



ADAMS COUNTY
HEALTH DEPARTMENT

Your Health. Our Mission.

REGULATION O-22

On-Site Wastewater Treatment Systems

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

**Effective Date
December 5, 2022**

**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**

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This document describes the rules and regulations for the use and permitting of On-Site Wastewater Treatment Systems in Adams 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 Adams 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 Adams 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 Adams County, State of Colorado. These Regulations are adopted by the Board of Health of Adams County on the 20th day of October, 2022 and shall become effective the 5th day of December, 2022.
- C. This Regulation will apply to On-Site Wastewater Treatment Systems as defined in Section 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 Adams 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 the Board of Health. Once approved by the Board of 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 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).
- 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 April 10, 2017, and do not include later amendments to the incorporated material.

SECTION 2 DEFINITIONS

Absorption system - means 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 - means easily reached, attained or entered by the necessary equipment or maintenance provider.

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

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

Basal Area - means 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 - means 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 - means 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 - means a room with an egress window, a closet, and/or is intended for sleeping purposes; or as defined by the local board of health, as stated in the local OWTS regulation.

Board of Health - means the Board of Health of Adams County.

Biochemical Oxygen Demand, Five-Day (BOD₅) - means 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) - means 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 - means piping that conveys wastewater to the first system component or the sewer main.

Carbonaceous Biochemical Oxygen Demand - See Biochemical Oxygen Demand, Carbonaceous

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 - means 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.

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

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

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

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

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

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

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

Composting toilet - means 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 - means 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 NRCS-USDA, Sept. 2012 (NRCS Field Book)

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

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

Dawson Arkose - means 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 - means 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 Adams County Health Department.

Design - means: 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 - means a practitioner who utilizes site evaluation and investigation information to select an appropriate OWTS and prepares a design document in conformance with this Regulation.

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

Distribution box - means 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 - means 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 - means 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 - means a high rate periodic discharge into a soil treatment area.

Dosing, demand - means 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 - means 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 - means 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 - means 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 - means a tank, compartment or basin that provides for storage of effluent from a septic tank or other treatment unit intended to be delivered to a soil treatment area at a high rate periodic discharge.

Drainfield - See Soil treatment area

Drop box - means a device used for serial or sequential distribution of effluent by gravity flow to a lateral of a soil treatment area.

Dry gulch - See Gulch, dry

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

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

Effluent filter - See Effluent screen

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

Effluent screen - means 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 screen may be a component of a pump installation. An effluent screen may also be installed following the septic tank but before higher level treatment components or a soil treatment area.

Environmental Health Specialist (EHS) - means 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 - means an unlined On-Site Wastewater Treatment component that uses evaporation, transpiration, and absorption for dispersal of effluent.

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

Experimental system - means a design or type of system based upon improvements or development in the technology of sewage treatment that has not been fully tested.

Failure - means 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 - means data gathering on a system in actual use that is being proposed for Division acceptance.

Floodplain (100-year) - means 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 - means 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 - means the measured volume of wastewater generated from a facility in a twenty-four (24) hour period expressed as gallons per day.

Flow, design - means 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 - means 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 - means 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 - means 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.

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

Ground water surface - means the uppermost limit of an unconfined aquifer at atmospheric pressure.

Gulch, dry - means a deep, narrow ravine marking the course of an intermittent or ephemeral stream.

Health officer - means 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 - means designated treatment levels other than treatment level 1 (see Table 4).

Holding tank - See Vault.

Infiltrative surface - means 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 - means an access point in a system component that enables inspection, operation and/or maintenance.

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

Lateral - means a pipe, chamber, or other conveyance used to carry and distribute effluent.

Leach field - See Soil treatment Area

Limiting layer - means a horizon or condition in the soil profile or underlying strata that limits the treatment capability of the soil or severely restricts the movement of fluids. This may include soils with low or high permeability, impervious or fractured bedrock, or a seasonal or current ground water surface.

Liner - means 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) ml.

Linear loading rate - means the amount of effluent applied per linear foot along the contour (gpd/linear ft.).

Long-term acceptance rate - (LTAR) – means 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 - means the condition in which a component is not performing as designed or installed and is in need of repair in order to function as originally intended.

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

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

Media, enhanced manufactured - means an accepted proprietary manufactured distribution product, wrapped in a specified fabric, and placed on a specified sand base or media that does not mask the infiltrative surface of the in-situ soil.

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

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

Nitrogen reduction - means 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.

NDDS - means a Non-Pressurized Drip Dispersal System.

On-Site 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 - means 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 - means 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 - means 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 - means the property of a material which permits movement of water through the material.

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

Person - means 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 - means 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 - means an engineer licensed in accordance with C.R.S. §12-25-114.

Professional geologist - means 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 and C.R.S. §34-1-201.

Proprietary product - means 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 - means 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 - means 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 - means 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 - means this Regulation O-22, adopted by the Board of Health of Adams County.

Regulation 43 - means the CDPHE Water Quality Control Commission On-Site Wastewater Treatment System Regulation 43, 5 CCR 1002-43, Effective June 30, 2017.

Remediation system - means 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 - means 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.

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

Rock-plant filter - means 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.

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

Sand filter, lined - means 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 - means 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 - means 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.

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

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

Site evaluator - means 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 - means a temporary shallow trench for use as disposal of non-water-carried human waste.

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

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

Soil treatment area, alternating - means final treatment and distribution component that is composed of two soil treatment areas that are independently dosed.

Soil treatment area, sequencing - means 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 - means the concentration of constituents of wastewater or effluent; usually expressed in mg/L.

Suitable soil - means 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.

System - See On-Site Wastewater Treatment System

Systems cleaner - means a person licensed by the Department and engaged in and who holds himself or herself 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 - means a person licensed by the Department and engaged in and who holds himself or herself out as a specialist in the installation, renovation, and repair of On-Site Wastewater Treatment Systems.

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

Transfer of Title - means change of ownership of a property.

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

Treatment media - See Media, treatment

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

Trench - means: 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 - means 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 - means a permit authorizing the use of an OWTS as more fully set forth in Section 4 herein.

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

Vault - means 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 or more at full occupancy, the vault is a domestic wastewater treatment works. Vaults are On-Site Wastewater Treatment Systems.

Visual and tactile evaluation of soil - means the determination of the properties of soil by standardized tests of appearance and manipulation in the hand.

Volume, effective - means 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 - means 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 - means: 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 - means a designed pond which receives exclusively domestic wastewater from a septic tank and which provides an additional degree of treatment.

Water Course - means a natural or artificial channel through which water flows.

Water Quality Control Commission - See Commission

Water Quality Control Division - See Division

Wetland, constructed - See rock-plant filter.

Wetlands - means 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 Adams 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 the expanded use of an existing system beyond the design capacity of said system.

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 fee of twenty-three dollars for each permit issued for a new, repaired, or upgraded OWTS. Of that fee, the Department must retain three dollars to cover the Department's administrative costs and twenty dollars must be transmitted to the state treasurer, who must deposit that sum in the water quality control fund created in C.R.S. §25-8-502(1)(c).

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 therefore.

3.7 Disclaimer

The issuance of a permit and specifications of terms and conditions therein will not constitute assumption of liability, nor create a presumption that the Department or its employees may be liable for the failure or malfunctioning of any system nor act as a certification of the equipment used in the system (or any component thereof used in its operation); nor act as a certification that the system for which the permit was issued ensures continuous compliance with the provision of the OWTS Act, or rules and the 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 his or her 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

An applicant for a permit to construct a new OWTS or to repair or expand an 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 Treatment Level (TL) 2;
- 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 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 his/her 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.

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. 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 the 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.

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 provides 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 installed.
- C. Before a product development permit is issued, the Division must determine that the product to be tested 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).
- E. 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.
- F. 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
- G. The Department may stipulate additional requirements for the product development permit necessary to ensure that the system performs as intended.
- H. A product development permit is a site-specific permit. Product development testing at multiple sites requires a product development permit for each site.
- I. During the term of the product development permit, all data collected is to be submitted to the Division and the Department.
- J. 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.

- K. 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.
- L. Once the system is installed and approved, the Department must supply the Division with a copy of the completed OWTS permit.

SECTION 4 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 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) bedroom;
 - 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; 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 condition of the septic tank and 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.
- 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, from 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 OWTS 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 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 septic tank, in good working order, and provided with safe and secure lids;
- B. All internal devices and appurtenances such as tees, effluent screens and baffles that were originally provided with the tank or added later must be intact and in working order;
- C. All internal devices and appurtenances such as tees, effluent screens and baffles that were originally provided with the tank or added later must be intact and in working order;
- D. Alarms, control devices, and components necessary for the operation of the system are present and in good working order;
- E. 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 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;
- F. A soil treatment area, or other means of subsurface wastewater treatment, must be present and not in a state of failure;
- G. There are no unapproved wastewater discharges from the system or structure; 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 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. The Use Permit will remain valid until the date of real estate closing or for a maximum period of twelve months, whichever comes first.
- C. Waiver of a Use Permit

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 of occupancy of the structure. If a permitted repair is required, the repairs must be completed by the expiration date of the permit.

- D. Revocation of a Use Permit

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.

- E. Penalties

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 by 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 – HIGHER LEVEL TREATMENT

5.1 Applicability

- A. A Use Permit under this Section shall mean a Use Permit for a higher level treatment system.
- B. A Use Permit shall be required for any system that includes a higher level treatment unit 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 higher level treatment unit.
- D. The Department shall not authorize the removal of a higher level treatment 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 Use Permits – Higher Level Treatment.

5.2 Minimum Application Requirements

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;
- 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 higher level treatment 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 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 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 screens shall be inspected and cleaned at an appropriate interval to assure 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

Frequency of inspection and maintenance must be the most frequent of the following:

- A. Manufacturer recommendations for proprietary systems or design criteria requirements for public domain technology;
- B. Department requirements; or

- C. For higher level treatment systems, two inspections at six-month intervals for the first year of operation; followed by annual inspections for the life of the system.

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 O&M 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 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 OWTS is operating, maintained and performing according to the required standards for the designated treatment level;
- B. Maintain an active service contract with a maintenance provider at all times; and

- C. Each time his/her current 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 insure 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 damage 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 local 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

In order to ensure good working order, all septic tanks shall be inspected once every four 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.

6.6 Monitoring and Sampling

- A. For an OWTS for which monitoring of effluent is required, the Department or delegated third party must collect and test effluent samples to ensure compliance with the provisions of this Regulation.
- B. Sampling may be required by the Department in conjunction with an enforcement action.
- C. 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 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.
- D. Conditions when the Department can require routine monitoring:
 - 1) Indications of inadequate performance;
 - 2) Location in sensitive areas;
 - 3) Experimental systems; and/or
 - 4) Systems under product development permits.
- E. Sampling and analysis must be performed according to American Public Health Association, American Water Works Association, and Water Environment Federation: Standards Methods for the Examination of Water and Wastewater, 23rd edition.

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, or cesspool is abandoned, and a pump receipt provided.
- B. The contents of a septic tank, vault, seepage pit, 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.

SECTION 7 REGULATION OF SYSTEMS CONTRACTORS AND CLEANERS

7.1 Systems Contractor License

- A. No person shall install, alter, or repair an OWTS unless he holds a valid Systems Contractor License issued by the Department.
- 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. Successful completion of the CDPHE Part A Systems Contractor Examination may be substituted until the next NAWT Installer Course is available. The license shall follow the individual if they change employment. Each systems contractor shall have a minimum of one (1) owner or employee with a valid systems contractor license at all times.
- C. Application for Systems Contractor's Licenses or renewals shall be made on forms supplied by the Department.

- D. 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.
- E. 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 unless he holds a valid Systems Cleaner License issued by the Department.
- 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 systems contractor 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.
- 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 scale 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 provided 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 investigation;

- 2) Reconnaissance visit;
- 3) Detailed soil investigation; and
- 4) Report and site plan.

