8.5 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.

1. Each site evaluation must consist of:

a. Preliminary investigation;

b. Reconnaissance;

c. Detailed soil investigation; and

d. Report and site plan

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

1. Property Information:

a. Address;

b. Legal Description;

c. Existing Structures, and

d. Location of existing or proposed wells on the property

2. EPCPH Records

~~3. Published site information~~

~~a. Topography; and~~

~~b. Soil data~~

4. Location of physical features, on and off the property that will require setbacks as identified in Table 7-1.

5. Preliminary soil treatment area size estimate based on the information on existing or planed facility and EPCPH Regulations.

6. Other information required by EPCPH.

7. Additional published information that may be useful to the site-specific evaluation, as available:

a. Soil information

b. Topography;

c. Survey;

d. Easements;

e. Floodplain maps;

f. Delineated wetland maps;

g. Geology and basin maps and descriptions;

~~h. Aerial photographs;~~

i. Climate information; and

j. Aerial Photographs; ~~and~~

~~k. Delineated wetland maps.~~

C. Reconnaissance: 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:

1. Landscape position;
2. Topography;
3. Vegetation;
4. Natural and cultural features; and
5. Current and historic land use

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

D. Detailed Soil Investigation

1. Soil investigation to determine the long-term acceptance rate of soil treatment area must be conducted per the following criteria:

    a. Visual and tactile evaluation of two 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.

    b. 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.

    c. If the site evaluation includes both a visual tactile evaluation of soil profile test pit excavations and percolation test, and the results from these two evaluations do not coincide with the same LTAR as noted in Table 10-1, The designer must use the more restrictive LTAR determining the size of the soil treatment area.

2. Procedure for performing visual and tactile evaluations: Visual and tactile evaluations of soil must be performed by professional engineer or by a trained person under the supervision of a

professional engineer or by a competent technician, in order to determine a long-term acceptance rate:

a. Evaluation of two or more soil profile test pit excavations must be performed to determine soil types, limiting layers, restrictive layers, groundwater conditions and the best depth for the infiltrative surface, unless otherwise approved by EPCPH.

b. At least one of the soil profile test pit excavations must be performed in the portion of the soil treatment area anticipated to have the most limiting or restrictive conditions.

c. The total number of soil profile test pit excavations beyond the required two shall ~~is~~ be based on the judgment of the competent technician who may require an additional soil profile test pit excavation in the area of the proposed alternate soil treatment area if deemed necessary.

d. The minimum depth of the soil profile test pit excavation must be to any limiting layer, ground water condition, or four feet below the infiltrative surface of the in-situ soil, whichever is encountered first.

e. Layers and interfaces that interfere with the treatment and dispersal of effluent must be noted. Thus, any ~~limiting~~ restrictive soil characteristic such as consistence, as defined by cementation class, also needs to be evaluated. ~~The evaluation of consistence may also include an evaluation of excavation difficulty, rupture resistance, and/or penetration resistance.~~

(1) When cemented soils are encountered, the evaluation must identify the cementation class from rupture resistance as provided in Table 5-1, "Rupture Resistance".

(2) Per the "Rupture Resistance" Table noted in item d.1 above, when the "Cementation Class" is identified within the soil profile as "strongly", "very strongly cemented", or "indurated" that layer will be classified as a "restrictive layer".

Note: Cemented soils will typically have characteristics of Type 3A or 4A soils (Table 10-1). Long term acceptance rates should coincide with the appropriate soil type classification or be adjusted to address the level of cementation.

Table 5-1: Rupture Resistance: Blocks, Peds, Clods – Estimate the class by the force required to rupture (break) a soil unit.

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

Source: NRCS Field Book for Describing and Sampling Soils. Version 3.0; 2021 Reprint; Consistence section. Pg. 2-63. Dry Rupture Resistance applies to soils that are moderately dry or drier.

f. 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.

g. 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.

h. The soil observation method must allow observation of the different soil horizons

i. 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.

j. The soil type at the proposed infiltrative surface of the soil treatment area or a more restrictive soil type within the treatment depth must be used to determine the long-term acceptance rate from Table 10-1 or Table 10-1A. The treatment depth is two to four feet depending on the required thickness for the treatment level below the infiltrative surface from Item 4, Table 7-2.

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

3. 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.

d. Any other soil characteristic that needs to be described to design a system, such as layers that will restrict permeability.

4. When a percolation test is determined to be necessary to obtain additional information regarding soil permeability, the following ~~P~~procedures for performing percolation tests must be followed:

a. 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.

b. Number of test holes; Location

(1) Soil percolation tests shall be performed in at least three test holes in the area in which the soil treatment area is to be located, spaced evenly over the proposed area.

(2) If the likely depth of a proposed infiltrative surface is uncertain, or if a vertical system is proposed, the percolation tests for this site must be performed at more than one depth to determine the of the infiltrative surface.

c. Dimensions

(1) The percolation test hole must have a diameter of eight to 12 inches and be terminated a minimum of six inches and a maximum of 18 inches below the proposed infiltrative surface.

d. Change in Soil

(1) 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 7-2 for vertical separation, a minimum of two soil percolation holes must be terminated in the changed soil, and percolation tests must be conducted in both holes.

e. Percolation Tests

(1) The percolation tests must be conducted using the hole preparation, soil saturation and rate measurement procedures described below.

(2) Preparation of Percolation Test Holes

i. Excavate the hole to the depth and diameter required.

ii. 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.

iii. Remove all loose soil from the hole.

iv. Add two inches of very coarse sand or fine gravel to protect the bottom of the hole from scouring and sediment.

(3) Presoak

i. 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.

ii. 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 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 ~~sandy soils containing five percent or less particles passing the #200 sieve, by weight,~~ type 1 soils, (and loamy sand: Table 10-1), the swelling procedure is not essential and the test may be conducted after the water from one filling of the hole has completely seeped out of the hole.

(4) Percolation Rate Measurement

i. With the exception of ~~sandy soils containing five percent or less oparticle passing the #200 seive, by weight,~~ type 1 soils, percolation rate measurements must be made on the day following the presoak procedure.

ii. If water remains in the percolation test hole after the swelling period, adjust the depth to approximately six inches above the gravel in the bottom of the hole. From a fixed reference point, measure the drop in water level over a 30-minute interval. The drops are used to calculate the percolation rate.

