REGULATION NO. I-02

INDIVIDUAL SEWAGE DISPOSAL SYSTEMS

PROMULGATED BY THE
BOARD OF HEALTH OF
TRI-COUNTY HEALTH DEPARTMENT

Effective Date

June 3, 2002

Reorganized September 1, 2005

Pursuant to Title 25, Article 10,
Paragraph 104, Colorado Revised Statutes
and Guidelines Adopted by the
Colorado Department of Public Health and Environment

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SECTION 1.0 SCOPE AND APPLICABILITY

1.1 Declaration

In order to preserve the environment and protect the public health; to eliminate and control causes of disease, infection, and aerosol contamination; and to reduce and control the pollution of the air, land and water, it is declared to be in the public interest to establish standards, rules and regulations for individual sewage disposal systems in the counties of Adams, Arapahoe, and Douglas, State of Colorado, and to provide the authority for the administration and enforcement of such minimum standards, rules and regulations.

The Board of Health of the Tri-County Health Department finds, determines and declares these regulations and standards to be necessary for the preservation of the public health and welfare of the inhabitants of the counties of Adams, Arapahoe, and Douglas, State of Colorado. This regulation and standard is adopted by the Board of Health of the Tri-County Health Department on the 9th day of April, 2002 and shall become effective the 3rd day of June, 2002.

1.2 Purpose

The purpose of these regulations, as authorized by Title 25, Article 10, *Colorado Revised Statutes* (C.R.S.), is to provide guidance and establish minimum standards for the location, construction, performance, installation, alteration and use of individual sewage disposal systems within the counties of Adams, Arapahoe and Douglas, State of Colorado, and concerning the application for and issuance of permits, the inspection, testing, and supervision of installed systems, the maintenance and cleaning of systems and the disposal of waste material.

1.3 Severability

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

1.4 Applicability

These regulations shall apply to individual sewage disposal systems. (Site approval and a groundwater discharge permit from the Colorado Department of Public Health and Environment are also required for a system with design capacity greater than or equal to 3,000 gallons per day.)

1.5 Repeal

Regulation No. I-96, adopted June 3, 1996 and revised April 2, 2001, is hereby repealed.

SECTION 2.0 DEFINITIONS

For the purpose of these regulations, the following words and phrases shall have the following meaning ascribed to them unless the context otherwise requires:

Absorption system – a wastewater disposal field or a leaching field and adjacent soils or other system for the treatment of sewage in an individual sewage disposal system by means of absorption into the ground and may include evaporation.

Absorption trench – one or more trenches not over three feet in width of varying length and depth in which sewage effluent is percolated into the soil.

Aerobic sewage treatment system – an individual sewage disposal system employing biological action, which is maintained by the addition of air or oxygen.

Applicant – any person who submits an application for a permit for an individual sewage disposal system.

Bedrock – the more or less solid undisturbed rock in place either at the surface or beneath surficial deposits of gravel, sand, or soil or a consolidated rock formation of more or less impervious material which may exhibit jointed, fractured, or weathered characteristics.

Bedroom – any room that could be used as a bedroom now or at some future date; or any room so designated by the owner or agent, or any room which has a closet.

Board of Health – the Board of Health of the Tri-County Health Department.

BOD_5 – a measure of the amount of molecular oxygen required by bacteria to stabilize the decomposable matter present in wastewater by aerobic biochemical action. The method for determining BOD_5 is prescribed in the most recent edition of *Standard Methods for the Examination of Water and Wastewater*.

Building Sewer – that part of the piping of a drainage system which extends from the end of the building drain and which receives the discharge of the building drain and conveys it to a public sewer, private sewer, individual sewage disposal system, or other point of disposal.

Cesspool – a covered underground receptacle which receives untreated sewage from a building or dwelling and which permits the untreated sewage to seep into the surrounding soil.

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

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

Competent Technician – a person designated by the Department who is able to conduct and interpret the results of percolation tests.

Composting Toilet – a unit which consists of a toilet seat and cover over a riser which connects to a compartment or vault that contains or will receive composting materials sufficient to reduce waste by aerobic decomposition.