8.2 Preliminary 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. Published site information:

- 1) Topography; and
- 2) Soil data

D. Location of physical features, on and off the property that will require setbacks as identified in Tables 6 and 7 in Appendix A.

E. Preliminary soil treatment area size estimate based on information on existing or planned facility and this Regulation.

F. Other information required by Department.

G. Additional information that may be useful to the specific evaluation as available:

- 1) Survey;
- 2) Easements;
- 3) Floodplain maps;
- 4) Geology and basin maps and descriptions;
- 5) Aerial photographs;
- 6) Climate information; and

- 7) Delineated wetlands maps.

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.

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 coincide 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; and
 - 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, clearly flag or otherwise mark each excavation or hole to allow easy location by others. Excavations left open and unattended must be suitably barricaded to prevent unauthorized access and to address safety concerns.

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, and 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 conditions.
- 3) The minimum depth of the soil profile test pit excavation must be to any limiting layer, or four feet below the infiltrative surface of the in-situ soil, whichever is encountered first.
- 4) Layers and interfaces that interfere with the treatment and dispersal of effluent must be noted. Thus, any limiting soil characteristic such as consistence also needs to be evaluated. The evaluation of consistence may also include an evaluation of excavation difficulty, rupture resistance, and/or penetration resistance.
- 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 Item 4, Table 7.
- 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. Procedure for performing percolation tests:
 - 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 soils classified as Type 1, the swelling procedure is not essential and the test may be conducted after the water from one filling of the hole has completely seeped out of the hole.

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 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 indicate and label the profile test pits and percolation test holes, a detail of the portion of the site containing the soil profile test pits and percolation test holes must be submitted. If the property is too large to adequately show site evaluation information, a

detail 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 and 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 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, physical and health impact features on both the subject and adjacent properties requiring setbacks. 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) Elevation or depth of infiltrative surface of the soil treatment area, the septic tank invert, and all other components of the OWTS;
- 6) Special structural design considerations, as applicable to ensure the long-term integrity of each component;
- 7) References to design manuals or other technical materials used;
- 8) Installation procedures, as applicable;
- 9) Operation and maintenance manuals or instructions; and
- 10) Other information that may be useful such as photos and cross-section drawings.

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
 - 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 procedure in this Regulation
 - 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. 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) Recognize evidence of highest seasonal water surface
 - e) Identify layers and interfaces that will interfere with effluent movement
 - f) Determine the most promising depth for infiltrative surface of OWTS and for percolation tests, if used
 - g) Understand basic principles of OWTS siting and design
- 2) Possible demonstrations of competence in visual and tactile evaluation of soil:
 - a) Attend an approved training or workshop for soil evaluation for OWTS including both class and field work. 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 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 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 six (6) bedrooms.

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.
- D. If the auxiliary building has a separate OWTS, the facility 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 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 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.

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 made 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 procedures of 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 too close together. 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 shall 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
 - b) Setback distance from soil treatment area to water features
 - c) Setback distance from soil treatment area to a dry gulch or cut bank
 - 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 in order to accommodate the site conditions.

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.

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 and all risers must extend to or above final grade. 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. Components that require access for maintenance must include but not be limited to: submerged bearings, moving parts, pumps, siphons, valves, tubes, intakes, slots, distribution boxes, drop boxes, cleanouts, effluent screens, filters, inlet and outlet baffles, aerators, treatment equipment and other devices.
- F. 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 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 24 inches below grade or as required in the local electrical requirements. If shallower than 24 inches wires must be placed in conduit and/or a Ground Fault Interrupter must be present.

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

- 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. Repairs of an existing system must meet the requirements as feasible. The system as approved must be designed to minimize or eliminate infiltration of floodwaters into the system and discharge from the system into floodwaters.
- 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.

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; 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 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 his/her own designs, the anchoring system design must be prepared by the professional engineer.

C. 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 400 gallons.
- 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, Section 9 (Standard Specification for Precast Septic Tanks) for concrete tanks or in the most current version of IAPMO/ANSI Z1000-2013 (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. 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 shall extend at least 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 screen must be located so that the effluent screen 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 gallon effective volume.

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 (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 (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 used in portions of OWTS that are pressurized must be constructed of compatible pipe, primer, bonding agent, and fittings. Flexible couplings to connect pipes may only be used in portions of an OWTS that are intended for gravity flow of wastewater.
- 2) 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 or equivalent or greater strength. Schedule 40 pipe is preferred.
- 3) 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 or equivalent or greater strength. Corrugated polyethylene pipe with smooth interior that meets ASTM F405 or AASHTO M252 specifications or equivalent may be used.
- 4) Schedule 40 or pipe of equivalent or greater strength must be used for the placement of piping under driveways or roadways and in instances where sewer line setback distances are granted a variance for any reason.
- 5) Tile pipe, open-joint pipe, and cast iron pipe must not be used in an OWTS.
- 6) Pressure pipe must be rated for the intended use to accommodate pump discharge pressure.

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 load 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 22 inches deep. If 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 onsite 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] foot-fall per one hundred [100] feet or one-fourth [1/4] 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 sanitary wye, riser to grade and secure cap. All cleanouts must be extended to or easily accessible from grade.
- 2) Cleanouts shall be provided at the following locations:
 - a) Within five (5) feet of the outside of the building
 - 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.

F. Bends

Bends ahead of the septic tank should be limited to 45 degrees or less wherever possible. If 90-degree bends cannot be avoided, they should be made with two (2) 45 degree ells, or a long sweep quarter curve.

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 water-tight 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 or serial 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 or serial 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 and bear the seal of approval of the NSF or equivalent testing and certification program.
- 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.

- 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 or provided with an approved filtering device to assure that only liquid effluent will be discharged. The transfer of liquid from the first to the second compartment must be at an elevation that is between the inlet and outlet invert elevations, and through a standard tee designed and located as per the requirements of Section 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 elevation, 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 24-inch 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

- 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).

12.9 Effluent Screens

- A. If a pump or dosing siphon 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 screen, pump vault

equipped with a filter cartridge, or a filter on the discharge pipe, would all be considered acceptable.

- B. The effluent screen must be cleaned at manufacturer-recommended intervals, or more often, if use patterns indicate.
- C. An alarm may be installed on an effluent screen indicating the need for maintenance. The Department may require all effluent screens to be equipped with alarms.
- D. Where an ejector pump, grinder pump or non-clog pump is proposed for use prior to the septic tank, an effluent screen must be installed on the outlet of the septic tank.
- E. The handle of the effluent screen 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 greases 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 1/3 of the liquid volume, but must be at least 12 inches off the inside floor of the interceptor.
- E. The inlet and outlet tees or baffles must extend at least 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 where any of the following conditions are present, the system must be designed by a professional engineer and approved by the Department:

- A. For soil types 3A, 4, 4A, 5, R-0, R-1 and R-2; Treatment Levels TL2, TL2N, TL3, and TL3N as specified in Tables 10 and 11 of this Regulation.

- B. The maximum seasonal level of the ground water surface is less than four feet below the bottom of the proposed infiltrative surface.
- C. A limiting layer exists less than four feet below the bottom of the proposed infiltrative surface.
- D. The ground slope is in excess of 20%.
- E. Pressure distribution is used.

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.
- B. Long-term acceptance rates (LTARs) are shown in Table 10 and Table 11 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 required soil treatment area receiving TL1 effluent may be multiplied by one size adjustment factor from Table 12, Table 13, or both, in Appendix A.
 - 6) A soil treatment area receiving TL2, TL2N, TL3, or TL3N 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 TL3N effluent may be applied by gravity flow in soil types 3, 3A, 4, 4A, or 5 for designs where reductions in the soil treatment area size or vertical/horizontal separation reductions are not being requested.
- E. The distribution media in Table 13 may be used for distribution of higher level treatment system effluent, but an additional reduction factor from Table 13 must not be used. Sizing reductions for higher level treatment systems are achieved through increased LTAR's provided in Table 10.

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. adjustment factor of 1.00, is considered to be TL1 applied by gravity to a gravel-filled trench.
- C. Sizing adjustments 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) 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.
 - 4) Pipe for gravity distribution must be no less than three inches in diameter.
 - 5) 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.
 - 6) Following construction, the ground surface must be graded to divert storm water 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.

- 7) 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.
- 8) 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 force main or effluent pipe must be connected to as near to the middle of the distribution header as possible. However, it must be offset from any distribution lateral to prevent preferential flow.
- 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 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 tube must extend to the infiltrative surface and not be connected to the end of a distribution pipe.
- 2) Inspection ports shall be perforated or saw-cut on the bottom portion in contact with the media to allow for ponded effluent to infiltrate into the inspection port and provide an accurate determination of the depth of ponded effluent.
- 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.
 - 5) Inspection ports in chambers may be installed according to manufacturer's instructions if the infiltrative surface is visible 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) A serial or 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.
 - 2) 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.
 - 3) 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 the top of the gravel or chamber outlet before flowing to succeeding treatment areas.
- 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 may range in size from one-half (1/2) inch to two and one-half (2 ½) inches. AASHTO M 43 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 3/4 of an inch.
- 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) Installation must be according to manufacturer's instructions.
- c) The width of the chamber unit, relative to the excavation of the bed or trench, must conform to Section 16.5.A.4).
- d) Effluent may be distributed by gravity, pump, or siphon.
- e) 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-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 30-72 inch operating head at the distal end orifice.
 - f) Pump/siphon information; Total Dynamic Head; gallon/minute
 - g) Drain-back volume from force main; and
 - h) Calculations, or a design software reference, that indicates the selected component sizing will provide equal flow within each active zone of the distribution system, and provide no more than a 10% flow differential from the initial orifice to the most distal end orifice within each zone.
- 2) The separating 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 degree must be provided. Diagram 7 in Appendix B illustrates the components of a typical pressure distribution system.

I. Driplines

- 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.
- 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 cleaning.

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 either "preferred" or "secondary" sand filter media, as specified in Section 14.3.B.5).

- b) The long-term acceptance rates as specified in Table 11 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) A gradation of the sand media used must be provided. The gradation must be dated no more than one month prior to the installation date. However, a gradation of the actual material placed in the excavation is recommended.
 - e) All added soil must be completely settled prior to installation of components as specified and approved by the professional engineer.
 - f) Pressure distribution must be used.
- B. The removal and reinstallation of in-situ soil may only be allowed where the soils are determined to be a soil type “R-1” (Option 2). The design must comply with the requirements for this soil type noted in Table 11 (Soil Type R-1, Option 2).
- C. 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 either “preferred” or “secondary” sand filter media, as specified in Section 14.3.B.5).
 - 2) Unless the design follows the criteria for a sand filter or mound system design as required in Sections 14.3 and 14.4, the TL1 long-term acceptance rate for the receiving soil must be used.
 - 3) A gradation of the sand media used must be provided. The gradation must be dated no more than one month prior to the installation date. However, a gradation of the actual material placed in the excavation is recommended.
 - 4) All added soil must be completely settled prior to installation of components.
 - 5) 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 will a setback reduction be approved by the Department less than what the existing separation is to 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. Deep Beds

For repairs, the infiltrative surface of a bed may be no deeper than five 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.

D. Wide Beds

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

E. Deep Gravel Trenches

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:

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

1) 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

2) Maximum allowable additional depth is five feet.

3) Percolation tests or soil profile test pit excavations must be performed at the proposed infiltrative surface depth.

4) Size adjustments as provided for in Tables 12 and 13 must not be applied to deep gravel trenches.

F. Seepage Pits

- 1) For repairs, 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, a seepage pit without higher level treatment may be used.
- 2) If the risks are not low, higher level treatment of at least TL2 must be attained prior to discharge to these systems for final dispersal.