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

(5) Sandy Soils

i. In sandy soils or other soils in which the first six inches of water seeps out of the hole in less than 30 minutes, after the 24 hour swelling period, the time interval between measurements must be ten minutes and the test conducted for one hour. The drop that occurs during the final ten minutes must be used to calculate the percolation rate.

ii. 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 minute per inch.

(6) Special Soil Types

i. EPCPH may identify soil types in El Paso County that require different or additional testing procedures than those defined in Regulation 43.

ii. Whenever decomposed granite is encountered, (within 48” from the bottom of the proposed infiltrative surface) the following soil tests are required:

(I) A percolation test shall be conducted per the standards defined in these regulations.

(II) A soil profile test pit excavation is required.

(III) Subsequent to the noted testing requirement in this subsection, the competent technician &/or professional engineer shall determine the soil type (0-5) as defined in table 10-1.

(7) Percolation Rate Determination and Reporting

i. 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 10-1.

ii. 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 8.5.G. All holes must be clearly labeled to relate to the information provided for the profile test pits and percolation tests.

(8) Alternate Percolation Testing

i. 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.

ii. Prior approval from EPCPH of alternate percolation test procedures is required.

E. Evaluation and ~~M~~marking of Soil Profile Test Pit Excavations or Percolation Holes

1. The engineer or technician conducting the soil profile test pit excavations or percolation tests must, upon completion of the tests, ~~flag or otherwise mark~~ adequately mark and identify each excavation or hole/pits to allow easy location by EPCPH.

a. Soil profile test pit excavations and percolation holes, conducted on properties along the HWY 24 W corridor must remain open until after evaluation, if required by EPCPH. Excavations must be suitably barricaded to prevent unauthorized access and to address safety concerns. Otherwise, appropriate notification of EPCPH staff shall be made to allow inspection to be completed.

2. The objective of the regulation is to ensure a detailed and accurate identification of the soils on each site, while concurrently ensuring the safety of the practitioner, general public and wildlife. In order to accomplish this, the following items are noted:

a. In order to address public safety concerns, the regulatory intent is to backfill all soil profile test pits promptly after the soil evaluation is complete.

b. EPCPH may identify additional requirements that would necessitate a joint evaluation of the soils along with the engineer or competent technician.

c. If EPCPH does not require a joint evaluation, and the excavator intends to backfill the excavation prior to an evaluation, EPCPH may require the excavator to communicate their intent with EPCPH prior to the date of the excavation.

d. EPCPH may identify additional requirements that requires the installation of inspection ports in order to confirm that the elevation of an actual or seasonal water table (a

groundwater condition) does not encroach on the vertical separation requirement to the proposed infiltrative surface of the soil treatment are

F. Soils Report and Site Plan

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

    a. Company name, address, telephone number, e-mail address, and name of individual, credentials and qualifications of the individual conducting the site evaluation;

        (1) All soils reports submitted to EPCPH for review must be stamped by a Professional Engineer as defined in these regulations.

    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 7-1;

    f. Setback distances to features listed in Table 7-2, 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. ~~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.~~ The minimum drawing size is 8.5-inches by 11-inches. If the property is too large to adequately show site evaluation information, a detailed drawing that includes the information required from the site and soil evaluation that will impact the location of the OWTS must be submitted. Drawings must indicate dimensions, have a north arrow 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. However, on difficult OWTS installation sites, EPCPH may require spot elevations in the area of the proposed OWTS as well as an area extending a minimum of 25’ beyond any proposed excavation.

        (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.

G. Design Document

1. 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.

2. The design document must include a brief description of the facility and its proposed use, basis and calculations of design flow, and influent strength.

3. The design document must contain all plan details necessary for permitting, installation and maintenance, including:

a. Assumptions and calculations for each component, including dose volume, total dynamic head (TDH), ~~and~~ gallons per minute (GPM) and associated pump curve for all dosing systems;

b. A fixed, non-degradable temporary or permanent benchmark, (North America Vertical Datum or assumed elevation is acceptable);

c. A scale drawing showing location of each OWTS component and distances to water supplies, surface water, easements, physical and health impact features on both the subject and adjacent properties requiring setbacks;

~~d. The proposed elevation of the infiltrative surface of the soil treatment area, the septic tank inlet invert, as well as other system components shall be provided from an established benchmark on sites that EPCPH determines such information is necessary for approval of the design and the permit.~~

e. Layout of soil treatment area, dimensions of trenches or beds, distribution method and equipment, distribution boxes, drop boxes, valves, or other components used;

f. Contours or slope direction and percent slope for the area of the OWTS;

g. Elevation or depth of infiltrative surface of the soil treatment area, the septic tank invert, and all other components of the OWTS. For sites with minimal elevation change, providing the depth of components from grade is acceptable. However, where the site has

noticeable elevation changes, it is the expectation that the proposed elevations of all components relative to a site benchmark be provided.

(1) Cross-section of the installation depth from grade to the infiltrative surface is required for all submissions.

h. Special structural design considerations, as applicable to ensure the long-term integrity of each component;

i. References to design manuals or other technical materials used;

j. Installation procedures, as applicable;

k. Operation and maintenance manuals or instructions; and

l. Other information that may be useful such as photos and cross-section drawings.

H. 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 methods.

I. Qualifications for a Competent Technician

1. Percolation Tests

a. Competencies needed:

(1) Set up equipment;

(2) Perform and run percolation tests according to the procedures identified in section 8.5.D.4 of ~~in~~ this regulation; and

(3) Record results and calculate percolation rates.

b. EPCPH may approve training for percolation testing.

2. Visual and Tactile Evaluation of Soil

a. Competencies needed:

(1) Identify soil types by hand texturing and observation;

(2) Identify presence or absence of soil structure;

(3) Identify type and grade of soil structure;

(4) Identify soil consistence/cementation;

(5) Recognize evidence of highest seasonal water surface;

(6) Identify limiting layers, restrictive layers, and groundwater conditions; ~~and interfaces that will interfere with effluent movement.~~

(7) Determine the ~~most promising~~ appropriate depth for infiltrative surface of OWTS, soil profile test pits, and for percolation tests, if used; and

(8) Understand basic principles of OWTS siting and design.

b. Possible demonstrations of competence in visual and tactile evaluation of soil as approved by EPCPH:

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

(2) Attendance at training or workshop for soil evaluation for OWTS including both class and field work.

i. If the training or workshop includes an exam to verify acceptable completion of the course, a passing grade on the exam must be attained.

c. EPCPH must approve training for visual and tactile evaluation of soil.