Constructed Wetlands – a system which utilizes various wetland plants to provide secondary treatment of wastewater through biological, physical, and chemical processes.

Dawson Sand – a soil which classifies (under the Unified System) as sand. The fine grained (minus 200) fraction consists of clay minerals with plastic cohesive characteristics. A moist sample of the material will typically exhibit cohesive behavior which allows the material to form into a mass, which has low to high compressive strength when dried.

Department – the Tri-County Health Department.

Dispersal System – a system for the disposal of effluent after final treatment in an individual sewage disposal system by a method which does not depend upon or utilize the treatment capability of the soil.

Distribution Box – a watertight chamber which receives wastewater from a septic tank or other primary treatment unit and from which effluent is distributed evenly throughout the absorption area.

Dosing – a high rate periodic discharge to an absorption area, constructed wetlands, or sand filter.

Dosing Systems – A system specifically designed by a Registered Professional Engineer to deliver septic tank effluent or secondary treated effluent to an absorption area or other treatment system, where dosing is necessary for the overall performance of the system. Typical systems relying upon dosing systems for their performance include sand filters, recirculating sand filters, mounds, drip irrigation systems and systems requiring uniform dosing. A dosing system shall include all components necessary to function, including, but not limited to: dosing tank, pump or siphon, liquid level controls, alarm control, electrical wiring, pressure pipe, air release valves, manifolds, and distribution laterals and risers.

Dosing Tank – a tank which provides for storage of wastewater from a septic tank intended to periodically be discharged at a high rate to an absorption area, constructed wetlands, or sand filter.

Drip Irrigation System – a system of small diameter perforated pipe placed in narrow, shallow, closely spaced trenches, which relies upon evapotranspiration and absorption for treatment and disposal of effluent. The effluent is dosed into the laterals in the absorption area using a pump or siphon.

Drywell – a type of soil absorption system dependent upon suitable soil, filled with gravel and containing a system of approved distribution which is designed on the basis of sidewall and bottom absorption area.

Effective Size D_{10} (of granular media) – is that size such that no more than 10% by weight of the media is finer than the size specified.

Effluent – the liquid waste discharged from an individual sewage disposal system.

Environmental Health Specialist – a person who is trained in physical, biological, and/or sanitary science to carry out educational and inspectional duties in the field of environmental health.

Evapotranspiration System – a type of dispersal system that wholly or primarily utilizes liquid evaporation or transpiration by vegetation as a means of effluent disposal.

Experimental System – a particular design or type of system based upon improvements, or development in the technology of sewage disposal and not otherwise provided for in paragraphs (e) to (k), C.R.S. 25-10-105(1).

Floodplain – an area adjacent to a stream which is subject to flooding as the result of the occurrence of a one hundred (100) year flood. This area is considered to constitute a significant hazard to public or environmental health and safety or to property. These areas are typically designated by the Federal Emergency Management Agency (FEMA) or National Flood Insurance Program (NFIP). In the absence of FEMA/NFIP maps, a Colorado Registered Professional Engineer shall certify the floodplain areas.

Floodway – that area of the floodplain in which the channel of the watercourse and those portions of the adjoining floodplain which must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one (1) foot at any point or as designated by the Federal Emergency Management Agency (FEMA) or National Flood Insurance Program (NFIP). In the absence of FEMA/NFIP maps, a Colorado Registered Professional Engineer shall certify the floodway elevation and location.

Greywater System – a system designed to accommodate only liquid wastes from sinks, lavatories, tubs, showers, and laundry or other plumbing fixtures approved by the Department.

Groundwater Table – the upper surface of groundwater in the zone of saturation of a geologic formation.

Health Officer – the chief administrative public health officer of the Tri-County Health Department or his authorized representative.

Holding Tank – a watertight receptacle for the retention of sewage either before, during or after treatment.

Individual Sewage Disposal System (ISDS) and the Term "System" (where the context so indicates) – a system or facility for treating, neutralizing, stabilizing, or disposing of sewage which is not part of or connected to a sewage treatment works.

