil treatment area receiving TL1 effluent shall apply the size adjustment factors in Tables 12 and 13 in Appendix A, when such adjustments result in an increase in required area.
- 6) Tables 12 and 13, Appendix A, may be used either individually or in combination, when such adjustments result in a decrease in required soil treatment area, provided that the resulting design meets all performance criteria of these regulations.
- 7) The distribution media options within Table 13 may be used for distribution of higher-level treatment system effluent (TL2 – TL3ND), however, the size reduction factors within Table 13 must not be used. Sizing reductions for higher-level treatment systems are achieved through increased LTARs provided in Table 10.
- 8) 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 to 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.

13.4 Allowable Soil Treatment Area Sizing Adjustments

- A. The soil treatment area size determined by dividing the design flow rate by the long-term acceptance rate may be adjusted by factors for method of treatment, soil treatment area design, and type of distribution media.
- B. For the purpose of Tables 12 and 13 in Appendix A, a “baseline system,” i.e., an adjustment factor of 1.00, is considered to be TL1 applied by gravity to a gravel-filled trench.
- C. Sizing adjustments are not allowed for systems placed in type “R” soils. The maximum LTAR’s are provided in Section 14.3.D.
- D. Long-term acceptance rates for use of the higher-level treatment categories listed in Table 10 in Appendix A will only apply provided the system is inspected and maintained as required in Section 5.

13.5 Design of Distribution Systems

- A. General
 - 1) The infiltrative surface and distribution laterals 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 the requirements of Section 5. The depth of the infiltrative surface will be measured on the up-slope side of the trench or bed.
 - 3) Where a conforming soil treatment area is reasonably available, the soil treatment area must not be placed below a paved surface, or an area where vehicular traffic occurs or is expected. If a compliant site for the soil treatment area cannot be identified, it may be placed below a paved surface when all of the following conditions are met:
 - 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 13 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) Pipe for gravity distribution must be no less than three inches in diameter.
 - 6) A final cover of soil suitable for vegetation at least 10 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 devoid of cobbles, boulders, building debris, or other non-permeable material. The preferred soil cover is a sandy loam textured material, topped with two to three 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. It must also allow for the establishment of vegetative cover, minimize settlement, and maintain proper drainage.
 - 9) Dosing may be used for soil treatment area distribution. The dose must be sized to account for the daily flow and the dosing frequency.
- B. Distribution Laterals
- 1) Must meet the requirements of Section 12.3 as applicable.

- 2) 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.
- 3) The maximum length of distribution laterals must not exceed 150 feet.
- 4) 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.
- 5) For absorption beds, the separating distance between parallel gravity distribution laterals must not exceed six feet (center-to-center), and a distribution lateral must be located within three feet of each sidewall and endwall.
- 6) The end of non-pressurized distribution pipe must be capped, unless it is in a bed, where the ends of the pipes may be looped.
- 7) To promote equal distribution to the soil treatment area, the effluent pipe on a gravity flow system must be connected 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.
- 8) Orifices must be oriented downward unless pressure distribution is used and provision for pipe drainage is included.

C. Inspection Ports

- 1) A four-inch inspection port accessible from the 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 a distribution pipe.
- 2) Perforations or 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.
- 3) The top of the inspection ports shall be saw cut at pipe quadrants to the depth of the top cap to allow for cap removal for inspection and replacement following the inspection.
- 4) Screw-on caps are prohibited on inspection ports unless the inspection port is secured to prevent rotation of the inspection port when opening the screw cap.
- 5) Inspection ports in chambers may be installed according to manufacturer's instructions if the infiltrative surface and effluent levels can be observed from the inspection port.

- 6) Additional inspection ports connected to distribution pipes may be installed.
- 7) The top of 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.

D. Trenches

- 1) Trenches must be three (3) feet wide or less.
- 2) The separating distance between trenches must be a minimum of four (4) feet, sidewall-to-sidewall.
- 3) Distribution laterals used in a trench must be as close to the center of the trench as possible.

E. Beds

- 1) Maximum width for a bed must be 12 feet, unless the bed receives effluent meeting TL2 quality or better, or is a repair.
- 2) The separating distance between beds must be a minimum of six (6) feet sidewall-to-sidewall.

F. Serial and Sequential Distribution:

- 1) New serial distribution systems, where the 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 drop box arrangement such that each trench fills with effluent to 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 subsequent trenches.

G. Storage/Distribution Media

- 1) Rock and Pipe
 - a) The pipe must be surrounded by clean, graded gravel, rock, or other material of equal efficiency which must range in size from one-half (1/2) inch to two and one-

half (2 ½) inches. AASHTO M 43-05 (2005 version) size No. 3 coarse aggregate meets this specification.

- b) 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 at least two inches above the top of the distribution pipe.
- c) The top of the placed gravel or such 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 must not be used.
- d) See Diagram 5 for a cross section of rock and pipe.

2) Tire Chips

- a) The pipe may be surrounded with clean, uniformly-sized tire chips.
- b) Tire chips must be nominally two (2) inches in size and may range from one-half (1/2) inch to a maximum of four (4) inches in any one direction.
- c) Wire strands must not protrude from the tire chips more than 0.75 inches.
- d) Tire chips must be free from balls of wire and fine particles less than two (2) mm across.
- e) 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 must not be used.

3) 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 so as 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 according to manufacturer's instructions.
- d) Pursuant to Section 16.5.A.4, 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.

- e) Effluent may be distributed by gravity, pump, or siphon.
 - f) Pipe installed to the ends or along the length of chambers shall not be installed on the infiltrative surface.
- 4) Enhanced Manufactured Media or Other Manufactured Media
- a) 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.
 - b) Installation must be according to manufacturer's instructions.
 - c) Pressure distribution is required for TL2 to TL3N effluent, unless otherwise noted in this Regulation.

H. Pressure Distribution

- 1) Design of pressure distribution systems must include:
- a) Dose size and frequency, for either proposed flows and soil type, or media long-term acceptance rate.
 - b) Float settings to achieve desired dose volume.
 - c) Pipe diameter and strength requirements.
 - d) Orifice size and spacing.
 - e) A 30 to 72 inch operating head at the distal end orifice.
 - f) Pump/siphon information; Total Dynamic Head; gpm
 - g) Drain-back volume from force main; and
 - h) Calculations, or a design software reference, that indicate the selected component sizing will provide equal flow within each active zone of the distribution system, and provides no more than a 10% flow differential from the initial orifice to the most distal end orifice within each zone.
- 2) The separation distance between parallel distribution pipes in a pressure distribution absorption bed must not exceed four feet, and the outer distribution pipe must be located within two feet of each sidewall and endwall. Specific requirements for the design of sand filters are noted in Section 14.3.
- 3) Flushing valve assemblies must be installed at the distal end of each lateral and be accessible from finished grade. A sweeping 90-degree bend or bends limited to 45

degrees must be provided. Diagram 7 in Appendix B illustrates the components of a typical pressure distribution system.

I. Drip Dispersal Systems

- 1) The infiltrative surface area must be calculated using the long-term acceptance rate for the site or a more conservative value if recommended by the manufacturer. Adjustment factors in Tables 12 and 13 may not be used.
- 2) Driplines must be installed on manufacturer's spacing recommendations.
- 3) Drainback must be provided for all driplines, pipes and pumps.
- 4) Provisions must be made to minimize freezing in the distribution lines, driplines, relief valves, and control systems.
- 5) Provisions must be made for filtering, back-flushing, or other required maintenance.

13.6 Alternating and Sequencing Zone Systems

A. Alternating Systems

- 1) An alternating system must have two or more zones that must be alternated on an annual or more frequent basis.
- 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 of this Regulation.
- 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.

B. 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 professional engineer based on projected daily flow rates, number of zones, and soil types.

13.7 Soil Replacement

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

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 14.3.B.5.
 - b) The long-term acceptance rates as specified in Table 11 and Section 14.3.D must be used. No additional sizing adjustments are allowed.
 - c) The depth of the added media must comply with the requirements of Table 11.
 - d) All added soil must be completely settled prior to installation of components as specified and approved by the professional 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 1-5 (Table 10) 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 14.3.B.5.
- 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 Sections 14.3 and 14.4, 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 14.3. 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. All added soil must be completely settled prior to installation of components.
- 4) The soil treatment area may be dosed or gravity fed if using a TL1 long-term acceptance rate.

13.8 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 6 when possible. When this is not possible using all available methods described above, the Department may permit reductions to setbacks. At no point may a setback reduction be approved by the Department less than what the existing separation to the existing OWTS. In maximizing this setback distance, all methods available in Section 13.8.A 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 of Health as outlined in Section 3.10.
- C. Soils information obtained for the previous OWTS installation may be used if the information meets the requirements of Section 8.5.A.10. Otherwise, an additional soils investigation will be required.

D. Deep Beds

For repairs, the infiltrative surface of a bed may be no deeper than five (5) feet. Size adjustments as provided for in Tables 12 and 13 must not be applied. System sizing will be based strictly on the soil type and corresponding LTAR.

E. Wide Beds

For repairs, beds may be wider than 12 feet without being required to receive effluent meeting TL2 quality or better.

F. Deep Gravel Trenches

- 1) Deep gravel trenches may only be installed in soil type 1, 2, 2A, and 3. Installations in soil types 3A, 4, 4A, 5, and 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:

- a) L = length of trench in feet prior to adjustment for deep gravel
- b) W = width of trench in feet
- c) 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 must be met.
- 4) The maximum allowable depth from existing grade to the trench bottom is five feet.
- 5) Evaluation of soil profile test pit excavations or percolation tests must be performed at the proposed infiltrative surface depth.
- 6) Size adjustments as provided for in Tables 12 and 13 must not be applied to deep gravel trenches.

G. Seepage Pit Repairs

- 1) The seepage pit must be designed by a professional engineer.
- 2) The design includes higher-level treatment of at least TL2.
- 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, or cinder block 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 five 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 2 ½ 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.

H. Wastewater Ponds

- 1) Construction of new wastewater ponds is prohibited.
- 2) For repairs of an existing wastewater pond, the potential for risk to public health and water quality may be evaluated by the Department. If risk is low in the determination of the Department, the repair of a wastewater pond may be permitted; however the following criteria must be followed:
 - a) A septic tank must precede the wastewater pond.
 - b) The depth of the design volume of the wastewater pond must be at least five feet.
 - c) A wastewater pond must have two feet of free board above the design volume of the pond.
 - d) A wastewater pond must be fenced to keep out livestock, pets, vermin, and unauthorized people.
 - e) Wastewater ponds must be designed on the basis of monthly water balance including design flow, precipitation, evaporation, and seepage.
 - f) Wastewater ponds must be constructed so the seepage out of the bottom or sides does not exceed 1/32 of an 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.
 - g) If the evapotranspiration does not exceed the rate of inflow of effluent from the structure, a soil treatment area meeting the requirements of these Regulations must be installed to accept the excess flow.
 - h) 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.
 - i) Wastewater ponds must be designed by a professional engineer.

I. Vaults

- 1) Criteria for vaults are in Section 12.1 of this Regulation.

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 defined in Table 4 are not granted to remediation technologies.
- 2) The Department 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 a remediation technology or process constitutes an alteration to the OWTS, and therefore the owner must obtain a permit for this work from the Department.
- 4) Upon approval of the Department, 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 these Regulations within a time frame determined by the Department.
- 7) The Department may require monitoring and/or maintenance of the remediation technology or process as a stipulation of permit issuance.

SECTION 14 DESIGN CRITERIA – HIGHER-LEVEL TREATMENT SYSTEMS

14.1 General

- B. Higher-level treatment systems must be designed by a professional engineer.
- C. 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 the Department. 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 manufacturer's instructions and additional criteria identified in the Technology Review and Acceptance process, Section 16.4.
- D. Soil treatment areas for higher-level treatment systems must be pressure dosed.
- E. Systems must be capable of accommodating all anticipated flows and organic loads.
- F. 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.
- G. 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.

14.2 Treatment Levels

The treatment levels identified in Table 4 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 16.4. Adequate maintenance for each system is required and must be documented as required in Section 6.