8.6 Wastewater Flow and Strength

A. Wastewater Flows

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

2. Single-Family Residential Homes:

a. Design flow per person must be at least 75 gallons per day (gpd).

b. EPCPH may only increase the wastewater design flow per person to 100 gpd on a case by case basis, where justified.

c. The minimum design flow for a new home must be for a two-bedroom house unless otherwise noted in this regulation. The minimum design flow for the repair or replacement of an OWTS of an existing one-bedroom home must, at a minimum, be for one- bedroom unless bedrooms are added.

d. For homes up to and including three bedrooms, the assumed number of persons per bedroom is two for design purposes.

e. For homes with more than three bedrooms, the assumed number of persons is six persons (first three bedrooms x two persons per bedroom) plus one additional person for each bedroom more than three bedrooms.

f. EPCPH may increase the number of persons per bedroom to two for all bedrooms for design purposes.

g. Table 6-1 summarizes the design flows for single-family residential homes up to six bedrooms. EPCPH has authority to adjust these values as described in sections 8.6.A.2.b and 8.6.A.2.f.

h. If a new home has unfinished areas, EPCPH may increase the number of bedrooms used for the design of the OWTS by one or two bedrooms based on an assumption that 150

square feet of unfinished space can be converted into a bedroom, if the space can meet building code requirements for a bedroom.

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

j. Accessory Dwelling Units

(1) An "accessory dwelling unit" is considered a smaller, independent residential dwelling located on the same lot or parcel as a stand-alone single-family home.

(2) A new or expanded OWTS must be sized for the number of bedrooms proposed within the accessory dwelling unit.

Table 6-1: Single-Family Residential Design Flows

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

3. Auxiliary Buildings

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

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

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

(1) If the auxiliary building will have space that may be considered livable space as defined in section 8.6.A.2.h, the design flow of the structure must follow the design requirements for a multifamily dwelling system.

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

4. Multi-Family and Commercial On-site Wastewater Treatment Systems

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

(1) Table 6-2; or

(2) An analysis of peak flows and strengths from at least three comparable facilities or from the facility, if it is an existing facility, must be submitted to EPCPH for approval. The analysis must include:

i. 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.

ii. Total Suspended Solids and BOD_5 or $CBOD_5$ tests at times of full use. At least three samples taken at least one week apart are required. Sampling that provides equivalent and representative data through "composite sampling" may be allowed.

iii. Explanation and justification for the comparability of the tested facilities with the proposed facility.

(3) When a specific use is proposed which is not addressed within Table 6-2, and where flow data from similar facilities is not available, the design document must provide reference to an alternate regulatory or industry standard for OWTS from where the proposed flow and water quality data was obtained. Estimates must include peak flows relative to full occupancy.

5. Flow Equalization

a. Flow equalization may be used if a facility has flows that vary from day to day by more than four times the average flow.

b. The highest peak assumed must be at least equal to the full capacity of the facility.

c. The stored flow must be distributed to the soil treatment area before the next greater-than-average peak.

d. Flow equalization may be used only if:

(1) The facility is non-residential;

(2) The facility is only used for one purpose;

(3) Flows will follow a predictable pattern; and

(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 10-2) must not be used in addition to the flow equalization reduction.

f. Contingency plans must be ~~made~~ specified for expanding the capacity of the OWTS in the event of changed use at the facility.

TABLE 6-2: For Design Purposes, the Estimated Daily Wastewater Flow and BOD $_5$ Load is "Per Person" Unless Otherwise Noted[5]

Residential Wastewater	**GPD**	**BOD $_5$ IN POUNDS PER DAY**
Single-family dwellings, Accessory dwelling units	75	.20
~~OR~~ **Auxiliary buildings by fixture type**	**GPD**	**BOD $_5$ IN POUNDS PER DAY**
Bath/Shower	14.7	.014
Dishwasher	1.8	.002
Kitchen sink with garbage grinder	5.8	.052
Laundry washer	19.5	.037
Lavatory	8.4	.021
Water closet (toilet)	24.8	.029
Residential, Other	**GPD**	**BOD $_5$ IN POUNDS PER DAY**
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
Vacation home rental; per additional bed space provided; in addition to the 150 gal./bedroom[4]	50	.20
COMMERCIAL WASTEWATER	**GPD**	**BOD $_5$ IN POUNDS PER DAY**
Day use, or ~~Facilities with short term~~ or Ttransient Facilities Examples: Airports or bus stations per passenger; fairgrounds per person attending; ball parks, race tracks, stadiums, theaters or auditoriums per seat	5	.02

Airport per employee	10	.06
Banquet halls per seat with food preparation, per event	7.5	.06
Banquet halls per seat, no food preparation, per event	5	.02
Barber and beauty shops per chair	100	.70[1]
Bowling alleys per lane - toilet wastes only	5	.03[1]
Convenience Stores with self-serve beverages	See footnote 7	See footnote 7
Country club per member	30	.02
County club per employee	20	.06
Dentist offices per non-wet chair	50	.14[1]
Doctor offices per doctor	250	.80[1]
Farm workers, factories and plants, exclusive of industrial wastewater per employee per eight-hour shift – no showers	20	.05
Farm workers, factories and plants, exclusive of industrial wastewater per employee per eight-hour shift - showers provided	35	.08
~~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
FOOD SERVICE ESTABLISHMENT	**GPD**	**BOD $_5$ IN POUNDS PER DAY**
Coffee shop per customer	3.5	.50[1,8]
Restaurant open 1 or 2 meals per seat	50	.06/meal
24-hour restaurant per seat	75	.07/meal served
Restaurant with paper service only per seat	25	.01/meal served

Additional for bars and cocktail lounges per seat	30	.02
Drive-in restaurant per car space	50	.02
INSTITUTIONAL WASTEWATER WITHOUT KITCHENS UNLESS OTHERWISE NOTED	**GPD**	**BOD $_5$ IN POUNDS PER DAY**
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]	7.5 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
RECREATIONAL AND SEASONAL WASTEWATER USE	**GPD**	**BOD $_5$ IN POUNDS PER DAY**
Camps, day, no meals served	15	.12
Children's camp, overnight with meals and showers	50	.12
Luxury resort[6]	125	.17
Resort night and day	50	.12
Campground per campsite[2]	50	.12
Public park flush toilet per fixture per hour when park is open	36	.04 lbs./ fixture
Public park urinal per fixture per hour when park is open	10	.01 lbs./fixture
Public park shower per fixture per hour when park is open	100	.10 lbs./ fixture
Public park faucet per fixture per hour when park is open	15	.04 lbs./ fixture
Swimming pools and bathhouses	10	.06
Travel trailer parks with individual water and sewage hookup per unit [2]	100	.24

