CLEAR CREEK COUNTY Public & Environmental Health	Soil Treatment Areas	Section 18

1. General Requirements

A. The size and design of the Soil Treatment Area (STA) shall be based on the results of the site and soil evaluation, design criteria, and construction standards for the proposed site and OWTS selected.

2. Calculation of Infiltrative Surface of a 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 Appendix C.

C. Factors for adjusting the size of the STA are in Tables 18-1 and 18-2.

D. The required area for a STA is determined by the following formula:

$$\text{Required STA (sq ft)} = \frac{\text{Design Flow (gpd)}}{\text{LTAR (gpd/sq ft)}}$$

1. The adjusted STA is the required STA multiplied by the Size Adjustment Factors.

2. The Size Adjustment Factors for methods of application are in Table 18-1.

3. The Size Adjustment Factors for types of storage / distribution media are in Table 18-2.

4. A required soil treatment area receiving TL1 treatment level effluent may be multiplied by one factor from Tables 18-1, Table 18-2 or both.

5. A soil treatment area receiving TL2, TL2N, TL3 or TL3N treatment level effluent shall be pressure dosed. The distribution mediation in Table 18-2 may be used for distribution of higher level treatment system effluent, but an additional reduction factor from Table 18-2 shall not be used.

3. Allowable Soil Treatment Area Reductions and Increases

A. The STA size determined by dividing the design flow rate by the LTAR may be adjusted by factors for method of treatment, soil treatment area design, and type of distribution media.

B. For the purpose of the Table 18-1, a "baseline system," i.e. adjustment factor of 1.0, is considered to be Treatment Level 1 (TL1) effluent dosed to a gravel or tire chip filled trench.

C. The maximum reduction from all combined reductions including higher level treatment shall be no greater than 50 percent of the baseline system required for a soil treatment area.

D. Reductions for the higher level treatment categories listed in Appendix C shall only apply provided the system is inspected and maintained as specified in the requirements of Section 6.

Table 18-1 Size Adjustment Factors for Application Methods in STA

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

Table 18-2 Size Adjustment Factors for Types of Distribution Media in STA Accepting Treatment Level 1 Effluent

Type of Soil Treatment Area	Type of Storage/Distribution Media Used in Soil Treatment Area		
	Rock or Tire Chips	Manufactured Media Other Than Chambers	Chambers
Trench or Bed	1.0	0.9	0.7

4. Design of Soil Treatment Areas- General Requirements

A. The infiltrative surface and distribution lines shall be level.

B. The infiltrative surface shall be no deeper than four (4) feet unless adequate treatment at a deeper level can be demonstrated and is approved by the health officer. The depth will be measured on the downslope side of the trench or bed excavation.

C. Trenches shall follow the ground surface contours so variations in infiltrative surface depth are minimized. Beds shall be oriented along contours to the degree possible.

D. Pipe for gravity distribution shall be no less than three (3) inches in diameter.

E. A final cover of soil suitable for vegetation at least ten (10) inches deep shall 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.

F. Following construction, the ground surface shall be graded to divert stormwater runoff or other outside water from the soil treatment area. The area shall be protected against erosion. Subsurface drains upslope of the STA may be installed to divert subsurface flow around the area.

G. Backfilling and compaction of STAs shall be accomplished in a manner that does not impair the intended function and performance of the storage/distribution media and soil and distribution laterals, allows for the establishment of vegetative cover, minimizes settlement, and maintains proper drainage.

H. Soil replacement is permitted to bring the soil within the requirements of suitable soil. Added soil shall meet the specifications of sand filter media, as specified in Section 19.3.A.1 All added soil shall be completely settled prior to installation of components as specified and approved by the design engineer. The loading rate for sand filters shall be used. Pressure distribution shall be used.

I. The design engineer may select the level of treatment to be applied to the STA that is necessary in order to accommodate the site conditions, if higher treatment for the purpose is required.

5. Distribution Lines

A. Distribution between lines in a STA shall be as even as possible. Uneven settling of portions of the distribution system following construction shall be addressed by provisions in the design to adjust flows between lines.

B. Distribution lines shall be a maximum of 150 feet long.

C. Distribution lines longer than 100 feet shall be pressure dosed or the application of the effluent shall be at the center of the line.

D. The end of a distribution pipe shall be capped, unless it is in a bed or trenches in a level soil treatment area, where the ends of the lines may be looped.

6. Inspection Ports

A. An inspection port accessible from ground surface shall be installed at the terminal end of each trench or bed. The bottom of the inspection port tube shall extend to the infiltrative surface and not be connected to the end of the distribution pipe. That portion of the tube in contact with the distribution media shall be perforated. Inspection ports in chambers may be installed according to manufacturer's instructions if the infiltrative surface is visible or can be measured from the inspection port.