14.3 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 effluent into a soil treatment area.
- B. Intermittent (Single Pass) Sand Filters; General Requirements
 - 1) Diagrams 8 and 9 in Appendix B illustrate typical sand filter components.
 - 2) The treatment level for intermittent sand filters is considered TL3.
 - 3) Size adjustment factors provided in Tables 12 and 13 are not applicable for sand filters.
 - 4) Dosing
 - a) Pressure distribution is required. The design of the distribution system must comply with the requirements of Section 13.5.H.
 - 5) Sand Filter Treatment Media
 - a) The depth of the sand media below the distribution system must be at least 24 inches, unless otherwise noted in Table 11 for type "R" soils.

b) "Imported Treatment Sand" media requirements:

- i) Effective size: 0.15-0.60 mm
- ii) Uniformity coefficient: ≤ 7.0
- iii) Percent fines passing #200 sieve must be ≤ 3.0
- iv) 100% must pass the 3/8" sieve; $\geq 95\%$ must pass the #4 sieve; $>65\%$ must pass the #10 sieve (2 mm).

c) A gradation of the sand media used must be provided.

- i) 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.
- ii) The gradation must be provided to the Department on letterhead from either the source gravel pit, or independent materials testing laboratory.

6) Gravel Requirements

- a) Clean, graded gravel, or rock, must range in size from 1/2 inch to 2 1/2 inches. AASHTO M 43 (2022 version), 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 six inches below and two inches above the pipes.
- c) Division accepted manufactured media may be used as an alternative to specified gravel.

7) Filter Fabric Requirements

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.

8) Final Cover Material

A final cover of 8 inches to 10 inches of Type 1 or 2 soil with an additional two inches of topsoil must be provided.

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

C. Unlined (Open Bottom) Sand Filters

- 1) All requirements of 14.3.B.2 through 14.3.B.9 will apply to unlined sand filters.

- 2) Application rates for the distribution media where a minimum of 24 inches of imported treatment sand is installed:
 - a) Maximum hydraulic loading rate for TL1 effluent applied to imported treatment sand in an unlined sand filter is 0.8 gal./sq.ft./day.
 - b) 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).
- 3) Application rates for the in-situ soil where a minimum of 24 inches of imported treatment sand is installed:
 - a) 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) of the most restrictive soil within 12 inches below the sand base.
- 4) 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.
- 5) 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.
- 6) 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.
- 7) 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.
- 8) 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.

D. Lined, Single-Pass Sand Filters

- 1) All requirements for application rates provided within Section 14.3.B will apply to lined sand filters.
- 2) The minimum depth of the sand media in a lined sand filter must be two feet.
 - a) An intermediate layer of pea gravel, two inches in thickness, must be placed between the sand filter media and the coarse 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.
 - b) 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 five-inch-thick bed of washed, graded

gravel, or rock ranging in size from 1/2 inch to 2 1/2 inches. AASHTO M 43-05 (2005 version), No. 3 coarse aggregate meets this specification.

- c) 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.
- d) 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.
- e) The base of the liner must be at least two feet above an actual or seasonal high ground water elevation.

E. Lined, Recirculating Sand Filter

- 1) 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. The engineer must justify through calculations or design software that the selected values will concur with industry standards.
 - a) Distribution pipe size: 3/4 inch – 2 inches (PVC Class 200, min.)
 - b) Distribution pipe spacing: 18 inches – 36 inches (24 inches typ.)
 - c) Orifice size: 1/8 inch – 1/4 inch
 - d) Orifice spacing: 18 inches – 36 inches (24 inches typ.)
 - e) Pressure head at end of distribution pipe: 24 inches – 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 13.5.H.
 - 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 1/2 inch to 2 1/2 inches. AASHTO M 43-05 (2005 version), 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 six inches below and two 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) Percent fines passing #200 sieve: ≤ 1.0
 - d) Media depth (min.): ≥ 24 inches
- 6) Intermediate gravel layer:
- 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 33-16 (2016 version), No. 8, coarse aggregate).
- 7) Under-drain requirements:
- 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 five-inch-thick bed of washed, graded gravel, or rock ranging in size from 1/2 inch to 2 1/2 inches. AASHTO M 43-05 (2005 version), 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 two feet above an actual or seasonal high ground water 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.

14.4 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 provide 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 provide 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; TL2 or TL3.
 - 3) Where TL1 effluent is 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 is 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 the 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 sand may use the TL3 application rates (Table 10) of the most restrictive in-situ soil layer within 12 inches of the imported sand base. Size adjustment factors within Table 13 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. 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 13 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; TL2 or TL3. Vertical separation requirements of Table 7 must be met, relative to the treatment level of the effluent received. Size adjustment factors within Table 13 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 are a main component, placement on the slope and percent 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 to 5 (Table 10), 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 type with permeabilities less than 60 min./inch (Table 10) and R-0 to R-2 (Table 11A), 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 permeabilities less than 60 min./inch (Table 10 and Table 11A), the 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, and 11A), 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 14.3.C, unless otherwise specified in this section.
- F. The basal area must be determined using the requirements for the soil loading rate and linear loading rate provided above.

- G. The final cover over a mound system must extend at least 12 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 one foot vertical.
- H. The surface of the mounded area must be planted with a suitable vegetative cover, preventing erosion and promoting run-off.
- I. Suggested references for the design and installation of mound systems are, "The CDPHE Mounded Wastewater Treatment Systems Technical Guidance" and "The Wisconsin Mound Soil Absorption System: Siting, Design, and Construction Manual, January 2000". Note that these are suggested guidance documents, and where the requirements of these Regulations differ from those in the referenced mound documents, the requirements of these Regulations will govern in those cases.

14.5 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 15 DESIGN CRITERIA - OTHER SYSTEMS

15.1 Evapotranspiration and Evapotranspiration/Absorption Systems

- A. 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 percent, 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 15 and be approved by the professional engineer. This sand is to be covered by a crowned, thin layer of loamy sand mix and appropriate vegetation that will assist in drawing the water to the surface.
 - a) The gradation of the wicking sand must be submitted to the Department on letterhead from either the source gravel pit, or independent materials testing laboratory. The gradation must be dated no more than one month prior to the installation date.
 - 7) Adjustment factors as provided in Tables 12 and 13 must not be used.
- B. For systems designed strictly as an evapotranspiration bed, the following criteria must be met:
- 1) Design data to be furnished must include but shall not be 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, 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 for determining the minimum area necessary for total evapotranspiration of septic tank effluent:
$$\text{Area (in sq.ft./)*} = \frac{\text{Design Flow (in gallons per day)} \times 586}{\text{Lake Evaporation Rate at the Site (in inches per year)}}$$

* Additional area may be required based on the annual water balance calculations.
 - 3) Designs must 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 the 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 which penetrate between the distribution system to the bottom of the bed, must be at least 15 percent 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 the Department, the surface area may be multiplied by 0.6 to obtain the required area.
- C. 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 within Section 13.5.A.5. 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 which penetrate between the distribution system to the bottom of the bed, must be at least 15 percent 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 long-term acceptance rate for that soil type and the formulas provided in Section 15.1.C.5 below.
 - 5) The following formula must be used for determining the minimum area necessary for evapotranspiration/absorption of septic tank effluent:

$$\text{Area (sq.ft.)}^* = \frac{\text{Flow (gpd)}}{(\text{LTAR} + \text{ETR})}$$

Where:

- a) LTAR refers to the long-term acceptance rate of the underlying soil as provided in Table 10 for TL1 effluent.
- b) ETR refers to the evapotranspiration rate derived from the following formula:

$$\text{ETR (gal./day/sq. ft.)} = \frac{\text{Lake Evaporation Rate at the Site (in inches per year)}}{586}$$

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

15.2 Non-Pressurized Drip Dispersal Systems (NDDS)

- A. An NDDS is considered an evapotranspiration/absorption system. However, as specific design criteria are provided for an NDDS (see sections 15.2.B and 15.2.C), they are exempt from the additional requirements of pressure distribution and items within Section 15.1.
- B. The design of an NDDS must follow the procedures stated in the document titled: The Colorado Professionals in Onsite Wastewater Guidelines for the Design and Installation of Non-Pressurized Drip Dispersal Systems (NDDS), Revision: October, 2024. The document is available from Colorado Professionals in Onsite Wastewater (www.cpow.net).
- C. The width of an NDDS system may be wider than 12 feet.
- D. NDDS shall be designed by a Registered Professional Engineer.
- E. An NDDS system shall conform to Sections 5 and 14.1 for higher-level treatment systems.

15.3 Vaults Other Than Vault Privies

- A. Vaults are prohibited for sites that cannot provide access for routine pumping and general system maintenance.
- B. Vaults for full time use in new construction are prohibited where a property can accommodate an OWTS with a soil treatment area.
- C. Vaults for full-time use may be permitted when a failing OWTS cannot be replaced and the property cannot accommodate a conforming system.
- D. Vaults may be permitted for limited use occupancy on a property which cannot accommodate an OWTS with a soil treatment area.
- E. A vault may be permitted if the facility is on land where the installation of an OWTS with soil treatment area is not permitted.
- F. Vaults may be permitted for systems where some of the wastewater flows are separated, such as toilet waste only, or a private recreational vehicle dump station, into a vault. The portion not retained in the vault must be treated in an OWTS sized per the requirements of this Regulation.
- G. Vaults may be permitted for commercial recreational vehicle waste disposal.
- H. Variances may be granted for specialized commercial uses.
- I. When in use, a vault must be accessible for routine pumping and maintenance.

- J. A vault, if permitted by the Department, must have a minimum 1000-gallon effective volume or be capable of holding a minimum of the 48-hour design wastewater flow, whichever is larger.
- K. A visual or an audible signal device or both, indicating filling to a maximum of 75 percent (75%) capacity, must be installed to indicate when pumping is necessary.
- L. Concrete vaults must meet the strength and watertightness requirements for septic tanks. Prefabricated fiberglass, fiberglass-reinforced polyester, and plastic tanks may be used as vaults, if the tank manufacturer provides testing criteria certifying them for this use. All tanks must meet the structural design requirements of 12.2.E and 12.2.F.
- M. Vaults must be watertight and meet the requirements of Section 12.1.
- N. Metal vaults are prohibited.

15.4 Privies

A. Vault Privy

- 1) Effective volume of the vault must be no less than 400 gallons and it must be constructed of concrete, fiberglass, or plastic. The vaults for privies must meet the structural and watertightness requirements of Section 12.2.E or 12.2.F as applicable.
- 2) 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

- 1) The construction of new pit privies is prohibited.
- 2) The repair of an existing pit privy is not permitted. If a conforming OWTS cannot be accommodated, the pit privy may be converted to a vault privy. See Section 18.1.B. for further prohibitions.
- 3) Abandonment of a pit privy shall conform to Section 6.8.F.

15.5 Incinerating, Composting and Chemical Toilets

Incinerating, composting, and chemical toilets are prohibited in permanently occupied buildings, unless otherwise approved by the Department on a case-by-case basis, and must comply with all pertinent sections of CDPHE Regulation 43.12.E and all applicable portions of Sections 4 and 5 of

this Regulation. If permitted, the use of an incinerating, composting, or chemical toilet will not reduce the required size of the OWTS.

15.6 Disinfection Systems

- A. Disinfection system 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.
 - 4) The system must comply with all requirements in Section 6.3.

15.7 Slit Trench Latrine

- A. This Department may permit utilization of a slit trench latrine only in remote or emergency situations when other approved sanitary means are unavailable. Other agencies may have more stringent regulations that must be adhered to.
- B. A slit trench latrine must be considered a temporary convenience to be used no longer than seven (7) days and must be backfilled and graded to match its surroundings when its use is discontinued.
- C. A slit trench latrine must be located only in a place that does not adversely affect public health or the environment. The location must provide ample privacy and should be exposed to several hours of sunlight each day. A slit trench latrine must not be located:
 - 1) In a building
 - 2) In a covered or partially covered location such as a cave or overhanging cliff
 - 3) On a slope of greater than 30 percent (30%)
- D. A slit trench latrine must be installed only in suitable soil.
- E. A slit trench latrine must be excavated approximately one (1) foot wide and two (2) feet deep for the required length. All human waste and tissue placed into the slit trench latrine

must be covered with at least two (2) inches of soil at least once a day or more frequently if requested by the Department.

