SEWAGE DISPOSAL REGULATIONS
GLENN COUNTY ADMINISTRATIVE CODE
CHAPTER 20.06

20.06.01 DIVISION I. APPLICATION

A. Application Required: Application for a permit to install all or part of a sewage disposal system shall be made by the owner.

B. Content of Application: An application for a permit shall be made on forms provided by the health officer. The application shall be complete prior to any action on the permit. A complete application shall contain the following information:

1. Owner's name, telephone number, and address of the structure (street address), assessor's parcel number.

2. All soil test data.

3. A scaled plot plan, which shall include:

a. Location of the structure in relation to all property lines.

b. Location of all easements on the property.

c. Location of one street accessing the property.

d. Location of all existing and proposed structures and hard surfaces such as patios, decks, walkways, driveways and swimming pools.

e. Location and nature of all existing sewage disposal systems on property.

f. Direction of the slope of ground indicated by arrows.

g. For properties with slopes, the plot plan shall indicate the original grade and include an elevation drawing showing the finished grade and location of the structure and the proposed sewage disposal system.

h. Location of the water sources on the property within 200 feet of the sewage disposal and replacement area.

i. Location of all water courses or bodies on the property within 200 feet of the sewage disposal and replacement area.

j. Location of cuts or embankments within 50 feet of the proposed soil absorption trench for both the primary and replacement areas.

k. Location of community wells within 200 feet of the proposed sewage disposal and replacement areas.

l. Location, design and replacement area of the proposed sewage disposal system.

m. The location and depth of all underground utility trenches and underground storage tanks.

n. All proposed grading or fill on the site.

o. Soil test data locations.

p. North arrow.

C. Plans and Specifications: The application for the permit shall be accompanied by not less than three copies of specifications and plans drawn to scale. For all installations, plans shall be drawn to a scale between 1 inch equals 20 feet and 1 inch equals 40 feet in the development area. The plan shall include, but not be limited to, the locations and size of septic tanks and leachfields. Specifications shall include types of pumps and controls, dose volume, elevation differences (vertical lift), pipe friction loss, pump performance curve, pump model, pump manufacturer, tanks and pipe, where applicable.

D. Soil Test Data: All soil test data shall be submitted in writing indicating soil profiles, permeability and percolation test data. Data shall include distances of all test holes from a reference point. All soil reports shall bear the signature of the soil tester. The soil tester shall meet all qualifications established by Section 7.10.020(E) of the Glenn County Code.

E. Inspections:
1. All new or repaired sewage disposal systems shall be inspected by the Glenn County Health Department or Building Department.

2. Covering installed improvements prior to inspection shall be limited solely to those portions of the work where the open excavation impedes necessary movement of equipment required to complete the system design as provided and only with prior approval of the administrative authority.

3. The applicant shall notify the Building Department that the work authorized by the permit is ready for inspection at least 24 hours before the work is to be inspected.

4. A copy of the approved permit shall be on-site at the time of inspection.

5. Alternative sewage disposal systems shall be inspected by the system designer and the Health Department before covering.

20.06.02 DIVISION II. GENERAL DEFINITIONS

Bedrock: The rock that underlies soil material or is at the earth's surface. Bedrock is encountered when the consolidated material, larger than 2 mm in size, is greater than 50 percent by volume.

Building Sewer: The solid pipe beginning two feet from the foundation and running to the septic tank.

Color: The moist color of the soil based on Munsell soil color charts.

Effluent: Liquid discharged from a septic or other treatment tank.

Effluent Distribution Pipe: The perforated pipe used to distribute effluent into the soil absorption trench.

Effluent Sewer: The solid pipe from the discharge side of the septic tank to the beginning of the soil absorption trench.

Groundwater: Zones of soil saturation which include perched water tables, shallow regional groundwater tables or aquifers, or zones that are seasonally, periodically, or permanently saturated.

Health Officer: The Glenn County Health Officer, or a duly authorized representative.

High Water Level: The apparent ten-year high water mark of any stream, river or drainage.

Intermittent Stream: A water course that flows only in direct response to rainfall and is at all times above the water table. Intermittent streams generally flow no more than five days after the last rainfall event.

Owner: The legal owner of a parcel of land into which a sewage disposal system has or will be installed or any authorized agent of such owner.

Perennial Stream: Any stream which is fed in whole or in part by groundwater or other long term sources.

Sewage Disposal Area: The land area used for the installation of the primary and replacement sewage disposal systems.
Sewage Disposal System: The combination of septic tank(s) and soil absorption trench(es) interconnected by piping.

Soil: The unconsolidated material over bedrock, which is 2 mm in diameter or smaller.

Soil Absorption Area: The soil area immediately adjacent to the proposed soil absorption trench sidewall which is to be in contact with effluent.

Soil Absorption Trench: The excavation containing the aggregate, effluent distribution pipe, straw, building paper or approved materials, and cover material used for effluent disposal through the soil absorption area.

Soil Depth: The combined thickness of adjacent soil layers that comply with the standards for effluent disposal in this chapter. Soil depth is measured vertically to bedrock, hardpan, an impermeable soil layer, gravel or saturated soil.

Soil Horizon: A layer of soil or soil material approximately parallel to the land surface and differing from adjacent related layers in physical, chemical, and biological properties or characteristics such as color, structure, texture, consistency, pH, etc.

Soil Mottles: Irregularly marked soil with spots of different colors that vary in number and size. Mottling in soil usually indicates poor aeration and lack of drainage. Mottling may be used to estimate the highest extent of saturated soil. Coarse textured soil, sand and gravel may not show mottling even when subject to

saturated conditions.

Soil Saturation: Soil with all voids and pores filled with water.

System Designer: A person described in subdivision (E) of Section 7.10.020 of the Glenn County Code.

Wet Weather: The wet weather test period shall begin as soon after January 1 as one half the average annual rainfall has occurred and shall continue until April 15. Unusual weather conditions may cause the wet weather testing period to be shortened or extended.

20.06.03 General

A. Site Evaluation: A site evaluation shall include, but not be limited to, description of soil properties such as permeability, depth to zones of soil saturation, and depth to impermeable material; slope; topography; type of vegetation; all setback requirements; and the potential for flooding.

B. Fill Material: Fill material may be utilized for soil absorption systems. Fills must either:

1. Have weathered in place for at least five years or,

2. Be designed for use as a soil absorption system by an individual qualified as required in Section 7.10.020 (E) of the Glenn County Code. The health officer may require additional soil testing and design information for systems installed in fill.

C. Replacement Sewage Disposal System Area: On each parcel of land being created or initially developed, sufficient usable area of suitable soils for replacement sewage disposal system(s) shall be set aside and maintained for sewage disposal system repair. The set back distances in Table T-1 shall apply to the replacement area.

D. Nonconforming Site Conditions: Where site conditions do not permit a sewage disposal system in accordance with Divisions III, IV and V, an alternative sewage disposal system(s) may be considered for approval by the health officer.

E. Undisturbed Site: The approved sewage disposal area shall not be disturbed to the extent that it becomes unsuitable for sewage disposal. The approved sewage disposal areas and replacement disposal system areas shall not be used for construction of buildings, parking areas, swimming pools, or any other use that may adversely affect their use as sewage disposal areas.

F. Crossing Property Lines:

1. A recorded utility easement and covenant against conflicting uses, on a form approved by the health officer, is required whenever a sewage disposal system crosses a property line separating properties under different ownership. The easement must accommodate that part of the system, including setbacks, which lies beyond the property line, and must allow entry to install, maintain and repair the system.

2. Whenever an on-site system is located on one lot or parcel and the facility it

serves is on another lot or parcel under the same ownership, the owner shall cause said lot or parcels to be reverted or merged into one parcel.

20.06.04 Slope

Soil absorption systems shall not be located on land having a slope greater than 30 percent. Areas with slopes exceeding 30 percent shall not be graded or reshaped to provide a sewage disposal area.

20.06.05 Permeability

A. General: The permeability of the soil in the proposed sewage disposal area shall be determined by soil excavation profile descriptions and at least one of the following procedures:

1. Percolation testing.

2. Hydrometer sampling method.

B. Where soil excavation profiles demonstrate soils are consistent with U.S.D.A. soil maps and can be classified into leaching classifications 2, 3, or 4 (see Section 20.06.10(B)), by field texture analysis (see Appendix A), percolation testing or hydrometer sampling may be waived by the health officer. This testing exemption applies to parcels existing before the effective date of these regulations and to land divisions requiring a parcel map as defined in the Subdivision Map Act.

C. Soil Excavations: There shall be a minimum of one soil excavation in the sewage disposal area. A second soil excavation will be required in the replacement sewage disposal system area if the replacement area is not contiguous with the sewage disposal area. Excavations shall extend at least five feet below the bottom of the proposed soil absorption trench and shall be of sufficient dimension to be accessible for direct observation of the excavation walls. All samples for evaluation and analysis shall be obtained from the sidewalls of the soil excavations, except that soil samples from below five feet may be collected from a backhoe bucket. Additional soil excavations may be required for evaluation of a sewage disposal area.

D. Soil Excavation Profile Description: Soil profile descriptions shall be written for all excavations. All depth measurements shall be from the undisturbed ground surface. The thickness in inches of the different soil horizons observed shall be indicated. Soil horizons shall be described using the Munsell soil color charts. Field texture analysis shall be conducted as follows using a format similar to that in Appendix A.

1. Field Texture Analysis: Soil texture shall be described using the field Soil Classification method in Appendix A by an individual qualified as required in Section 7.10.020(5). Soil samples shall be taken from each soil horizon between the top of the proposed effluent pipe to five feet below the proposed trench bottom, depending on the depth to groundwater. Samples must then be worked through a No. 10 Sieve (2 mm). The soil which passes through the No. 10 Sieve is then moistened and worked so as to determine the sand/silt/clay components as described in Appendix A then properly named in accordance with the U. S. Department of Agriculture Soil Triangle (see Diagram D-3).

2. Soil Structure: Soil structure shall be described as to how the primary sand, silt,

and clay particles are grouped together into aggregates or peds. The principal forms of soil structure are platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are 1) single grain (each grain by itself, as in dune sand), 2) massive (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

3. Consistence: The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

a. Loose: Non-coherent; will not hold together in a mass.

b. Friable: When moist, crushes easily under gentle to moderate pressure between thumb and forefinger and can be pressed together in a lump.

c. Firm: When moist, crushes under moderate pressure between the thumb and forefinger, but resistance is distinctly noticeable.

d. Plastic: When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a wire when rolled between thumb and forefinger.

e. Sticky: When wet, adheres to other material; tends to stretch somewhat and pull apart rather than pull free from other material.

f. Hard: When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

g. Soft: When dry, breaks into powder or individual grains under very slight pressure.

h. Cemented: Hard and brittle; little affected by moistening. A weakly cemented mass is brittle and hard, but it can be broken in the hands. A strongly cemented mass is brittle; it is too hard to be broken in the hand but can easily be broken with a hammer. An indurated mass is very strongly cemented and brittle, does not soften under prolonged wetting, and a sharp blow with a hammer is required to break it.

4. Soil Color: The Munsell soil color chart shall be the descriptive tool utilized to determine the background soil color.

5. Soil Pores: Soil pores shall be described by size and abundance.

6. Roots: The size, abundance, and location of roots and root channels shall be described.

7. Soil Mottles: Zones of seasonal or periodic soil saturation shall be estimated at the highest level of soil mottles. (Except frozen soils and soils with rapid permeability.)

8. Observed Groundwater: The depth to groundwater, if present, shall be reported. Observed groundwater shall be reported at the level groundwater reaches in the soil excavation, and at the highest level of sidewall seepage into the excavation. Measurements shall be made from ground surface. Soil above the water level in the excavation shall be checked for conditions associated with saturation, except for

those soils subjected to freezing conditions and rapidly permeable soils (Leaching Class 1) in which case only actual observation shall be acceptable.

20.06.06 Percolation Testing

A. Percolation Tests and Procedures: At least three percolation tests in the primary and replacement soil absorption areas shall be conducted. The holes shall be spaced uniformly in the soil horizons proposed for leaching. A total minimum of six percolation tests shall be required where the replacement area is not contiguous with the sewage disposal area. Percolation tests shall be conducted only under saturated soil conditions.

1. Percolation Test Hole: The test hole shall be dug or bored. It shall have vertical sides and have a horizontal dimension of six inches. The bottom and sides of the hole shall be carefully scratched with a sharp-pointed instrument to expose the natural soil. All loose material shall be removed from the hole and the bottom shall be covered with two inches of pea gravel. A four-inch diameter perforated pipe shall be centered in the hole and surrounded by pea gravel.

2. Test Procedure: It is important to distinguish between saturation and swelling of the soil. Saturation means that the void spaces between soil particles are full of water. This can be accomplished in a short period of time. Swelling is caused by intrusion of water into the individual soil particles. This is a slow process, especially in clay soil, and is the reason for the prolonged soaking period.

The hole shall be carefully filled with clear water and a minimum water depth of 12 inches shall be maintained above the bottom of the hole for a 4-hour period, 24 hours prior to testing, by refilling whenever necessary or by use of an automatic siphon. The presoak is to be continued until the soil around the test hole is both saturated and swelled. The water level shall be adjusted to 6 inches above the pea gravel from a fixed reference point. The water level shall be measured at 30-minute intervals for a minimum period of 4 hours. The hole shall be filled with clear water to a point not more than six inches above the pea gravel after each reading. When the first 6 inches of water seeps away in less than 30 minutes, the time interval between measurements shall be 10 minutes and the test run for 2 hours. The percolation rate shall be the last three readings where the successive water level drops do not vary more than one-eighth inch from each other unless there is evidence that this does not represent the stabilized percolation rate. It is recommended that the percolation rate be measured by a float gauge (see Diagram D-1).

3. The 24-hour presoak period may be eliminated in wet weather conditions.

4. Percolation tests in class 4 or 5 soils must be conducted in wet weather conditions unless the applicant can demonstrate to the satisfaction of the health officer that the tested soil is completely saturated and swelled. At a minimum, the presoak period must be extended to 48 hours for dry weather tests of class 4 or 5 soil.

5. Tests which percolate faster than five minutes per inch shall not be used in calculating soil absorption trench design.

20.06.07 Hydrometer Testing

A. Hydrometer Sampling Method. Soil samples shall be taken at each soil layer between the top of the effluent pipe and five feet below the soil absorption leach trench bottom. To take a soil sample, a blunt knife or trowel can be used to remove soil from the desired layer of the soil profile. The soil samples are required to be between one to two pounds and shall be in the form of undisturbed soil aggregates. The soil samples shall be put in plastic bags during transportation to a laboratory for testing by the hydrometer method. A leaching class shall be determined by plotting the hydrometer sample(s) results on the soil triangle (see Diagram D-3) using the following procedure:

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.

2. Adjust for coarse fragments by moving the plotted point in the sand direction an additional two percent for each ten percent (by volume) of fragments greater than 2 mm in diameter.

3. Adjust for compactness of soil by moving the plotted point in the clay direction an additional 15 percent for soils having a bulk density greater than 1.7 gm/cc. For soils falling in sand, loamy sand, or sandy loam, classification bulk density analysis will generally not affect suitability and analysis is not necessary.

20.06.08 Verification

A. The applicant shall notify the Health Department at least 24 hours before conducting soil tests so that Health Department staff may observe testing, if desired.

B. Information submitted on soil permeability, percolation tests, depth to soil mottles, depth to high groundwater, soil textures, structure, and layers that limit effective soil depth, and land slope may be subject to verification by the health officer.