Lift Station – a system consisting of a tank, pump, liquid level controls, pressure pipe, and electrical controls intended solely for the purpose of delivering septic tank effluent to a non-engineered (conventional) absorption area that is located such that it is not possible to provide gravity flow from the septic tank to the absorption area.

Liner – a watertight membrane liner of at least 0.02-inch (20 mil) thickness which is used to prevent effluent from entering the soil or groundwater table. Material shall be polyvinyl chloride or material of equal integrity.

Low Pressure Pipe System – (see Drip Irrigation System).

Manufacturer – the person or firm that constructs or assembles individual sewage treatment system components.

Mound System – an absorption system installed where the top of the gravel, rock, or chamber is installed above the original grade of the area where the system is installed.

Percolation Test – a subsurface soil test at the depth of a proposed absorption system or similar component of an individual sewage disposal system to determine the water absorption capability of the soil, the results of which are normally expressed as the rate at which one inch of water is absorbed.

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

Permit – a permit authorizing the construction, alteration, repair, or use of an individual sewage disposal system.

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

Pretreatment Tank – a watertight receptacle which receives sewage from the building sewer for pretreatment before transmission to another treatment unit.

Privy – a structure allowing for the disposal of excreta not transported by a sewer and which provides privacy and shelter and prevents access to the excreta by flies, rodents, or other animals.

Public Health Sanitarian – (See Environmental Health Specialist).

Recirculating Sand Filter – a subsurface system which uses effluent filtration or absorption or both, and which contains an intermediate layer of sand as filter material. Effluent is dosed from a recirculation tank which receives septic tank effluent and returned filtrate. A portion of the filtrate is diverted for further treatment or disposal during each dose or when the recirculation tank is full.

Registered Professional Engineer – an engineer licensed in the State of Colorado in accordance with Section 12-25-114, C.R.S.

Sand Filter – a subsurface system which utilizes effluent filtration or absorption or both, and which contains an intermediate layer of sand as filter material.

Seepage Bed or Absorption Bed – a subsurface soil absorption area which is wider than three (3) feet, together with a system of perforated distribution pipes through which effluent may seep or leach into the soil.

Seepage Pit – a type of soil absorption system dependent upon suitable soil containing a structural internal void and designed on the basis of sidewall area.

Septic Tank – a watertight, accessible covered receptacle designed and constructed to receive sewage from a building sewer, to settle solids from the liquid, to digest organic matter, to store digested solids through a period of retention and allow the clarified liquids to discharge to other treatment units for final disposal.

Serial Distribution – an arrangement of absorption trenches, seepage pits or seepage beds where effluent is retained to utilize the absorption capacity of a component before flowing into a succeeding component.

Septage – a liquid or semisolid which includes normal household wastes, human excreta, animal or vegetable matter in suspension or solution generated from a septic tank serving a dwelling, building or other establishment.

Sewage – a combination of liquid wastes which may include chemicals, house wastes, human excreta, animal or vegetable matter in suspension or solution, or other solids in suspension or solution and which is discharged from a dwelling, building, or other establishment.

Sewage Treatment Works – a system or facility for treating, neutralizing, stabilizing, or disposing of sewage, which system or facility has a designed capacity to receive greater than or equal to two thousand gallons of sewage per day, unless designed as an absorption system. The term "sewage treatment works" includes appurtenances such as interceptors, collection lines, outfall and the outlet sewers, pumping stations, and related equipment.

State Waters – any and all surface and subsurface waters which are contained in or flow in or through this state, except waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all waters withdrawn for use, until all uses and treatment have been completed.

Suitable Soil – a soil which will effectively filter effluent by removal of organisms and suspended solids before the effluent reaches: any seasonal or perched water tables (determined by direct observation of the water table or salts, chemically reduced iron expressed as mottling or gleying); bedrock with impermeable, slowly permeable, or fractured strata; or excessively coarse sand and/or gravels; and which meets percolation test requirements and has a vertical thickness of at least four feet below the bottom of the absorption area, as installed.

Systems Cleaner – a person licensed by the Department and engaged in cleaning and pumping of sewage disposal systems and removal of the residues deposited in the operation thereof.