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

- A. For systems discharging to State Waters, see Section 1.5.
- B. Systems that discharge other than through a soil treatment area or a sand filter system must:
 - 1) Be designed by a professional engineer
 - 2) Be reviewed by the Board of Health
 - 3) Not pose a potential health hazard or private or public nuisance or undue risk of contamination.
 - 4) Not allow drainage of effluent off of the property of origin.
- C. The Board of Health may choose to permit only systems that do not allow drainage of effluent off the property of origin.
- D. 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 five (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 (5) day carbonaceous biochemical oxygen demand (CBOD₅) must not exceed ten (10) milligrams per liter when averaged over any three (3) consecutive samples.
 - c) The arithmetic mean of the total suspended solids must not exceed ten (10) milligrams per liter when averaged over any three (3) 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 five (5) consecutive samples, and no single sample can exceed 325 *E.coli* per 100 milliliters.
 - b) The arithmetic mean of the standard five (5) day carbonaceous biochemical oxygen demand (CBOD₅) must not exceed 25 milligrams per liter when averaged over any three (3) consecutive samples.
 - c) The arithmetic mean of the total suspended solids must not exceed 30 milligrams per liter when averaged over any three (3) consecutive samples.
- E. To determine compliance with the standards contained in this section, the required sampling frequency for *E. coli*, CBOD₅, and total suspended solids levels must be performed at least once per month when the system is in operation and the results submitted to the Department for compliance with the permit requirements.
- F. 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 edition, 2022, (International Standard Book Number: ISBN-10: 0875532993, ISBN-13: 978-0875532998)
 - 2) The sampling point must be a location that is representative of final discharge from the system.

15.9 Seepage Pits

The construction of new seepage pits for the treatment and dispersal of on-site wastewater on new sites is prohibited.

SECTION 16 TECHNOLOGY REVIEW AND ACCEPTANCE

16.1 OWTS Technologies – Public and Proprietary

OWTS technologies must either be public domain, including but not limited to rock and pipe distribution systems, 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 Division review and acceptance before the Department may permit them for use.

16.2 Division Review

The Division must review and provide either comment or acceptance to the manufacturer for proprietary products in these technology categories:

- A. Proprietary treatment products (e.g. treatment systems);
- B. Proprietary distribution products (e.g. manufactured distribution products or subsurface dripline);
- C. Septic tanks;
- D. Others as needed.

16.3 Product Acceptance Requirements

General:

- A. To qualify for product acceptance, manufacturers desiring to sell or distribute proprietary products in Colorado must submit a completed application to the Division in the format provided by the Division and a report describing in detail the test procedures and data confirming the performance and properties of the product claimed by the manufacturer. Products within a single series or model line sharing distinct similarities in design, materials, capacities, configuration, and claiming the same level of treatment may be accepted under a single application. Products outside of the series or model line must be accepted under separate applications. The following information must be included in the application:
 - 1) Manufacturer's name, mailing address, street address, and phone number;
 - 2) Contact individual's name, mailing address, street address, phone number and email address. The contact individual must be vested with the authority to represent the manufacturer in the acceptance process;
 - 3) Category of product (e.g., proprietary treatment product and treatment level requested, proprietary distribution product, septic tank);
 - 4) Name, including specific brand and model, of the proprietary product;
 - 5) A description of the functions of the proprietary product, along with any known limitations on the use of the product;
 - 6) Product description and technical information, including dimensioned drawings; materials and characteristics; component design specifications; and volumes, design capacity, and flow assumptions and calculations, as relevant;
 - 7) Siting and installation requirements;

- 8) Product performance information in appropriate products section;
 - 9) Detailed description, procedure and schedule of routine service and maintenance events;
 - 10) Copies of manufacturer's literature to include sales and promotion, design, installation, operation and maintenance, and owner instructions; and
 - 11) Identification of information subject to protection from disclosure and trade secrets, if any.
- B. Upon receipt of an application, the Division must verify that the application is complete and meets the requirements for which the product is being evaluated. If the application is found to be complete, and the requirements of this section needed to accept the product are met, the Division will place the product on a list of accepted proprietary products for the type of product. Installation and use of accepted products must comply with the requirements noted on the acceptance document provided by the Division.
- C. Manufacturers must have readily accessible and up-to-date information for designers, regulators, product owners, and other interested parties about their product including:
- 1) Product manuals
 - 2) Design instructions
 - 3) Installation instructions
 - 4) Operation and maintenance instructions
 - 5) A list of representatives and manufacturer-certified service providers in Colorado, if any. If none exist, information on how service on the product will be provided in Colorado.
- D. If, at any time after a proprietary product has been accepted for use, the Division receives information that the product so accepted does not meet the required standards, or in any way constitutes a public health or environmental hazard, the Division may, at its discretion, revoke the product acceptance. The Division shall notify the manufacturer and the Department agencies within 30 days of any revocation.

16.4 Proprietary Treatment Product Acceptance Requirements

- A. If a proprietary treatment product is submitted to meet a specific treatment level, a report with test procedures and data must be submitted to the Division to demonstrate that it can meet the treatment level for which the approval is being requested on a consistent basis in actual installations. The Division must approve the test methods and programs. Test results from product certification testing must also be submitted.

- B. If a product is accepted for a specific treatment level, the product may also be used for applications requiring lower treatment levels. Reductions based on higher-level treatment may not be applied unless the Department has a maintenance oversight program in place as described in Section 5.
- C. Field Performance Testing
 - 1) Testing must be performed by a neutral third party.
 - 2) Testing for residential applications must be performed on a minimum of 12 single-family homes under normal operating conditions unless otherwise noted below:
 - a) If the proprietary treatment product is requesting TL2 acceptance and that product has received NSF/ANSI 40 (2023 or earlier version) certification, the number of homesites to be tested may be reduced to six. The NSF/ANSI 40 (2023 or earlier version) certification must be submitted if the reduced number of test sites is requested.
 - b) If the proprietary treatment product is requesting TL2N or TL3N acceptance and that product has received NSF/ANSI 245 (2023 or earlier version) certification, the number of home sites to be tested may be reduced to six. The NSF/ANSI 245 (2023 or earlier version) certification must be submitted if the reduced number of test sites is requested.
 - 3) Each system must be tested over a period of at least one (1) year.
 - 4) Each system must be sampled at least four (4) times during the year with the sampling evenly distributed throughout the year.
 - 5) Laboratory results for all parameters for which acceptance is being requested must be submitted.
 - 6) Testing may be performed in Colorado under a Product Development Permit.
 - 7) Testing may be performed in locations other than Colorado. However, as part of the testing, the manufacturer must define, to the acceptance of the Division, what adjustments or modifications to the product will be required to compensate for the following conditions:
 - a) Increased elevation results in lower atmospheric pressure and lower oxygen content. Adjustments or modifications to the treatment process may be required to compensate for these conditions, and those adjustments or modifications must be specified.
 - b) Winter season conditions in Colorado include cold temperatures that may affect product performance. Adjustments or modifications to the treatment process may be required to compensate for these conditions, and those adjustments or

modifications must be specified. This item must be addressed if nitrogen reductions are claimed.

- 8) The report conclusions must indicate the proprietary treatment unit can consistently be expected to meet the treatment level for which acceptance is being requested.
- 9) The report must include estimated operating costs for the first five (5) years of the treatment system's life. This must include both estimated annual electricity or other energy costs, and routine inspection and maintenance costs, including replacement of parts.
 - a) Energy and other costs are to be based on typical Denver, Colorado, costs at the time of the acceptance request.
 - b) Replacement part costs must include shipping and handling.
 - c) If media or other major part replacement is expected during the normal life of the system, the cost of replacement and the typical replacement interval must be included even if replacement is not expected within five (5) years.
- D. The manufacturer must identify the provisions that they have developed for the training of installers and service providers specific to their product line.
- E. Following the adoption of Regulation 43 in 2013, that regulation provided limited provisions for the continued acceptance of treatment level 2 proprietary products that had been previously accepted for use in Colorado prior to June 30, 2013, under NSF/ANSI 40 (2013 or earlier version) or equivalent testing. Only treatment products with a CDPHE acceptance letter dated after June 30, 2013, will be accepted for use in Colorado.

16.5 Proprietary Distribution Product Acceptance Requirements

- A. Proprietary manufactured distribution products must:
 - 1) Be constructed or manufactured from materials that are non-decaying and non-deteriorating and do not leach chemicals when exposed to septic tank effluent and the subsurface soil environment;
 - 2) For gravity distribution systems, the product must provide liquid storage volume at least equal to the storage volume within the assumed 30 percent (30%) void space in a rock and pipe distribution system assuming six (6) inches of rock below the pipe and two (2) inches above the pipe;
 - 3) Maintain the integrity of the trench or bed. The material used, by its nature and its manufacturer-prescribed installation procedures, must withstand the physical forces of the soil sidewalls, soil backfill and the weight of equipment used in the backfilling; and

- 4) If the width of a proprietary manufactured distribution product is within 90 percent (90%) of the width of the excavation, it may be approved as being equivalent to the full width of the excavation, if information is provided that demonstrates distribution over the full width. Thus, the product must cover at least 90 percent of the excavated area in either a trench or bed configuration in order to receive sizing adjustments provided in Table 13.
- B. Chambers:
- 1) Include a sidewall that is structurally sound and capable of allowing aeration of the infiltrative surface and exfiltration of effluent while minimizing the intrusion of soil.
 - 2) Chamber construction shall meet IAPMO Property Standards, PS 63 (2019 version)
- C. Enhanced manufactured media:
- 1) The product must include synthetic media contained within one or more external permeable outer layers that promote the movement of the effluent and prevent the intrusion of soil from above the synthetic media. The manufacturer must demonstrate that the product has been adequately tested and functions as intended.
 - 2) For enhanced manufactured media that requires a specified layer of sand or other media to be placed below the actual product, the vertical separation requirements of these Regulations will be determined from the base of the sand or other media, as the sand or media is an integral part of the component.
 - 3) For products that allow for sand extensions beyond the actual manufactured component, the distance of sand allowed from the edge of the excavation to the manufactured component may be up to six inches in a trench system and 24 inches in a bed system.
 - 4) If sand media is proposed by the manufacturer as an integral part of the distribution product, it must meet the size and uniformity specifications as noted by the manufacturer.
- D. Other manufactured media:
- In order to receive sizing adjustments provided in Table 13, the product must cover at least 90 percent of the excavated area in either a trench or bed configuration without the use of gravel, stone or other aggregate containing fines, which may compromise soil permeability.
- E. Proprietary subsurface dripline products must:
- 1) Be warranted by the manufacturer for use with OWTS effluent;
 - 2) Specify required treatment level of influent to the driplines;
 - 3) Be designed for resistance to root intrusion; and

- 4) Incorporate emitters that may be controlled either by use of pressure-compensation emitters or with a pressure regulator.

16.6 Septic Tank Acceptance Requirements

- A. Septic tank design must conform to the requirements of Section 12.2 of this Regulation.
- B. Each manufacturer must annually test five percent (5%) of its tanks for watertightness at the manufacturing facility, unless the tanks are certified for use as a septic tank by the International Association of Plumbing and Mechanical Officials (IAPMO) or Canadian Standards Association (CSA), or the manufacturer participates in the Plant Certification Program of the National Precast Concrete Association (NPCA).
- C. Watertightness results must be sent to the Division on an annual basis unless otherwise addressed in Section 16.6.B above. The manufacturer must provide information that specifies measures taken to repair a tank that fails the watertightness test. The manufacturer must also define the measures taken to prevent similar problems in future tanks.
- D. IAPMO, CSA, and NPCA certifications must be submitted to the Division for acceptance. Current certifications must be submitted to the Division on an annual basis.

16.7 Other Product Acceptance Requirements

The Division may adopt review and acceptance requirements for additional products as needed.

SECTION 17 IMPACT OF CHERRY CREEK BASIN CONTROL REGULATION ON ON-SITE WASTEWATER TREATMENT SYSTEMS

17.1 Requirements for New On-Site Wastewater Treatment Systems

The Cherry Creek Basin Water Quality Authority, Reservoir and Watershed Water Quality Management Goals and Objectives, include the following: Reduce septic system loads (phosphorus) in the Cherry Creek Basin. Consequently, new systems permitted and installed within the Cherry Creek Basin in Soil Type 1, as indicated in Table 10 in Appendix A, or having percolation rates faster than (less than) 15 minutes per inch shall be subject to the following additional requirements:

- A. Soil treatment areas shall be either alternating or sequencing zone systems, in accordance with Section 13.6.
- B. The alternating or sequencing zone system must be pressure dosed in accordance with Section 13.5.H.