- 3) A seepage pit must consist of a buried structure of precast perforated concrete, or cinder or concrete block laid dry with open joints.
 - a) Pits must be provided with both vertical sidewall and top supporting structural concrete or other material of equal structural integrity.
 - b) The excavation must be larger than the structure by at least 12 inches on each side and may not exceed 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.
- 4) 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.
- 5) The requirements for the design and construction of seepage pits for the treatment and dispersal of on-site wastewater on new sites is defined in Section 15.8.

G. Wastewater Ponds

- 1) Construction of new wastewater ponds are 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.

H. Vaults

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

I. 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

- A. Higher level treatment systems must be designed by a professional engineer.
- B. Higher level treatment systems may be public domain technology systems or proprietary systems.
 - 1) Public domain technology systems must be designed, installed and maintained according to established criteria and 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.
- C. Soil treatment areas for higher level treatment systems must be pressure dosed.
- D. Systems must be capable of accommodating all anticipated flows and organic loads.
- E. Ventilation and air systems

Mechanical components must be installed in a properly vented location and all vents, air intakes, and air hoses must be protected from snow, ice, or water vapor accumulations.
- F. Covers, barriers, or other protection

All systems must be installed to include protection of openings against entry of insects, rodents, other vectors and unauthorized people.

14.2 Treatment Levels

The treatment levels identified in Table 4 are specified in this Section for public domain technology, and proprietary treatment systems will be assigned a treatment level by the technology review and acceptance process in Section 16.4. Adequate maintenance for each is required and must be documented as in Section 6.

14.3 Sand Filters

- A. A lined or unlined intermittent sand filter, or 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) General Design Parameters: Not all combinations of the variables noted below will result in a proper distribution system design. The professional engineer must justify through calculations or design software that the selected values will concur with industry standards.
 - a) Distribution pipe size: 3/4 inch – 1.5 inches (PVC Class 200, min.)
 - i) Two inch distribution pipe may only be used where other design modifications cannot overcome a greater than 10% variation in the pressure head between the initial and distal orifices.
 - b) Distribution pipe spacing: 18 inches – 48 inches
 - c) Orifice size: 1/8 inches – 3/8 inches
 - d) Orifice spacing: 18 inches – 48 inches
 - e) Operating head at the distal end of distribution pipes: 30 inches – 72 inches (60 inches typ.). Larger orifices allow for an operating head at the lower end of this range, while smaller orifices will necessitate an operating head at the higher end of this range.
 - 4) Dosing:
 - a) Pressure distribution is required. The design of the distribution system must also comply with the requirements of 13.5.H.
 - b) Number of cycles/day: Will vary with design (Short, frequent doses are preferred.)
 - c) Proposed dose volume: Will vary with design (0.25 – 1.0) gallons/orifice/dose, or 3-5 times distribution pipe volume.
 - d) Timed dosing is recommended where design considerations allow.
 - 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) "Preferred" sand media requirements:

- i) Effective size: 0.25-0.60 mm
- ii) Uniformity coefficient: ≤ 4.0
- iii) Percent fines passing #200 sieve: ≤ 3.0

c) "Secondary" sand media requirements:

- i) Effective size: 0.15-0.60 mm
- ii) Uniformity coefficient: ≤ 7.0
- iii) Percent fines passing #200 sieve: ≤ 3.0

d) A gradation of the sand media used must be provided. The gradation must be dated no more than one month prior to the installation date. However, a gradation of the actual material placed in the excavation is recommended.

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 size 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

8 inches – 10 inches of Type 1 or 2 soil with an additional two inches top soil.

9) Size adjustment factors provided in Tables 12 and 13 are not applicable for sand filters.

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

11) Diagrams 8 and 9 in Appendix B illustrate typical sand filter components.

D. Unlined (Open Bottom) Sand Filters

- 1) All requirements of 14.3.B will apply to unlined sand filters.
- 2) Application Rates:
 - a) Maximum hydraulic loading rate for TL1 effluent applied to “Preferred Sand Media” in an unlined sand filter is 1.0 gal./sq.ft./day, or the long-term acceptance rate of the receiving soil for TL3 (Table 10) whichever results in the larger area.
 - b) Maximum hydraulic loading rate for TL1 effluent applied to “Secondary Sand Media” in an unlined sand filter is 0.8 gal./sq.ft./day, or the long-term acceptance rate of the receiving soil for TL3 (Table 10) whichever results in the larger area.
 - c) Maximum hydraulic loading rate for TL2, TL2N, TL3, or TL3N effluent applied to “Preferred” or “Secondary” Sand Media in an unlined sand filter must be the long-term acceptance rate of the receiving soil for TL3 (Table 10).
 - d) The upper infiltrative surface of an unlined sand filter receiving TL1 and TL2 effluent must be at least three feet above a limiting layer.
 - e) The upper infiltrative surface of an unlined sand filter receiving TL2N and TL3 effluent must be at least 2 1/2 feet above a limiting layer.
 - f) The upper infiltrative surface of an unlined sand filter receiving TL3N effluent must be at least two feet above a limiting layer.
 - g) Lined Sand Filters
 - h) All requirements of 14.3.B will apply to lined sand filters.
 - i) Application rates:
 - j) Hydraulic loading rate for TL1 effluent applied to “Preferred Sand Media” in a lined sand filter is 1.0 gal./sq.ft./day.
 - k) Hydraulic loading rate for TL1 effluent applied to “Secondary Sand Media” in a lined sand filter is 0.8 gal./sq.ft./day.
 - l) The minimum depth of the sand media in a lined sand filter must be two feet.
 - m) 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, No. 8, coarse aggregate meets this specification.
 - n) A minimum four-inch diameter slotted SCH40 PVC 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, No.3 coarse aggregate meets this specification.

- o) 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.
- 3) 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. Recirculating Sand Filter, Minimum Requirements:

- 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. 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, 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, No. 8, coarse aggregate).
- 7) Under-drain requirements:

A minimum four-inch diameter slotted SCH40 PVC 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, No.3 coarse aggregate meets this specification.
- 8) PVC liner requirements:

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.
- 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 TL3N effluent.

14.4 Mound Systems

- A. When the infiltrative surface area of the media receiving wastewater effluent is at or above the natural ground surface at any point, it shall be considered a mound system.
- B. Mound systems that provide a minimum of 24 inches of sand treatment media may use the application rates for the in-situ receiving soil for TL3 effluent (Table 10). Size adjustment factors within Table 13 must not be applied to mound designs where TL3 application rates are used. However, they may be applied if TL1 application rates are used.
- C. Mound systems must conform to the design requirements of Sections 14.3.C for unlined (open bottom) sand filters, with the following exceptions:
 - 1) A mound system may include less than 24 inches of imported sand media on a site where a lesser depth of sand media is sufficient to meet vertical separation

requirements above a limiting layer. Application rates for the in-situ receiving soil for TL1 effluent must be used when less than 24 inches of sand media is used, unless higher level treatment is provided prior to dispersal into the mound system.

- 2) For the design of a mound system where less than 24 inches of sand media is proposed, and application rates for TL1 are used, the size adjustment factors within Table 13 may be used.
- D. The basal area must be determined using the LTAR from Table 10 for the in-situ receiving soil under the mound.
- E. Linear loading rates must be determined. The evaluation of many factors is required for an accurate determination of the linear loading rate. While application rates for the in-situ receiving soil under the mound is a main component, placement on the slope, and 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 3A to 5 (Table 10), then the linear loading rate is extremely important and long narrow mounds are strongly recommended.
- 1) When TL1 effluent is applied to the distribution media of a mound system installed above in-situ soil types 1 to 3 (Table 10) and R-0 to R-2 (Table 11), 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.
 - 2) When TL2 to 3N effluent is applied to the distribution media of a mound system installed above in-situ soil types 1 to 3 (Table 10) and R-0 to R-2 (Table 11), the linear loading rate may exceed 12 gpd/lin.ft. Subsequently, the mound may be wider than 12 feet.
 - 3) When TL1 to TL3N effluent is applied to all mound systems installed above in-situ soil types 3A to 5 (Table 10), 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.
- F. 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.
- G. The surface of the mounded area must be planted with a suitable vegetative cover.
- H. A suggested reference for the design and installation of mound systems is: (CDPHE). (2017). *Mounded Wastewater Treatment Systems: A Technical Guidance for Site Suitability, Design,*

- I. *Construction, Operation and Maintenance.* Note that this is suggested guidance, and where the requirements of these Regulations differ from those in the referenced mound document, 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 FACILITIES

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.
 - 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:

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

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

- 3) Designs will include a rock and pipe, or other Division approved proprietary distribution product, with the centerline of the distribution system 6 to 8 feet on center. 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 6 to 8 feet on

center. A thick non-woven fabric may be replaced 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.B.5) below.
- 5) The following formula must be used for determining the minimum area necessary for evapotranspiration/absorption of septic tank effluent:

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

- 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 a type of evapotranspiration/absorption system. However as specific design criteria is provided for an NDDS, they are exempt from the additional requirements of Section 15.1.
- B. The Colorado Professionals in Onsite Wastewater Guidelines for the Design and Installation of Non-Pressurized Drip Dispersal Systems (NDDS), September, 2016, is the procedural guideline in the design of a NDDS and must be followed when an NDDS is proposed.
- C. The width of an NDDS system may be wider than 12 feet.
- D. NDDS shall be designed by a Registered Professional Engineer.

15.3 Vaults Other Than Vault Privies

- A. Vaults for full time use in new construction are prohibited where a property can accommodate an OWTS with a soil treatment area.
- B. Vaults for full time use may be permitted when a failing OWTS cannot be replaced.
- C. Vaults may be permitted for limited use occupancy on a property which cannot accommodate an OWTS with soil treatment area.
- D. A vault may be permitted if the facility is on land where the installation of an OWTS with soil treatment area is not permitted.
- E. Vaults may be permitted for systems where some of the wastewater flows are separated, such as toilet wastes only, into a vault. The portion not retained in the vault must be treated in an OWTS sized per the requirements of this Regulation
- F. Variances may be granted for specialized commercial uses.
- G. 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.
- H. 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.
- I. Concrete vaults must meet the strength and water tightness 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.
- J. Vaults may be permitted for commercial recreational vehicle waste disposal.

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 or plastic. The vaults for privies must meet the structural and water tightness standards of vaults.
 - 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 bottom of the pit must be located above at least four feet of suitable soil and four feet above a limiting layer.
- 2) The pit must have at least 400 gallons of effective volume.
- 3) The superstructure must provide complete privacy and have fly- and rodent-tight construction, an earth mound around the top of the pit 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.

15.5 Incinerating, Composting and Chemical Toilets

- A. The Board of Health may permit incinerating, composting and chemical toilets. The use of an incinerating, composting or chemical toilet will not reduce the required size of the OWTS as noted in Section 11.1.
- B. An incinerating or composting toilet may be used for toilet waste where an OWTS is installed for treating wastewater remaining after removal of toilet waste. Subject to the Board of Health or other applicable regulations or codes (e.g., Colorado Plumbing Code if a local code does not exist), the compartment may be located within a dwelling or building provided the unit complies with the applicable requirements of this Regulation, and provided the installation will not result in conditions considered to be a health hazard as determined by the Department. Compartment and appurtenances related to the unit must include fly-tight and vector-proof construction and exterior ventilation.
- C. Incinerating Toilets
 - 1) An approved incinerating toilet must be designed and installed in accordance with all applicable federal, state, and local air-pollution requirements and manufacturer's instructions.
 - 2) Incinerating Toilets Acceptance Requirements
 - a) Incinerating toilets must meet the requirements of the NSF Protocol P157 and bear the seal of approval of the NSF or an equivalent testing and certification program.
 - b) Incinerating toilets must be operated according to manufacturer's specifications.
- D. Composting Toilets
 - 1) Composting toilets must meet the requirements of NSF/ANSI Standard 41 and bear the seal of approval of the NSF or an equivalent testing and certification program.
 - 2) An approved composting toilet must treat deposits of feces, urine, and readily decomposable household garbage that are not diluted with water or other fluids and are retained in a compartment in which aerobic composting will occur.