Travel trailer park without individual water and sewage hookup per unit [2]	50	.12

*1 BOD levels ~~and~~ may require further verification depending on the specific use of the facility.
*2 Laundry facilities are to be calculated on a per commercial washer basis in accordance with other elements of this table.
3. For ~~the purposes of this Table,~~ a "Tiny home" the OWTS may be sized as a one-bedroom home. ~~Is a structure (a non-recreational vehicle) 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. As stated in section 43.6.A.2.i, EPCPH may increase the "per bedroom" design flows for vacation home rentals relative to the expected maximum occupancy of the home. These flows are in addition to the 150 gal./bedroom requirement. ~~For churches with food service, the 4 gal/meal must be added to the 3.5 gal/seat to determine projected design flows.~~
5. Note that discharges from non-domestic sources such as process waste, industrial waste, microbreweries, dog kennels, veterinary clinics, horse barns, etc. are not addressed in this regulation. Such discharges must obtain permitting as a Class V Injection Well through the EPA, as appropriate.
6. A "Luxury Resort" will typically include a spa, restaurant/bar, pool, etc.
7. Wastewater from convenience stores will likely meet the requirements of high strength waste. Studies indicate that BOD5 effluent levels will range between 500 – 1500 mg/l. The exact levels will depend on products available (i.e.: coffee, soda, etc.), number of patrons, and how often the excess from each product is disposed. Flows from each facility can also vary substantially depending on location and the size of the store. Locations adjacent to freeways could have significantly more flow than a site located in a residential area. Subsequently, the design engineer must provide data from similar facilities in order to afford an estimation of projected peak daily flows.
8. Wastewater from coffee shops will likely meet the requirements of high strength waste. Studies indicate that BOD5 effluent levels may exceed 500 mg/l. The exact levels will depend on the drink options (i.e.: latte, espresso, etc.), number of patrons, and how often the excess from each product is disposed. Flows from each facility can also vary substantially depending on location and the size of the store. Subsequently, the design engineer must provide data from similar facilities in order to afford an estimation of projected peak daily flows.

B. Wastewater Strength

1. Table 6-3 includes levels of treatment that can be achieved by various OWTS components, excluding the soil treatment area. Systems qualifying for these treatment levels except TL1 produced by a septic tank alone must be approved under section 8.13. of this regulation. If soil treatment area or vertical separation distance reductions are permitted, EPCPH must have a maintenance oversight program under section 8.14.D. in place.

2. High strength waste must be reduced to at least Treatment Level TL1 quality or lower before applying to a soil treatment area. Waste strength levels defined in Tables 6-3 and 6-4 must be used to determine compliance.

Table 6-3 Treatment Levels

Treatment Level	BOD_5 (mg/L)	1 $CBOD_5$ (mg/L)	TSS (mg/L)	Total Nitrogen (mg/L)	Fecal Coliform[5]
TL1[2]	180	-	80	60-80	-
TL2	-	25	30	N/A[3]	-
TL2N	-	25	30	>50% reduction[4]	-
TL3	-	10	10	~~4~~N/A[3]	-
TL3N	-	10	10	20 ~~mg/L~~	-
TL3ND	-	10	10	20	≤200 per 100 mL.

Shading indicates higher treatment levels.
1. Requirements for $CBOD_5$ are only related to effluent samples from a higher level treatment system.
2. Domestic septic tank effluent prior to soil treatment or higher level treatment has a wide range of concentrations. These values are typical, but values used for design must account for site-specific information.

3. Total Nitrogen does not apply to Treatment Levels TL2 and TL3. Processes intended to reduce total nitrogen are addressed in Treatment Levels TL2N and TL3N. Any total nitrogen reductions that may be observed for TL2 and TL3 are as a result of the treatment process for BOD_5 and TSS reductions.
4. NSF/ANSI Standard 245 – Wastewater Treatment Systems – Nitrogen Reduction requires reduction of 50 percent rather than an absolute value. TL3ND requires effluent to be treated to TL3N standards prior to disinfection. The disinfection must meet the requirements of section 43.12.H.
5. With the exception of fecal coliform, treatment level requirements are based on values obtained from composite sampling.

Table 6-4 High Strength Wastewater*

	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

* High strength wastewater ~~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.

8.7 Minimum Distances ~~B~~between Components of an On-site Wastewater Treatment System and Physical Features

A. 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 7-1. The setback requirements are applicable for minimum system performance and treatment levels with specific modifications allowed for higher treatment levels as provided in Table 7-2. All distance setback modifications must be analyzed and approved by the EPCPH and be in complete compliance with the variance or administrative procedures identified within ~~of~~these regulations and those of the EPCBoH. Acceptable methods of analyzing horizontal separation distances with higher treatment levels include but are not limited to:

   1. Analyzing the intended uses of impacted surface and/or ground waters;

   2. Contacting adjacent property owners for potential conflicts with property line encroachments; and

   3. Analyzing potential impacts that system locations may have on building foundations and other potentially affected features.

B. 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 8.14.

C. Dry Gulches, Cut Banks and Fill Areas

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

   2. 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.

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

D. Components of an OWTS listed in Table 7-1 ~~shall~~ must be installed or located in accordance with the minimum distance requirements provided in the table or such increased distances provided by EPCBoH regulations, unless otherwise noted below:

1. EPCPH may choose to allow the installation of an OWTS at a reduced property line setback in accordance with the following criteria:

a. If a property can accommodate the installation of an OWTS no closer than the required minimum 10-foot property line setback, it must do so. If the proposal complies with the requirements of this section and is deemed acceptable by EPCPH, EPCPH may administratively allow a reduction to the setback.

b. The property line setback must not be reduced to any less than 3 ft., unless a variance by the Board of Health is provided.

c. The property line setback encroachment must be proposed at the time of permit application and must include the following information

(1) A statement from the applicant and/or designing engineer providing the reason for the reduced property line setback request.

(2) The applicant must demonstrate that the allowance of encroachment of the property line setback will not inhibit the development of surrounding properties (i.e. by allowing the encroachment of the property line setback, a neighboring property would not be able to meet the minimum setback requirement between the subject OWTS and a proposed adjacent well).