- C. Soil treatment area sizes may be adjusted in accordance with Section 13.4.

17.2 Prohibition of New On-Site Wastewater Treatment Systems in Floodplains

Within the Cherry Creek watershed in Arapahoe County, no new OWTS systems shall be constructed within the 100-year floodplain as designated by the Urban Drainage and Flood Control District, or the Federal Emergency Management Agency if no Urban Drainage and Flood Control District designation exists. This restriction shall not apply to the replacement of, or improvements to the operation of, existing OWTS located within the 100-year floodplain.

SECTION 18 GENERAL PROHIBITIONS AND PENALTIES

18.1 General Prohibitions; 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, which includes plumbing, that is not serviced by a sewage treatment works until the Department has issued a permit for an OWTS.
 - 2) An occupancy permit for the use of a building that is not serviced by a sewage treatment works until the Department makes a final inspection of the OWTS, provided for in C.R.S. §25-10-106 (1) (h), and the Department approves the installation.
- B. The construction of new, or the repair of existing cesspools and pit privies is prohibited. When an existing cesspool or pit privy is identified during the transfer of title process, or otherwise, a conforming OWTS must be installed where it can be accommodated. Where space is not available for a conforming OWTS, the criteria for repairs established within Section 13.8 must be followed.
- C. A person must not connect more than one (1) dwelling, commercial, business, institutional or industrial unit to the same OWTS unless such multiple connections were specified in the application submitted and in the permit issued for the system.
- D. No person shall construct or maintain any dwelling or other occupied structure that 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 the local public health agency determines to be a public health or safety concern.
- E. An 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 industrial, animal, or process waste.

- F. All persons shall dispose of septage removed from systems in the process of maintenance or cleaning at an approved site and in an approved manner.

18.2 Prohibition of On-Site Wastewater Treatment Systems in Unsuitable Areas

- A. The Board of Health may prohibit issuance of OWTS permits in accordance with applicable land use laws and procedures for defined areas in which the Board of Health determines that construction and use of additional OWTS may constitute a hazard to public health or water quality.
- B. Within the Cherry Creek watershed in Arapahoe County, no new OWTS shall be constructed within the 100-year floodplain as designated by the Urban Drainage and Flood Control District, or the Federal Emergency Management Agency if no Urban Drainage and Flood Control District designation exists. This restriction shall not apply to the replacement of, or improvements to the operation of, existing OWTS located within the 100-year floodplain.

18.3 Penalties- C.R.S. §25-10-113

- 10) Any person who commits any of the following acts or violates any of the provisions of this section commits a Class 1 petty offense civil infraction as defined in section 18-1.3-503, C.R.S.: 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;
 - A. Constructs, alters, or installs an OWTS in a manner which involves a known and material variation from the terms or specifications contained in the application, permit or variance;
 - B. 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);
 - C. Conducts a business as a systems contractor without having obtained the license provided for in C.R.S. §25-10-109 (1);
 - D. Conducts a business as a systems cleaner without having obtained the license provided for in C.R.S. §25-10-109 (2);
 - E. Falsifies or maintains improper records concerning system cleaning activities not performed or performed improperly; or
 - F. Willfully fails to submit proof of proper maintenance and cleaning of a system as required by these Regulations.

18.4 Civil Penalty

A. Assessment

Upon a finding by the Board of Health that a person is in violation of this Regulation, or of rules adopted and promulgated pursuant to section 25-10-104, the Board of Health may assess a penalty of up to fifty dollars (\$50.00) for each day of violation, pursuant to C.R.S. §25-10-113 (2). In determining the amount of the penalty to be assessed, the Board of Health shall consider the seriousness of the danger to the health of the public caused by the violation, the duration of the violation, and whether the person has previously been determined to have committed a similar violation.

B. Appeal of Civil Penalty Assessment

A person subject to a penalty assessed pursuant to Section 18.3 may appeal the penalty to the Board of Health by requesting a hearing before the Board of Health. The request must be filed within thirty (30) days after the penalty assessment is issued. The Board of Health shall conduct a hearing upon the request in accordance with C.R.S. §24-4-105.

SECTION 19 ENFORCEMENT

19.1 Hearings

Hearings shall be administered pursuant to the requirements of the OWTS Act.

19.2 Notice of Violation

Whenever the Department determines that there has been a violation of any provision of these Regulations, the Department shall give notice of such violation to the responsible person. Such notice shall be in writing and shall particularize the violation, provide a reasonable time for correction, and be addressed to the owner and/or occupant of the property concerned.

19.3 Cease and Desist Orders

The Department may issue an order to cease and desist from the use of any OWTS or sewage treatment works which is found by the health officer not to be functioning in compliance with the OWTS Act, Regulation 43 or these Regulations, is found to constitute a nuisance or a hazard to public health, or has not otherwise received timely repairs under the provisions of C.R.S. §25-10-106 (1) (j). Such an order may be issued only after a hearing which shall be conducted by the Hearing officer of the Department not less than 48 hours after written notice thereof is given to the owner or occupant of the property on which the system is located. The order shall require that the owner or occupant bring the system into compliance or eliminate the health hazard within thirty (30) days, or thereafter cease and desist from the use of the system. A cease and desist order issued by the Hearing Officer shall 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.

SECTION 20 BOARD OF HEALTH ADMINISTRATIVE PROCEDURES

20.1 Revocation of Systems Contractors or Cleaners Licenses

A systems contractor's or cleaner's license may be revoked for failure to comply with these Regulations. Revocation shall take place only after a hearing before the Board of Health. The license holder shall be given not less than ten (10) days' notice of the hearing and may be represented at the hearing by counsel.

20.2 Rules and Regulations for Maintenance and Cleaning of On-Site Wastewater Treatment Systems

The Board of Health may adopt rules and regulations for the scheduling of maintenance and cleaning of systems and practices adequate to ensure proper functioning of acceptable systems, and may require proof of proper maintenance and cleaning pursuant to any such schedules and practices to be submitted periodically to the Department by the owner of the system.

20.3 Findings on Appeal

- A. A request for review must be made within 60 days after denial of an application by the Department.
- B. The applicant must bear the burden of supplying the Board of Health with sufficient evidence to document that the denied system shall be constructed and used in such a manner that will result in no greater risk than that associated with compliance with the requirements of the Regulation, comply with the declaration and intent of these Regulations, and comply with all applicable state and local regulations and required terms and conditions in any permit.
- C. Such review must be conducted pursuant to the requirements of C.R.S. §24-4-105.

20.4 Hearing and Review of Variance Requests

- A. Upon receipt of the request for a variance and the required information in Section 3.10.B, the Department will schedule a public hearing before the Board of Health. The Department will issue a Public Notice of the Hearing and send notice via certified mail, with a minimum 20-day reply time from the date of mailing, to all adjacent property owners. The applicant and his/her engineer may attend the hearing and present testimony regarding the request for a variance.

- B. Following the public hearing, the Board of Health shall vote on the proposed variance. Approval of the variance shall require a majority vote of the Board of Health.
- C. The applicant will receive written notification of the decision regarding the request for a variance.
- D. The Board of Health may impose requirements and conditions on the variance granted and the notice of approval of the variance will include any conditions of the approval. The notice of a denial or a variance shall include those reasons which form the basis for the denial.
- E. The variance and any conditions thereof shall be recorded on the deed to the property and any expenses associated with that recording shall be the responsibility of the party obtaining the variance.

SECTION 21 ERRATA

21.1 This section is reserved for errors discovered after adoption of these regulations.

APPENDIX A - TABLES

TABLE 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
BOD	Biochemical Oxygen Demand
C.R.S.	Colorado Revised Statutes
CBOD	Carbonaceous Biochemical Oxygen Demand
CSA	Canadian Standards Association
ETL	Electrical Testing Lab
gpd	gallons per day
IAPMO	International Association of Plumbing and Mechanical Officials
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
NPCA	National Precast Concrete Association
NRCS	Natural Resources Conservation Service
NSF	National Sanitation Foundation International
OWTS	On-Site Wastewater Treatment System(s)
STA	Soil Treatment Area
TL	Treatment Level
TN	Total Nitrogen
TSS	Total Suspended Solids
UL	Underwriters' Laboratories
USDA	United States Department of Agriculture

TABLE 2: 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	8	75	600
5	9	75	675
6	10	75	750
7	11	75	825

TABLE 3: ESTIMATE OF AVERAGE DAILY WASTEWATER FLOW AND BOD₅ LOAD IS “PER PERSON” UNLESS OTHERWISE NOTED⁵

<u>RESIDENTIAL WASTEWATER</u>	GPD	BOD ₅ IN POUNDS PER DAY
Single-family dwellings, Accessory dwelling units	75	.20
<u>AUXILIARY BUILDINGS BY FIXTURE TYPE</u>		
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
<u>RESIDENTIAL, OTHER</u>		
Hotels and motels per room	75	.15
Multiple-family dwellings or apartments	75	.20
Boarding and rooming houses (users absent during working hours)	50	.15
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
Mobile home	75	.20
Mobile home park per space	300	.80

<u>COMMERCIAL WASTEWATER</u>		
Day-use or Transient Facilities; 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
<u>FOOD SERVICE ESTABLISHMENT</u>		
Restaurant open 1 or 2 meals per seat	50	.06/meal
Coffee Shop per customer	3.5	.50 ^{1,8}
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
<u>INSTITUTIONAL WASTEWATER WITHOUT KITCHENS UNLESS OTHERWISE NOTED</u>		
Churches per seat; without any food service, or other uses	3.5	.01
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
<u>RECREATIONAL AND SEASONAL WASTEWATER USE</u>		
Camps, day, no meals served	15	.12
Children's camps overnight with meals and showers	50	.12
Luxury resort ¹	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 43.6.A.2.i, the Department 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. For churches with food service, the 4 gal/meal must be added to the 3.5 gal/seat to determine projected design flows.
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 BOD₅ 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 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 BOD₅ 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 4: TREATMENT LEVELS ⁶					
Treatment Level	BOD ₅ (mg/L)	CBOD ₅ ¹ (mg/L)	TSS (mg/L)	Total Nitrogen (mg/L)	Fecal Coliform ⁵
TL 1 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	
TL3ND		10	10	20	<200 per 100 mL

Note: Shading indicates higher treatment levels

1. Requirements for CBOD₅ 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 BOD₅ 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 15.6.
6. With the exception of fecal coliform, treatment level requirements are based on values obtained from composite sampling.

TABLE 5: 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 6: Minimum Horizontal Distances in Feet between OWTS Components and Water, Physical, and Health Impact Features^(7, 10)

	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 , Drywell, Lined pond or irrigation channel, storm sewer, stormwater structure	Surface Water, Lake, Water Course, Open Irrigation Channel ⁷ , Stream, Wetland	Dry Gulch, Cut Bank, Fill Area (from Crest), Inground Swimming 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 Evapotranspiration Field or Outside 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 Evapotranspiration System, Outside of Berm of Unlined Wastewater Pond, or System Not Relying on STA for Treatment Other than Aerosol	100	25 ²	20	10	10	25	25	15	10
Slit Trench Latrine, 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 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 the Department.

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 of this regulation. Setbacks for existing wells must comply with requirements of Section 13.8.B.

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 is to 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 that provide equal protection are allowed. These methods must be reviewed and approved by the Department.
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 and the Department has a maintenance oversight program in accordance with Section 14.D. of this Regulation, 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 well or 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 to 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. Where ditch companies have a specific right of easement for “reasonable and necessary use to access, operate, and maintain ditches”, all OWTS components must maintain a minimum of 25’ setback from the crest of the ditch/channel.
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, the Department may allow for a reduced setback from a property line to the OWTS; per the requirements of Section 10.4.B.4.

TABLE 7: Minimum Separation Distance Requirements in Feet from Soil Treatment Area, Relative to Treatment Level Provided³

			PRESSURE DOSING REQUIRED			
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
	<u>Horizontal Separation Distances, in feet</u>					
1	Distance from soil treatment area to on-site wells ⁵	100	100	100	100 ¹	100 ¹
2	Distance from effluent pipes and 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
	<u>Vertical Separation Distances, in feet</u>					
4A	Treatment depth from infiltrative surface to a limiting layer or groundwater condition	4 feet ² (3 feet with pressure dosing)	2.2	2.5	2	1
4B	Treatment depth 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 4.