- 3) The effective volume of the receptacle must be sufficient to accommodate the number of persons served in the design of the unit installed. The effective volume of the unit must include sufficient area for the use of composting materials which must not be toxic to the process or hazardous to persons and which must be used in sufficient quantity to assure proper decomposition.
 - 4) Residue from the composting toilet must be removed when it is filled to 75 percent (75%) of capacity. Residue from the unit must be properly disposed of by methods recommended by the manufacturer and acceptable to the Department. Disposal methods must prevent contamination of water and not cause a public health nuisance. Disposal using solid waste practices is recommended.
 - 5) If a system will be installed where low temperature may be a factor, design and installation must address the effects of the low temperature.
 - 6) Composting toilets must be operated according to manufacturer's specifications.
- E. Portable Chemical Toilets
- 1) A portable chemical toilet may be used by permit from the Department or other agency with authority to issue permits for portable chemical toilets.
 - 2) Use of a portable chemical toilet in permanently occupied buildings is prohibited except during construction or under emergency circumstances as determined by the Department. Proper ventilation of a chemical toilet used inside must be required.

15.6 Slit Trench Latrine

- A. A slit trench latrine must be utilized 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.

15.7 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 solid 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: Standards Methods for the Examination of Water and Wastewater, 21st edition.
 - 2) The sampling point must be a location that is representative of final discharge from the system.

15.8 Seepage Pits

- A. The construction of new seepage pits for the treatment and dispersal of on-site wastewater on new sites is prohibited unless:
- 1) The seepage pit is designed by a professional engineer; and
 - 2) The design includes higher level treatment of at least TL2
 - 3) The design requirements for new seepage pits must also comply with requirements as defined in 13.8.F.3).
 - 4) Pressure distribution is not required for dispersal into a seepage pit.

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, 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 product 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 certification, the number of home sites to be tested may be reduced to six. The NSF/ANSI 40 certification must be submitted if the reduced number of test sites is requested.
 - b) If the proprietary treatment product is requesting TL2N acceptance and that product has received NSF/ANSI 245 certification, the number of home sites to be tested may be reduced to six. The NSF/ANSI 245 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. 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.
 - c) The report conclusions must indicate the proprietary treatment unit can consistently be expected to meet the treatment level for which acceptance is being requested.

- d) 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.
- e) Energy and other costs are to be based on typical Denver, Colorado, costs at the time of the acceptance request.
- f) Replacement part costs must include shipping and handling.
- g) 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.
- h) If a proprietary product had been previously accepted for use in Colorado under NSF/ANSI 40 or equivalent testing and at least one product unit had been installed in Colorado prior to June 30, 2013, the acceptance for use in Colorado may continue as TL2. A request for this continued acceptance must be submitted to Division on the forms provided by the Division. Documentation of a product installation must be provided.

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:

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.

C. Enhanced manufactured media:

- 1) The product must be wrapped in a fabric that promotes movement of the effluent through the fabric and prevents intrusion of soil. 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 10-3, 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 GENERAL PROHIBITIONS AND PENALTIES

17.1 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 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 is prohibited. Where an existing cesspool is failing, a conforming OWTS must be installed. Where space is not available for a conforming OWTS, the criteria for repairs established within Section 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 connection was 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 which is not equipped with adequate facilities for the sanitary disposal of sewage.
- E. 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.

17.2 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.

17.3 Penalties- C.R.S. §25-10-113

Any person who commits any of the following acts or violates any of the provisions of this Section commits a Class 1 petty offense as defined in C.R.S. §18-1.3-503, and as otherwise may be permitted in the OWTS Act:

- A. Constructs, alters, installs, or permits the use of any OWTS without first having applied for and received a permit as provided for in C.R.S. §25-10-106;
- B. Constructs, alters, or installs an OWTS in a manner which involves a knowing and material variation from the terms or specifications contained in the application, permit or variance;
- C. 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);
- D. Conducts a business as a systems contractor without having obtained the license provided for in C.R.S. §25-10-109 (1);
- E. Conducts a business as a systems cleaner without having obtained the license provided for in C.R.S. §25-10-109 (2);
- F. Falsifies or maintains improper records concerning system cleaning activities not performed or performed improperly; or
- G. Willfully fails to submit proof of proper maintenance and cleaning of a system as required by these Regulations.

17.4 Civil Penalty

A. Assessment

Upon a finding by the Board of Health that a person is in violation of this Regulation, the Board of Health may assess a penalty of up to fifty (\$50.00) dollars 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 18 ENFORCEMENT

18.1 Hearings

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

18.2 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.

18.3 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 19 BOARD OF HEALTH ADMINISTRATIVE PROCEDURES

19.1 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.

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

A 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.

19.3 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 insure 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.

19.4 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.

19.5 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 an 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.

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
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

TABLE 3: ESTIMATE OF AVERAGE DAILY WASTEWATER FLOW AND BOD₅ LOAD PER PERSON UNLESS OTHERWISE NOTED

<u>RESIDENTIAL WASTEWATER</u>	GPD	BOD₅ IN POUNDS PER DAY
Single-family dwellings	75	.20
Auxiliary buildings by fixture type		
Bath/Shower	14.7	.014
Dishwasher	1.8	.002
Kitchen sink with garbage grinder	5.8	.052
Laundry washer	19.5	.037
Lavatory	8.4	.021
Water closet (toilet)	24.8	.029
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
Mobile home	75	.20
Mobile home park per space	300	.80
<u>COMMERCIAL WASTEWATER</u>		
Facilities with short-term or transient visitors 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
Barber and beauty shops per chair	100	.70 ¹
Bowling alleys per lane - toilet wastes only	5	.03 ¹
Country club per member	30	.02
County club per employee	20	.06
Dentist offices per non-wet chair	50	.14 ¹
Doctor offices per doctor	250	.80 ¹
Factories and plants exclusive of industrial wastewater per employee per eight-hour shift – no showers	20	.05
Factories and plants exclusive of industrial wastewater per employee per eight-hour shift - showers provided	35	.08
Kennels per dog	30	.20
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
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 ⁴	4	.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
Luxury resort	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 need 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 the purposes of this Table, a "Tiny home" is a structure that has only one bedroom and has <400 sq.ft. of livable space, including lofts. In this instance, the OWTS may be sized for only one bedroom.
4. For churches with food service, the 4 gal/meal must be added to the 3.5 gal/seat to determine design flows.

TABLE 4: TREATMENT LEVELS

Treatment Level	BOD ₅ (mg/L)	CBOD ₅ ¹ (mg/L)	TSS (mg/L)	Total Nitrogen (mg/L)
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 mg/L

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

TABLE 5: HIGH STRENGTH WASTEWATER¹

	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 effluent 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 Installed after November 15, 1973 and Water, Physical, and Health Impact Features

	Spring, Well, ¹ Suction Line, Potable Water Supply Cistern ⁴	Potable Water Supply Line ² , In- Ground Swimming Pool	Structure w/Basement, Crawl Space or Footing Drains	Structure Without Basement, Crawl Space or Footing Drains	Property Lines, Piped or Lined Irrigation Ditch, or Upslope Curtain Drain	Subsurface Drain, Intermittent Irrigation Lateral, Drywell, Stormwater Structure, or Stormwater Conveyance Channel	Lake, Water Course, Irrigation Ditch, Stream, Wetland	Dry Gulch, Cut Bank, Fill Area (from Crest)	Septic Tank, Higher Level Treatment Unit, Dosing Tank, Vault or Privy
Septic Tank, Higher Level Treatment Unit, Dosing Tank, Vault, or Vault Privy	50 ²	10 ²	5	5	10	10	50	10	--
Building Sewer or Effluent Lines	50 ²	5 ⁶	0	0	10 ²	10 ²	50 ²	10 ²	--
STA Trench, STA Bed, Unlined Sand Filter, Sub-surface Dispersal System, Seepage Pit	100 ³	25 ²	20	10	10	25	50 ³	25	5
Lined Sand Filter	60	10 ²	15	10	10	10	25	10	5
Lined Evapo-transpiration Field or Outside of Berm of Lined Wastewater Pond	60	10 ²	15	15	10	10	25	10	5
Unlined Sand Filter in Soil With a Percolation Rate Slower than 60 Minutes per Inch, Unlined or Partially Lined Evapo-transpiration System, Outside of Berm of Unlined Wastewater Pond, or System Not Relying on STA for Treatment Other than Aerosol	100	25 ²	15	15	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. Components that are not watertight should not extend into areas of the root system of nearby trees.

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.

2. Crossings or encroachments may be permitted at the points as noted above provided that the 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 of sufficient diameter to easily slide over and completely encase the conveyance must be used. Rigid end caps of at least Schedule 40 rating 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. Other methods of encasement 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 a 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.

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

TABLE 7: ON-SITE WASTEWATER TREATMENT SYSTEM DESIGN CONSIDERATION AND TREATMENT REQUIREMENTS-SEPARATION DISTANCES FROM SOIL TREATMENT AREA					
			PRESSURE DOSING REQUIRED		
ITEM	OWTS DESIGN CONSIDERATION	Treatment Levels 1 and 2	Treatment Level 2N	Treatment Level 3	Treatment Level 3N
	<u>Horizontal Separation Distances</u>				
1	Distance from soil treatment area to on-site well	Greater than or equal to 100 feet	Greater than or equal to 100 feet	Greater than or equal to 100 feet	Greater than or equal to 100 feet ¹
2	Distance from soil treatment area to pond, creek, lake, or other surface water feature	Greater than or equal to 50 feet	Greater than or equal to 25 feet	Greater than or equal to 25 feet	Greater than or equal to 25 feet
3	Distance from soil treatment area to dry gulch or cut bank	Greater than or equal to 25 feet	Greater than or equal to 10 feet	Greater than or equal to 10 feet	Greater than or equal to 10 feet
	<u>Vertical Separation Distances</u>				
4	Treatment depth in feet from infiltrative surface to a limiting layer	4 feet ² (3 feet with pressure dosing)	Greater than or equal to 2.5 feet	Greater than or equal to 2.5 feet	Greater than or equal to 2 feet

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 TL 3N effluent, a reduction to 75 feet is allowed if a variance from the Water Well Construction Regulations is obtained.
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.