B. At least one (1) inspection port connected to the distribution pipes shall be provided for each trench or bed.

C. The top of inspection ports may be below the final grade of the surface if each has a cover at the surface such as a valve box for a lawn irrigation system.

7. Trenches

A. Trenches shall be three (3) feet wide or less.

B. The separating distance between trenches shall be a minimum of six (6) feet sidewall-to-sidewall.

C. Perforated distribution pipe used in a trench shall be as close to the center of the trench as possible.

D. Perforations shall be oriented downward unless pressure distribution is used and provision for pipe drainage is included.

8. Beds

A. Maximum width for a bed shall be 12 feet, unless the bed receives effluent meeting TL2 treatment level or better or for repairs to existing systems as provided in Section 18.13.C.

B. The separating distance between beds shall be a minimum of six (6) feet sidewall-to-sidewall.

C. The separating distance between parallel distribution lines in an absorption bed shall not exceed six (6) feet and a distribution line shall be located within three (3) feet of each sidewall and endwall of the absorption bed.

9. Serial and Sequential Distribution

A. 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.

B. The horizontal distance from the side of the absorption system to the surface of the ground on a slope shall be adequate to prevent lateral flow and surfacing.

C. Adjacent trenches or beds shall be connected with a stepdown/relief line 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.

10. Storage/Distribution Media

A. Rock and Pipe

1. The pipe shall be surrounded by clean, graded gravel, rock, or other material of equal efficiency which may range in size from 1/2 inch to 2 1/2 inches that meets ASTM D448 (AASHTO M43) Size 2-5. At least six (6) inches of gravel, rock or other material shall be placed below the pipe. The gravel, rock, or other material shall fill the trench around the pipe and at least two (2) inches above the top of the distribution pipe.

2. The top of the placed gravel or such material used shall 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 shall not be used.

B. Tire Chips

1. The pipe may be surrounded with clean, uniformly-sized tire chips.

2. Tire chips shall be nominally two (2) inches in size and may range from 1/2 inch to a maximum of four (4) inches in any one direction.

3. Wire strands shall not protrude from the tire chips more than 3/4 inches.

4. Tire chips shall be free from balls of wire and fine particles less than two (2) millimeters across.

C. Chambers

1. Installation shall be according the manufacturer's instructions provided that those instructions are no less stringent than these Regulations.

2. Chambers shall be installed with the base on the infiltrative surface.

3. Effluent may be distributed by gravity or pressure dosing.

4. A distribution pipe shall be placed extending the entire length of the chambers and may be either suspended or left in contact with the ground.

D. Manufactured Media

1. Manufactured media shall be installed with the base on the infiltrative surface.

5. A seepage pit shall consist of a buried vertical cylinder with holes in the wall.

6. Pits shall be provided with both vertical sidewall and top supporting structural concrete or other material of equal structural integrity.

7. The excavation shall be larger than the cylinder by at least 12 inches on each side.

8. The space between the cylinder wall and the edge of the excavation shall be filled with rock ranging in size from 1/2 inch to 2 1/2 inches.

9. The capacity of the pit shall be computed on the basis of long-term acceptance rates determined for each stratum penetrated. The weighted average of the results shall be used to obtain a design figure.

10. Soil strata in which the percolation is slower than 30 minutes per inch shall not be used for absorption or seepage. These strata shall not be included in the weighted average to determine the long-term acceptance rate.

11. 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 area inside the vertical cylinder.

12. Pits shall 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 shall be 20 feet.

10. Storage/Distribution Media

A. Rock and Pipe

1. The pipe shall be surrounded by clean, graded gravel, rock, or other material of equal efficiency which may range in size from 1/2 inch to 2 1/2 inches that meets ASTM D448 (AASHTO M43) Size 2-5. At least six (6) inches of gravel, rock or other material shall be placed below the pipe. The gravel, rock, or other material shall fill the trench around the pipe and at least two (2) inches above the top of the distribution pipe.

2. The top of the placed gravel or such material used shall 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 shall not be used.

B. Tire Chips

1. The pipe may be surrounded with clean, uniformly-sized tire chips.

2. Tire chips shall be nominally two (2) inches in size and may range from 1/2 inch to a maximum of four (4) inches in any one direction.

3. Wire strands shall not protrude from the tire chips more than 3/4 inches.

4. Tire chips shall be free from balls of wire and fine particles less than two (2) millimeters across.

C. Chambers

1. Installation shall be according the manufacturer's instructions provided that those instructions are no less stringent than these Regulations.

2. Chambers shall be installed with the base on the infiltrative surface.

3. Effluent may be distributed by gravity or pressure dosing.

4. A distribution pipe shall be placed extending the entire length of the chambers and may be either suspended or left in contact with the ground.