Reductions in separation distances with higher-level treatment may be granted only if the Department Regulations 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 TL3N 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 for 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 wells by the Division of Water Resources.

TABLE 8: APPROVED PIPE AND TANK BEDDING MATERIAL

<u>Sieve Size</u>	<u>Percent Passing</u>
3/8"	100
#4	70-80
#8	10-25
#16	0-10
#200	0-1

TABLE 9: MINIMUM SEPTIC TANK SIZE BASED ON NUMBER OF BEDROOMS

<u>Number of Bedrooms</u>	<u>Tank Capacity (gallons)</u>
2	1,000
3	1,000
4	1,250
5	1,500
6	1,750
7	2,000

Note: ADUs will have a minimum tank capacity of 1,000 gallons

TABLE 10: 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 ³		
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 11A				>35% Rock (>2mm), or Fractured or Deteriorated Bedrock: See Table 11A		
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
3A²	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
4A⁴	Sandy Clay, Clay, Silty Clay	PR, BK, GR, Massive	1 0 (Structureless)	91-120	0.15	0.20	0.20
5A⁴	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 4.
2. **At a minimum, Dawson Arkose and cemented sands will be classified as a Type 3A soil, unless, based on additional data or information, the professional engineer recommends it be classified as Soil Type 4, 4A, or 5.**
3. 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 Section 43.5.D. 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.
4. 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 11A¹: 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
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 11A:

- 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 11B 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 11C 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 43.12.F 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 11C.
- 2) Provisions for determining the long-term acceptance rates for soils referenced in this chart are provided in Section 43.11.C.3. The design of systems in type “R” soils must conform to the requirements of Sections 43.11.C.2 and 3.
 - 3) The “Soil Matrix Type, Percentage and Size of Rock” column references the soil types described in Table 11A.
 - 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 43.10.E.3.
 - 7) Minimum imported sand depths are provided in this table. NOTE HOWEVER THAT 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 the Department.

Table 11B: 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 11B is intended to provide guidance to the design engineer in determining the appropriate LTAR for the soil treatment area. Fractured bedrock formations 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 11C: 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 11A.

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

TABLE 12: SIZE ADJUSTMENT FACTORS FOR METHODS OF APPLICATION IN SOIL TREATMENT AREAS ACCEPTING TREATMENT LEVELS 1, 2, 2N, 3 AND 3N EFFLUENT

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

TABLE 13: SIZE ADJUSTMENT FACTORS FOR TYPES OF DISTRIBUTION MEDIA IN SOIL TREATMENT AREAS FOR RECEIVING TREATMENT LEVEL 1 EFFLUENT

<u>Type of Soil Treatment Area</u>	<u>Type of Distribution Media Used in Soil Treatment Area¹</u>		
	Category 1	Category 2	Category 3
	Rock or Tire Chips	Other Manufactured Media	Chambers or Enhanced Manufactured Media
<u>Trench or Bed Soil Types 1-4</u>	1.0	0.9	0.7
<u>Trench or Bed Soil Types 4A-5</u>	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 16.5.

TABLE 14: NDDS SIZE ADJUSTMENT FACTORS

<u>Soil Type</u>	<u>Percolation Rate</u>	<u>Size Adjustment Factor</u>
1, 2, 2A, & 3 ¹	N/A	N/A
3A	61-75	2.2
4	76-90	1.7
4A	91-120	1.5
5	121+	1.4

¹These soil types are unsuitable for an NDDS

**TABLE 15: GRADATION OF WICKING SAND FOR
EVAPOTRANSPIRATION BEDS**

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

APPENDIX B - DIAGRAMS

On-Site Wastewater Treatment System Record Drawing	Property Address _____ Permit # _____ Date System Completed _____ System's Contractor Name _____ System's Contractor License # _____ System's Contractor Address and Phone _____
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Note: Drawing must be to scale.

On-Site System Record Drawing

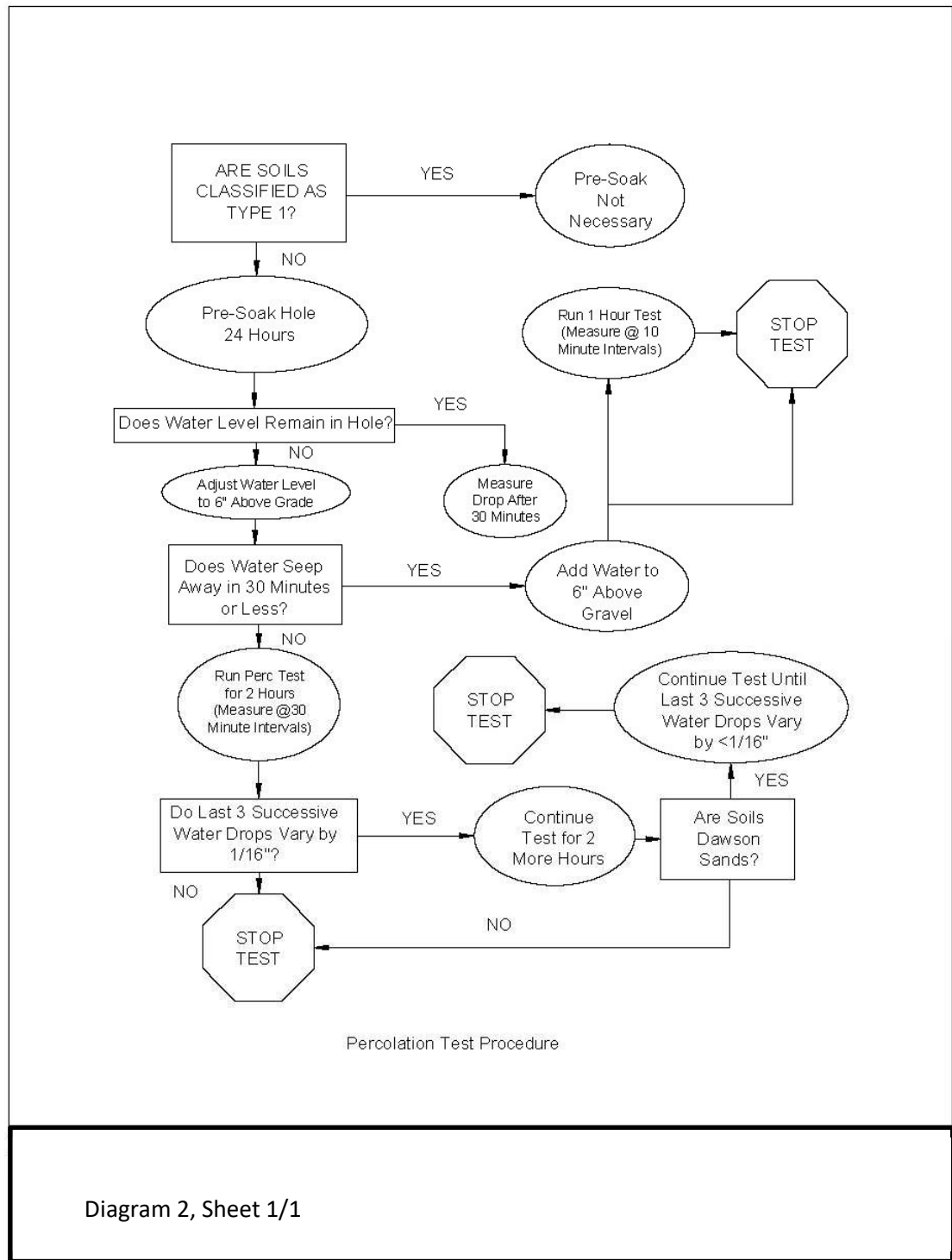
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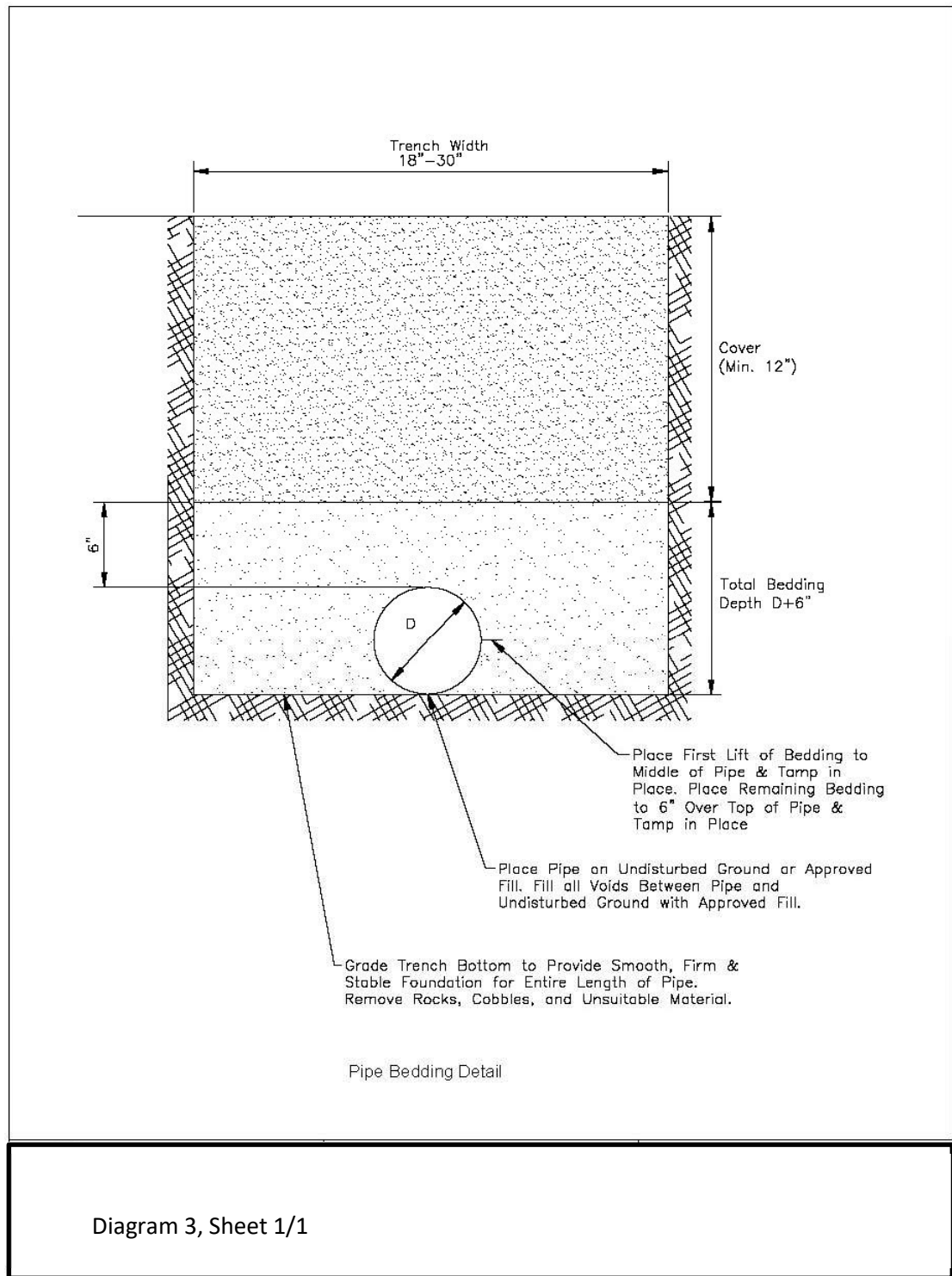
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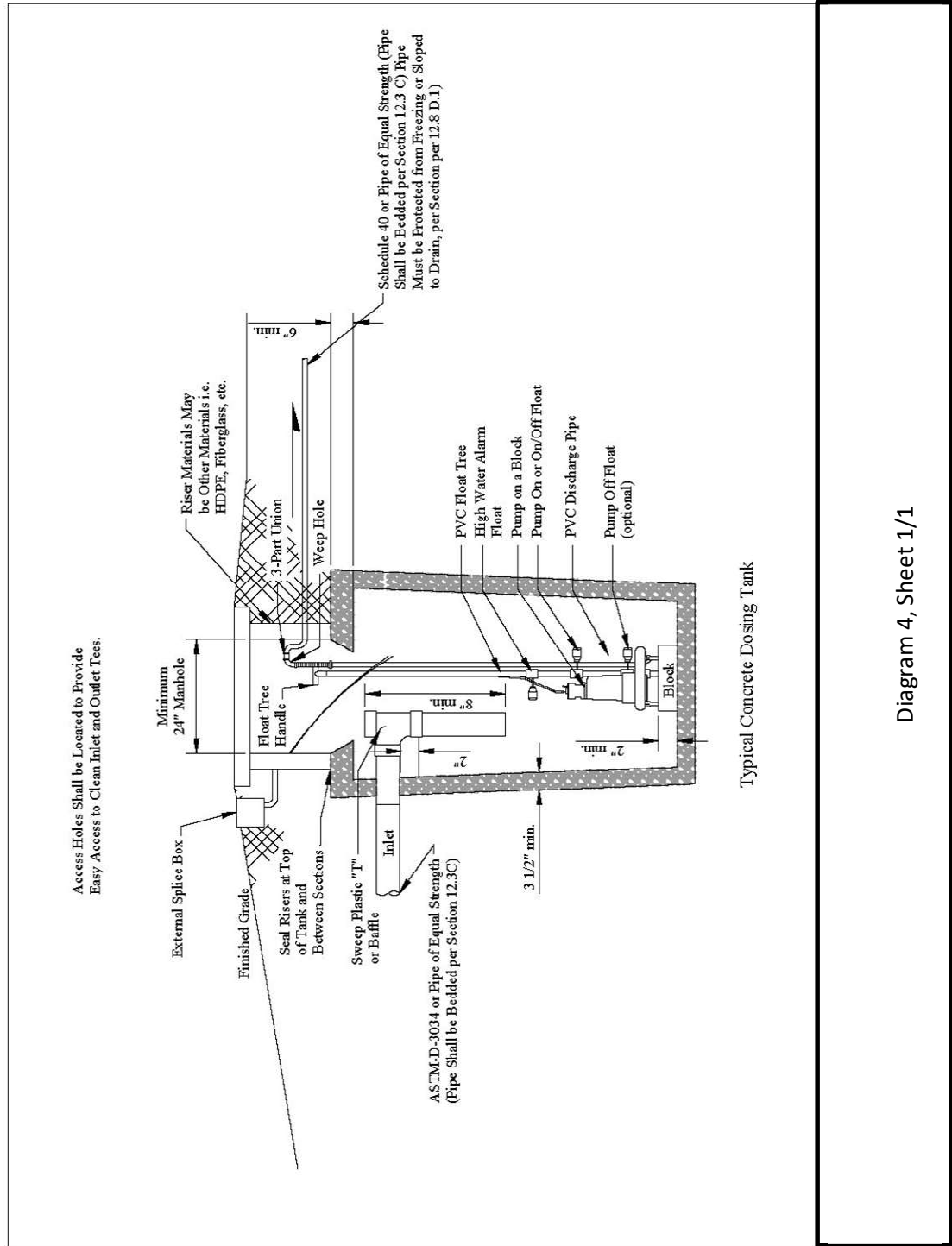
SCALE: 1" = XX'