TABLE 8: APPROVED PIPE 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 or 3	1,000
4	1,250
Each Additional	250

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				
Soil Type	USDA Soil Texture	USDA Soil Structure-Type	USDA Soil Structure-Grade	Percolation Rate (MPI)	Treatment Level 1 ¹	Treatment Level 2 ¹	Treatment Level 2N ¹	Treatment Level 3 ¹	Treatment Level 3N ^{1*}
R	>35% Rock (>2mm): See Table 10-1A					>35% Rock (>2mm): See Table 10-1A			
1	Sand, Loamy Sand	Single Grain	0 (Structureless)	5-15	0.80	1.40	1.40	1.55	1.55
2	Sandy Loam, Loam, Silt Loam	PR (Prismatic) BK (Blocky) GR (Granular)	2 (Moderate) 3 (Strong)	16-25	0.60	1.0	1.0	1.1	1.1
2A	Sandy Loam, Loam, Silt Loam	PR, BK, GR Massive	1 (Weak) 0 (Structureless)	26-40	0.50	0.80	0.80	0.90	0.90
3	Sandy Clay Loam, Clay Loam, Silty Clay Loam	PR, BK, GR	2, 3	41-60	0.35	0.55	0.55	0.65	0.65
3A²	Sandy Clay Loam, Clay Loam, Silty Clay Loam	PR, BK, GR, Massive	1 0 (Structureless)	61-75	0.30	0.45	0.45	0.55	0.55
4	Sandy Clay, Clay, Silty Clay	PR, BK, GR	2, 3	76-90	0.20	0.30	0.30	0.30	0.30
4A	Sandy Clay, Clay, Silty Clay	PR, BK, GR, Massive	1 0 (Structureless)	91-120	0.15	0.20	0.20	0.20	0.20
5	Soil Types 2-4A	Platy	1, 2, 3	121+	0.10	0.15	0.15	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.**

*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 11: DESIGN CRITERIA FOR SOILS WITH HIGH ROCK CONTENT (TYPE “R SOILS”)^{1,2,3,4}

Soil Type, Percentage of Rock, LTAR, Distribution				Required Sand or Media Depth Relative to the Quality of Effluent Applied to the Distribution System				
Soil Type	Percentage and Size of Rock ⁵	Maximum LTAR (Gal./sq.ft./day)	Type of Distribution Required	Treatment Level 1 ⁶	Treatment Level 2	Treatment Level 2N	Treatment Level 3	Treatment Level 3N
R-0	Soil Type ⁷ 1 with more than 35% Rock (>2mm)	Unlined Sand Filter: 1.0 for “Preferred Sand Media”; 0.8 for “Secondary Sand Media”	Pressure Distribution ⁸	Minimum 3-foot deep Unlined Sand Filter	Minimum 3-foot deep Unlined Sand Filter	Minimum 2.5-foot deep Unlined Sand Filter	Minimum 2.5-foot deep Unlined Sand Filter	Minimum 2-foot deep Unlined Sand Filter
R-1; Option 1	Soil Type ⁷ 2 – 5, >35 - 65% Rock (>2mm); with ≥50% of the Rock <20 mm (3/4 inch)	Use TL1 LTAR from Table 10 for the soil type corresponding to the soil matrix, with a maximum LTAR of 0.8. If sand media is required, use corresponding application rates in 14.3.C.	Pressure Distribution ⁸	Minimum 2-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter	Minimum 1-foot deep Unlined Sand Filter	Sand media not required	Sand media not required
R-1; Option 2	Soil Type ⁷ 2 and 2A, >35 - 65% Rock (>2mm); with ≥50% of the Rock <20 mm (3/4 inch)	The allowable LTAR’s are defined in each individual treatment level column in this Table	Pressure Distribution ⁸	Remove, mix, replace 4 feet of existing material; with a maximum LTAR of 0.6	Remove, mix, replace 2 feet of existing material; with a maximum LTAR of 0.7	Remove, mix, replace 2 feet of existing material; with a maximum LTAR of 0.7	Remove, mix, replace 2 feet of existing material; with a maximum LTAR of 0.8	Remove, mix, replace 2 feet of existing material; with a maximum LTAR of 0.8
R-2	Soil Type ⁷ 2 – 5, >65 Rock (>2mm), OR ≥50% of Rock >20 mm (3/4 inch)	Use corresponding application rates in 14.3.C.	Timed, Pressure Distribution ⁸	Minimum 3-foot deep Unlined sand filter	Minimum 3-foot deep Unlined Sand Filter	Minimum 2.5-foot deep Unlined Sand Filter	Minimum 2.5-foot deep Unlined Sand Filter	Minimum 2-foot deep Unlined Sand Filter

- General guidance for Table 11: The intent of the soil type R-0 is to define a material that consists of a high percentage of rock, or rock fragments, and has a percolation rate of less than 5 mpi. Soil types R-1 and R-2 consists of a high percentage of rock or rock fragments, but have a percolation rate of greater than 5 mpi. Soil types R-0 and R-2 are considered to be a “limiting layer”.
- No sizing adjustments are allowed for systems placed in type “R” soils. The maximum LTAR’s are provided in this table
- The design of type “R” soil treatment systems must conform to Sections 14.3.B and C
- All systems installed in a type “R” soil must be designed by a professional engineer.
- The percentage of rock may be determined by a gradation conducted per ASTM standards, or an appropriate field evaluation by volume.
- Type “R” soil treatment systems that are designed per the criteria noted in the Treatment Level 1 column of this table do not require O/M oversight by the LPHA.
- The “Percentage and Size of Rock” column references the soil types noted in Table 10.
- Design of the pressure distribution system for type “R” soils shall comply with the requirements of Sections 14.3.B.1,3,4,6,7,8,9,10 and 11

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 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 TREATMENT LEVEL 1 SYSTEMS¹

<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</u>	1.0	0.9	0.7

1. All proprietary distribution products must receive acceptance and the applicable reduction through Division review per the applicable requirements of Section 16.5.


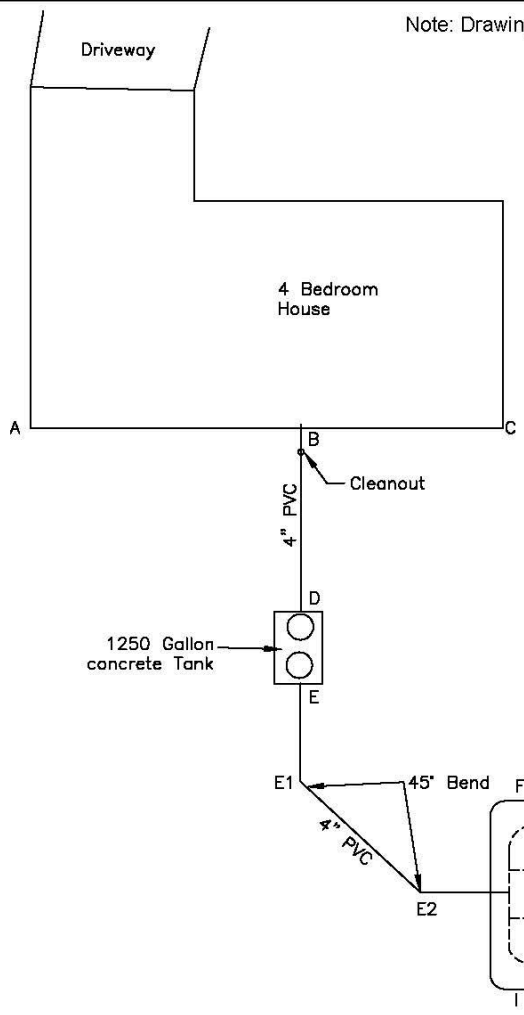
TABLE 14: NDDS SIZE ADJUSTMENT FACTORS		
<u>Soil Type</u>	<u>Percolation Rate</u>	<u>Size Adjustment Factor</u>
1, 2, 2A, & 3 ¹	N/A	N/A
3A	61-75	2.2
4	76-90	1.7
4A	91-120	1.5
5	121+	1.4


¹These soil types are unsuitable for an NDDS

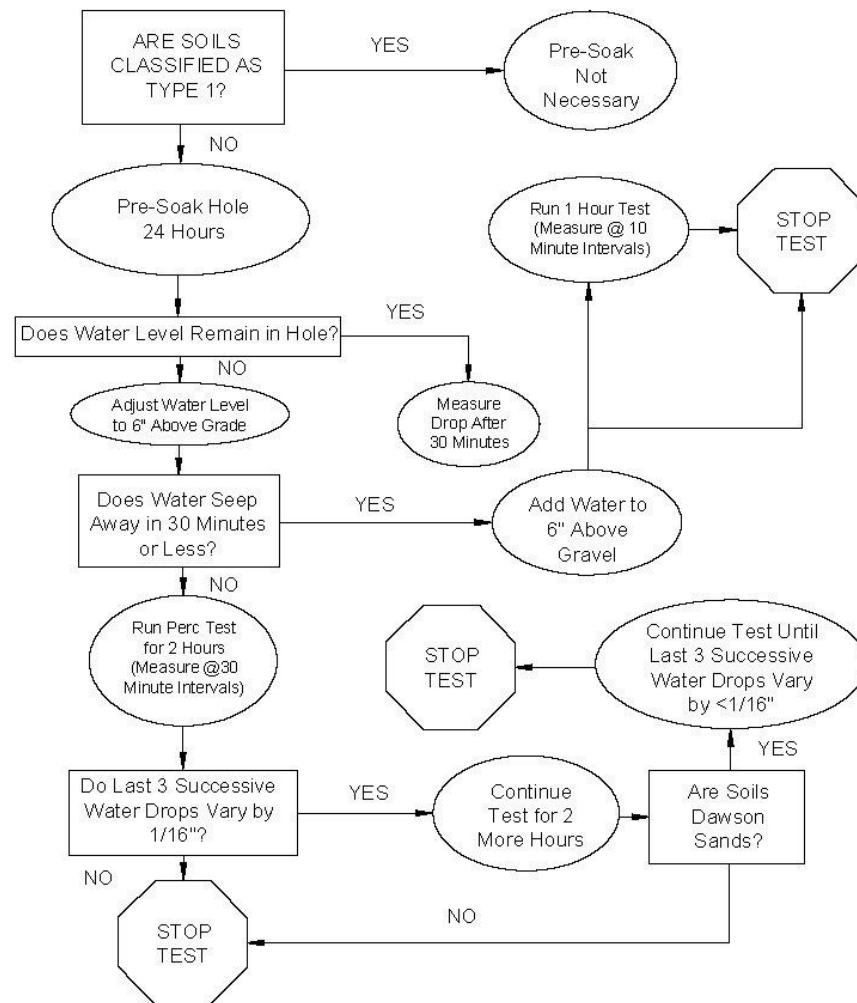
TABLE 15: GRADATION OF WICKING SAND FOR EVAPOTRANSPIRATION BEDS	
<u>Sieve Size</u>	<u>Percent Passing</u>
4	100
40	50-70
200	<15

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APPENDIX B - DIAGRAMS

	ADAMS COUNTY HEALTH DEPARTMENT <i>Your Health. Our Mission.</i>	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 _____																					
	<div style="display: flex; justify-content: space-between;"> <div style="width: 60%;">  </div> <div style="width: 35%;"> <p>Note: Drawing must be to scale.</p> <p style="text-align: center;">Well</p> <p style="text-align: center;">N</p> <p style="text-align: center;">SCALE: 1" = XX'</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2">Table of Horizontal Distances</th> </tr> </thead> <tbody> <tr><td>A-B</td><td>_____</td></tr> <tr><td>A-D</td><td>_____</td></tr> <tr><td>B-C</td><td>_____</td></tr> <tr><td>B-D</td><td>_____</td></tr> <tr><td>C-D</td><td>_____</td></tr> <tr><td>E-E1</td><td>_____</td></tr> <tr><td>E1-E2</td><td>_____</td></tr> <tr><td>E2-E3</td><td>_____</td></tr> <tr><td>F-G</td><td>_____</td></tr> <tr><td>G-H</td><td>_____</td></tr> </tbody> </table> </div> </div>			Table of Horizontal Distances		A-B	_____	A-D	_____	B-C	_____	B-D	_____	C-D	_____	E-E1	_____	E1-E2	_____	E2-E3	_____	F-G	_____	G-H
Table of Horizontal Distances																								
A-B	_____																							
A-D	_____																							
B-C	_____																							
B-D	_____																							
C-D	_____																							
E-E1	_____																							
E1-E2	_____																							
E2-E3	_____																							
F-G	_____																							
G-H	_____																							
On-Site System Record Drawing																								