Systems Contractor (Installer) – a person licensed by the Department and engaged in the installation, renovation, and repair of sewage disposal systems.

Uniformity Coefficient (C_u) – a value which is the ratio of D_{60} to D_{10} where D_{60} is the soil diameter of which sixty (60%) percent of the soil weight is finer and D_{10} is the corresponding value at 10% finer. (A

soil having a uniformity coefficient smaller than four (4) would be considered "uniform" for purposes of this regulation.)

Uniform Dosing – a dosing system whereby the entire distribution network is pressurized to uniformly distribute effluent over the entire surface of the treatment or absorption area.

Vault – a watertight, covered receptacle, which is designed to receive and store excreta or wastes either from a sewer or from a privy and is accessible for the periodic removal of its contents.

Wastewater Pond – a designed pond which receives exclusively wastewater from a second stage treatment unit and which provides an additional degree of treatment.

SECTION 3.0 PERMITS AND INSPECTIONS

3.1 Permit Required

No person or persons shall install, alter, or repair an individual sewage disposal system (ISDS) within the counties of Adams, Arapahoe, and Douglas, State of Colorado, unless such person holds a valid permit, issued by the Health Officer in the name of the property owner for the specific construction, remodeling, installation, or use, proposed at the location described on the permit. An ISDS permit may be required for the expanded use of an existing system beyond the design capacity of said system.

3.2 Fees

A non-refundable fee in the amount established by resolution of the Board of Health shall be required of applicants for accepting and processing an application for a permit to construct and install any new, or for the repair or alteration of any existing individual sewage disposal system. The fee shall be payable to the Department at the time the application is accepted. The Board of Health may waive any permit fee normally required for an individual sewage disposal system.

By resolution, the Board of Health of the Tri-County Health Department adopted the fees shown in Table #15 in Appendix B for new and repair permits and for inspections effective July 1, 2005.

3.3 Permit Application Requirements and Procedures

Required Information

A. The application shall include such information, data, plans, specifications, statements, and commitment as required by Title 25, Article 10, C.R.S., and these rules and regulations adopted thereunder.

B. All applications for permits shall be made in writing on the forms provided by the Department.

C. Applications for a permit to construct a new ISDS shall be accompanied by a percolation test, soil profile data and maximum slope determination in the absorption area, performed by or under the supervision of a Registered Professional Engineer, plot plan, and engineered design (where applicable as described in Section 9.0 ENGINEERED SYSTEMS.)

3.4 Plot Plan

A plot plan, drawn to scale, signed by the owner or applicant and showing the following information, shall accompany the application and soils test data:

A. Location of property, address and lot, block, subdivision, or other legal description

B. Accurate property boundary measurements with an indication of north direction and ground slope direction

C. Accurate location of both existing and proposed structures, trees, and driveways

D. Accurate location of the ISDS showing soil profile and percolation test hole locations

E. Accurate or proposed location of domestic well, neighboring wells, and neighboring septic systems within one-hundred (100) feet of the subject property lines

F. Accurate location of streams, lakes, irrigation ditches, washes or other drainage conditions within the boundaries of the parcel and within one-hundred (100) feet of the subject property lines

G. Topographic mapping with two (2) foot contour intervals when the slopes exceed fifteen (15%) percent in the area of the proposed construction and when any lot grading is proposed which will affect the system construction

H. The Department may waive the requirements of 3.4 C, E and F if the property for which the permit is being applied for exceeds five (5) acres in size and the Department determines that the information required by 3.4 C, E and F is not necessary to show conformance with this regulation

I. Any other information deemed necessary by the Health Officer shall be furnished

3.5 Permit Expiration

Permits to install and construct an individual sewage disposal system shall expire at the end of twelve (12) months from date of issue unless the permit is extended to a fixed date upon written request by the applicant and at the discretion of the Health Officer.

3.6 Changes in Conditions After Permit Issuance

A. Any changes or relocation of proposed structures or additions to the plot plan without approval by the Health Officer may void the permit.