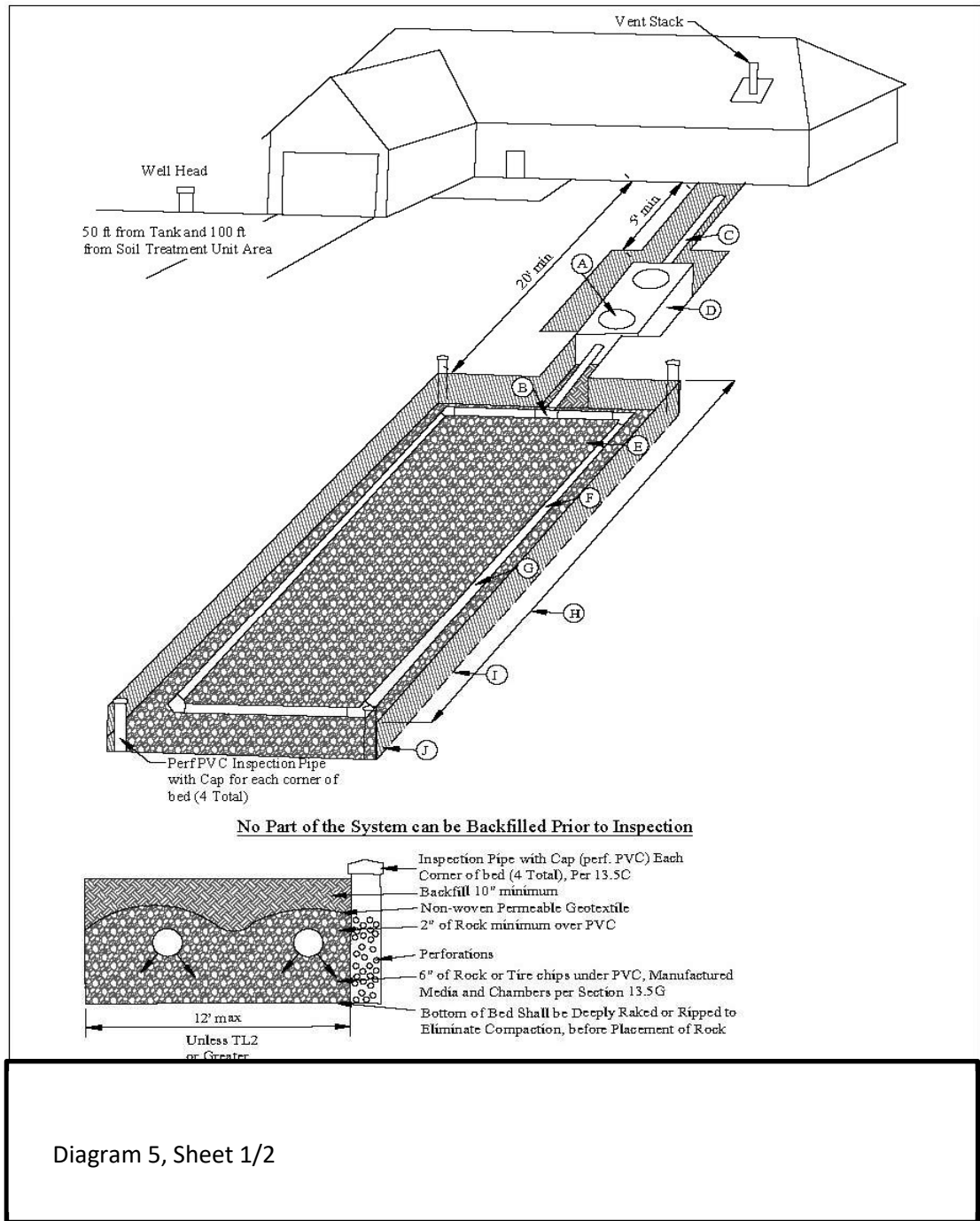
Table of Horizontal Distances	
A-B	_____
A-D	_____
B-C	_____
B-D	_____
C-D	_____
E-E1	_____
E1-E2	_____
E2-E3	_____
F-G	_____
G-H	_____

Diagram 1, Sheet 1/1





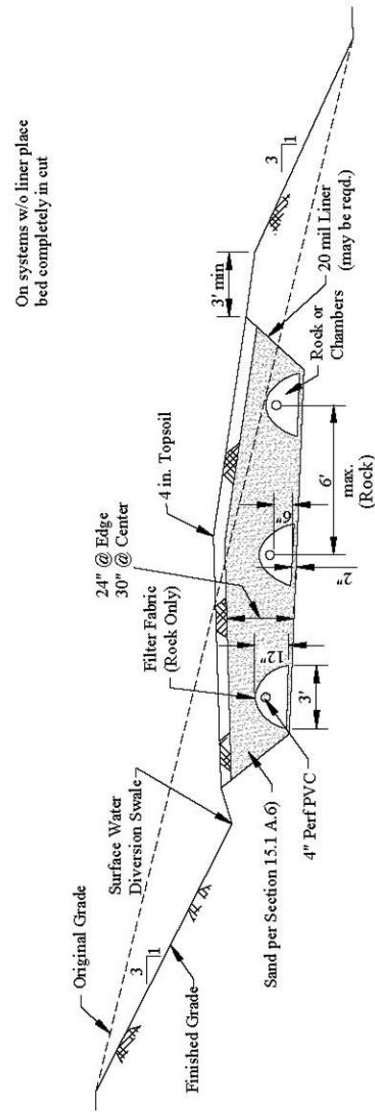




TYPICAL ON-SITE WASTEWATER TREATMENT SYSTEM

- A. Both manhole lids and risers shall extend to grade.
- B. "T" - set level and may be attached at any point.
- C. At least one-quarter (1/4) inch per foot (2%) fall. Clean-out required if one hundred (100) feet or more. Pipe shall be bedded per Diagram 3.
- D. Two-compartment tank or two (2) tanks in series, set level. both inlet and outlet must have a "T" or baffle.
- E. One (1) foot clean, graded rock, one-half (1/2) inch to two and one-half (2-1/2) inch in size, tire chips chambers or manufactured media.
- F. Perforated PVC imbedded in rock at least two (2) inches over top and six (6) inches below. Perforated PVC must be three (3) feet from edge of bed and no more than six (6) feet apart.
- G. Perforated PVC must be level.
- H. Soil treatment area (STA) shall not exceed one hundred (100) feet in length unless pressure dosed - must be ten (10) feet from property.
- I. STA width shall not exceeded 12 feet, unless receiving TL2 effluent or better or for repair if approved by the Department.
- J. STA depth shall not exceed four feet on up-slope side.

Bottom of bed or trench excavated level. STA shall not be excavated when soil is wet enough to smear or compact. Perforated PVC shall be placed so that perforations are opposite each other at the bottom (see end view drawing). The ends must be capped or may be looped.