(3) The applicant must demonstrate that all activities associated with the installation of the proposed OWTS will not encroach on a neighboring property, and/or provide written permission from the adjacent owner or property manager of said property allowing the encroachment of machinery or excavated materials in order to install the proposed OWTS.

(4) The proposed OWTS must comply with all other required setbacks noted in Table 7-1. EPCPHs approval of the encroachment must only be for the referenced property line setback.

(5) The applicant must submit a survey of the property line(s) that the proposed setback encroachment will impact. The survey must include:

i. A survey completed by a Colorado registered professional land surveyor in accordance with section 12-120-301 et seq., C.R.S.

ii. A legal description and drawing of the subject property. Said drawing must also include the location of the proposed OWTS, onsite and adjacent wells.

iii. The surveyor must clearly mark the surveyed property line(s) in a manner that is clearly defined and will not degrade over time due to exposure to

the elements. The markings must remain in place until after system construction and final approval by EPCPH.

d. Prohibitions

(1) Approval for an encroachment of the property line setback must not be provided after installation of the OWTS. Any postconstruction reduction will require a variance by the Board of Health.

(2) A reduction in the setback to a property line may only be granted where a minimum separation of six feet between soil treatment areas on all adjacent properties is provided.

(3) The size of the soil treatment area must comply with section 43.10.C of Reg. 43

E. Table 7-2 provides the required site evaluation, design, and treatment level considerations necessary to evaluate the site and to design and locate the soil treatment area component of an OWTS.

1. Items 1, 2 and 3 in Table 7-2 address the allowable horizontal setback distance between the soil treatment area and the following physical features:

a. Setback distance from soil treatment area to on-site well (Item 1);

b. Setback distance from soil treatment area to water features (Item 2); and

c. Setback distance from soil treatment area to a dry gulch or cut bank (item 3).

2. Item 4 in Table 7-2 addresses the required vertical separation distance between the infiltrative surface of the soil treatment area and the limiting layer, or the required depth of soil comprising the soil treatment area.

3. The designer may select the level of treatment from Table 7-2 to be applied to the soil treatment area that is necessary in order to accommodate the site conditions, if higher level treatment for that purpose is permitted by the EPCPH.

Table 7-1 Minimum Horizontal Distances in Feet between Components of an On-Site Wastewater Treatment System and Water, Physical and Health Impact Features[7,10]

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

Open Unlined Sand Filter in Soil with a Percolation Rate Slower than 60 Minutes per Inch, Unlined Evapotranspiration System, Outside of Berm of Unlined Wastewater Pond, or System Not Relying on STA for Treatment Other than Aerosol	100	25 [2]	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	25[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 EPCBoH 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 EPCPH. ~~Components that are not watertight should 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. All horizontal setbacks to a potable water supply must be met unless a variance by the Board of Examiners of Water Well Construction and Pump Installation Contractors is granted per section 18.2 of the Water Well Construction Rules, 2 CCR 402-2, (Division of Water Resources). Setback requirements which may necessitate a variance are found within section.10.2 or 11.4 of the Water Well Construction Rules, as applicable. The minimum horizontal setback that may be granted for new construction through a variance is to 75 feet; and must meet the requirements of Table 7-2 of this regulation. Setbacks for existing wells must comply with requirements of section 43.10.I.2.

2. Crossings or encroachments may be permitted at the points as noted above provided that the potable water or wastewater conveyance pipe is encased for the minimum setback distance on each side of the crossing. A length of pipe with a minimum Schedule 40 rating [ASTM Standard D3034-24 (2024 version)] of sufficient diameter to easily slide over and completely encase the conveyance must be used. Rigid end caps of at least Schedule 40 rating [ASTM Standard D3034-24 (2024 version)]. must be glued or secured in a watertight fashion to the ends of the encasement pipe. A hole of sufficient size to accommodate the pipe must be drilled in the lowest section of the rigid cap so that the conveyance pipe rests on the bottom of the encasement pipe. The area in which the pipe passes through the end caps must be sealed with an approved underground sealant compatible with the piping used. Piping of equal or higher strength also be used. Other methods of ~~encasement~~ separation between the potable water pipe and a component of the OWTS that provide equal protection are allowed. These may include, but are not limited to, concrete or controlled flowable fill encasement extending no less than 10 feet each side of the crossing, or an impermeable geo-membrane curtain extending at least two feet below the potable water pipe and no less than 10 feet each side of the crossing.~~that provide equal protection are allowed.~~ These methods must be reviewed and approved by EPCPH.

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 EPCPH 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

4. All horizontal setbacks to an underground potable water supply cistern must be met unless a variance by the Board of Examiners of Water Well Construction and Pump Installation Contractors is granted per section 18.2. Setback requirements which may necessitate a variance are found within section.10.2 or 11.4 of the Water Well Construction Rules, as applicable. The minimum horizontal setback that may be granted through a variance is to 25 feet. Noted setbacks are not required to above ground cisterns.

5. If the structure is not used as a habitable unit, the isolation may be reduced by the EPCBoH to no less than 50 feet.

6. Building sewer installations shall meet the design requirements of the Colorado Plumbing Code

7. Where ditch companies have a specific right of easement for "reasonable and necessary use to access, operate, and maintain ditches", all OWTS components must maintain a minimum of 25' setback from the crest of the ditch/channel.

8. Sites with multiple OWTS on a single property where the total flows are > 2,000 gpd must meet the increased required setbacks as provided in WQSA-6 (Policy 6).

9. Per 2 CCR 402-10 (6.4.2) Geothermal wells shall be located at least 100 feet to the nearest source or potential source of contamination, unless a variance has been obtained from the state engineer.

10. Setback from a utility easement: While a specific setback for components of an OWTS to a utility easement is not specifically identified, the intent of the regulation is provided herein. The setback from utility easements is dependent on whether the utility is above or below ground. For above ground utilities, components of an OWTS must not be installed in areas where construction or maintenance vehicles may be required to travel in order to gain access to the utility. For utilities installed below grade, the objective is to setback the utility far enough away from the soil treatment area so that sewage will not seep into a utility trench excavation. The setback is also necessary to prevent construction or maintenance vehicles from driving on any component of an OWTS. Where remote properties have a blanket utility easement, the owner/operator of the OWTS will be responsible for providing signage or physical barriers as needed to reduce the risk of vehicular traffic or other disturbance to the OWTS. In all instances, a five foot setback will typically address most concerns.