20.06.09 Groundwater Monitoring

A. Monitoring Groundwater Levels: The applicant may provide documentation that soil mottling or other color patterns at a particular sewage disposal area are not an indication of high groundwater levels. Documentation shall be made by directly observing the groundwater level at a time of the year when high groundwater occurs due to precipitation, snow melt, or irrigation. The period for testing high groundwater shall be determined by the health officer.

B. Artificial Drainage: Sewage disposal areas which are to be monitored shall be checked for groundwater intercept drains, drainage tiles, and open ditches which could have altered naturally high groundwater levels. Where such factors are involved, information on the location, design, ownership, and maintenance responsibilities for such drainage shall be provided. Documentation shall be provided to show that the drainage network has an adequate outlet and will be maintained and tested to ensure it will not drain the proposed soil absorption trenches.

C. Groundwater Monitoring Well Installation: Wells shall extend to a depth of at least five feet below the depth of the proposed soil absorption trench. However, with layered mottled soil over permeable unmottled soil, at least one well shall terminate within the mottled layer. The monitoring well shall be a perforated pipe below the

surface seal in the bore hole. The pipe size shall be a minimum of four inches. The bore hole shall be two inches larger than the pipe (see Diagram D-2).

D. Groundwater Observations: Observations shall be made during the high groundwater elevation period at intervals not to exceed seven days. If water is present above the depth required in Section 20.06.10(C and D),at two consecutive seven-day observations, or if the groundwater rises above the bottom of the proposed soil absorption trench, monitoring shall cease and the sewage disposal area shall be considered unacceptable.

E. Groundwater Observation Well Abandonment: Except when required by the health officer, all groundwater observation wells shall be properly abandoned. Abandonment shall be accomplished by removing the casing and backfilling with clean native material.

F. Reporting Data: All data giving test locations, soil profile descriptions, soil series classifications, dates observed, depths to observed water and local precipitation data shall be submitted to the health officer.

20.06.010 Site Requirements

A. Sewage Disposal System Location: Locate the surface grade of all sewage disposal systems at a point lower than the surface grade of any water well, spring or reservoir on the same or adjoining property. When this is not possible, the site shall be located so that surface water drainage from the sewage disposal system is not directed toward a well or reservoir. The sewage disposal system shall be located with a minimum distance between various elements as indicated in Table T-1. Soil absorption trenches in compacted areas, such as parking lots and driveways, are prohibited. Surface water shall be diverted away from any sewage disposal system. All areas disturbed during the construction of the sewage disposal system shall be stabilized and revegetated prior to the first wet weather season after installation.

B. Leaching Classes:

1. (See Diagram D-3) Soil absorption trenches shall be sized based on the leaching classes shown in Table T-2.

2. Class 1 soil is acceptable for soil absorption trenches only if the water table separation required in Section 20.06.10 (D) can be met, or by use of an alternative sewage disposal system.

3. For soil absorption trench design purposes, each acceptable test(s) shall be assigned into a leaching class (Classes 1 (see Section 20.06.10(D)), 2, 3, or 4) and then shall be averaged. The leaching class used for soil absorption trench design shall be the highest whole number of the averaged tests. The minimum soil absorption area shall be sized per Table T-4.

4. Where permeability of the soil falls outside leaching classes 1 (see Section 20.06.10(D)), 2, 3, or 4, percolation tests shall be used to determine design and application rates.

C. Depth to Groundwater and Separation from Impermeable Layers: The minimum separation between the bottom of the soil absorption system and groundwater shall

be based on the leaching classes encountered in the soil profile as follows:

Class 1–(see Section 20.06.37(D) and 20.06.28)
Class 2–5 feet
Class 3–4 feet
Class 4–3 feet

Depth to the highest level of groundwater may be reduced to 2 feet for alternative sewage disposal systems or with approval by the health officer.

D. Depth of Groundwater, Class 1 Soil: The minimum depth to the anticipated highest level of groundwater below the bottom of the leaching trench shall be determined according to soil texture as set forth in Table T-3.

E. Soil Depth. Soil depth is measured vertically to the point where bedrock, hardpan, impermeable soils or saturated soils are encountered. Where ground slope is 20% to 30%, minimum soil depth immediately below the bottom of the leaching trench shall be five feet. Where ground slope is less than 20%, a minimum soil depth of three feet immediately below the leaching trench shall be permitted. Lesser soil depths may be granted only as a waiver or for Alternative Systems.

20.06.011 Soil Absorption Systems

General: Effluent from septic tanks shall be disposed of by soil absorption. Sewage disposal systems receiving a daily sewage flow of 1,500 gallons per day or less shall be constructed in accordance with this division. A sewage disposal systems receiving flows greater than 1,500 gallons per day shall comply with Division VII.

20.06.012 Soil Absorption Trench Sizing

A. General: The soil absorption area for leachfields shall be based on soil characteristics and shall be calculated using the loading rates provided in Table T-4.

B. Sewage Flow: Single-family residential soil absorption trenches shall be designed based on a minimum flow of 300 gallons per day. A 2-bedroom residence shall be designed based on an estimated flow of 300 gallons per day with an additional 150 gallons per day for a 3-bedroom house and an additional 75 gallons per day for each bedroom in excess of three. Structures other than single-family residences shall not use less than the sewage flow in Table T-5 to calculate soil absorption areas.

20.06.013 Installation of a Standard Soil Absorption Trench

A. Standard Soil Absorption Trenches: Soil absorption trenches shall be at least 18 inches and no more than 36 inches in width. Soil absorption trenches shall be spaced a minimum of six feet apart, sidewall to sidewall. The trench depth shall be based on the slope table set forth in Table T-6. The absorption area of the standard soil absorption trench shall be calculated from the bottom area of the trench.

B. Deep Soil Absorption Trenches: Soil absorption trenches deeper than the standard trench may be utilized where the provisions of Section 20.06.10 C, D and E can be met.

The absorption area of the deep trenches shall be calculated as the total sidewall and

bottom area below the standard soil absorption trench. The first 12 inches of sidewall below the effluent distribution pipe shall not be used in this computation.

The separation between soil absorption trenches shall be six feet plus two feet for every additional foot of absorption trench below the standard absorption trench.

C. Slow Percolation Rate System: The standard soil absorption trench (Section 20.06.13) may be installed in Class 5 soil with percolation rates between 60 to 120 minutes per inch. Class 5 soils can be easily smeared and compacted during construction, greatly reducing the soil's expected percolation rate. Construction of absorption trenches shall proceed only when the soil is sufficiently dry to resist smearing and compaction during construction. This point is reached when a soil sample crumbles when trying to roll it into a wire between the palms of the hands.

D. Excavation and Construction: The bottom of a soil absorption trench shall be level (0-2 inches/100 lineal feet). Soil absorption trenches shall not be excavated when the soil is frozen or so wet that soil material rolled between the hands will form a soil wire. All smeared or compacted soil surfaces in the absorption area or bottom of the trench shall be scarified to the depth of smearing or compaction and the loose material removed.

E. Aggregate and Backfill: Twelve inches of aggregate ranging in size from 3/4 to 2 1/2 inches shall be laid into the trench below the effluent distribution pipe elevation. The aggregate shall be evenly distributed a minimum of two inches over the top of the effluent distribution pipe. The aggregate shall be washed and free of fines. The aggregate shall be covered with straw, untreated building paper or approved materials and covered with a minimum of 12 inches of soil backfill. The soil backfill shall be mounded over the soil absorption trench (see Diagram D-4).

F. Building Sewer: The building sewer for gravity systems shall be a minimum of three-inch solid wall pipe with 1/4 inch fall per lineal foot and comply with the most recent adopted edition of Uniform Plumbing Code. Where four-inch pipe is used the minimum pipe slope shall be no less than 1/8-inch fall per lineal foot.

G. Effluent Sewer: The effluent sewer for gravity flow systems shall be a minimum three-inch solid wall pipe with 1/8 inch fall per lineal foot. The top of the effluent sewer shall be a minimum of eight inches below the finished grade. Effluent sewers shall have one cleanout per 100 feet of line.

H. Where required soil absorption trench exceeds 100 feet the soil absorption system shall be divided into trenches of approximately equal length served by one or more distribution boxes.

I. Replacement Area: An approved sewage disposal area adequate to install a 100% replacement shall be provided for each sewage disposal system. This area shall meet all requirements imposed on initial leachfield areas. A 200% replacement area shall be required for alternative systems.

J. Chambered Leachfields: Leachfield chambers may be used as a replacement for rock in standard leachfield trenches. Chambered leachfields must meet all applicable portions of Chapter 20.06 and the following standards.

1. Systems and system components shall conform to the standards cited in the most

recent edition of the Uniform Plumbing Code published by IAPMO and adopted by Glenn County.

2. Systems chambers shall be installed in undisturbed soil in accordance with the manufacturer's instructions and Health Department policy.

3. The absorption area of chambered systems shall be calculated as the total open or louvered sidewall and bottom area of the chamber. The first six inches of sidewall area shall not be used in this computation.

4. Chambered systems may be installed in class 2, 3, 4, or 5 (up to 120 minutes per inch) soil.

5. The health officer shall approve each brand and model of chambered leachfield system before it may be used in the county. The health officer shall prepare and maintain installation guidelines for each brand and model approved.

20.06.014 Installation of Groundwater Interceptor Drains

A. When Permitted: Groundwater intercept drains to lower groundwater in the soil absorption trench area may be permitted when the site investigation confirms groundwater to be perched on bedrock, hardpan or an impermeable layer with the depths of a soil absorption trench permitted by this code.

B. Where Permitted: A groundwater intercept drain, in compliance with 20.06.14 (A) may be permitted under the following conditions:

1. The natural slope of the sewage disposal area to be used for soil absorption trenches is between 5 and 30%.

2. The groundwater intercept drain extends from the ground surface and into the bedrock, hardpan or impermeable layer.

3. The groundwater intercept drain is installed at least 15 feet upgradient and 50 feet laterally from the proposed soil absorption trench and 50 feet down-gradient from any sewage disposal system.

4. Any dewatering drain shall comply with this section (e.g., foundation drain).

C. Exceptions: Use of groundwater intercept drains in areas that do not comply with paragraph (A) must be installed and monitored through a wet weather season to determine compliance with Section 20.06.09.

20.06.015 Septic Tank Construction

A. Septic tanks shall be constructed of concrete, fiberglass, or approved alternative material and meet all relevant provisions of the most recently adopted edition of the Uniform Plumbing Code, Appendix I. Septic tanks constructed of fiberglass or alternative material shall be IAPMO approved.

B. Capacity of the Septic Tank: The minimum liquid capacity for single-family dwellings shall be in accordance with Table T-7. The septic tank size shall be twice the estimated sewage flows in Table T-5 for all other building classifications which do

not exceed 1,500 gallons of sewage flow per day. The minimum liquid capacity shall be 1,000 gallons. When the required capacity is to be provided by more than one tank, the minimum capacity of any one tank shall be 1,000 gallons. The installation of more than four tanks in series is prohibited. Installation of septic tanks in parallel is prohibited.

C. Installation: Septic tanks shall be located with a minimum distance between various elements as indicated in Table T-1. Septic tanks installed in groundwater shall be watertight and anchored. Septic tanks shall be installed on stable, undisturbed soil and in accordance with the manufacturer's instructions. Septic tanks shall be installed to provide accessibility for pumping.

D. Maintenance: Septic tanks and other treatment tanks shall be cleaned whenever the sludge and scum occupies one-third of the tank's liquid capacity.

E. Septage: All septage shall be disposed of at an approved location.

F. Chemical Restoration of a Sewage Disposal System: No products or procedures for chemical restoration of sewage disposal systems may be used unless approved by the health officer.

20.06.016 General

Minimum Standards: Materials including but not limited to distribution boxes, pipe, joints and fittings shall conform to the standards cited in the most recent edition of the Uniform Plumbing Code published by IAPMO and adopted by Glenn County which shall be considered minimum standards when used in the construction, installation, alteration or repair of sewage disposal systems or parts thereof unless superseded by these regulations.

20.06.017 Care in Installation

All materials installed in sewage disposal systems shall be handled and installed so as to avoid damage or degradation.

20.06.018 Different Piping Materials

Joints between dissimilar materials shall be made by the use of fittings or couplings approved for the specific application.

20.06.019 Installation

Pipe and distribution boxes shall be installed in accordance with the most recent edition of the Uniform Plumbing Code published by IAPMO, adopted by Glenn County.

20.06.021 General

A. Scope: Systems generating estimated sewage flows in excess of 1500 gallons per day are high flow disposal systems and shall comply with Divisions III through VI of this chapter except as required by this division.

B. Septic Tank Size: The minimum septic tank shall be 2,250 gallons. With flows greater than 1,500 gallons per day, the minimum effective tank capacity shall equal

1,125 gallons plus 75% of the daily sewage flow (V= 1,125 + .75Q) where V is the net volume of the tank in gallons and Q is the daily sewage flow in gallons. If garbage grinders are used, 20% additional volume for extra sludge shall be provided. Sewage flows used to calculate septic tank size shall be the estimated flows in Table T-5.

C. Soil Testing: Soil testing for site evaluation shall be provided as follows:

1. One soil excavation for soil profile determination shall be provided for each 750 gallons per day of estimated sewage flow or fraction thereof.

2. One percolation test for each 250 gallons per day of estimated sewage flow or fraction thereof.

Testing shall be done uniformly in the proposed soil absorption area split evenly between the primary and replacement areas.

20.06.022 Pressure Dosing

A. General: Pressure dosed leachfields are used in many alternative sewage disposal systems to distribute sewage evenly over the entire leachfield.

B. Design and Installation:

1. Maximum distribution pipe length (lateral) shall be 100 feet.

2. Discharge perforations may range in size from 1/8 to 5/16 inches in diameter.

3. Minimum discharge head at the discharge orifices according to perforation size shall be as follows:

- 1/8” and 3/16” diameter holes – 5 feet head
- ¼” and 5/16” diameter holes – 2 feet head

4. The septic tank shall be fitted with an effluent filter (1/8” mesh) or the pump system fitted with an effluent screen (1/8” mesh) to minimize solids accumulation or clogging in the pressure distribution system. The screen or filter shall have at least 12 square feet of surface area.

5. The pump dose volume shall be set at approximately 25 gallons per bedroom or 1/6 the estimated daily flow to provide multiple daily doses to the disposal field. For large pressurized systems the pump dose volume shall be at least three times the total pipe volume of the system.

6. Discharge orifices shall be spaced no more than 48 inches on center.

7. Maximum distribution pipe (lateral) diameter shall be two inches.

8. Designers shall calculate the total dynamic Head Loss on the entire distribution system. This includes the vertical differences, length of entire piping system, loss through all valves, tees, elbows and appurtenances. Head loss shall be termed in feet of head. Flow rates shall be determined from orifice discharge equations or

charts.

9. The distribution system shall be fitted with a balancing valve at the beginning of each lateral and a purge valve or removable threaded cap at the end of each lateral. All valves and threaded caps shall be encased in plastic or concrete control boxes. Wooden boxes are not allowed. All boxes shall allow enough room for maintenance, including adequate room to install stand pipes onto the end of the purge valves so as to readjust the flow (if needed). (See Diagram D-6).

10. The separation between the effluent sewer and the effluent distribution pipe shall be two feet. The cross section of the effluent sewer and the beginning of the gravel portion of the soil absorption trench shall be stepped so as to prevent seepage of effluent between soil absorption trenches (see Diagram D-6).

11. The pressure distribution system shall be tested with the distribution pipe inverted so that the rise through each orifice is as follows:

- 1/8 and 3/16 inch holes – 5 to 6 foot rise
- ¼ and 5/16 inch holes – 2 to 3 foot rise

C. Effluent Pump and Sump Tank Requirements:

1. Specifications: Specifications for the pump, including the pump curve, must be submitted with the design for the sewage system. Design information shall include elevations of the pump and leachfield pipe, as well as static head losses and friction losses through the effluent piping.