Not To Scale

Typical Evapotranspiration (ET) Bed Section

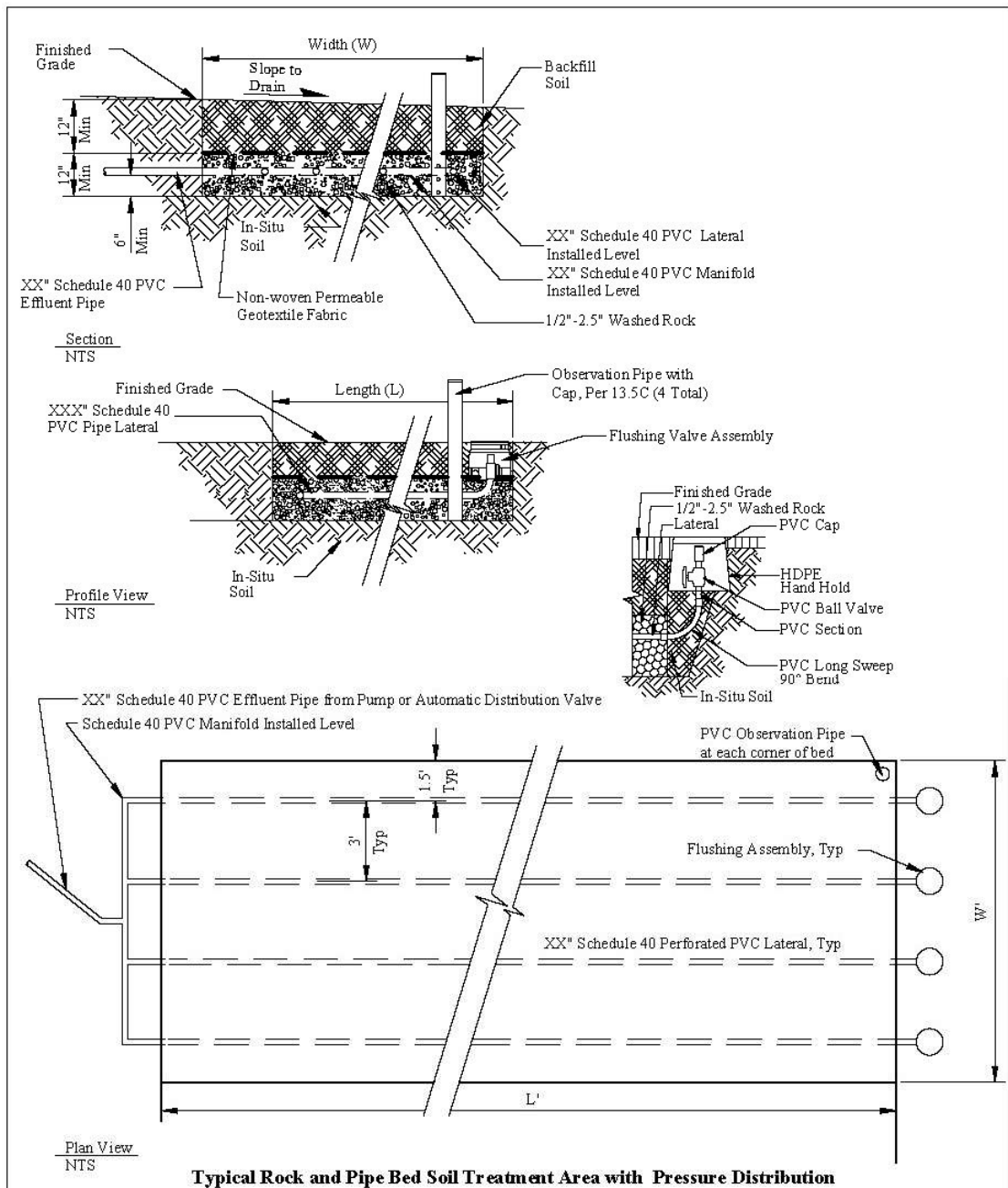


Diagram 7, Sheet 1/2

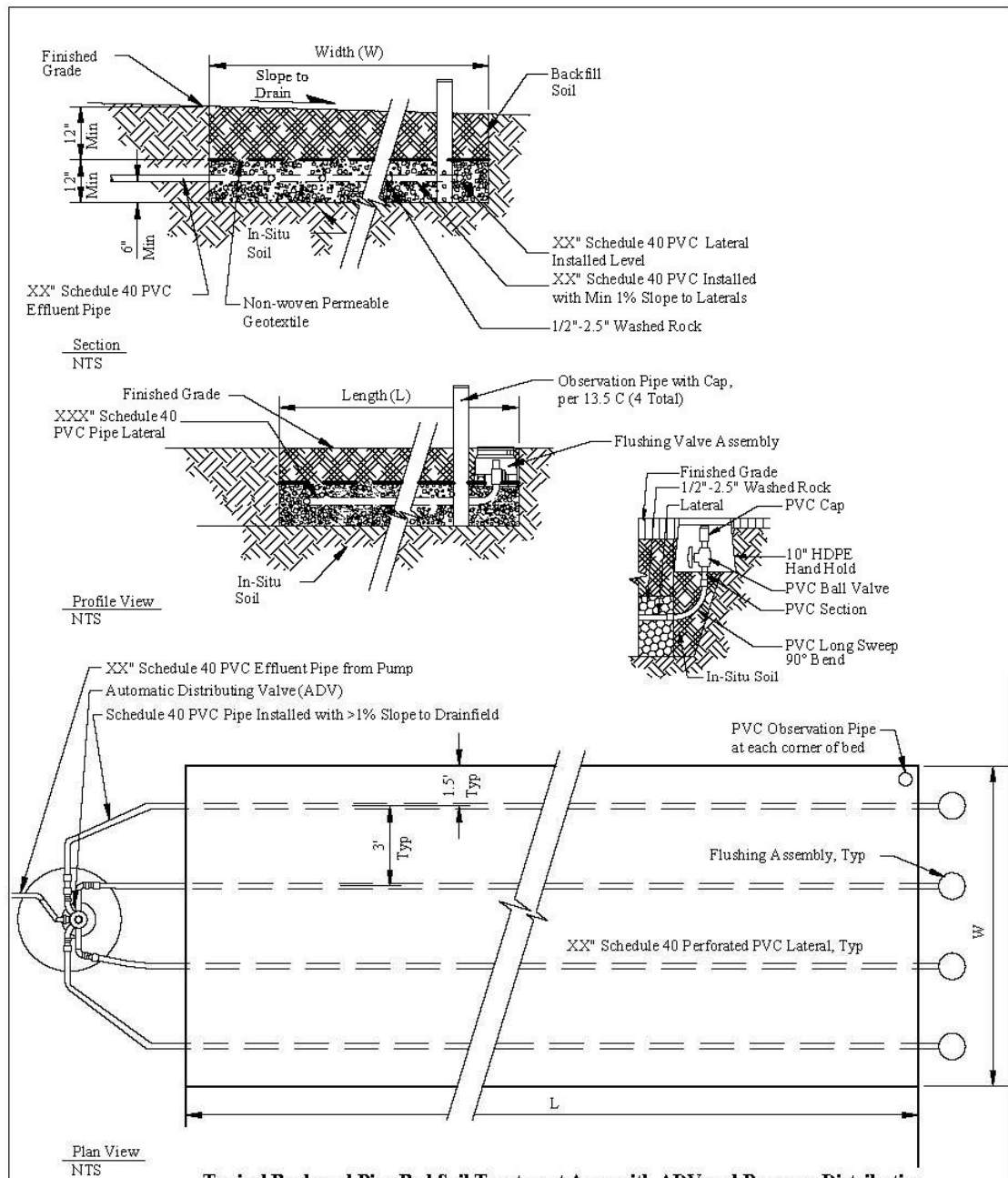
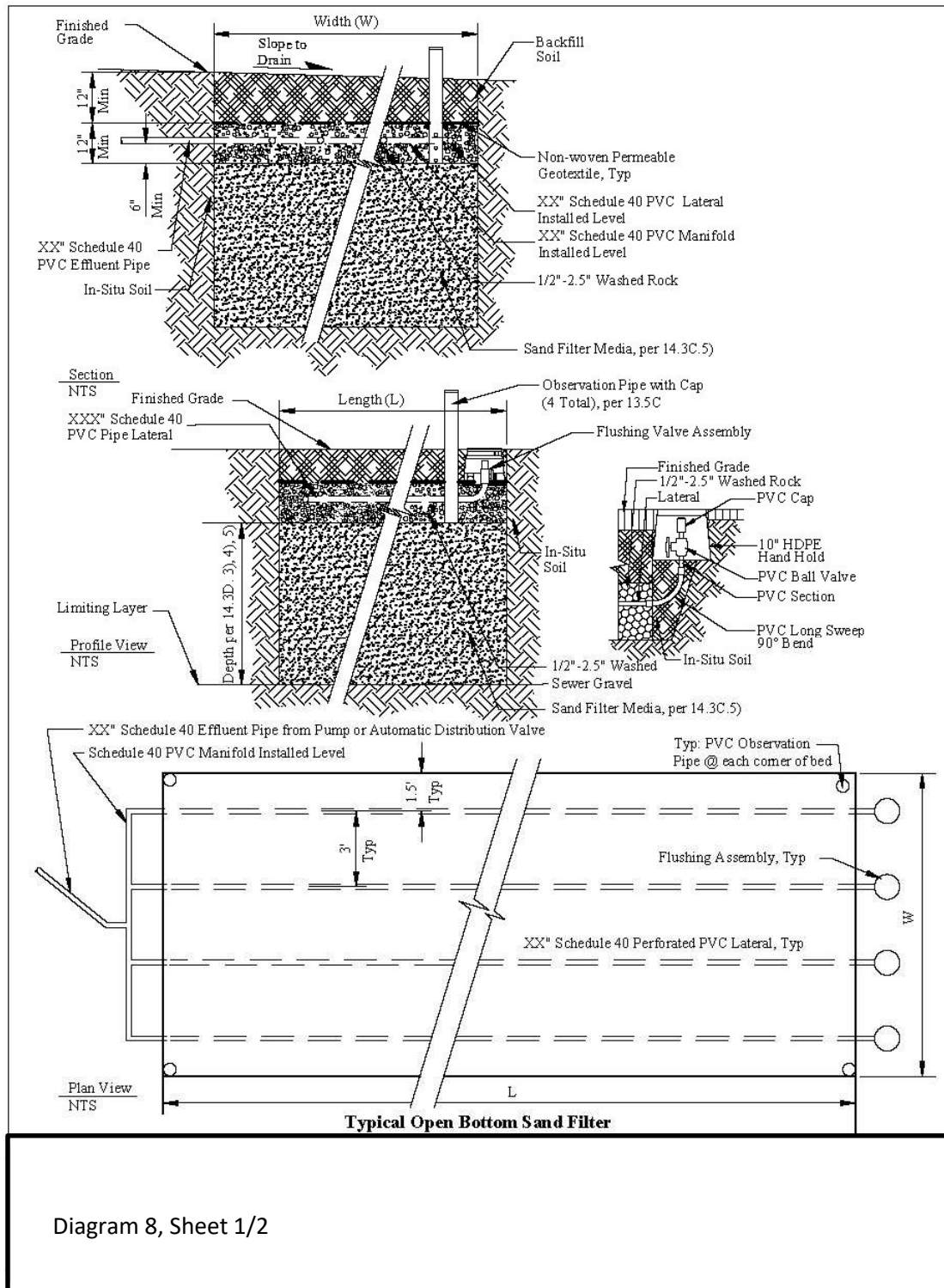