11. In specific circumstances, EPCPH may allow for a reduced setback from a property line to the OWTS; per the requirements of section 43.7.D.1.

Table 7-2: Minimum separation distance Requirements in Feet from Soil Treatment Area, Relative to Treatment Level Provided[3] ~~On-sire Wastewaer Treatment System Design Consideration and Treatment Requirements – Separation Distances from Soil Treatment Area~~

			~~Pressure Dosing Required~~	~~Pressure Dosing Required~~	~~Pressure Dosing Required~~	
ITEM	**OWTS DESIGN CONSIDERATION**	**Treatment Levels 1 and 2**	**Treatment Level 2N[4]**	**Treatment Level 3[4]**	**Treatment Level 3N[4]**	**Treatment Level 3ND**
	Horizontal Separation Distances					
1	Distance from soil treatment area to on-site wells[5]	~~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]	100 feet
2	Distance from effluent pipe & 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	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	10 feet
	Vertical Separation Distances					
4A	Treatment depth in feet from infiltrative surface to a limiting layer or groundwater condition	4 feet[2] (3 feet with pressure dosing)	Greater than or equal to 2.5 feet	Greater than or equal to 2.5 feet	Greater than or equal to 2.5 feet	1
4B	Treatment depth in feet from infiltrative surface to a limiting layer or groundwater condition with the inclusion of an unlined sand filter	3 (TL1) 2.5 (TL2)	2.5	2	2	1

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

1. All setback distance reductions to the 100 foot requirement for wells and soil treatment areas must be in full compliance with the minimum standards and variance requirements of the State of Colorado Division of Water Resources: Rules and Regulations for Water Well Construction, Pump Installation, Cistern Installation, and Monitoring and Observation Hole/Well Construction .For TL3N and TL3ND effluent, a reduction to 75 feet is allowed if a variance from the Water Well Construction Regulations is obtained. Note that the Division of Water Resources does not address inquiries for existing wells. Local agencies must follow the same review principles, as provided within division's guidance document; "Variances for water wells"; March 2019.

2. Reductions in the vertical separation requirements for the use of higher level treatment systems with seepage pits are not allowed. The bottom of the excavation of a seepage pit must be a minimum of four feet above a limiting layer.

3. Refers to the quality of effluent applied to the distribution media

4. Pressure dosing is required for all TL2N, TL3, TL3N, and TL3ND system

5. Includes potable wells, irrigation wells and monitoring wells set within a potable aquifer and infiltration galleries permitted as wells by the Division of Water Resources.

8.8 Design Criteria – General

A. The OWTS for single-family homes shall be designed to accommodate the proposed flows from the structure as defined in 8.6.A.2. Flow estimates for multi-family or commercial OWTS must comply with 8.6.A.4 Expected waste strength as noted in Table 6-3 and Table 6-4 must also be addressed, where applicable. Installation of low flow fixtures or the separation of toilet waste or other sources of wastewater does not allow for the reduction in the size of an OWTS, except as provided in section 43.12.E.

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

C. 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.

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

D. Accessibility for Inspection, Maintenance, and Servicing

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

    2. For new construction, the top of any septic tank, dosing tank or vault must be no deeper than four feet below finished grade unless otherwise approved by EPCPH.

    3. 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.

    4. Riser Lids

        a. 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.

        b. ~~EPCPH may require a secondary plug, cap, cover, or screen be provided below the riser cover to prevent tank entry if the cover is unknowingly damaged or removed.~~ Access risers for all new septic tanks, seepage pits, or vaults, must include a structurally sound interior grate, or other similar secondary safety feature, securely installed below the tank lid to prevent persons pets, or wildlife from falling into the tank.

    5. Components that require access for maintenance must be accessible from the ground surface. This includes but not be limited to maintenance of ~~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.

6. 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.

E. 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 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.

F. Electrical Equipment, If Used

1. All electrical work, equipment, and material must comply with the requirements of the currently applicable National Electrical Code as designated by the State Electrical Board Rules and Regulations (3 CCR 710-1). An electrical permit may be required.

2. Electrical components must be protected from moisture and corrosive gases.

G. 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.

H. Sampling Access

1. 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.

2. 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 EPCPH.

I. Component Operating Instructions

1. 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.

2. If the OWTS uses public domain technology, the design engineer must provide clear, concise written instructions covering the components which, when followed, must assure proper installation and safe and satisfactory operation and maintenance.

J. 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 ha~~sve~~ changed.

K. Floodplains and Floodways

1. A new, expanded, modification or repair/replacement OWTS installed in a 100-year floodplain must meet or exceed the requirements of the Federal Emergency Management Agency and the El Paso County emergency agency. Additional requirements are provided below:

    a. Must follow EPCPH Installation in Floodplain/Floodway Guidelines

    b. OWTS installations in floodplain zones beginning with the letters "A" or "V" are considered high-risk areas. Systems installed in these areas must be designed by a professional engineer.

    c. Repairs of an existing system must meet the requirements as feasible.

    d. The system as approved by EPCPH must be designed to minimize or eliminate infiltration of floodwaters into the system and discharge from the system into the floodwaters. The OWTS must be located to avoid impairment to floodwaters or contamination from them during flooding.

2. A new or expanded or modification 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.

    a. Must follow EPCPH Installation in Floodplain/Floodway Guidelines

    b. Installations within a floodway requires a professional engineer to certify that an OWTS cannot be installed outside of the foodway.

    c. OWTS installations in a floodway must be designed by a professional engineer.

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

1. 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 as 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, EPCPH may choose to also issue a permit for this type of use.

8.9 Design Criteria - Components

A. Tanks and Vaults

1. Watertightness

a. 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.

b. 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.

c. Acceptable watertightness testing methods performed at a manufacturer's site or in the field include water filling the tank or vacuum testing.

2. Tank Installations: All tanks are to be installed level and placed on a uniform surface or bedding which does not contain rocks, roots, other items that could create point loading on the tank.

    a. If imported bedding is needed, common options include a 5" depth of compacted pea gravel or similar material.

3. 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.

    a. If a manufacturer provides recommendations for anchoring designs, they may be used if they meet the conditions present at the site.

    b. 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.

4. 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:

    a. Name of manufacturer;

    b. Model or serial number, if available;

    c. Effective volume and unit of measure;

    d. Maximum depth of earth cover and external loads the tanks is designed to resist; and

    e. Inlet and outlet identifications, if relevant.