	ADAMS COUNTY HEALTH DEPARTMENT <i>Your Health. Our Mission.</i>	Diagram 1 Sheet 1/1
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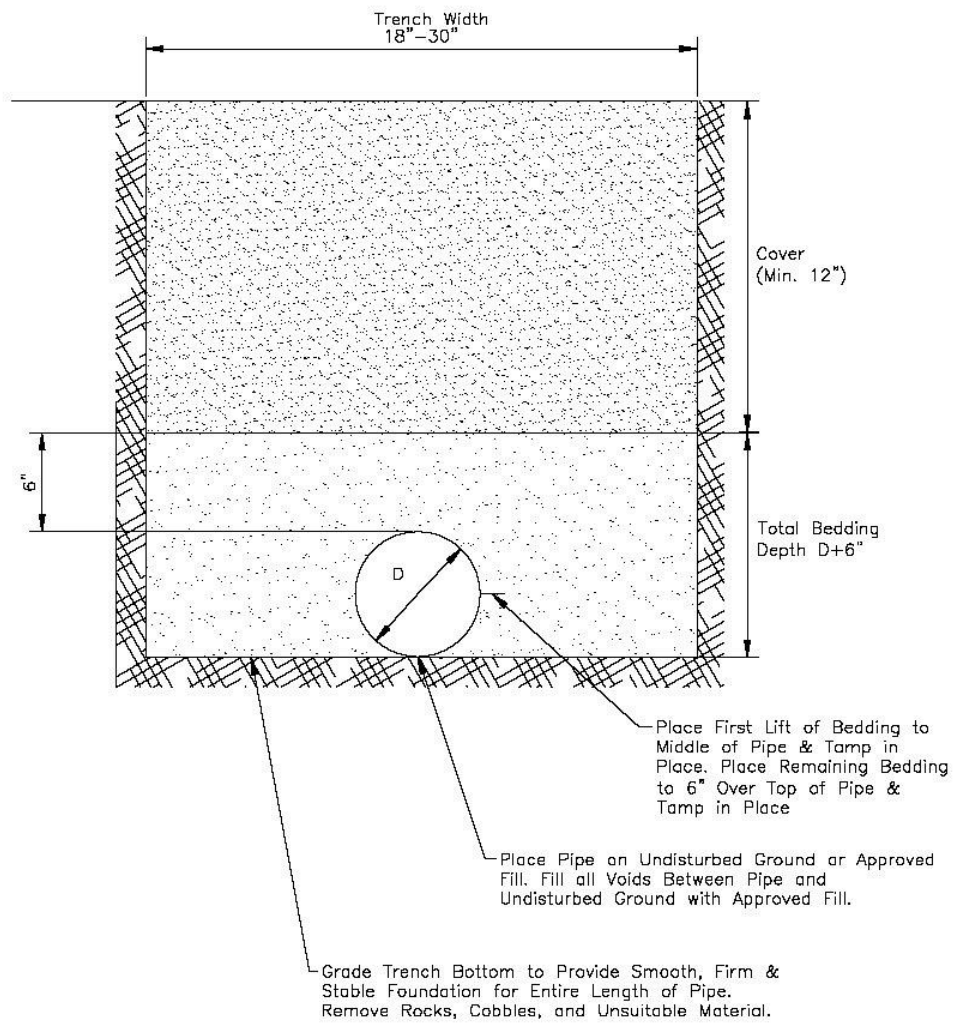
Percolation Test Procedure



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Diagram 2
Sheet 1/1



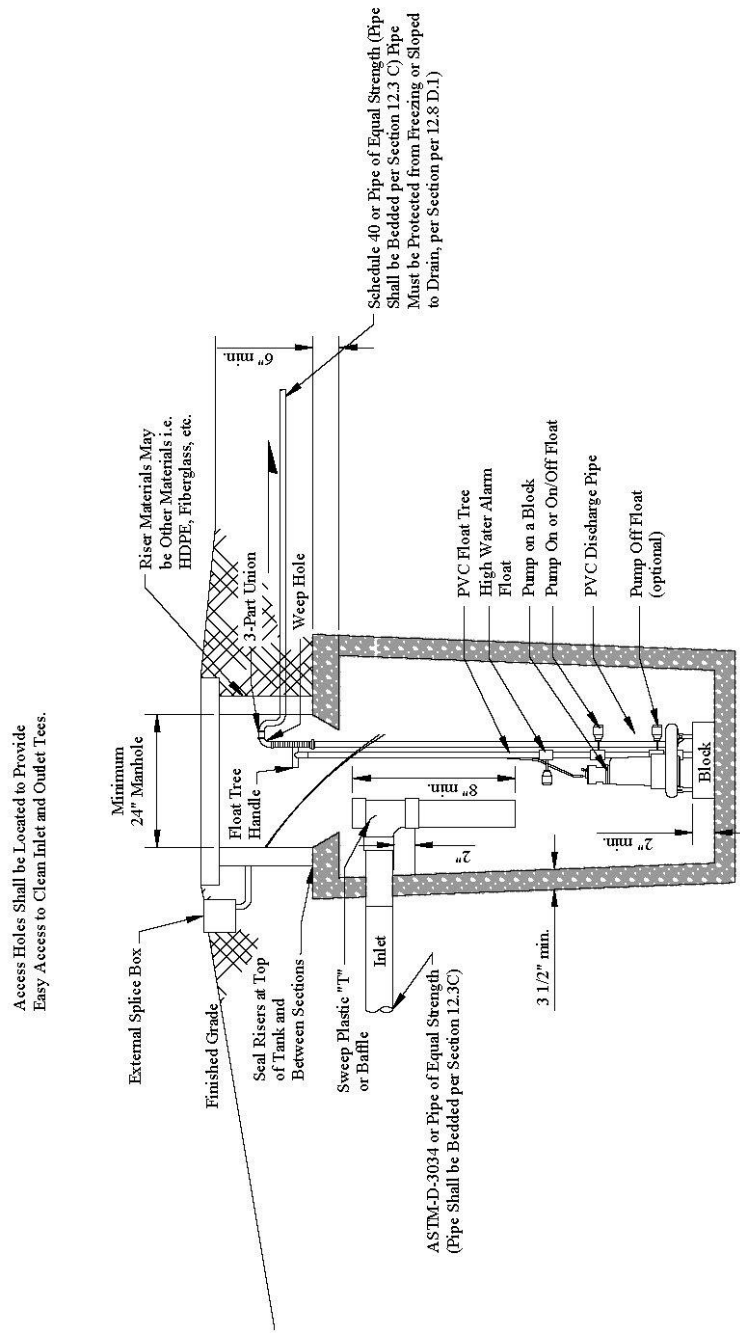
Pipe Bedding Detail



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Diagram 3
Sheet 1/1



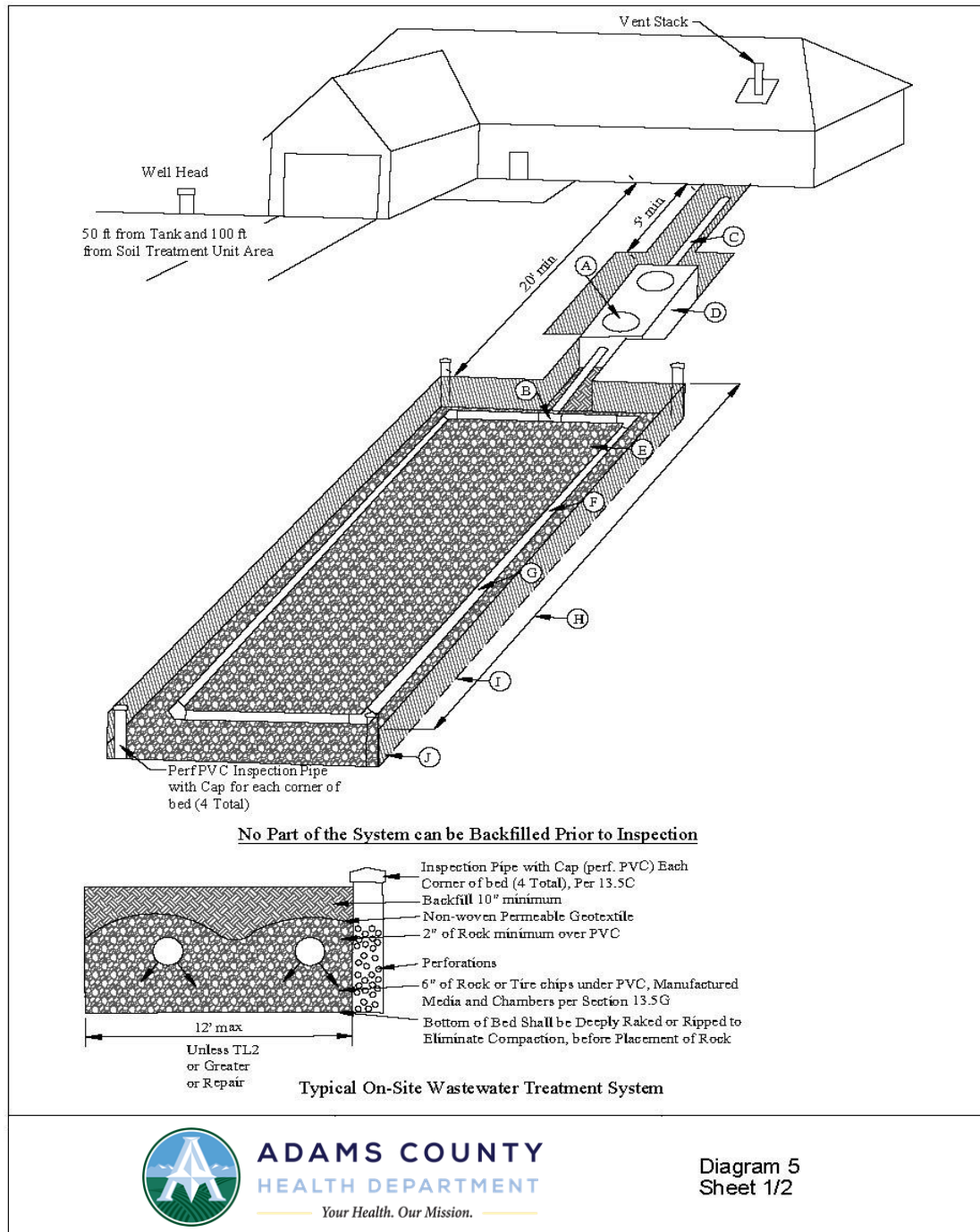
Typical Concrete Dosing Tank



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Diagram 4
 Sheet 1/1

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Diagram 5
 Sheet 1/2

TYPICAL ON-SITE WASTEWATER TREATMENT SYSTEM

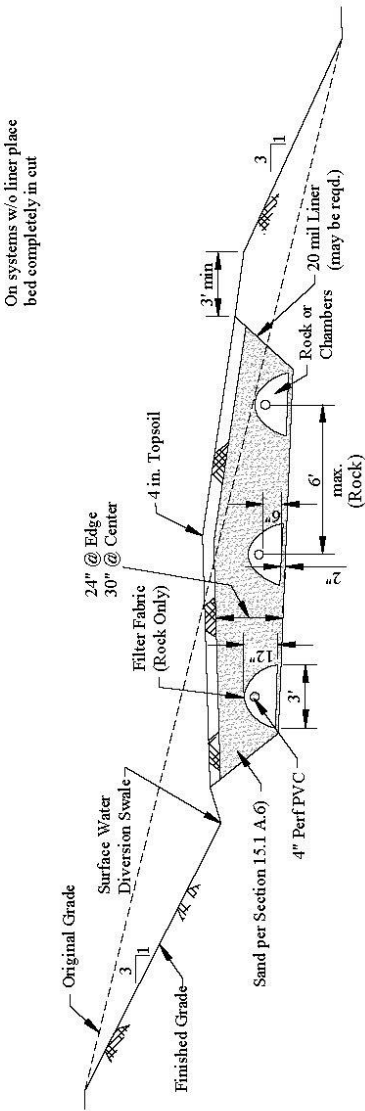
- A. Both manhole lids and risers shall extend to grade.
- B. "T" - set level and may be attached at any point.
- C. At least one-quarter (1/4) inch per foot (2%) fall. Clean-out required if one hundred (100) feet or more. Pipe shall be bedded per Diagram 3.
- D. Two-compartment tank or two (2) tanks 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.