Diagram 7, Sheet 2/2



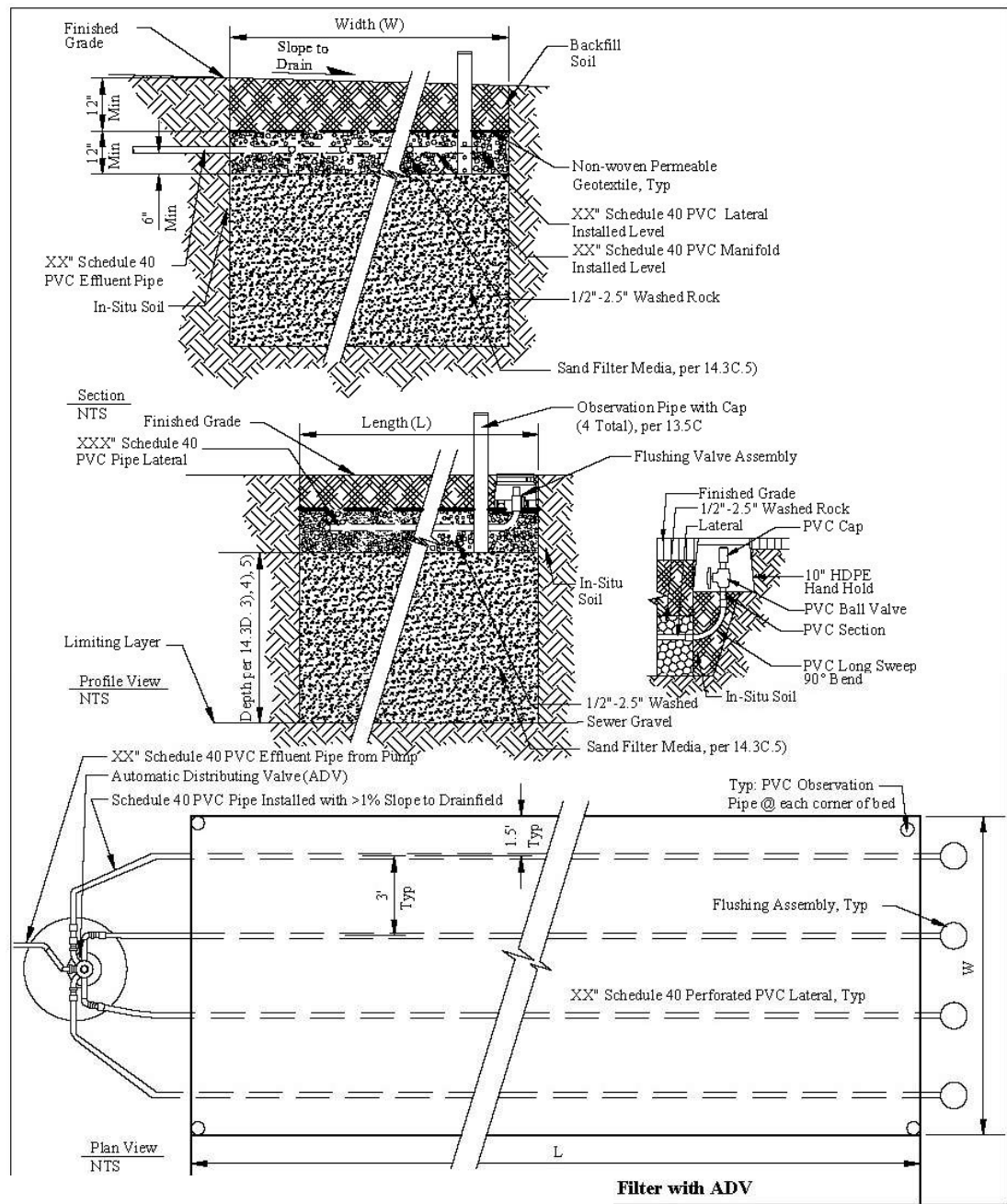


Diagram 8, Sheet 2/2

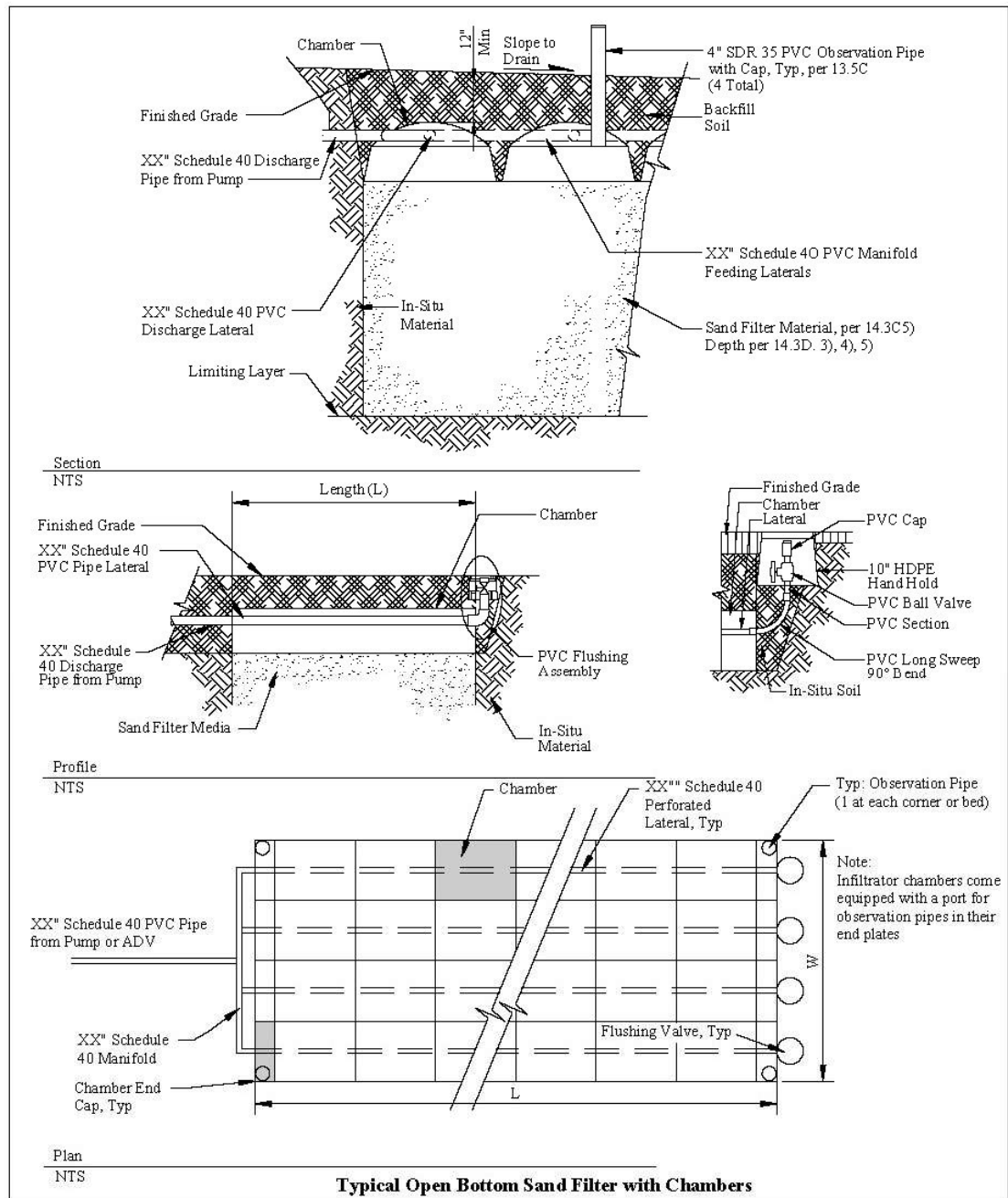


Diagram 9, Sheet 1/2

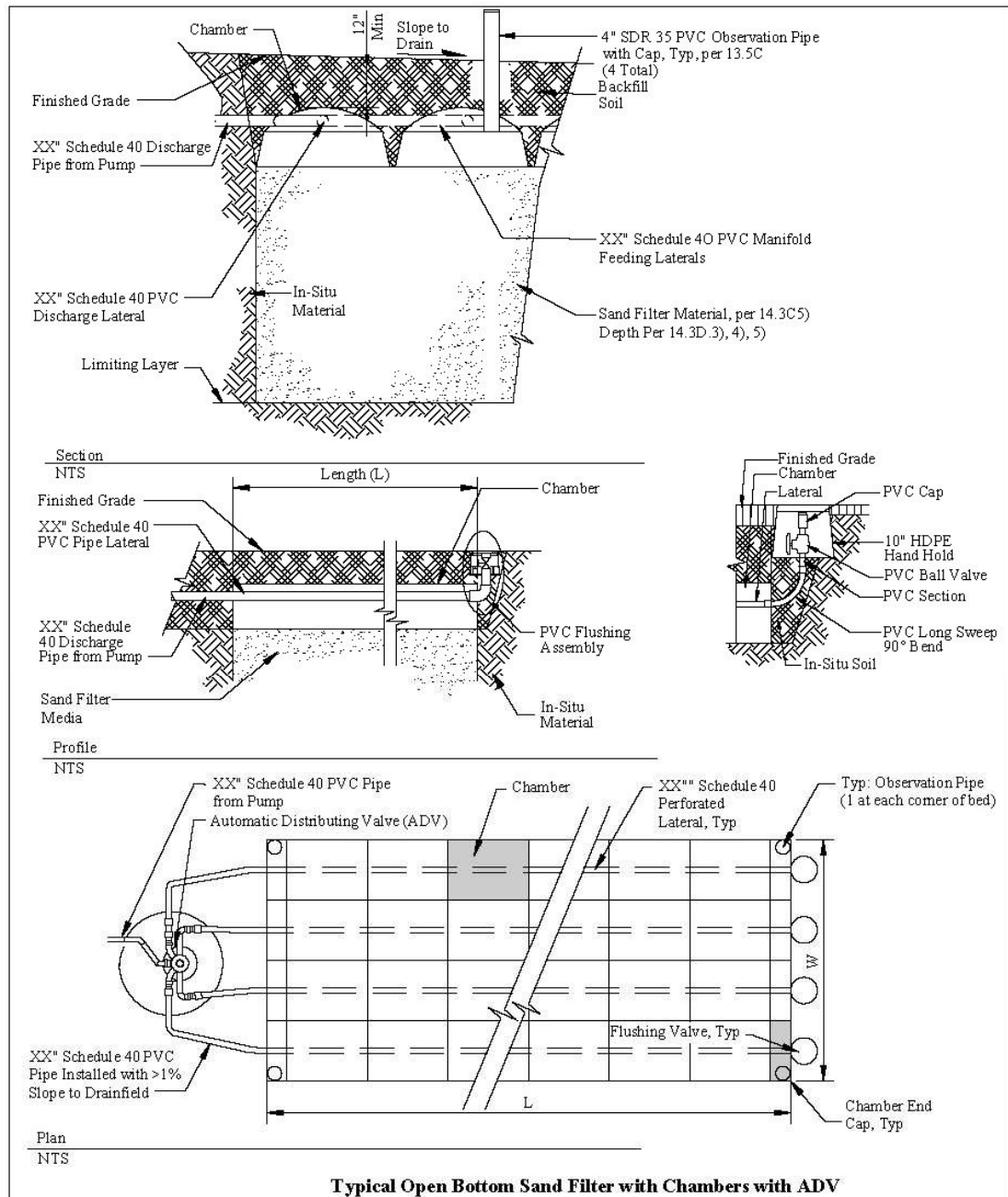


Diagram 9, Sheet 2/2

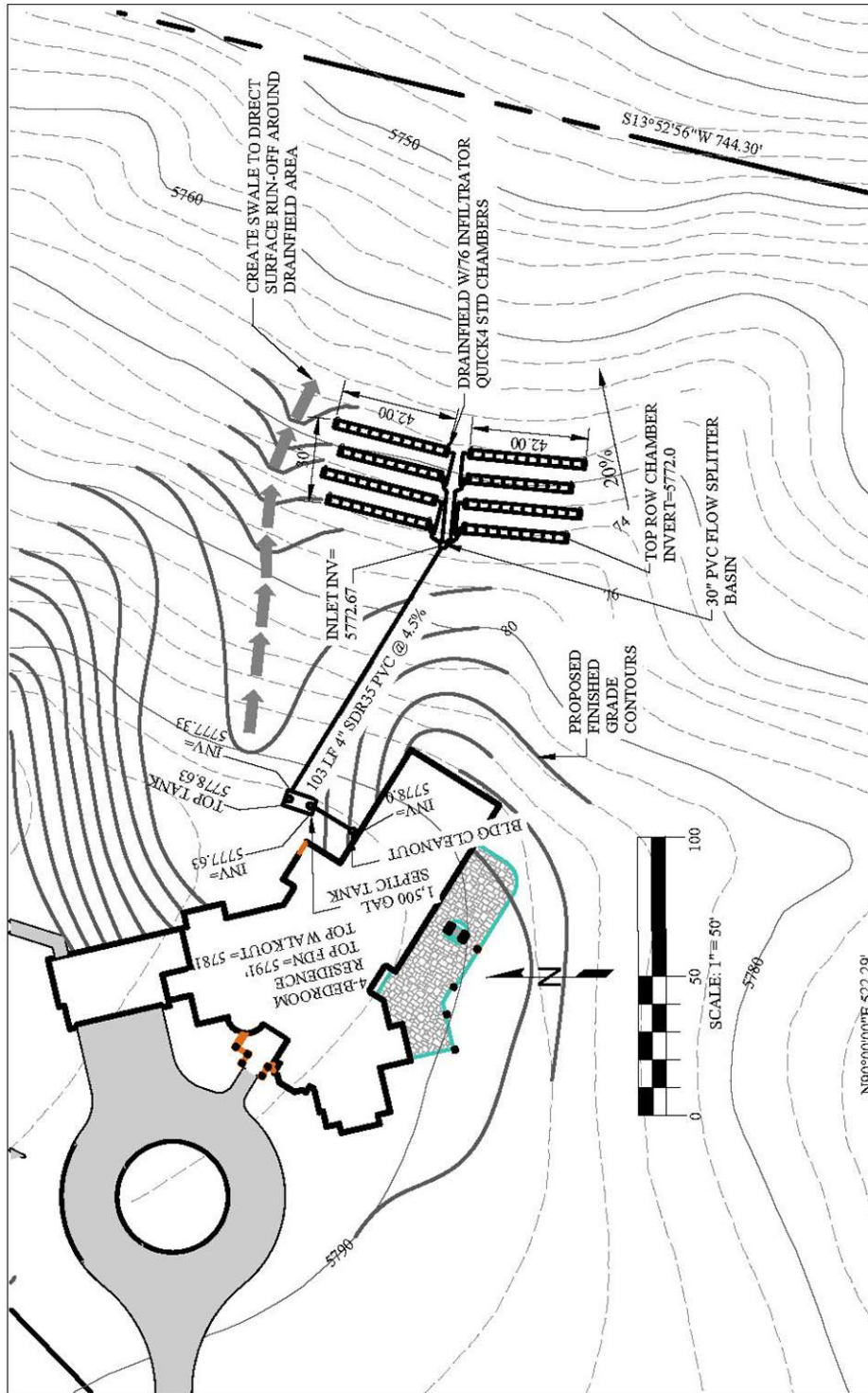


Diagram 10, Sheet 1/1