2. Pump Standards: The pump's electrical control and tank construction shall provide:

a. A mercury float switch or switches for starting and stopping the pump.

b. The pump to be set a minimum of four inches above tank bottom.

c. A high-level alarm buzzer and probes to activate at 10% above the pump switch starting level. The alarm shall be located where it will be effective.

3. Sump Tank Standards: (Diagram D-5)

a. Minimum sump tank capacity shall include room for the design dose (at least 100 gallons) and at least one-day storage capacity above the high-level alarm.

b. A riser to the ground surface with a minimum 20" diameter manhole.

c. The tank, riser and all pipes through the tank shall be water-tight. Sealants shall be approved by the health officer. Electrical conduits through the tank shall be gas-tight.

d. The pump, switches, effluent filter or screen and associated controls, wiring and piping shall be designed to be accessible for maintenance without entering the sump tank.

4. Electrical:

a. The electrical control box shall contain the following:

- A fused disconnect and motor protection switch.
- A control box in an accessible location and weather protected.

b. Electrical PVC conduit through the tank shall provide individual fusing for the pump and alarm.

c. An electrical permit is required.

d. The pump and alarm must be connected to separate circuits.

5. Piping: Sewage piping shall:

a. Be a minimum of 1 ¼ inch PVC or schedule 40 from the pump to the leachfield with: 1) a PVC or brass swing check valve, or 2) a PVC or brass double wedge gate valve or ball valve and union(s).

b. Contain a union, check valve and gate or ball valve (mounted in this order away from the sump) in a plastic or concrete box at ground level with “sewer” marked on the lid or within the sump in an accessible area.

c. Be on a continuous grade. Rises or high spots in the piping may be required to be equipped with an Air Relief Valve depending on the design situation.

6. Inspection: All tank pump systems, including switches and alarms, must be inspected and hydraulically tested for the proper operation by the designer and approved by the health officer prior to final approval of the installation and occupancy of the structure.

20.06.023 Alternative Sewage Disposal Systems, General Requirements.

A. Scope: Alternative disposal systems shall comply with Divisions III through VI of this chapter except as required by this division.

B. Availability of Use: When the soil permeability, depth to groundwater, or depth of soil requirements for a sewage disposal system specified in Sections 20.06.10 and 20.06.13 cannot be met, an alternative individual disposal system may be used.

C. Alternative systems must be designed by individuals qualified under Section 7.10.020 of the Glenn County Code, or follow one of the standard alternative designs in Section 20.06.29 (D).

D. Construction Standards:

1. The system designer shall inspect the site and weather conditions prior to construction of the system. The designer must verify dry and acceptable soil and weather conditions for construction, and decide if conditions are suitable to begin construction.

2. The system designer shall verify (with the contractor) the proper staking of the system prior to any construction. The system details, configuration, location,

contour, percolation area, expansion area, etc., shall be verified.

3. The system designer or contractor shall notify the health officer a minimum of 24 hours in advance of when construction is to take place and certify that the soil conditions are acceptable for construction purposes and that the staking of the system has been accomplished.

Interim and final inspections by the designer and health officer are required prior to covering any elements of the system. The contractor is responsible for notifying the health officer a minimum of 24 hours in advance of required inspections.

4. A final letter from the system designer shall state that all construction has been completed, approved and is in conformance with all specifications. Minor changes in the installation shall be noted on as-built plans to be submitted with this letter.

5. Inspection wells shall be 2” diameter plastic pipe and fitted with a wrench-tight cap or pipe plug and a bottom cap. Perforations shall consist of hacksaw slots at 1” spacing. A “tee” and 6-inch-long stub section of pipe (or equivalent method) shall be used to stabilize the inspection well.

E. Maintenance:

1. A ground cover shall be developed and maintained over the soil cover of the alternative sewage disposal systems. This may include the seeding, planting, and maintenance of appropriate vegetation.

2. Property owners are responsible for preventing disturbance to the soil cover. This includes preventing animals, vehicles, structures, etc., from adversely impacting the soil cover.

3. Property owners shall prevent the overuse (hydraulic overloading) of an alternative sewage disposal system. In case of overuse, the Health Department has the right to require the installation of water saving devices as a condition of the operation permit.

4. Occasionally, the pressurized distribution lines may have to be cleaned. This involves purging of the pressurized lines by a competent and knowledgeable individual.

5. The property owner is responsible for the proper use and functions of all components of the alternative sewage disposal system, including the electrical systems, the alarm system, the dose counter and the proper adjustment and operation of the floats and pumping system.

20.06.024 Mound Disposal System

Only mound designs corresponding to those developed by the Small Scale Waste Management Project, University of Wisconsin, Madison, or the "Guidelines for Mound Systems" published by the California State Water Resources Control Board will be accepted for review and approved for installation. In addition, mound system installation proposals shall comply with the following:

1. Soil and site characteristics as set forth in Table T-8.

2. An expansion area of 100% of the initial area required for the sewage disposal mound shall be provided.
3. Mounds shall be installed only on parcels zoned for agriculture or on parcels created before the effective date of these regulations.

4. The mound pressure dosing system and sump tank shall conform to Section 20.06.22.

5. Multiple absorption beds shall not be permitted in mounds.

6. “Shoulders” at least two feet wide shall be provided around the edge of the gravel distribution bed.

7. The mound must be at least three times as long as it is wide.

8. Mound cover shall be at least 12” thick.

9. The minimum soil depth below the mound shall be 24”.

20.06.025 Shallow Trench System (see Diagram D-7)

A. Trench Depth: The soil absorption trench shall penetrate at least six inches into undisturbed soil. In class 4 soil trenches must penetrate at least 18 inches into undisturbed soil. Shallow trenches are not permitted in Class 5 soil. The shallow absorption trench shall be installed so that all sidewall area below the pipe is in undisturbed soil.

B. Slope: Shallow trench systems are limited to areas not exceeding a 12 1/2% slope.

C. Fill: The absorption quality of the fill imported to cover the soil absorption trenches shall be equal to Leaching Classes 2, 3 or 4. The fill is to be of uniform depth extending to a distance at least 5 feet from the ends and edges of all trenches, but where installed in sloping ground, minimum horizontal distance of 5 feet between the nearest effluent distribution pipe and daylight. The toe of the fill shall be tapered a 3:1 or flatter ratio from the edge of any soil absorption area.

D. Fill Construction:

1. Plow the area where fill is to be placed. Use a mold-board plow or chisel plow, plowing 6-8 inches deep, parallel to the contour. Plowing should be done when the soil is dry. The Health Department or engineer shall be consulted to determine if proper soil moisture conditions exist.

2. Fill shall be constructed in not more than eight-inch layers and to the same dry density as the soil native to the site. Certified results of the soil density test may be required to be submitted to the health officer by the system designer.

3. The fill must be completed before any leaching trenches are constructed.

E. Vegetation Removal: Site specifications shall require the vegetation to be removed and the surface prepared to permit good mixing of the native soil and fill material.

Areas with closely spaced trees in excess of 24 inches in diameter are generally not suitable for shallow trench systems.

F. Completion: The fill area shall be seeded or sodded with appropriate vegetation after construction of the shallow trench system is complete.

20.06.026 At Grade Systems (see Diagram D-8)

A. General: This system is intended for use on slopes less than 12% where there exists at least three feet of soil with percolation rates between 5 and 60 minutes per inch (MPI) and where seasonal water table remains at least 3 feet below the original ground surface.

B. Siting Criteria: The site shall meet all requirements of Division III except as follows:

1. Percolation Rates: At-grade systems may be used in soils having as average percolation rate 5 to 60 MPI as determined by percolation testing representative of conditions between depths of 12 to 30 inches.

2. Groundwater: Minimum depth to seasonally high ground water shall be three (3) feet.

3. Soil Depth: There shall be at least 3 feet of class 2, 3 or 4 soil between original grade and the highest extent of groundwater.

4. Ground Slope: The natural ground slope in the disposal field area shall not exceed 12%.

C. Design and Installation:

1. Pretreatment: Effluent discharged to At-Grade systems shall, at a minimum, have received primary treatment through a septic tank, sized and installed in accordance with applicable sections of Glenn County Sewage Disposal Regulations.

2. Effluent Distribution: Pressure distribution shall be used for At-Grade systems. Pressure distribution shall be designed in accordance with applicable provisions in Section 20.06.22 of the Glenn County Sewage Disposal regulations except the number of effluent distribution pipes for At-Grade systems shall be based on the absorption bed width as follows:

Bed Width Minimum Number of Distribution Pipes

<5’ 1
6 –10’ 2

3. Gravel Absorption Bed Dimensions:

- Maximum absorption bed length shall be 200 feet.
- Maximum absorption bed width shall be 10 feet.

4. Absorption Area: The wastewater absorption area for purposes of system sizing shall be the bottom area of the gravel distribution bed.

5. Wastewater Application Rate: The maximum wastewater application rate for system sizing shall be as follows:

Percolation Rate Wastewater Application
MPI Rate (gpd) FT

5 -- 10 .91
11 - 29 .60
30 - 45 .50
46 - 60 .45

6. At-Grade Soil and Aggregate Materials:

a. Drainrock

- Material: Standard ¾" to 2 ½" drainrock (crushed, washed or rounded).

- Depth: Depth of drainrock materials for At-Grade Systems shall be as follows:

+ 8" of standard drainrock below pipe
+ 2" of standard drainrock over top of pipe
+ 11—12" total rock depth, depending on distribution pipe size.

b. Soil Coverfill

- Material: Soil coverfill consist of a medium-textured loamy soil.

- Depth: Depth of soil coverfill over the top of the drainrock shall be 12 inches.

- Lateral Extent: Soil coverfill shall extend a minimum of 5 feet in all directions from the sides and ends of the gravel absorption bed and be tapered no steeper than 3:1 to the original grade.

7. Silt Barrier: The drainrock and distribution piping shall be covered in its entirety with a geotextile (filter fabric) silt barrier. Filter fabric shall be either polyester, nylon or polypropylene, or any combination thereof, and shall be suitable for underdrain applications. Filter fabric shall be non-woven, shall not act as a wicking agent and shall be permeable. Filter fabric shall be handled and installed in accordance with manufacturer's recommendations. Borders of fabric shall be overlapped 12 to 18 inches. Any torn or damaged sections of fabric shall be covered with additional pieces of filter fabric sufficient to meet the above overlapping requirement.

8. Inspection Wells: An inspection well shall be installed at each end of the At-Grade system absorption bed. The inspection wells shall extend from finished grade to the rock-soil interface. They shall be perforated in the rock zone only.

9. Installation: At-Grade construction shall be in accordance with the following guidelines:

a. Disposal Site Preparation

Step 1: Rope off the site to prevent damage to the area during other construction activity on the lot. Vehicular traffic over the area shall be prohibited to avoid soil

compaction.

Step 2: Stake-out the At-Grade system perimeter and absorption bed in the proper orientation (parallel to contour). Reference stakes set some distance from the At-Grade perimeter are recommended in case the corner stakes are disturbed. Absorption bed shall be installed level.

Step 3: Cut and remove vegetation.

Step 4: Install the delivery pipe from the sump to the absorption bed. Lay the pipe at a depth of 18 inches and slope it uniformly back to the pump chamber. Backfill and compact the soil around the pipe.

Step 5: Plow the area within the absorption bed perimeter. User a moldboard plow or chisel plow, plowing 6—8 inches deep, parallel to the contour. Plowing should be done when the soil is dry. The Health Department or engineer shall be consulted to determine if proper soil moisture conditions exist.

b. Drainrock Placement: The use of track-type equipment in placing drainrock and cover is preferred to avoid over compacting the soil.

Step 1: Place the drainrock on the edges of the plowed area, keeping all equipment off the plowed area.

Step 2: Move the drainrock into place working from the sides of the plowed area with a backhoe. Using backhoe, spread drainrock uniformly to a depth of 8 inches along the length and width of the absorption bed.

Step 3: Hand level the absorption bed, checking for the proper elevation.

c. Distribution Network Placement.

Step 1: Assemble the distribution network on the drainrock, laying the laterals level. Perform hydraulic test of distribution system in the presence of the design engineer or county health inspector.

Step 2: Place additional drainrock to a depth of at least 2 inches over the crown of the pipe.

Step 3: Place filter fabric over the drainrock to form silt barrier; filter fabric shall meet specifications for “silt barrier” and shall be installed in accordance with manufacturer’s recommendations.

d. At-Grade Covering

Step 1: Plow remaining area of At-Grade perimeter (area between absorption bed and top of soil cover) in accordance with Disposal Site Preparation, Step 5.

Step 2: Place good quality topsoil (medium, loamy texture) over the entire absorption bed and plowed area. Place the cover material working from the sides of the plowed area so that the plowed surface is not over compacted. Topsoil depth shall be 12 inches over the center of the drainrock and 12” over the side slopes and

extend a minimum of 5 feet beyond the absorption bed in all directions.

Step 3: Plant grass over the entire system using grasses adapted to the area that will aid in protecting the At-Grade system from erosion. Shrubs can be planted around the base and the side slopes. Shrubs should be somewhat moisture tolerant since the perimeter may become moist during early spring and late fall. Plants placed on top of the system should be drought tolerant.

20.06.027 Evapotranspiration/Infiltration (ETI) Systems

ETI systems meeting the State Water Resources Control Board "Guidelines for Evapotranspiration Systems" will be accepted for review and approved for installations. In addition, ETI systems must comply with the following:

A. A water balance shall be provided using the criteria as outlined in the guidelines. Percolation test data shall be provided to justify the ETI bed water balance data. The percolation tests shall be performed at both bed depth and three feet below.

The pan evapotranspiration percentage rates used in the water balance shall be as follows for design purposes:

Percent of Pan
Rate Used

*December, January, February - 40
March, November - 50
April, October - 65
May, June, July, August, September - 70

* Reference: "Soils", Donahue, Miller and Shickluna, p. 97.

B. The topsoil shall be seeded and maintained (irrigated in the summer and mowed) according to permit conditions.

C. There shall be a minimum of 9 inches of sloping clay loam cover at the edges and 12 inches in the center (to assure runoff of rainwater) over the top of the bed.

D. Berms surrounding the bed shall be keyed into native soil at least 12 inches and shall be constructed to at least 85% compaction.

E. A minimum of two inspection wells inside the bed (to bed bottom) and four outside the bed (to at least six feet) shall be provided. At least one outside inspection well shall be located downhill of the bed.

F. The maximum slope permitted for installation of an ETI system shall be 6%. Areas with slopes exceeding 6% shall not be graded or reshaped to provide an ETI site.

G. There shall be three feet of native soil beneath an ETI bed.

H. The siting criteria in the referenced "guidelines" are mandatory.

I. ETI systems shall be installed only on parcels zoned for agriculture or on parcels created before the effective date of these regulations.

20.06.028 Filter Trench System

A. General: The filter trench system is intended for use in coarse textured alluvial soils (leaching class 1, at least 40% of the soil passes the #4 sieve) with very rapid permeability where the water table remains at least 5 feet underground.

B. Siting Criteria: All siting criteria for standard soil absorption systems in Division III of these regulations shall apply to Filter Trench systems except as modified by the requirements shown in Table T-9 pertaining to soil type, depth to groundwater, and water well setback. Siting requirements for Filter Trench systems are based on determination of soil properties (percentage of fines) and depth to seasonally high groundwater. Percolation testing is not required and is not a factor in system siting or design; it is assumed that, because of the coarse soils, percolation rates are rapid and not a limiting factor in system sizing. The siting criteria relating system design type (I, II or III) to soils, groundwater depth and well setbacks are intended to produce combinations of treatment processes and natural site factors to achieve the objective of providing “adequate filtration” of sewage effluent to protect public health and water quality.