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Diagram 5
Sheet 2/2

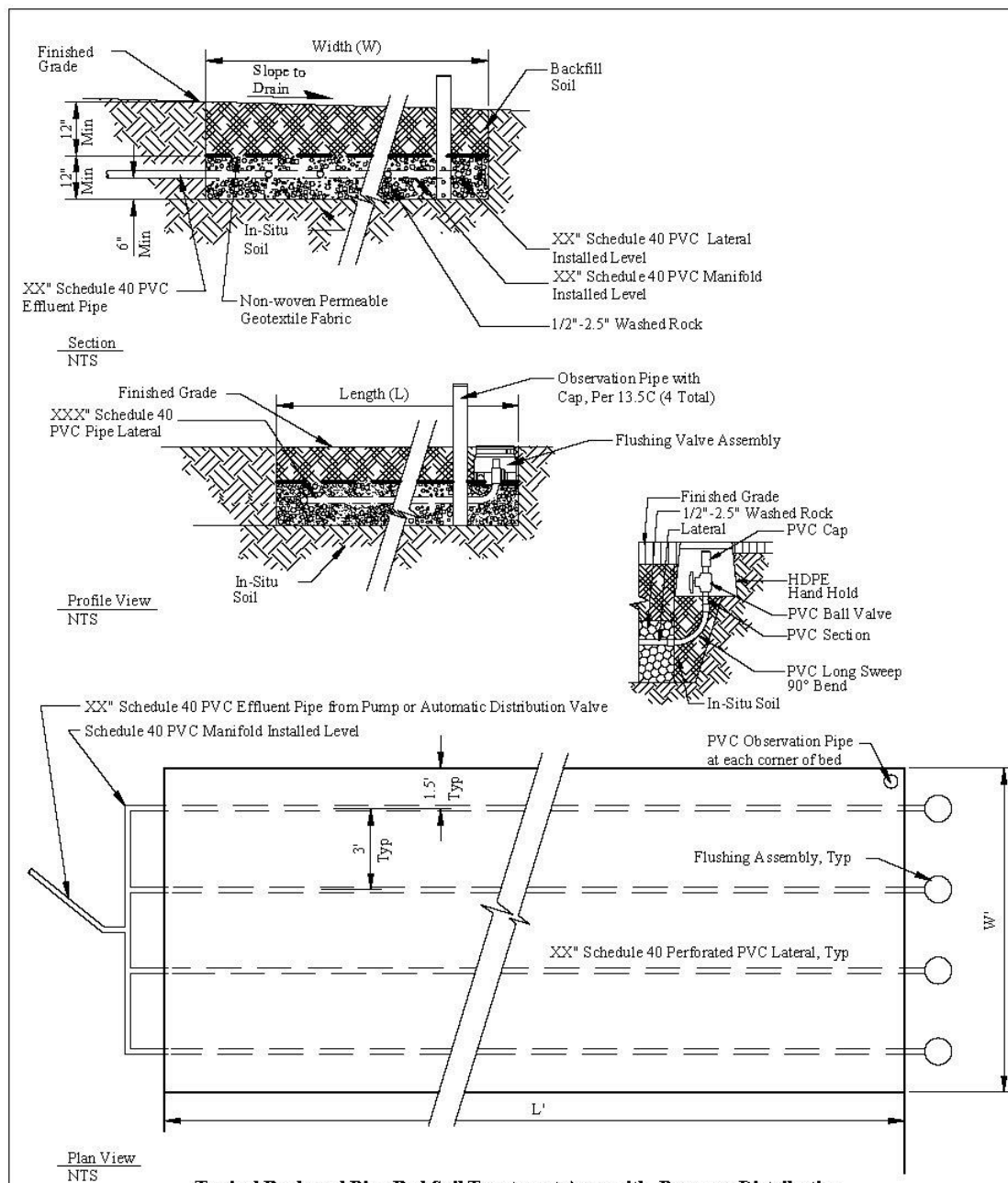


Not To Scale

Typical Evapotranspiration (ET) Bed Section

Diagram 6
Sheet 1/1

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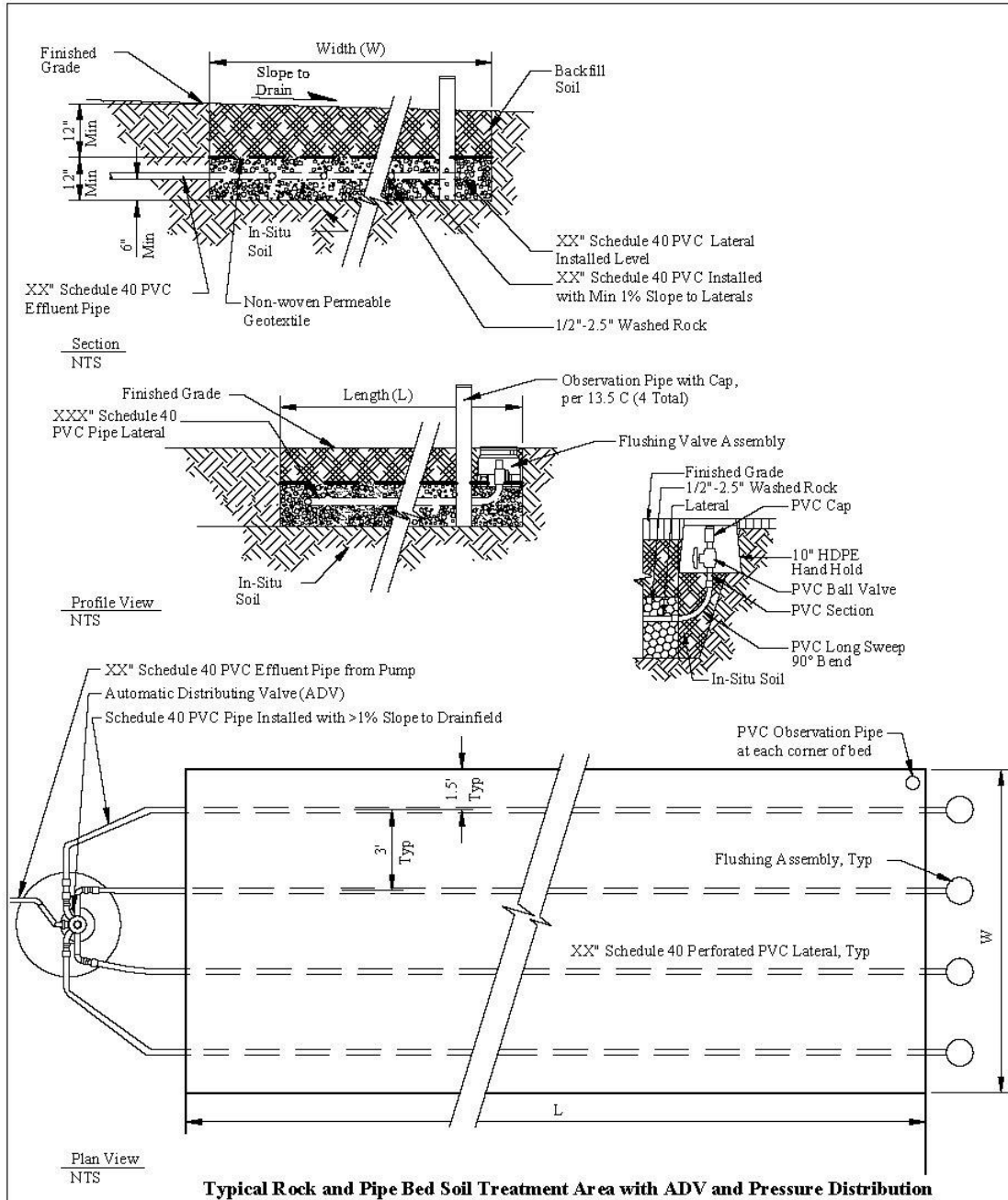
Typical Rock and Pipe Bed Soil Treatment Area with Pressure Distribution