B. Septic Tanks

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

2. Sizing Requirements:

    a. Sizing residential capacity for new installations must be based upon the number of bedrooms according to Table 9-1:

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

b. 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.

c. 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.

d. Minimum tank size for new installations other than for a single-family residence is 400 gallons.

e. Where a grinder pump is installed prior to the septic tank, the required tank volume must be increased by at least 500 gallons above the required volumes provided in Table 9-1.

f. If a proprietary aerobic treatment component is installed, the minimum septic tank (or trash tank) volume may be reduced to the volume as determined by the manufacturer. This volume will typically be provided on the CDPHE product acceptance document, which can be found on the CDPHE OWTS webpage

3. Inspection and Testing of Septic Tank Watertightness

a. Testing of septic tanks must be performed and evaluated as specified in section 9 of ASTM C1227-~~13~~22 (2022 version or earlier) (Standard Specification for Precast Septic Tanks) for concrete tanks or in Standard IAPMO/ANSI Z1000-~~2013~~ (2019 version) (American Standards for Prefabricated Septic Tanks) for other prefabricated septic tanks.

b. Each unit must be inspected in the field for conditions that may compromise its watertightness.

c. The inspection in the field must be conducted by EPCPH and be performed after the tank installation but before backfilling.

d. 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.

4. Septic Tank Design and Dimension Criteria

a. A septic tank must have two or more compartments or more than one tank may be used in series, unless otherwise noted in this regulation. The first compartment of a two-compartment tank or the first tank in a series must hold no less than one-half of the required effective volume.

b. Inlet invert must be at least two inches higher than the outlet invert.

c. Inlet tee or baffle must extend above the surface of the liquid at least five inches and must extend a minimum of eight 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.

d. ~~All new septic tank installation must incorporate an effluent screen on the outlet of the tank.~~ Outlet tee or baffle must extend at least five~~5~~ inches above and 14 inches below the outlet invert, however it must not extend to more than 40 percent of the liquid depth measured from the liquid surface. The outlet tee or baffle that accommodates an effluent filter~~screen~~ must be located so that the effluent filter~~screen~~ has sufficient clearance to be removed through the access opening with an approved riser in place.

e. The distance from the outlet invert to the underside of the tank top must be at least ten inches.

f. Liquid depth must be a minimum of 30 inches and the maximum depth must not exceed the tank length.

g. 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 of the liquid depth measured from the liquid surface.

h. At least one access opening no less than 20 inches across must be provided in each compartment of a septic tank.

i. A septic tank must have a minimum of 25 square feet of liquid surface area and have at least a six-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 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.

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

5. Concrete Septic Tank Structural Design

a. Concrete septic tanks must comply with the structural design criteria of ASTM C1227-22 (2022 Version) (Standard Specification for Precast Septic Tanks).

b. 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.

c. Certification by a professional engineer must be submitted to EPCPH for acceptance.

d. Tank slab lids, mid-seam tanks, and the connections between the tank and risers must be designed to provide for a watertight seal.

6. Fiberglass, Fiberglass-Reinforced Polyester, and Plastic Tanks

a. All fiberglass, fiberglass-reinforced polyester, and plastic tanks must meet the minimum design and structural criteria of IAPMO/ANSI Z1000 (2019 Version) (American Standards for Prefabricated Septic Tanks) and be certified by a professional engineer as meeting these standards. The professional engineer certifying the criteria must be registered or licensed in the United States, but need not be registered in Colorado.

b. 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.

c. 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 in shape as a result of loads imposed.

d. All tanks must be constructed of sound, durable materials and not be subject to excessive corrosion, decay, frost damage, or cracking.

e. All seams or connections including to risers must be sealed to be watertight.

7. Metal tanks are prohibited.

C. Abandonment of Tank

1. A tank may be completely removed and the parts disposed of safely.

2. If the tank will remain in place:

a. The tank must be pumped to remove as much waste as possible;

b. The bottom of the tank must be broken so the tank neither floats nor fills with water;

c. The top must be collapsed and the sides may be broken into the void;

d. The remaining void must be filled with gravel, sand or compacted soil; and

e. The filled excavation will be graded to surroundings, allowing for settling.

3. EPCPH may require abandonment of a tank that is deemed to be a hazard.

D. Pipe Standards and Bedding Requirements:

1. Pipe Standards:

a. All wastewater pipes used in portions of an OWTS that are pressurized must be constructed of compatible pipe, primer, bonding agent, and fittings. Flexible couplings to connect pipes may only be used in portions of an OWTS that are intended for gravity flow of the wastewater.

b. Where unperforated plastic pipe and fittings are used for gravity flow, the minimum wall thickness of the pipe must conform to ASTM Standard D 3034-21 (2021 Version) or equivalent or greater strength. Schedule 40 pipe is preferred.

c. Perforated distribution pipe surrounded by rock within a soil treatment area must have a minimum wall thickness and perforations conforming to ASTM Standard D 2729-21 (2021 Version) or equivalent or greater strength. Corrugated polyethylene pipe with a smooth interior that meets ASTM ~~F405~~667/F667M (2021 Version) or AASHTO M252-24 (2024 Version) specifications or equivalent may be used.

d. Schedule 40 [ASTM Standard D3034-24 (2024 Version)] or pipe of equivalent or greater strength must be used ~~for the placement of piping under driveways or roadways and in~~ instances where pipe is installed in the following locations ~~sewer line set back distances are granted a variance for any reason~~

1) Under driveways, roadways, or other areas where vehicular traffic is expected. Properly compacted select building material must be installed in such cases. Additional frost protection, such as installing 2" foam board or double-encasement of the pipe, is recommended.

2) 5' prior to and beyond all tanks, and

3) In instances where sewer line setback distances are granted a variance for any reason.

e. Tile pipe, open-joint pipe, and cast iron pipe must not be used in an OWTS.

f. Pressure pipe must be rated for the intended use to accommodate pump discharge pressure. Cellular (foam) core piping must not be used in pressurized systems.

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

E. Cleanouts required between the building and the septic tank:

1. Cleanouts must have a secure cap and a riser extending to or easily accessible from grade. The installation of a straight tee or sanitary tee is acceptable.

2. ~~Cleanouts must be provided within five (5) feet of the outside of the building.~~ If a cleanout is not already provided outside of the building, a two-way cleanout, no smaller than the building sewar must be installed between the building and septic tank, as close to the home as practical but a distance no further than 50 feet of the outside. Local building codes may also apply.

a. For long runs of piping, building sewer must have a cleanout installed at intervals of not more than 100 feet.