C. Design and Installation: Cross-section details of Filter Trench systems are provided in Diagram D-9 through Diagram D-12.

1. Pretreatment: Effluent discharged to Filter Trench systems shall, at a minimum, have received primary treatment through a septic tank, sized and installed in accordance with applicable sections of the Glenn County Sewage Disposal Regulations.

2. Effluent Distribution: The method of effluent distribution for Filter Trench systems shall be as follows:

- Type I System – Gravity flow
- Type II system – Pressure Distribution
- Type III System – Pressure Distribution

Pressure distribution, as required for Type II and Type III systems, shall be designed in accordance with applicable provisions in Section 20.06.22 of the Glenn County Sewage Disposal Regulations.

3. Trench Width: Trench widths shall be as follows:

- Type I System – 24”
- Type II System – 18” minimum, 48’’ maximum
- Type III System – 18’’ minimum, 48” maximum

4. Trench Length: Maximum trench shall be 100 feet.

5. Trench Depth: Overall trench depth, as measured from native grade, shall be 60” (5 feet) for Filter Trench systems. This depth may be reduced to 48” (4 feet) where raised coverfill, in accordance with Section 20.06.25, is incorporated in the system design.

6. Trench Spacing: Minimum spacing between trenches for filter Trench systems shall be 10 feet, center-to-center or end-to-end.

7. Absorption Area: The wastewater absorption area for purposes of system sizing shall be trench bottom area.

8. Wastewater Application Rate: The maximum wastewater application rate for system sizing shall be as follows:

- Type I System - 1.0 gpd/ft
- Type II System - 1.0 gpd/ft
- Type III System - 0.5 gpd/ft

9. Trench Filter Material: Trench filter material for Type I, II and III systems shall consist of successive layers (starting at trench bottom) of sandy textured soil fill, medium to coarse sand and drainrock.

a. Soil Fill

- Material: Soil fill shall consist of loamy sand or sandy loam, corresponding with Leaching Class 2 or Glenn County Sewage Disposal Regulations.

- Depth: Depth of soil fill shall be 12 inches.

- Installation: Soil fill shall be dry when placed in the trench. Installation steps shall be as follows:

1) An initial 9-10 inch layer of soil shall be placed in the bottom of the trench and hand tamped; then the surface of the soil fill shall be scarified by raking;

2) The balance of the soil, approximately 2—3 inch layer, shall be placed and spread evenly over the length and width of the trench;

3) A 2—3 inch layer of sand fill (see specifications below) shall be placed and evenly spread over the soil fill;

4) The sand and soil layers shall be mixed by hand-raking to form a sand-soil transition zone.

b. Sand Fill

- Material: Sand fill shall consist of a medium to coarse sand which meets the following gradation specifications:

Sieve Size Percent Passing

3/8” 100
#4 90—100
#10 62—100
#16 45—82
#30 25—55
#50 5—20

#60 0—10
#100 0—4

- Depth. Depth of sand fill shall be 24 inches for all filter trench systems. This depth shall include the 2-3 inches of sand mixed in the sand-soil transition zone.

c. Drainrock

1) Material: Two types of drainrock shall be used in Filter Trench systems:

- 3/8” to 5/8” Pea Gravel, free of fines.
- Standard ¾” to 2½” drainrock (crushed, washed or rounded).

2) Depth: Depth of respective drainrock materials for Filter Trench systems shall be as follows:

- Type I system (Part pea gravel/part standard drainrock)
+ 3” of pea gravel below pipe (in contact with sand)
+ 4” of standard drainrock below pipe
+ 2” of standard drainrock over top of pipe
+ 12” total rock depth
- Type II and III System (all pea gravel)
+ 8” of pea gravel below pipe invert
+ 2” of pea gravel over top of pipe
+ 12” total rock depth

10. Silt Barrier. The drainrock and distribution piping shall be covered in its entirety with a geotextile (“filter fabric”) silt barrier. Filter fabric shall be either polyester, nylon or polypropylene, or any combination thereof, shall be suitable for underdrain applications. Filter fabric shall be non-woven, shall not act as a wicking agent and shall be permeable. Filter fabric shall be handled and installed in accordance with manufacturer’s recommendations. Borders of fabric shall be overlapped 12 – 18 inches. Any torn or damaged sections of fabric shall be covered with additional pieces of filter fabric sufficient to meet the above overlapping requirements.

11. Soil Backfill: Soil backfill over the drainrock and filter fabric shall be a minimum of 12 inches. Additionally, soil shall be mounded over the trench above finished grade to allow for settlement. The mounded cover shall be compacted by wheel rolling to achieve a final mounded height of 9 inches over finished grade.

12. Raised Soil Coverfill: Where soil coverfill is utilized, the fill construction shall conform to Section 20.06.25 c of these regulations.

13. Inspection Wells: Two inspection wells shall be installed in each individual trench section of Filter Trench systems, as follows:

- One inspection well shall extend from finished grade to the rock-sand interface. It shall be perforated in the rock zone only.

- One inspection well shall extend from finished grade to the sand-soil interface. It shall be perforated in the sand-soil zone only.

20.06.029 Standardized Alternative Design

A. General: Standardized alternative designs may be used by the property owner to develop lots that cannot be developed with a standard leachfield system. No design engineer is required where standardized alternative designs are proposed. Soil profile and percolation testing or texture analysis must be completed before a standard alternative system can be selected.

B. Standard Diagrams: All standardized alternative designs shall incorporate the standard drawings specified for that design and shall not be modified.

C. The health officer shall provide written guidelines for the design and construction of standardized alternative design sewage disposal systems.

D. Standardized Alternative Designs:

1. Filter Trench System

a. The standardized design shall be based on Tables T-9 and T-10.

b. Diagram D-9 through D-13 shall be utilized for designing the trench cross section.

c. Diagram D-14 shall be utilized for designing the sump tank. The electrical control, pump, filter and other equipment must be specified and be selected from a list approved by the health officer.

d. This system must be installed on sites where the overall slope is less than 2%.

2. At-Grade System

a. The standardized design shall be based on Table T-11.

b. Diagram D-8 shall be utilized for designing the trench cross section.

c. Diagram D-14 shall be utilized for designing the sump tank. The electrical controls, pump, filter and other equipment must be specified and selected from a list approved by the health officer.

d. This system must be installed on sites where the overall slope is less than 2%.

20.06.030 Shallow Sand Trench (see Diagram D-13)

A. General: This system is intended for use on slopes less than 20% where percolation rates are faster than 240 m/in and the highest extent of the water table is no less than four feet below original ground level.

B. Siting Criteria: The site shall meet all requirements for Division III except as follows:

1. Percolation Rates: Shallow Sand Trench systems may be used in soils having an average percolation rate of 61 to 240 MPI, as determined by percolation testing at a depth of 24 inches. Percolation testing shall be conducted during wet weather conditions or with an extended pre-soak period to reasonably simulate wet weather conditions.

2. Depth to Groundwater: The minimum depth to seasonally high groundwater, below trench bottom, shall be 3 feet. For these purposes, “trench bottom” shall be considered to be the bottom of the drainrock.

3. The original site slope shall not exceed 20%.

C. Designs and Installation:

1. Pretreatment: Effluent discharged to Shallow Sand Trench systems shall, at a minimum, have received primary treatment through a septic tank, sized and installed in accordance with applicable sections of the Glenn County Sewage Disposal Regulations.

2. Effluent Distribution: Pressure distribution shall be used for Shallow Sand Trench systems. Pressure distribution shall be designed in accordance with applicable provisions in Section 20.06.22 of the Glenn County Sewage Disposal Regulations.

3. Trench Width: Trench width shall be 24”.

4. Trench Depth: Overall trench depth as measured from native grade, shall be 24” from the top of the trenches.

5. Trench Spacing: Minimum spacing between Shallow Sand Trenches shall be 10 feet, center-to-center or end-to-end.

6. Absorption Area: The wastewater absorption area, for purposes of system sizing, shall be the sand bottom and sidewall area, totaling 4 ft/lineal foot.

7. Wastewater application Rate: The maximum wastewater application rate for system sizing shall be as follows:

Wastewater Application Rate
Percolation Rate (MPI) (gpd/ft)

61 – 120 0.2
121 – 240 0.2 – 0.1
(straight-line graded scale)

Systems utilizing soil slower than 120 mpn shall be designed by a qualified consultant.

8. Trench Filter Materials:

a. Sand Fill

- Material: Sand fill consists of medium to coarse, which meets the following gradation specifications:

Sieve Size Percent Passing

3/8” 100
#4 90—100
#10 62—100
#16 45—82
#30 25—55
#50 5—20
#60 0—10
#100 0—4

- Depth: Depth of sand fill shall be 12 inches.

b. Drainrock

- Material: Drainrock shall consist of 3/8” to 5/8” pea gravel, free of fines.

- Depth of drainrock shall be as follows:

+ 8” of pea gravel below pipe invert
+ 2” of pea gravel over top of pipe
+ 11 – 12” total rock depth (depth dependent on diameter of distribution piping)

9. Raised Soil Coverfill: The absorption trenches shall be covered in their entirety with a geotextile (“filter fabric”) silt barrier. Filter fabric shall be either polyester, nylon or polypropylene, or any combination thereof, and shall be suitable for underdrain applications. Filter fabric shall be non-woven, shall not act as a wicking agent and shall be permeable. Filter fabric shall be handled and installed in accordance with manufacturer’s recommendations. Borders of fabric shall be overlapped 12 to 18 inches. Any torn or damaged sections of fabric shall be covered with additional pieces of filter fabric sufficient to meet the above overlapping requirement.

10. Inspection Wells: Two inspection wells shall be installed in each individual trench of Shallow Sand Trench systems, as follows:

a. One inspection well shall extend from finished grade to the rock-sand interface. It shall be perforated in the rock-sand zone only.

b. One inspection well shall extend from finished grade to the sand-soil interface. It shall be perforated in the sand-soil only.

20.06.31 Lined Trenches (Diagram D-14)

A. General: Lined trenches are intended for use in excessively drained soil.
B. Site and soil characteristics:

1. Slope: 0 – 12%

2. Percolation Rate: 0 – 5 min/inch

3. Minimum separation between the bottom of the absorption trench and groundwater or impermeable material: 5 ft.

C. Fill material shall:

1. Be class 2 or 3 soil;

2. Be piled and mixed until uniform before placing in the trench; and

3. Extend at least 3 feet below and 2 feet to the side of the absorption trench.

D. Absorption trench:

1. The size of the absorption trench shall be based on percolation tests conducted in conformance to Section 20.06.26 in the completed fill of the initial trench.

2. Only standard absorption trenches (section 20.06.13) shall be constructed in the fill material.

3. The absorption area of the trench shall be computed by using the bottom area of the absorption trench.

20.06.031 Lined Trenches (Diagram D-14)

A. General: Lined trenches are intended for use in excessively drained soil.

B. Site and soil characteristics:

1. Slope: 0 – 12%

2. Percolation Rate: 0 – 5 min/inch

3. Minimum separation between the bottom of the absorption trench and groundwater or impermeable material: 5 ft.

C. Fill material shall:

1. Be class 2 or 3 soil.

2. Be piled and mixed until uniform before placing in the trench.

3. Extend at least 3 feet below and 2 feet to the side of the absorption trench.

D. Absorption trench:

1. The size of the absorption trench shall be based on percolation tests conducted in conformance to Section 20.06.26 in the completed fill of the initial trench.

2. Only standard absorption trenches (Section 20.06.13) shall be constructed in the fill material.

3. The absorption area of the trench shall be computed by using the bottom area of the absorption trench.

Table T-1
SETBACK DISTANCES IN FEET -- MINIMUM [1]
Reference Sections 20.06.03 C, 20.06.10 A, and 20.06.15 C

Elements	Septic Tank	Soil Absorption Area
Septic Tank	-	5
Sewage Disposal Area (and replacement area)	5	-
Subsurface Cistern	50	100
Structures (permanent improvements)	5	8
Intermittent Stream	25	50
Lake	50	100
Lot Line	5	10
Drainage Way*, Irrigation Ditch* or Rice Field	25	50
Spring	100	100
Stream or River*	50	100
Water Line/Box	10	10
Well	100	100
Cut Bank/Escarpment and Steep Slope	20	4h, 50 Max**

h= height

* if culverted with an impervious lining, no separation required

** as measured from the highest extent of the ten-year high water mark

***except where confining layers are encountered, in which case site specific setbacks may be required

[1]See Section 20.06.14(B) for groundwater intercept drain separations.

Reference Sections:
20.06.03 (C)
20.06.10 (A)
20.06.15 (C)

Table T-2
SOIL DESCRIPTION FOR SOIL PROFILES AND THE
HYDROMETER ANALYSIS TEST METHOD
Reference Section 20.06.10 B

	Class
Sand	1
Loamy Sand, Sandy Loam	2
Loam, Sandy Clay Loam	3
Sandy Clay, Clay Loam, Silt Loam	4
Clay*, Silty Clay, Silty Clay Loam, Silt	5

* Clay soil exhibiting a 1:1 shrink swell shall be considered a class 3 soil.

PERCOLATION TEST METHOD

Percolation Rate (Minutes Per Inch)	Class
Less than 5	1 (see Section 20.06.10(D))
5-14	2
15-30	3
31-60	4
More than 60	5

Table T-3
DEPTH TO GROUND WATER FOR CLASS I SOIL
Reference Section 20.06.10 D

Soil Texture* Percent Silt and Clay	Depth to Groundwater Below Leaching Trench (feet)
5 or less	40
6 to 10	20
11 to 15	10
Greater than 15	5

* Soil must consist of no more than 50% coarse fragments (grain size 2 millimeters or larger) and must exist for at least three continuous feet between the bottom of the soil absorption trench and the highest extent of the groundwater.

Table T-4

MINIMUM SOIL ABSORPTION AREA FOR STANDARD SEWAGE DISPOSAL SYSTEM

Reference Section 20.06.10 B and 20.06.12 A

Leaching Class		Application Rate (gals/day/sq. ft.)
1		1.5
2		1.00
3		.75
4		.50
5	(61-120 min/in)	.2 (alternative sewage disposal systems only)

Table T-5

SEWAGE FLOWS*

Reference Sections 20.06.15 B, 20.06.12 B and 20.06.21 B

Building Classification**	Units	(G.P.D.) per unit
Assembly hall (no kitchen)	person	5
Assembly hall (with kitchen)***	person	10
Bar and cocktail lounge***	patron space	25
Beauty salon	station	150
Bowling alley	bowling lane	75
Camp (day use only)	person	10
Camping area, overnight (central facilities)	person	25
Church (no kitchen***)	person	5
Church (with kitchen***)	person	10
Condominium	bedroom	150
Dining Hall	meal served	10
Drive-in Theater	car space	5
Employees (in all buildings****)	person	15
Hospital	bed space	250
Hotel or motel and tourist rooming house	room	100
Kennels and Animal Hospital	run	50
Labor Camp (central bathhouse)	employee	25
Laundromat	machine	1000
Medical and Dental offices:		
Medical	doctor	400
Dental	doctor	500
Mobile Home Park	mobile home site	250
Multi-unit residential	bedroom	150
Nursing or Group homes	bed space	100
Outdoor sports facility (toilet waste only)	person	3
Park (showers and toilets)	person	25
Park (toilet waste only)	person	10
Restaurant (multiple service)	seating space	40
Restaurant (single service)	customer	2
Retail food market	square foot	0.05
Retail store public toilet	toilet/urinal	150
RV Park (with water and sewer hook-ups)	space	100
School	student	15
School (with meals)	student	3
School (with showers)	student	10
Swimming Pool bathhouse	person	10
Tent Camp	camping space	50

* Minimum sewage flow for any structure classification shall be 100 g.p.d.