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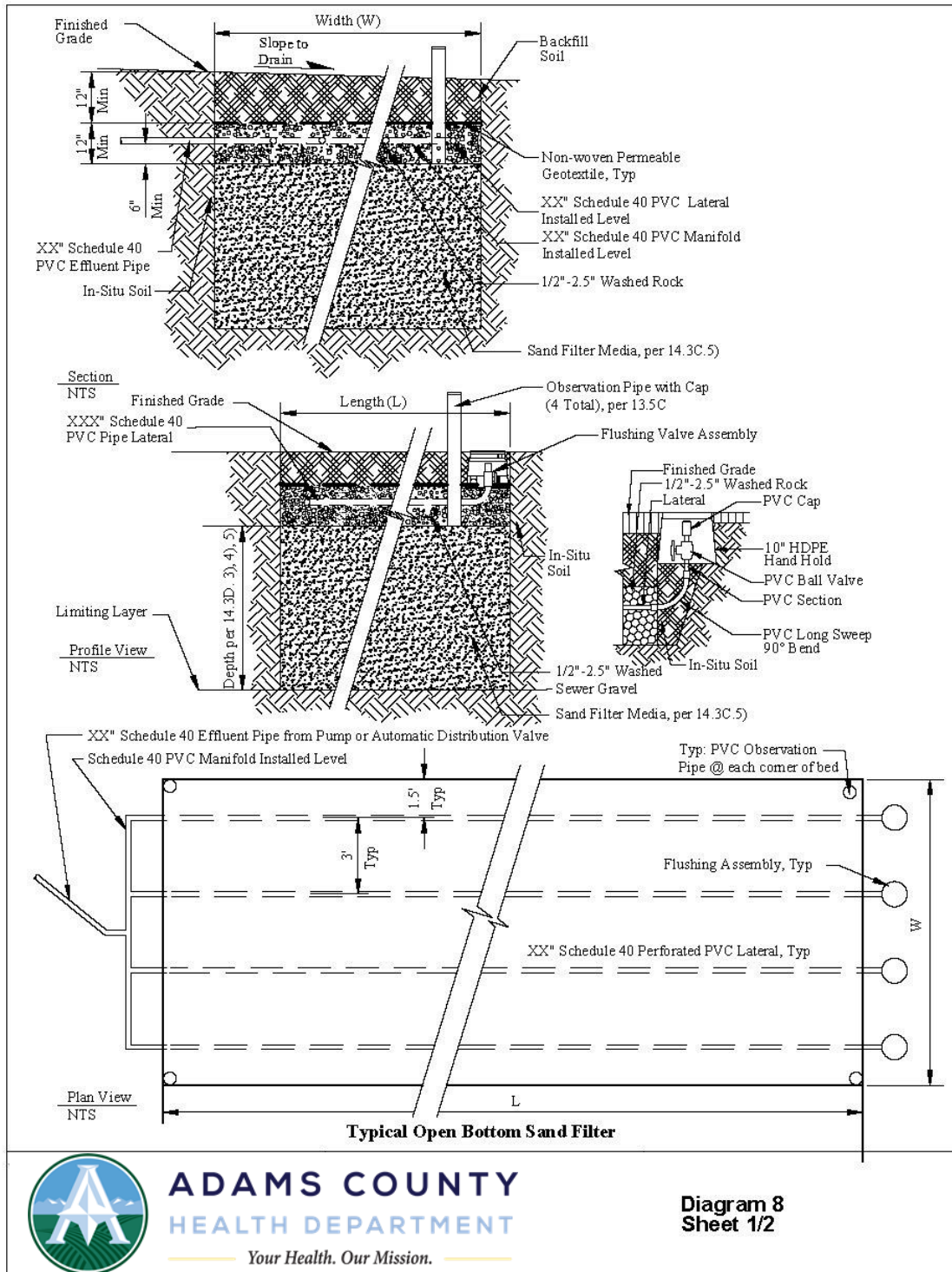
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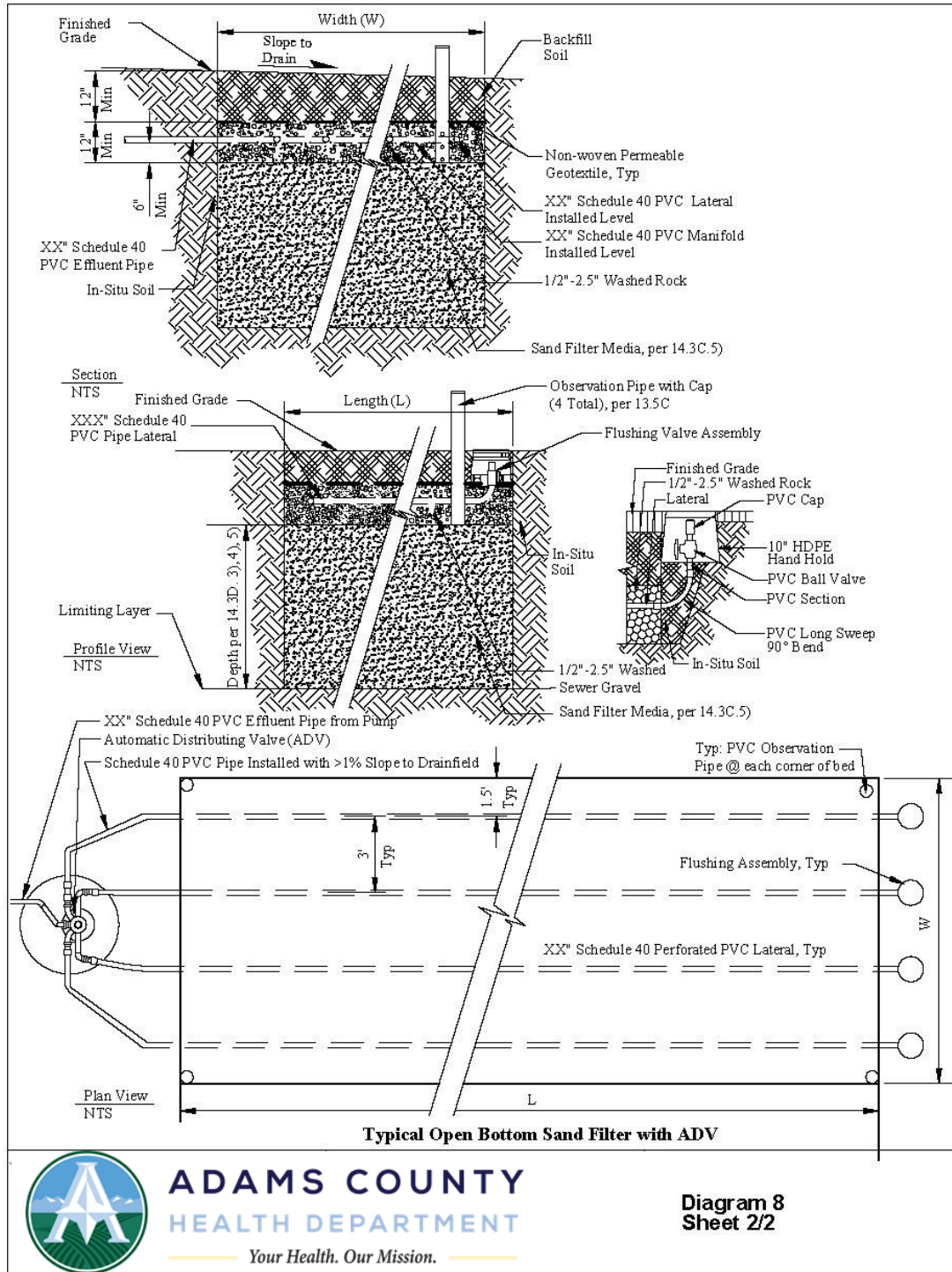
Diagram 7
Sheet 1/2

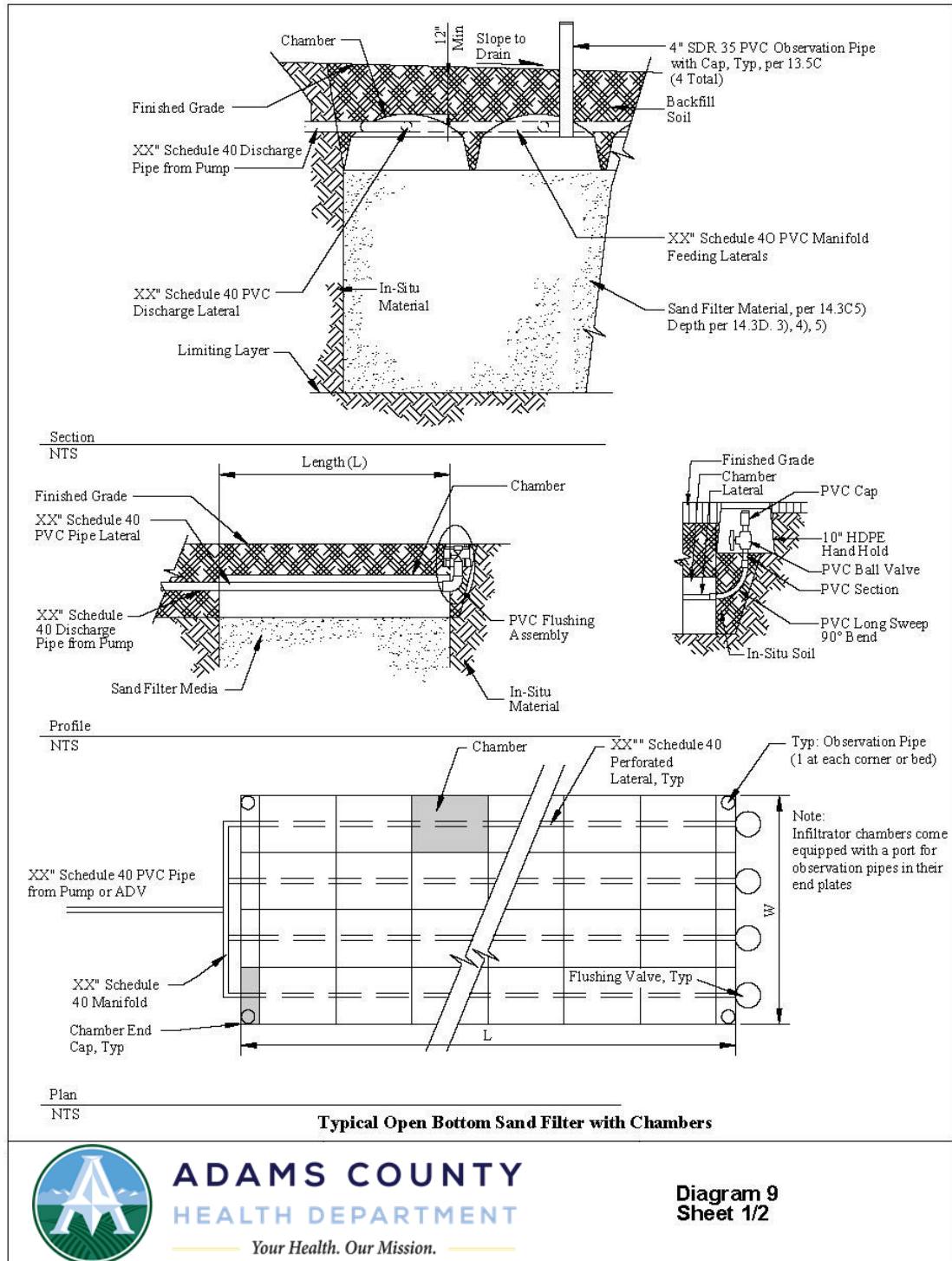


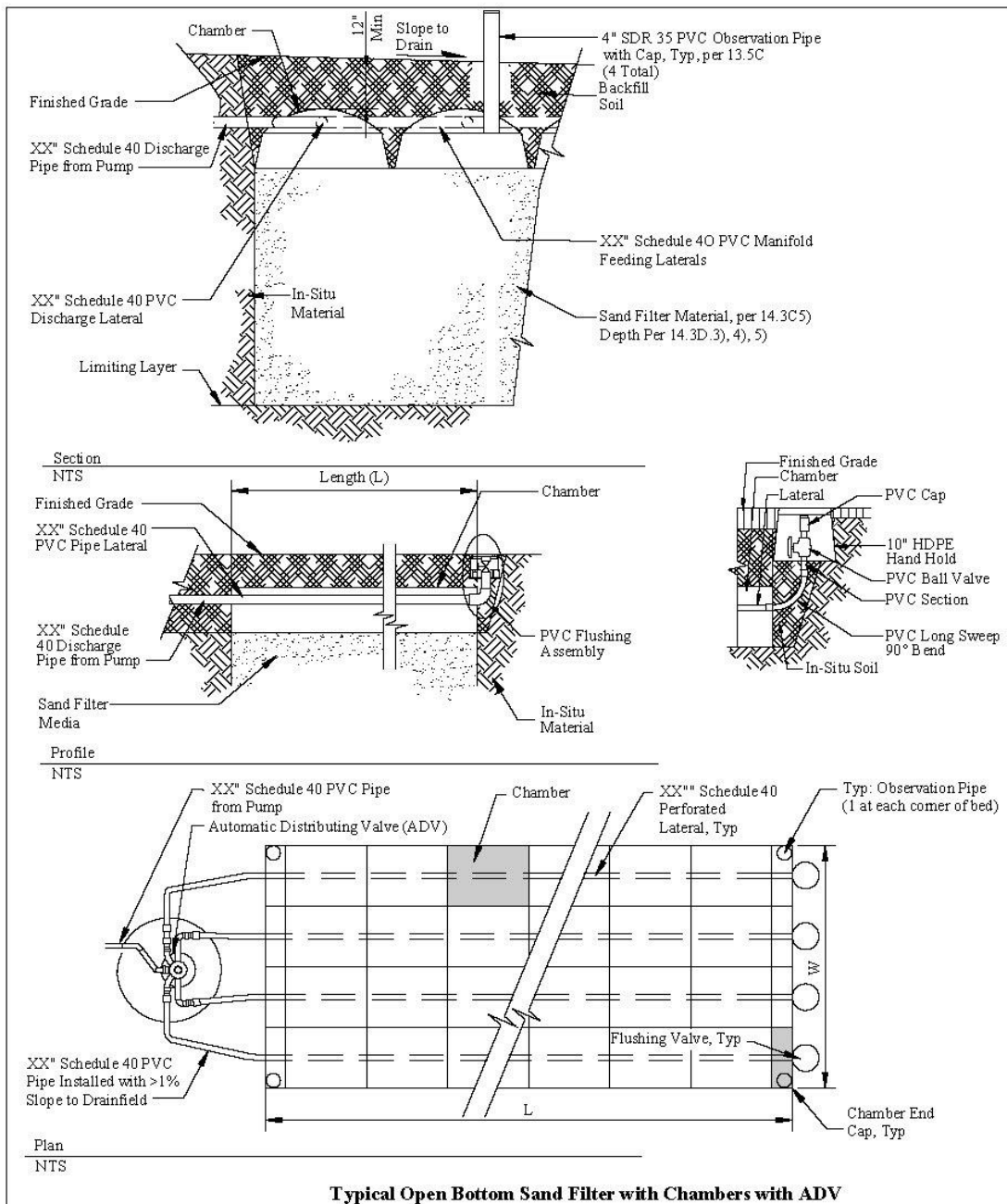
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Diagram 7
Sheet 2/2









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Diagram 9
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