3. Where a sewer has a change of horizontal direction greater than 45 degrees, a cleanout must be installed at the change of direction unless a cleanout already exists within 40 feet upstream of this fitting. Where more than one change of direction greater than 45 degrees occurs within 40 feet of a developed length of piping, the cleanout for the first change of direction may serve as the cleanout for all changes within that 40 feet of developed length of pipe.

~~4. Cleanouts must be provided at intervals within the building sewer from the structure to the tank of not more than 100 feet. The effluent pipe between the septic tank and soil treatment area is exempt from this requirement.~~

F. 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 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.

G. 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.

H. Stepdown/Relief Pipe: In sequential ~~or serial~~ distribution, an unperforated pipe may be used to transfer the effluent to the following trench when the effluent in a trench has received the designed level for overflow from that trench.

I. Wastewater Pumping and Dosing Siphon Systems

1. Pumps

a. When a pump is proposed for use within an OWTS design a pump curve for selected pump must be submitted as part of the system design.

b. Be designed by a professional engineer if the design utilizes Pressure Distribution;

c. Non-clog pump opening must have at least two-inch diameter solids handling capacity where raw wastewater is pumped. A pump opening must not have more than 3/4-inch diameter solids handling capacity if previously settled effluent is pumped.

d. Pumps must be certified to the applicable UL778 (Edition 6 or earlier version) ~~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.

e. Grinder pumps must also be certified to NSF/ANSI Standard 46 (2022 or earlier version) and bear the seal of approval of the NSF or equivalent testing and certification program.

1) Where a grinder pump is used prior to the septic tank, an effluent filter is required to be installed on the outlet of the septic tank. Additional tank requirements are provided in section 43.9.B.2.e

2) Where a grinder pump is used prior to the septic tank, the effluent pipe from the grinder pump must be connected to the sewar line prior to the inlet of the tank.

2. Floats and Switches

a. Automatic liquid level controls must be provided to start and shut off pumps at a frequency or level specified in the design.

b. 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. Component used to hold the floats must be securely attached and of a material that is resistant to corrosion and will not absorb water.

c. Float switches must be certified to the applicable UL60947-4-1 (Edition 4 or earlier version) or CSA C22.2 No. 205-17 (2017 or earlier version) electrical safety standard, bear

the seal of approval of CSA, UL or an equivalent certification program and be constructed of corrosion resistant materials.

d. Dosing siphons for pressure dosing and higher level treatment systems must provide for a means of determining the number of dosing events.

3. Location of Pump or Siphon

a. 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.

b. 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 EPCPH that the minimum 48-hour detention time will not be decreased. The pump must be screened ~~or provided with an approved filtering device~~ to remove solids greater than 1/8", assuring that only liquid effluent will be discharged. The transfer of liquid from the first to the second compartment must be at an elevation that is between the inlet and outlet invert elevations, and through a standard tee designed and located as per the requirements of section 8.9.B.4.d.

1) Siphons must not be installed in the second compartment of a two compartment tank.

c. All pumping or siphon chambers shall be watertight and be of sufficient volume so as to keep the pump submerged at all times

1) The minimum volume of a stand-alone pumping or siphon chamber shall be 500 gallons.

~~2) The minimum volume of a pre-fabricated pumping or siphon chamber shall be 250 gallons~~

d. 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 8.9.B.4.d.

4. Pump or Siphon Discharge Piping

a. 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.

b. The pump discharge piping must have a quick disconnect that is accessible from grade to allow for easy pump access and removal.

c. The pipe must be sized to maintain a velocity of two or more feet per second.

d. Pressure pipes must be designed to prevent air or vacuum locking and allow self- draining of the pipes.

5. Access
   a. The pump or dosing system tank, chamber, or compartment must have a minimum 24-inch nominal diameter access riser, made of corrosion-resistant material, extending to or above ground level. A smaller diameter riser may only be installed if it is accepted by EPCPH as an integral component of a specific product during the product review process.

   b. 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.

6. Splice Box (Junction Box)
   a. Splice boxes must be located outside the pump system access riser and be accessible from the ground surface.

   b. Wire splices are prohibited inside the tank, dosing chamber or riser. Wire splicing must be completed with corrosion-resistant, watertight connectors.

7. Controls

   a. Control panels or other electrical boxes used to control the functions of an OWTS must comply with the following, as appropriate:

      1) The pump system must have an audible and visual alarm notification in the event an excessively high water conditions occurs.

      2) The pump must be connected to a control breaker separate from the alarm breaker and from any other control system circuits.

      3) An electrical disconnect must be provided within the line of sight of the pump chamber

      4) The pump system must be provided with a means that will allow the pump to be manually operated; such as an H.O.A. switch (Hando/Off/Auto)

      5) The pump system for pressure dosing and higher level treatment systems must have a mechanism for tracking both the amount of time the pump runs and the number of cycles the pump operates

      6) Must bear the seal indicating acceptable product testing from a U.S. Department of Labor, Occupational Safety and Health Administration Nationally Recognized Testing Laboratory (NRLT) (https://www.osha.gov/dts/otpca/nrtl/nrtllist.html) such as UL or ETL

      7) The bottom of the control panel must be at least 36 inches above grade

J. Effluent Filters ~~Screens~~

1. EPCPH may require that effluent ~~screens~~ filters be installed in all septic tanks in new installations and repairs where the septic tank is replaced.

2. When effluent filters are required, the septic tank outlet, or the outlet of the last septic tank in series, must include an effluent filter that retains solids greater than one-eighth inch in size. Effluent filters must be sized to meet the estimated daily design flow and waste strength.

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

4. The effluent ~~screens~~ filters must be cleaned at manufacturer-recommended intervals, or more often, if use patterns indicate.

5. An alarm may be installed on an effluent ~~screens~~ filters indicating need for maintenance. EPCPH may require all effluent screens to be equipped with alarms.

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

7. The handle of the effluent ~~screens~~ filters must extend to within 12 inches of the riser lid so as to allow for ease of maintenance.

K. Grease Interceptor Tanks

1. All commercial food service facilities and other facilities generating fats, oils and greases in their waste must install a grease interceptor tank.

2. Grease interceptor tanks shall treat only those portions of the total wastewater flow in which grease and oils are generated.

3. All grease interceptor tanks shall have an appropriately sized watertight, secure access riser made of corrosion resistant material extending to, or above, grade.

4. 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.

5. 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.

6. 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.