** Structure occupancies not classified shall base their sewage flows on one year's actual water use of a similar occupancy.

*** Based on the maximum occupancy permitted by the fire marshal.

**** Excluding medical and dental office buildings.

Table T-6
TRENCH DEPTHS ON SLOPES
Reference Section 20.06.13 A

Slope	Standard Trench Depth	Soil Cover
0-10%	30 inches	12-18 inches
10-20%	42 inches	18 inches
20-30%	48 inches	30 inches

The setbacks in this table are intended to provide eight horizontal feet from the downhill side of the top of the leachfield aggregate to the natural slope.

The soil absorption area of the trench shall be computed by using the bottom area of the absorption trench. Individual trenches shall be no longer than 100 feet.

Table T-7
SEPTIC TANK CAPACITY FOR SINGLE-FAMILY DWELLINGS
Reference Sections 20.06.15 B

Number of Bedrooms	Septic Tank (gal)
1 and 2	1,000
3 and 4	1,200
5 and 6	1,500
Each additional bedroom	150

Table T-8
MOUND DISPOSAL SYSTEM
Reference Section 20.06.24

Characteristic	Slowly Permeable Soils	Permeable Soils
Percolation Rate*	60-120 mpi	up to 60 mpi
Depth to Bedrock or Impermeable Soils	60 inches	60 inches
Slope	6% or less	12% or less
Depth to groundwater	Over 24 inches	Over 24 in.

* Percolation holes shall be 24 inches deep. If water is at 24', percolation tests shall be 16" deep.

T A B L E T - 9

FILTER TRENCH - WATER WELL SETBACKS
RELATED TO SOILS AND GROUNDWATER CONDITIONS

Reference 20.06.28 B
20.06.29 D

SOIL CONDITIONS[1]	DEPTH TO GROUNDWATER (feet)[2]	FILTER TRENCH SYSTEM TYPE		
		TYPE I GRAVITY-FED @ NORMAL LOADING[3]	TYPE II PRESSURE-DOSED @ NORMAL LOADING[3]	TYPE III PRESSURE-DOSED @ LOW LOADING[4]
Very Coarse Gravelly Soil <5% Fines[5]	4 to 5	N/A	200'	150'
	> 5 to 10	200'	150'	100'
	> 10	150'	100'	100'
Coarse Sandy Soil 5 to 15% Fines[5]	4 to 5	200'	150'	100'
	> 5 to 10	150'	100'	100'
	> 10	100'	100'	100'

1 Applies to the predominant soils found between trench bottom and the water table. To be considered "soil", the material must be well graded and at least 40% of the material must pass the #4 (5 mm) sieve.

2 As measured from the bottom of the drain rock within the Filter Trench

3 Normal Loading Rate = 1.0 gpd/ft^2 (bottom area)

4 Low Loading Rate = 0.5 gpd/ft^2 (bottom area)

5 Fines are defined as the soil particles passing the #200 sieve; percent (%) fines is determined relative to the amount of material passing the #4 sieve. This may be determined by volume or by weight.

N/A: Not Allowed

Table T-10
Standardized Alternative Design
Filter Trench System
System Design Elements
Reference 20.06.29 D

	BEDROOMS	NUMBER OF LATERALS	LENGTH OF LATERALS	HEIGHT OF SQUIRT-FT.	ORIFICE SIZE - IN.	ORIFICES/ LATERAL	ORIFICE SPACING - INCHES	WIDTH OF TRENCH -FT.	MIN. % PASSING #4	FILTER
Type I	2	2	75'	-	-	-	-	2	40	NO
Gravity-Fed	3	3	75'	-	-	-	-	2	40	NO
(Normal Loading)	4	3	88'	-	-	-	-	2	40	NO
Type II	2	1	100'	2.5'	3/16	26	46	3	40	YES
Pressure-Dosed	3	2	75'	5'	1/8	20	46	3	40	YES
(Normal Loading)	4	2	88'	5'	1/8	23	46	3	40	YES
Type III	2	2	100'	5'	1/8	26	46	3	40	YES
Pressure-Dosed	3	3	100'	5'	1/8	26	46	3	40	YES
(Low Loading)	4	4	88'	5'	1/8	23	46	3	40	YES

Construction Notes:

For Type I systems:

1) The distribution piping shall be constructed of 3 or 4 inch diameter PVC perforated sewer and drain pipe.

For Type II and Type III systems:

1) The piping between the pump and the lateral valve shall be minimum 2" diameter schedule 40 PVC. The pipe run between the pump check valve and the lateral balancing valve should minimize flow restricting angles and bends and must not exceed 75 feet.

2) Lateral piping shall be constructed of 1 1/4 inch diameter schedule 40 PVC.

3) All lateral valves shall be checked for elevation and shall be constructed a minimum of 0.5 foot above the check valve, the manifold shall be constructed below this grade line for it's entire length.

4) All piping shall be schedule 40 PVC.

5) Orifices shall be drilled using the specified drill bit in a true and plumb manner using care not to ream or otherwise oversize the hole beyond the specified size. Any lateral found to have enlarged orifices will be rejected and removed from the site.

TABLE T-11
Standardized Alternative Design
At-Grade System
System Design Elements
Reference 20.06.29 D

	BEDROOMS	TOTAL LINEAR FT OF LATERAL PIPE	LENGTH OF BED	HEIGHT OF SQUIRT - FT.	ORIFICE SIZE - INCHES	ORIFICES PER LATERAL	ORIFICE SPACING	# OF BEDS REQ.
Percolation	2	66'	33'	2.0'	1/4	9	45"	1
Rate	3	99'	49'	2.0'	1/4	13	46"	1
5 - 10 m/in	4	116'	58'	2.0'	1/4	15	47"	1
Percolation	2	100'	50'	2.0'	1/4	13	47"	1
Rate	3	150'	75'	2.0'	1/4	19	48"	1
11 - 30 m/in	4	176'	88'	5.0'	3/16	23	46½"	1
Percolation	2	120'	60'	5.0'	3/16	16	45½"	1
Rate	3	180'	90'	5.0'	3/16	23	47½"	1
31 - 45 m/in	4	210'	53'	5.0'	1/8	14	46"	2
Percolation	2	134'	67'	5.0'	1/8	17	48"	1
Rate	3	200'	100'	5.0'	1/8	26	46½"	1
46 - 60 m/in	4	233'	59'	5.0'	1/8	16	45"	2

1) The pressure pipe between the pump check valve and the lateral valves shall have a minimum diameter of 2" and shall have a maximum length of 75 feet.

2) All lateral valves shall be checked for elevation and they shall be constructed a minimum of 0.5' above the check valve, the manifold shall be constructed below this grade line for its entire length.

3) All piping shall be schedule 40 PVC.

4) Orifices shall be drilled using the specified drill bit in a true and plumb manner using care not to ream or otherwise oversize the hole beyond the specified size. Any manifold found to have enlarged orifices will be rejected and removed from the site.

5) At-Grade system requires that two (2) laterals, 1 1/4" diameter be installed in each bed 5.0' on center. See Diagram D-8.

6) At-Grade absorption beds over 100 feet long shall be fed from the center of the bed.