D. Manufactured Media

1. Manufactured media shall be installed with the base on the infiltrative surface.

2. Installation shall be according the manufacturer's instructions provided that those instructions are no less stringent than these Regulations.

3. Effluent may be applied by pressure distribution only if the manufacturer specifies suitability of the product for that use.

E. Pressure Distribution

1. Design of pressure distribution systems shall include:

   a. Dose size and frequency for flows and soil or media long-term acceptance rate;

   b. Pipe diameter and strength requirements;

   c. Orifice size and spacing; and

   d. Distal pressure head.

2. Cleanouts shall be installed at the end of each line.

F. Drip Distribution System

1. The infiltrative surface area shall be calculated using the long-term acceptance rate for the site or a more conservative value if recommended by the manufacturer.

2. Driplines shall be installed on manufacturer's spacing recommendations.

3. Drain back shall be provided for all drip lines, pipes, and pumps.

4. Provisions shall be made to minimize freezing in the distribution lines, driplines, relief valves, and control systems.

5. Provisions shall be made for backflushing or other cleaning.

11. Sand Filters

A. Sand filters, such as a lined intermittent sand filter or recirculating sand filter, may be used as a pre-treatment system where the treated effluent is collected and dispersed to a soil treatment area or where site conditions require importing treatment media, such as an unlined sand filter, a soil replacement system, or a mounded system.

12. Sequencing Zone Systems

A. Sequencing zone systems have more than two (2) soil treatment area sections that are dosed on a frequent rotating basis.

B. The combined size of the zones shall equal the minimum size of the STA as calculated in Section 18.2.

C. Where soil conditions are similar between the sections, each section area shall 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.

D. An automatic distribution valve shall be used.

E. Dosing of each system shall be evaluated by the design engineer based on projected daily flow rates, number of zones, and soil types.

13. Repairs to Existing Systems

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, and seepage pits may be considered for repairs only. Other options are vaults or higher level treatment systems.

B. Repairs or upgrades of existing OWTS where the size of lot precludes adherence to these distances, a repaired OWTS shall not be closer to setback features than the existing OWTS, as reviewed and approved by the health officer.

C. Wide Beds

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

D. Deep Gravel Trenches

1. For deep gravel trenches or beds, the length of an absorption trench or bed may be calculated by allowance for the sidewall area of additional depth of gravel in excess of six (6) inches below the bottom of the distribution pipe according to the following formula:

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

Where:
L = length of trench prior to adjustment for deep gravel
W = width of trench or bed in feet

D = additional depth in feet of gravel in excess of the minimum required six (6) inches of gravel below the distribution pipe

a. The maximum allowable additional depth is five (5) feet.

b. Percolation tests and soil profile hole or soil profile excavation test pit evaluations shall be performed at the proposed infiltrative surface depth.

c. The reduction in field size area with the use of chambers shall not be applied to deep gravel systems.

E. Alternating Systems

1. An alternating system may be used only for repairs to existing systems when the existing STA is retained and a new one is added.

2. An alternating system shall have two (2) zones that shall be alternated on an annual or more frequent basis.

3. A maximum of 25 percent of the minimum total required STA infiltrative surface may be allocated to the existing STA. Size adjustment factors for methods of effluent application or type of distribution media shall not be allowed.

4. A diversion valve or other approved diversion mechanism shall be installed on the septic tank effluent line allowing STA zones to be alternated.

5. The diversion mechanism shall be readily accessible from the finished grade.

F. Seepage Pits

1. Seepage pits may be used only for repairs to existing systems, if the potential for risk to public health and water quality is low.

2. The construction of new seepage pits for the treatment and dispersal of onsite wastewater on new sites is prohibited unless the design includes higher level treatment of at least TL2 treatment level.

3. If risk is low in the determination of the health officer, a seepage pit without higher level treatment may be used.

4. If the risks are not low, higher level treatment of at least TL2 treatment level shall be attained prior to discharge to these systems for final disposal.

5. A seepage pit shall consist of a buried vertical cylinder with holes in the wall.

6. Pits shall be provided with both vertical sidewall and top supporting structural concrete or other material of equal structural integrity.

7. The excavation shall be larger than the cylinder by at least 12 inches on each side.

8. The space between the cylinder wall and the edge of the excavation shall be filled with rock ranging in size from 1/2 inch to 2 1/2 inches.

9. The capacity of the pit shall be computed on the basis of long-term acceptance rates determined for each stratum penetrated. The weighted average of the results shall be used to obtain a design figure.

10. Soil strata in which the percolation is slower than 30 minutes per inch shall not be used for absorption or seepage. These strata shall not be included in the weighted average to determine the long-term acceptance rate.

11. 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 area inside the vertical cylinder.

12. Pits shall 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 shall be 20 feet.