Diagram D-1

FLOAT GAUGE AND PERCOLATION TEST ASSEMBLY

Reference Section 20.06.06 A

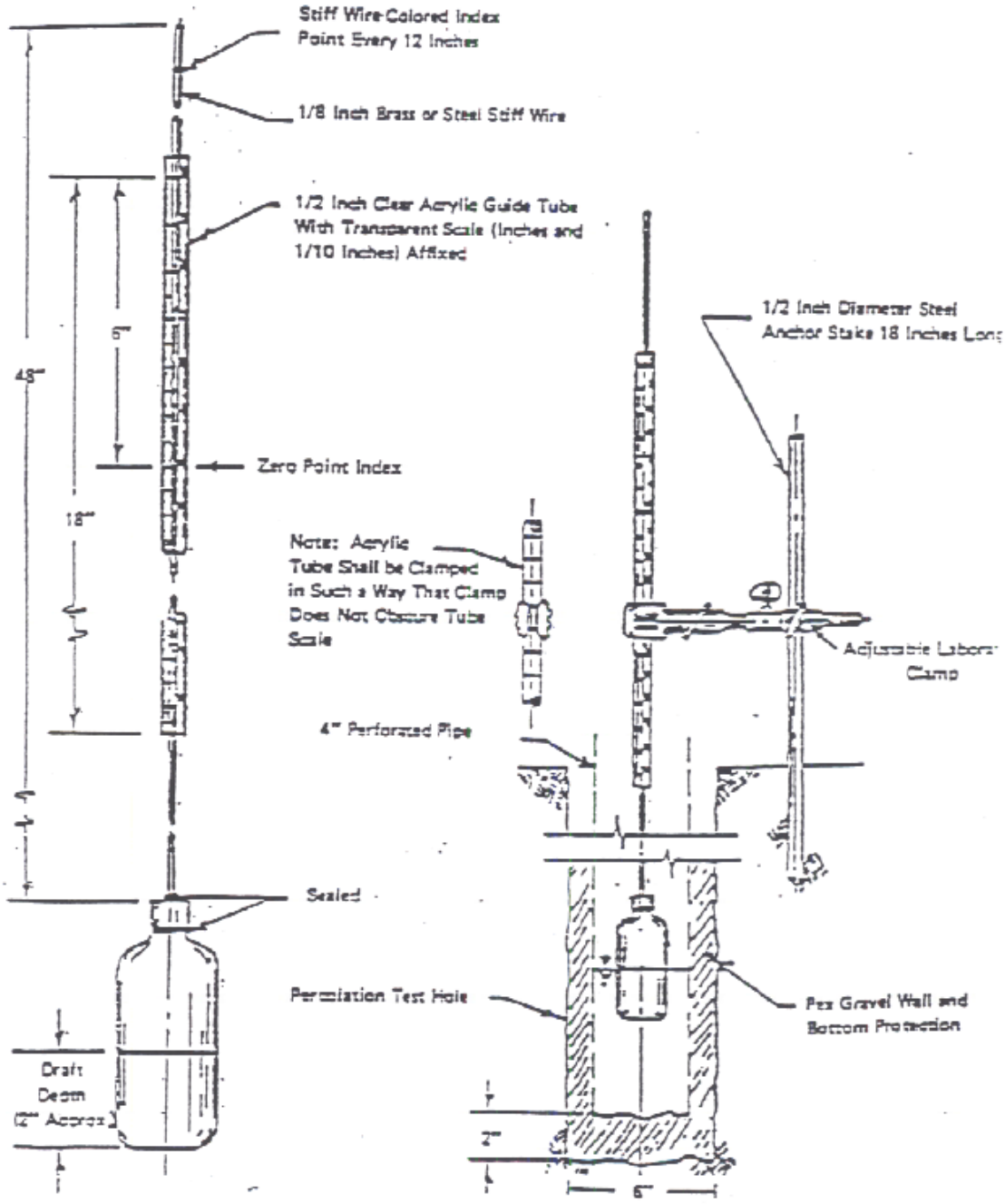


Diagram D2

Monitoring Well Design

Reference Section 20.06.09 C

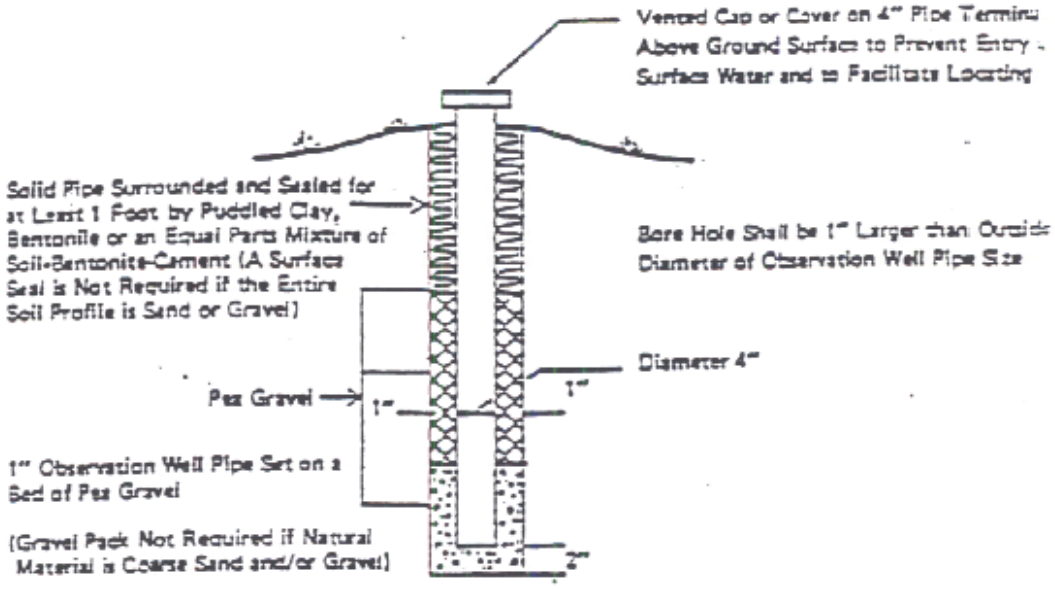


Diagram 03
Soil Triangle
Reference Sections 20.06.05 D, 20.06.07 A & 20.06.10 B

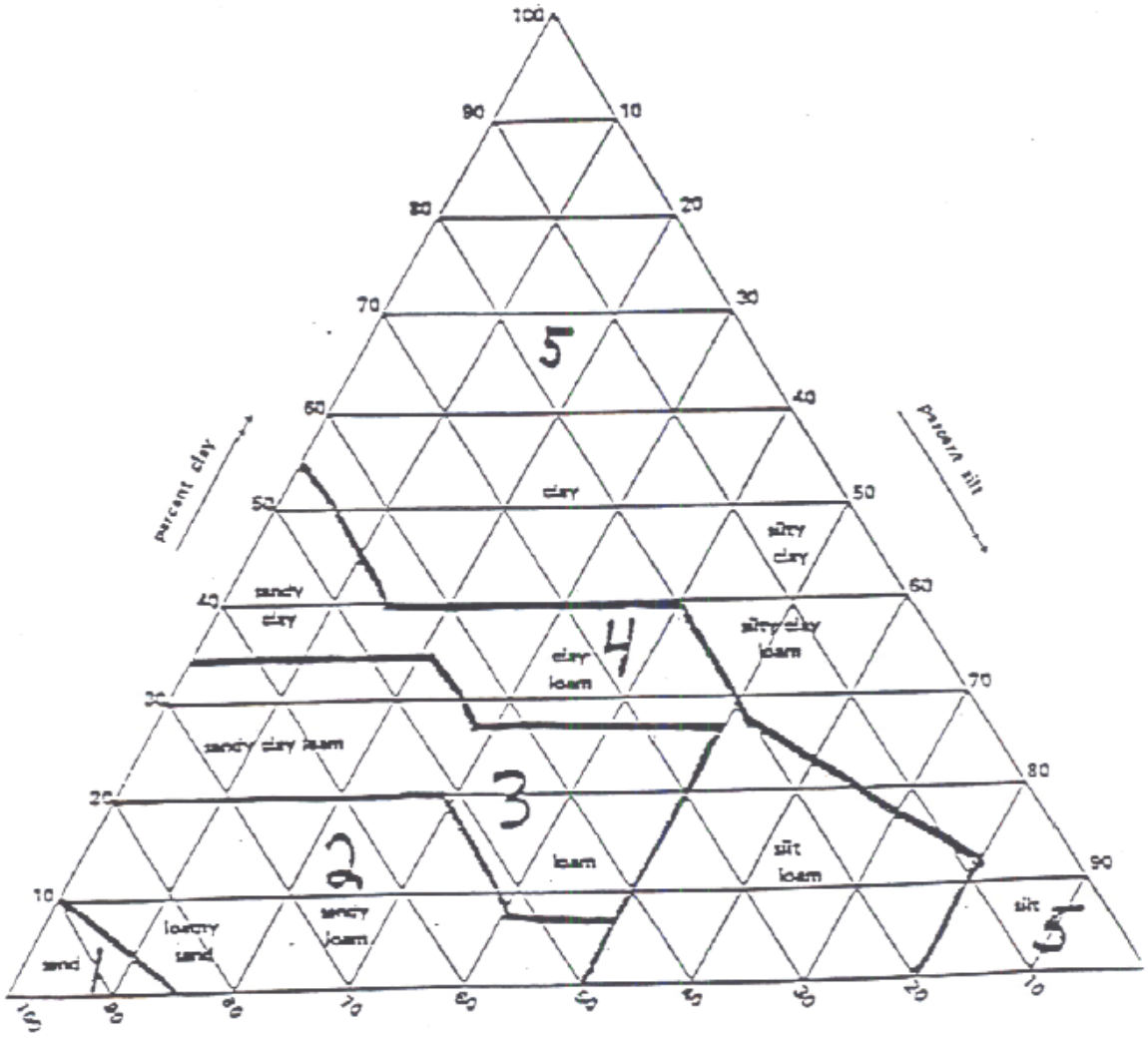


DIAGRAM D-4

STANDARD SOIL ABSORPTION TRENCH

Reference Section 20.06.13 E

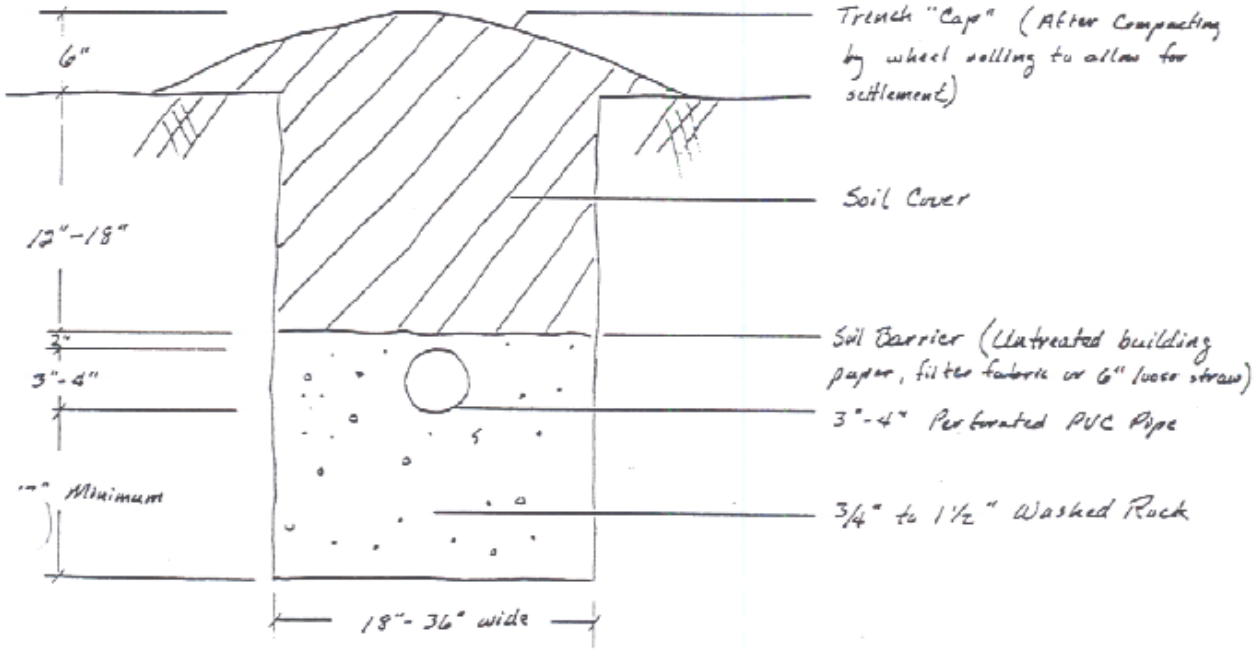


DIAGRAM D-5

SUMP TANK
Reference Section 20.06.22

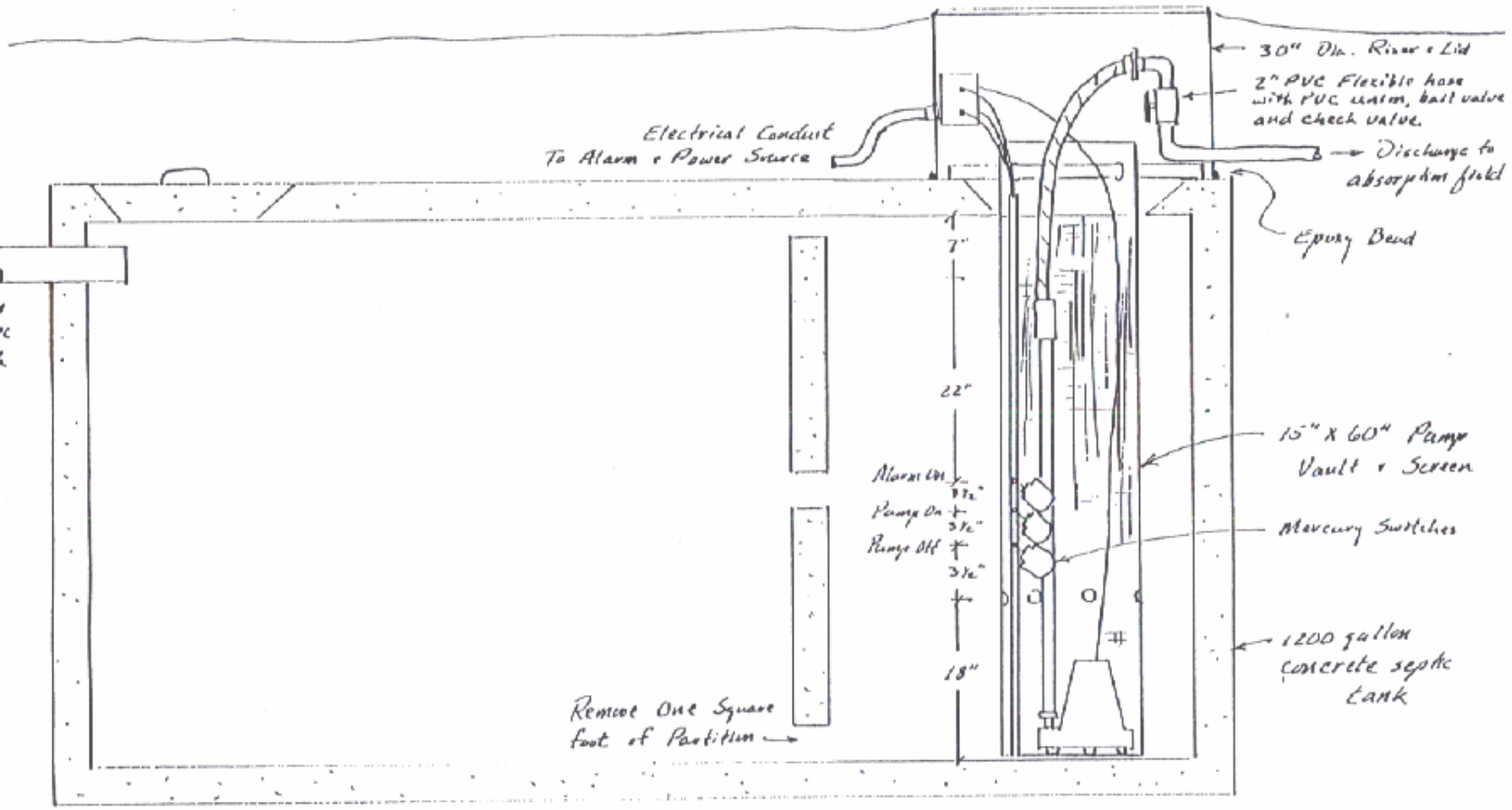
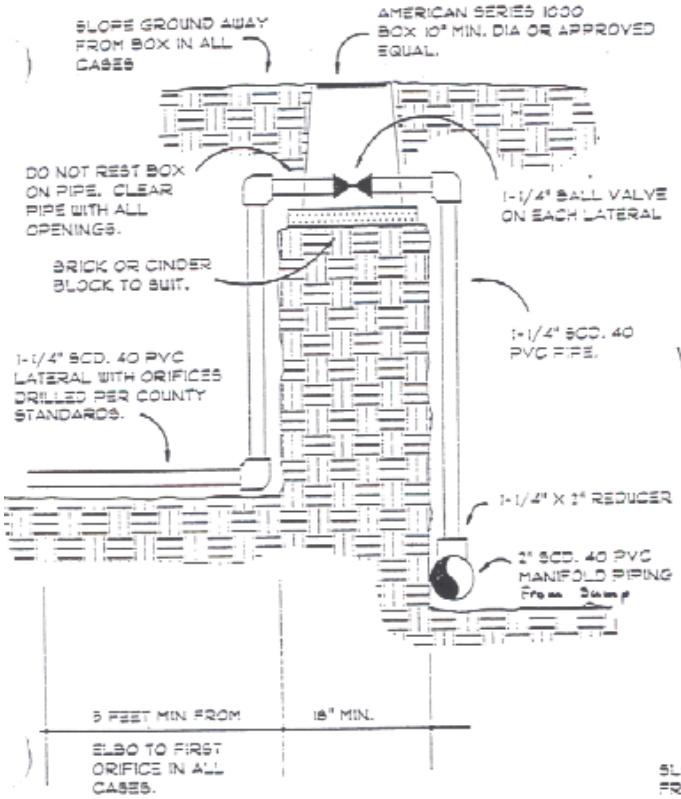
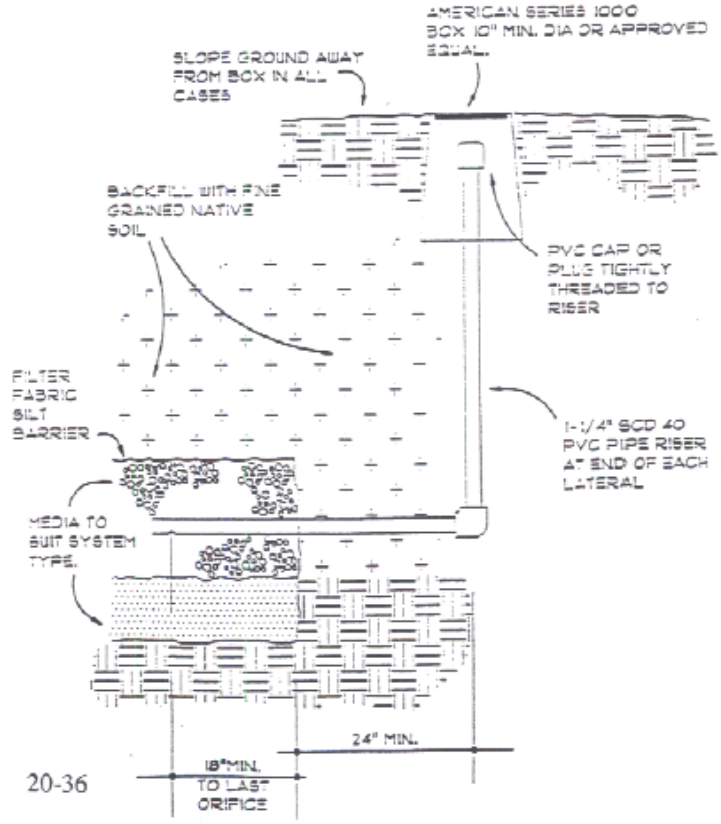


DIAGRAM D6
PRESSURE DISTRIBUTION SYSTEM
Reference Section 20.06.22 B



VALVE DETAIL

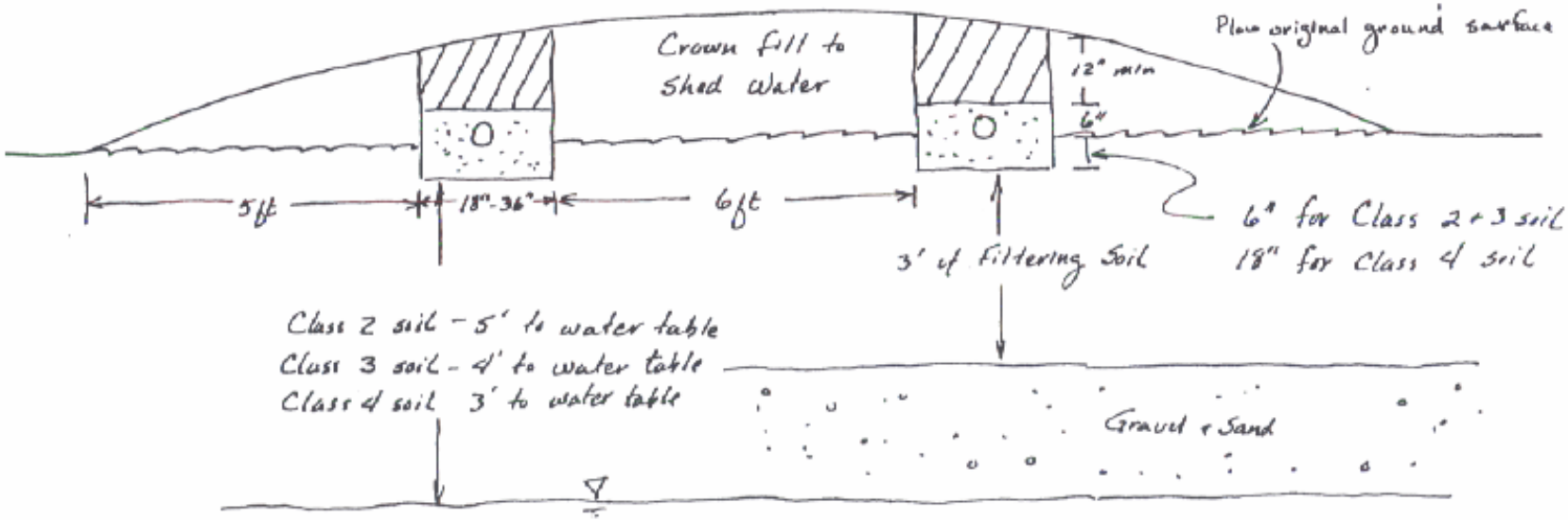


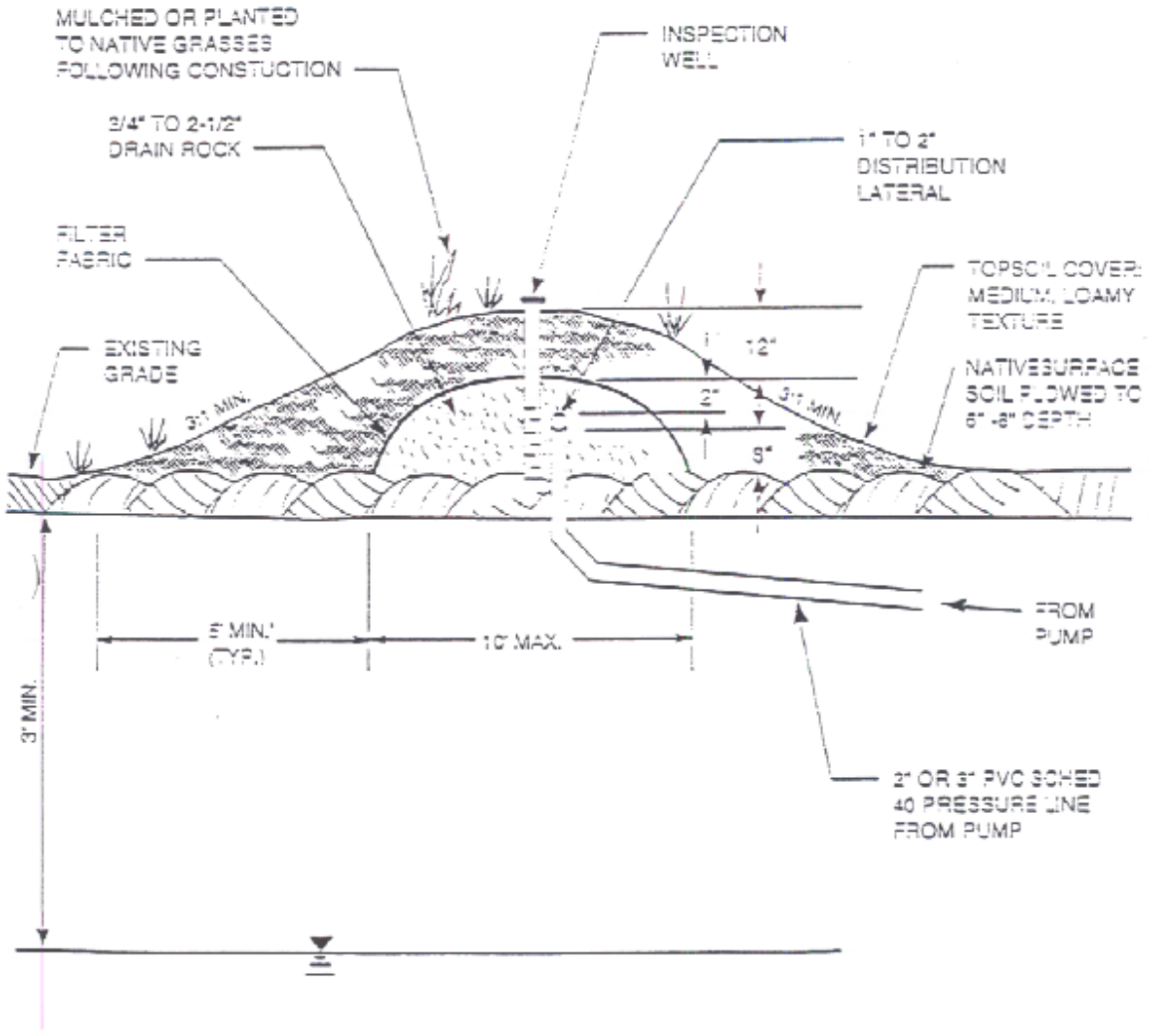
LATERAL ENDS

DIAGRAM D-7

SHALLOW TRENCH SYSTEM

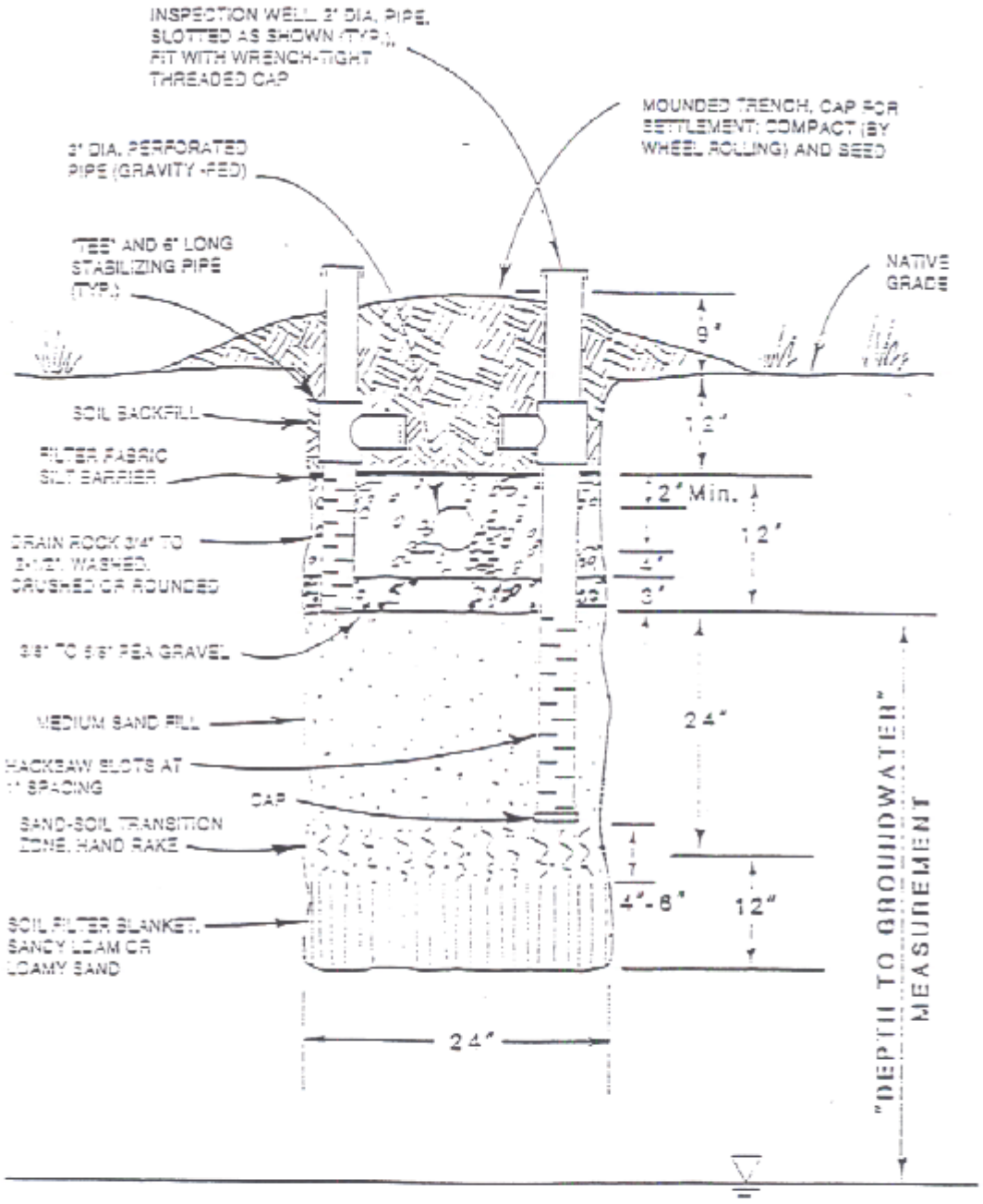
Reference Section 20.06.25





Not to Scale

Diagram D-8
AT GRADE SYSTEM
Section 20.06.26

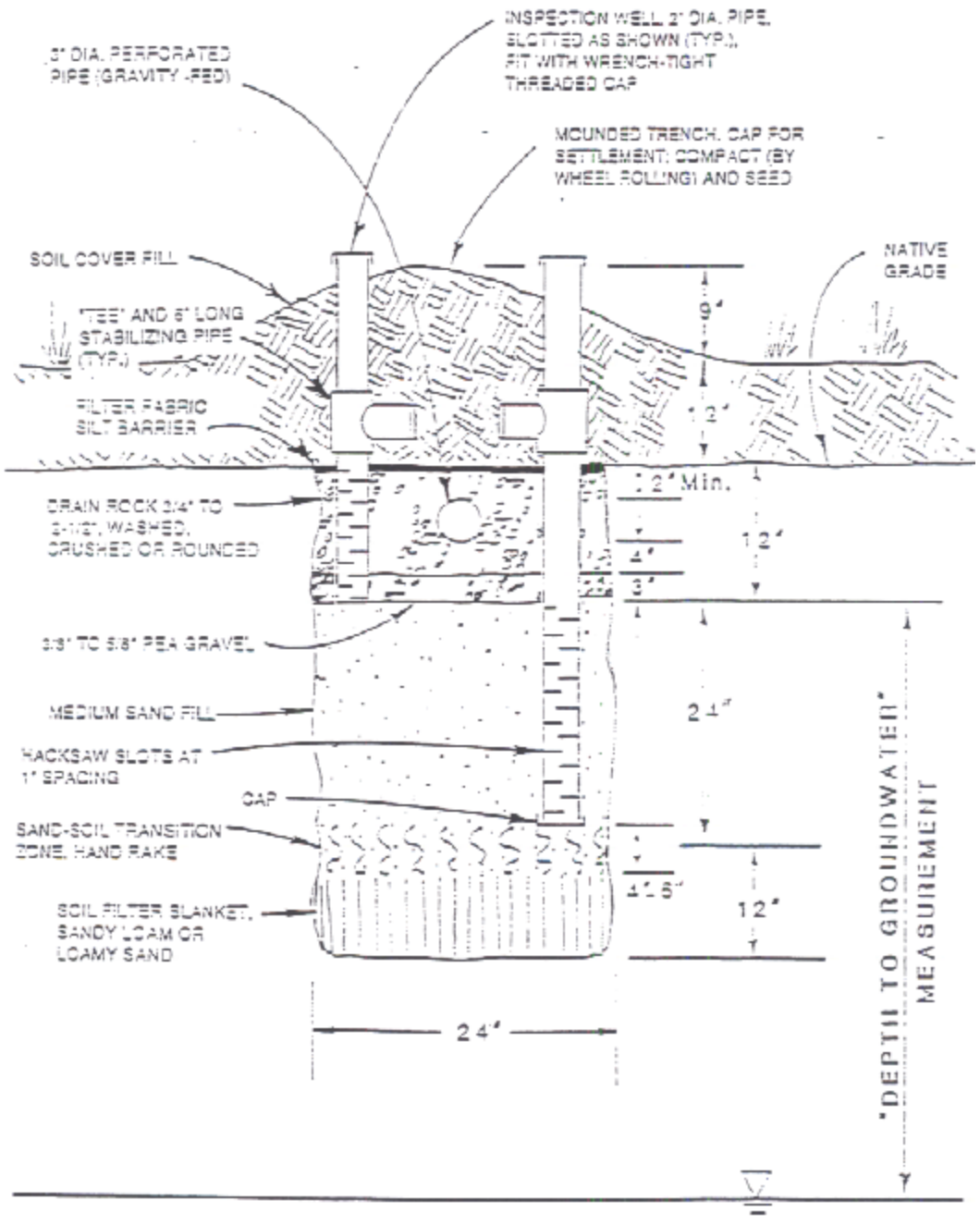


NOT TO SCALE

FILTER TRENCH DETAIL

TYPE I

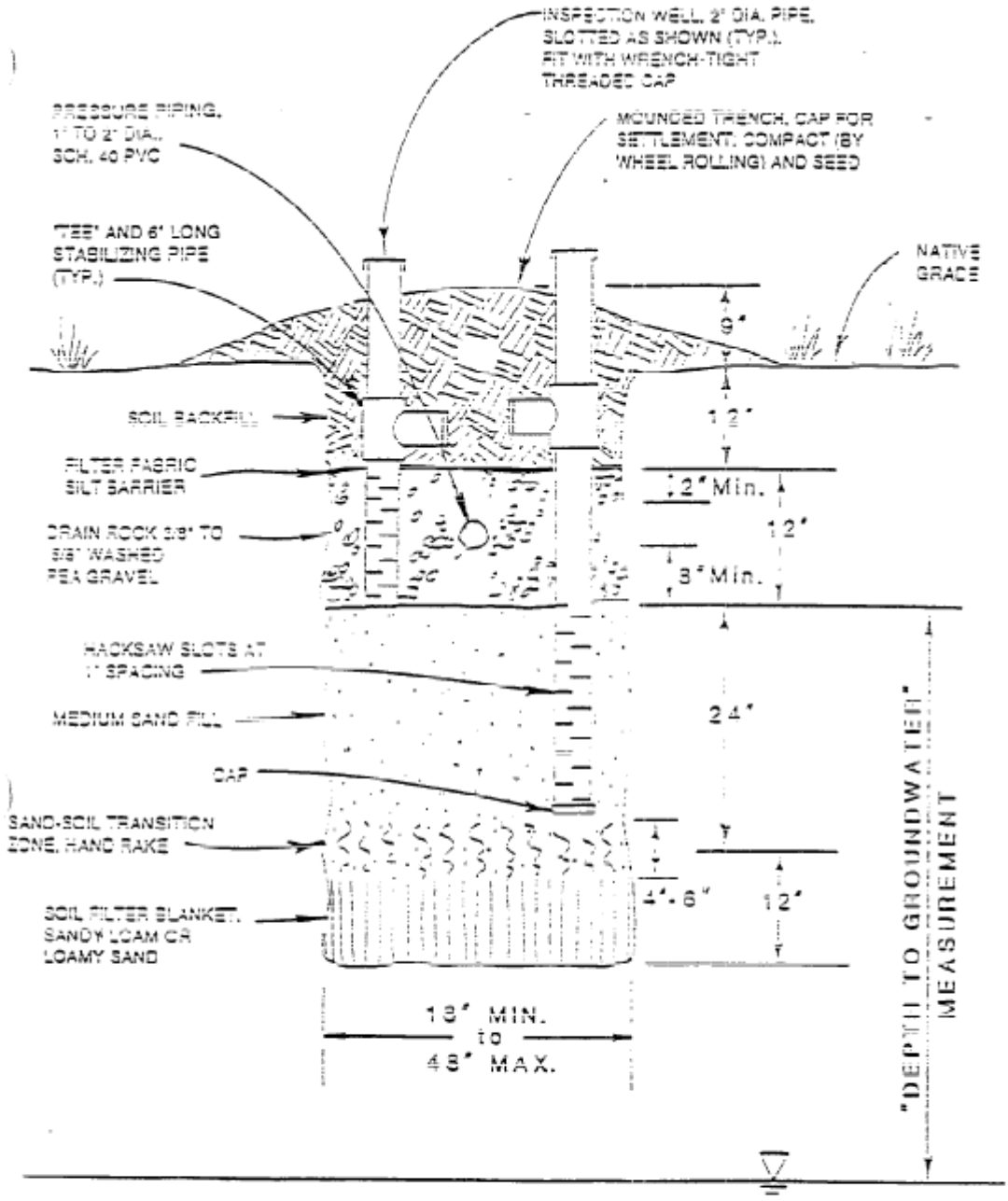
Diagram D-9 Section 20.06.28



NOT TO SCALE

FILTER TRENCH DETAIL
TYPE I
WITH COVER FILL

Diagram D-10 Section 20.06.28

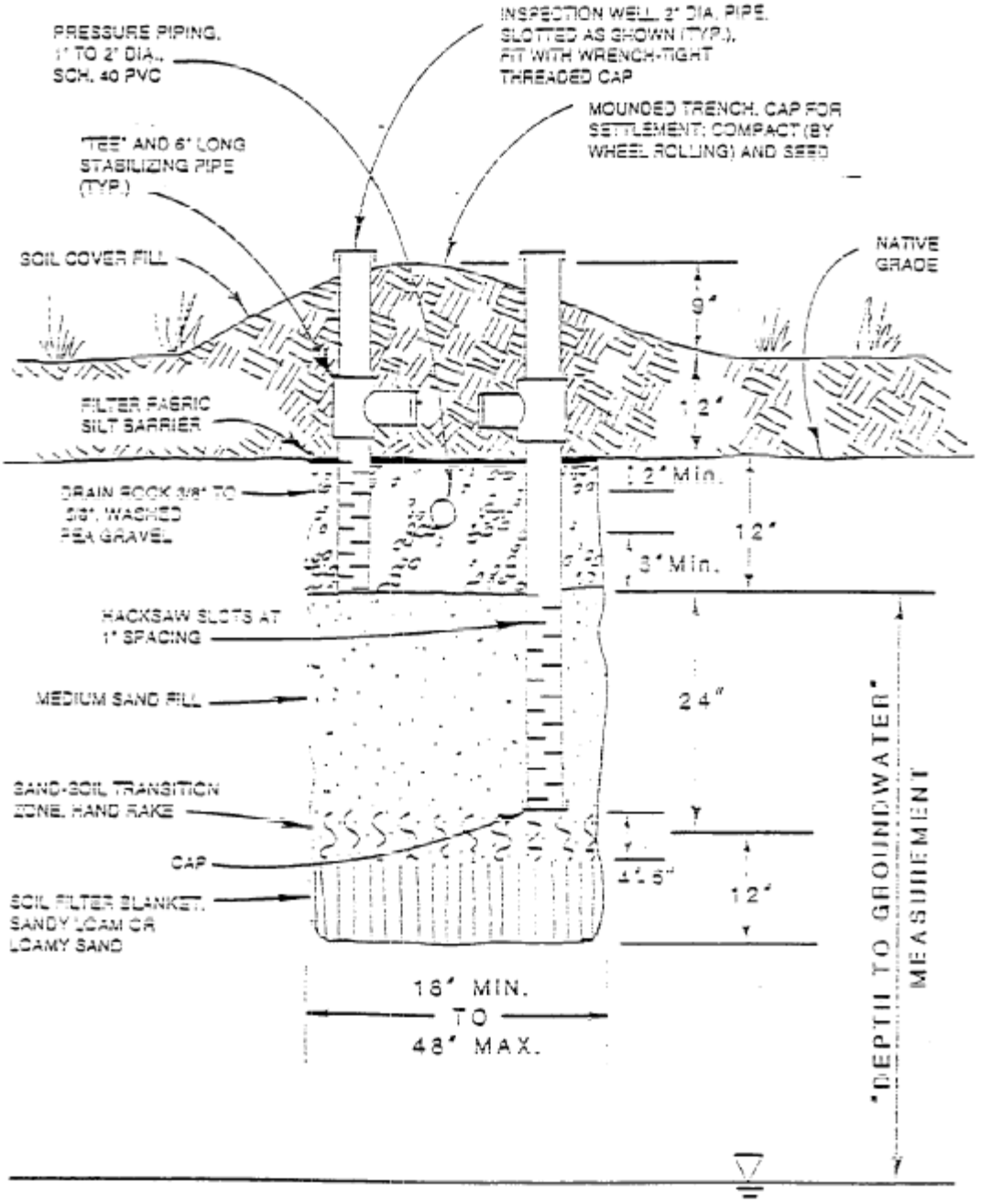


NOT TO SCALE

FILTER TRENCH DETAIL

TYPE II AND III

Diagram D-11 Section 20.06.28



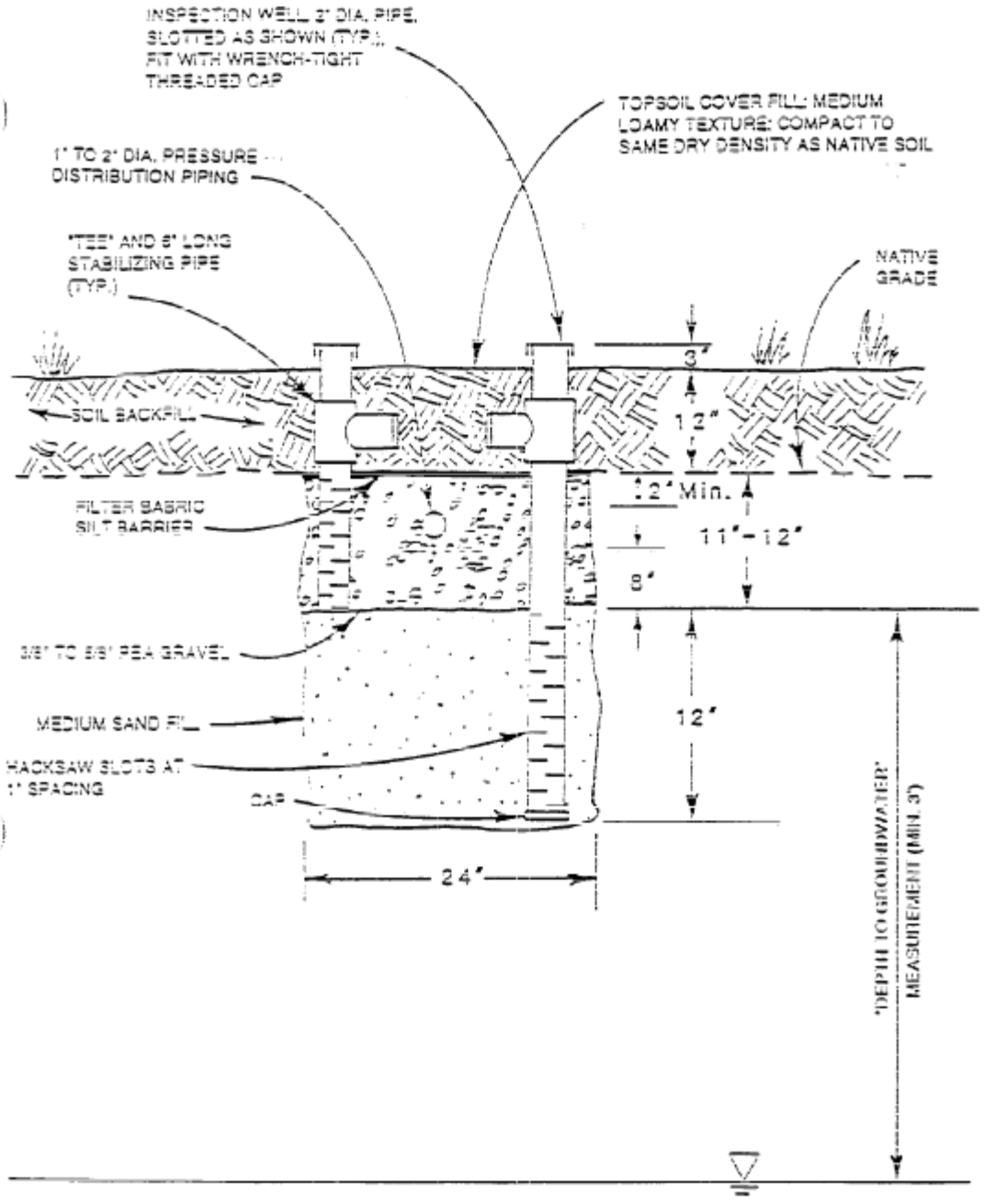
NOT TO SCALE

FILTER TRENCH DETAIL

TYPE II AND III

WITH COVER FILL

Diagram D-12 Section 20.06.28



NOT TO SCALE

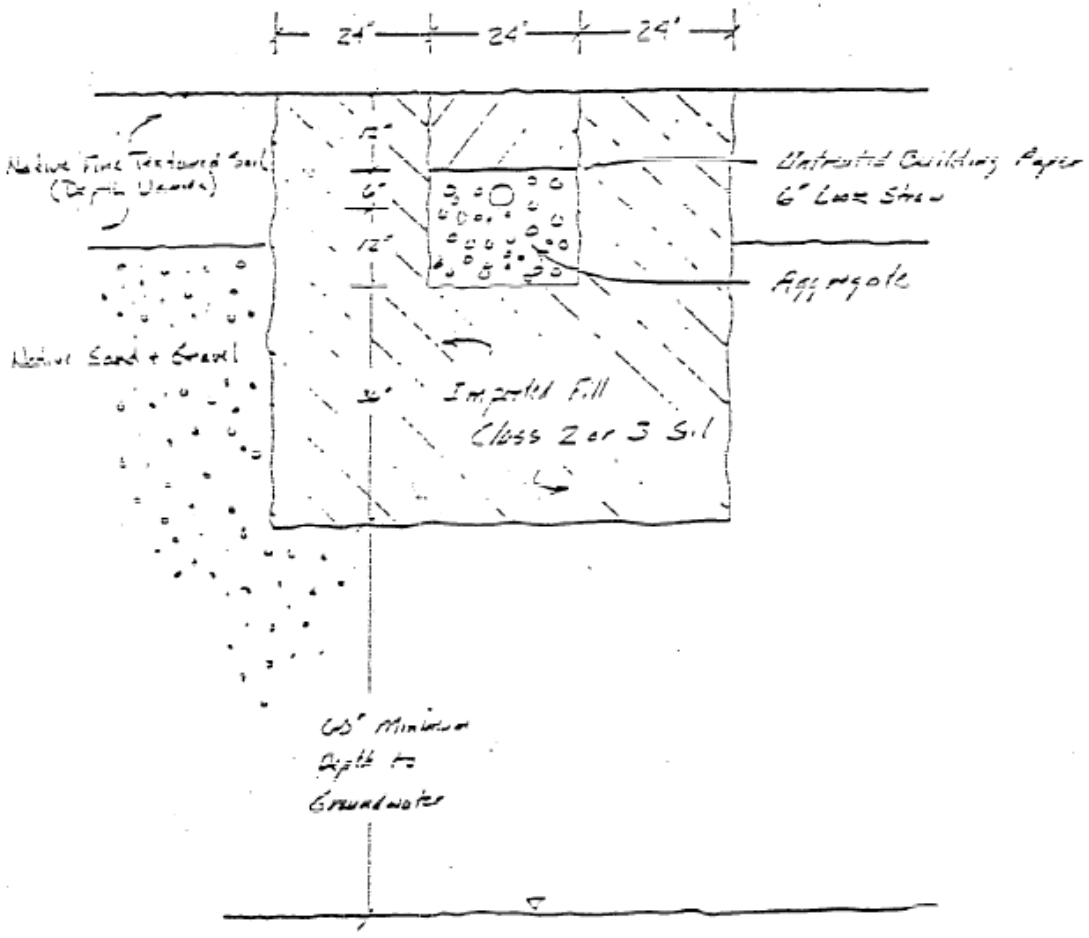
SHALLOW SAND TRENCH DETAIL

Diagram D-13 Section 20.06.28

DIAGRAM D 14

LINED TRENCH

Reference Section 20.06.31



APPENDIX A

SOIL CLASSIFICATION
Reference Section 20.06.05 D

Sand or Loamy Sand: Dry--loose, single grained. Gritty--no or very weak clods. Moist-gritty--forms easily crumbled ball; does not ribbon. Wet--lacks stickiness; may show faint clay stainings (loamy sand especially). Individual grains can be both seen and felt under all moisture conditions.

Sandy Loam: Dry--clods break easily. Moist--moderately gritty to gritty; forms ball that stands careful handling; ribbons very poorly. Wet--definately stains fingers; may have faint smoothness or stickiness, but grittiness dominates. Individual grains can be seen and felt under nearly all conditions.

Loam: This is the most difficult texture to place since characteristics of sand, silt, and clay are present but none predominates. Suggests other textures. Dry--clods slightly difficult to break; somewhat gritty. Moist--forms firm ball; ribbons poorly; may show poor fingerprint. Wet--gritty, smooth, and sticky all at same time; stains fingers.

Silt or Silt Loam: Dry--clods moderately difficult to break and ruptures suddenly to a floury powder that clings to fingers; shows fingerprint. Moist--has smooth, slick, velvety, or buttery feel; forms firm ball, may ribbon slightly before breaking; shows good fingerprint. Wet--smooth with some stickiness from clay; stains fingers. Grittiness of sand is well masked by other separates. (Texture most likely silt loam, there are few silt soils.)

Sandy Clay Loam: Dry--clods break with some difficulty. Moist--forms firm ball that dries moderately hard; forms one-half inch ribbons that hardly sustain own weight; may show poor to good fingerprint. Wet--grittiness of sand and stickiness of clay about equal, masking smoothness of silt; stains fingers.

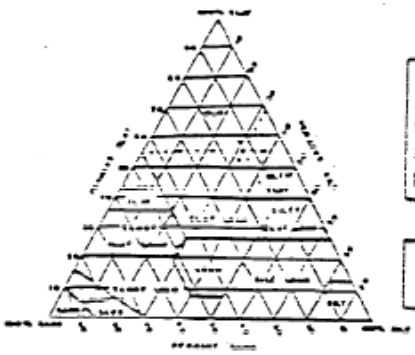
Clay Loam: Dry--clods break with difficulty. Moist--forms firm ball that dries moderately hard; ribbons fairly well, but ribbons support own weight; shows fair to good fingerprint. Wet--moderately sticky with stickiness dominating over grittiness and smoothness; stains fingers.

Silty Clay Loam: Resembles silt loam with more stickiness of clay. Dry--clods break with difficulty. Moist--shows a good fingerprint; forms a firm ball drying moderately hard; ribbons one-half inch that can be fairly thin. Wet--stains fingers; has sticky-smooth feel with little grittiness of sand.

Sandy Clay: Dry--often cloddy; clods broken down only with extreme pressure. Moist--forms very firm ball, drying quite hard; shows fingerprints; squeezes to thin, long, somewhat gritty ribbon. Wet--stains fingers; clouds water; usually quite sticky and plastic, but has some grittiness present. Silty Clay: Dry--see Sandy Clay. Moist--forms very firm ball becoming quite hard on drying; shows fingerprint; squeezes out to a thin, long smooth ribbon. Wet--stains fingers; clouds water; stickiness dominates over smoothness; grittiness is virtually absent.

Clay: Dry--clods often cannot be broken even with extreme pressure. Moist--forms firm, easily molded ball, drying very hard; squeezes out to a very thin ribbon two-three inches long. Wet--stains fingers; clouds water; usually very sticky with stickiness masking both smoothness and grittiness; wets slowly.

THIEN: TEXTURE-BY-FEEL ANALYSIS



Start

Place approximately 25 g soil in palm. Add water dropwise and knead the soil to break down all aggregates. Soil is at the proper consistency when plastic and moldable, like moist putty.

Add dry soil to soak up water

YES

Does soil remain in a ball when squeezed? NO

Is soil too dry? NO

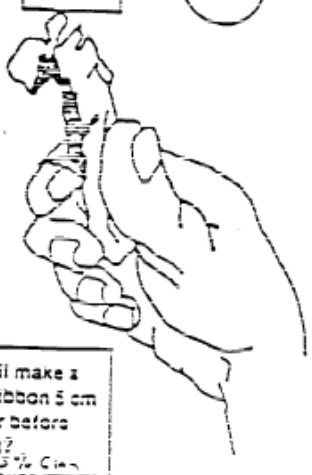
Is soil too wet? NO

SAND

YES

YES

Place ball of soil between thumb and forefinger gently pushing the soil with the thumb, squeezing it upward into a ribbon. Form a ribbon of uniform thickness and width. Allow the ribbon to emerge and extend over the forefinger, breaking from its own weight.



LOAMY SAND NO Does soil form a ribbon?

YES

Does soil make a weak ribbon less than 2.5 cm long before breaking? NO

Does soil make a medium ribbon 2.5-5 cm long before breaking? NO

Does soil make a strong ribbon 5 cm or longer before breaking?

YES

YES

YES

Excessively wet a small pinch of soil in palm and rub with forefinger

Does soil feel very gritty?

SANDY LOAM YES

NO

Does soil feel very gritty?

SANDY CLAY LOAM YES

NO

Does soil feel very gritty?

SANDY CLAY YES

NO

Does soil feel very smooth?

SILT LOAM YES

NO

Does soil feel very smooth?

SILTY CLAY LOAM YES

NO

Does soil feel very smooth?

SILTY CLAY YES

NO

Neither grittiness nor smoothness predominates

LOAM YES

Neither grittiness nor smoothness predominates

CLAY LOAM YES

Neither grittiness nor smoothness predominates

CLAY YES