B. No change of design of an individual sewage disposal system after the permit has been issued shall be made unless authorized in writing by the Health Officer.

3.7 Denial of a Permit

A. Denials of permits shall be made in writing by the Health Officer stating reasons for the denial and requirements for reconsideration of the application.

B. The Health Officer may refuse to issue a permit for the construction of an individual sewage disposal system where a sewage treatment works is available within four-hundred (400) feet of the nearest property line and connection can be made thereto. The applicant shall provide a letter from the sewer district, municipality or county having jurisdiction, stating whether it is permissible for the Department to issue a permit for installation, alteration or repair of an individual sewage disposal system.

C. Any applicant who is denied a construction permit, or any person who is adversely affected by the denial or issuance of a permit, within thirty (30) days following such denial, may request and receive a hearing before the Board of Health.

D. Upon a finding, by the Board of Health after the review of a denial of the issuance of a permit as provided by Section 25-10-106-(1)-(f) C.R.S., that an applicant for individual sewage disposal system has demonstrated that said system will be constructed and used in such a manner as to comply with the declaration and intent of these regulations and all applicable state and local rules and regulations and required terms and conditions in any permit issued pursuant thereto, a permit may be issued therefore.

3.8 Disclaimer

The issuance of a permit and specifications of terms and conditions therein shall not constitute assumption or create a presumption that the Department or its employees may be liable for the failure of any system nor act as a certification that the equipment used in the system or any component thereof used in its operation or that the system for which the permit was issued insures continuous compliance with the provision of Title 25, Article 10, C.R.S., and these rules and regulations adopted thereunder or any terms and conditions of a permit.

3.9 Additional Evaluation

When the Department does not have sufficient information for evaluation of an application or a system, the Health Officer may require additional tests, including soil percolation tests. This requirement may apply to applications for new, repair or altered systems.

3.10 Additional Hydrological, Geological, Engineering, or Other Information

When specific evidence suggests that undesirable subsurface conditions exist, additional hydrological, geological, engineering or other information provided by a Registered Professional Engineer or Geologist may be required to be submitted by the applicant.

3.11 Test Pits

When additional subsurface investigation is necessary for the evaluation of an application for a system, based upon criteria established by the Department, the Health Officer may require that a test pit be excavated. If determined to be necessary, the test pit shall comply with the provisions of Section 5.3 B.

3.12 Repair Permits

Application to repair and for emergency use of a malfunctioning individual sewage disposal system shall be made within two business days by any owner or occupant after receiving notice from the Health Officer that the system serving his property is not functioning in compliance with these regulations. The date of expiration for repair permits shall not extend beyond four (4) weeks from the date of issuance and shall not be renewed unless such a person can show good cause in writing to the Department and can demonstrate that no hazard or nuisance exists on the property.

A permit shall be required for the following repairs or alterations:

A. Addition or replacement of septic tank

B. Replacement of an existing absorption system

C. Addition of an absorption system

D. Expansion of an existing absorption system

E. Addition of a lift station or pump and associated piping, where a lift station, pump or piping were not a part of original ISDS

3.13 Variance Procedure

A. Request for Variance

An applicant for a permit to construct a new ISDS or to repair or expand an ISDS may request a variance from any provision of the Colorado Guidelines on Individual Sewage Disposal Systems except as prohibited in Section 3.13 B.

A request for a variance must be submitted to the Director of Environmental Health of Tri-County Health Department, and shall include the following:

1) Specific requirements within the Colorado Guidelines on Individual Sewage Disposal Systems from which a variance is being requested

2) Technical justification by a Colorado Registered Professional Engineer which indicates the specific conditions which exist and/or the measures which will be taken to result in no greater risk than that associated with compliance with the requirements of the Colorado Guidelines on Individual Sewage Disposal Systems. Examples of conditions which exist, or measures which might be taken, include but are not limited to the following: evidence of a natural or physical barrier to the movement of effluent to or toward the feature from which the variance is requested; soil amendment or replacement to reduce the infiltration rate of the effluent such that the travel time of the effluent from the absorption field to or toward the physical feature is no less than the travel time through the native soils at the prescribed setback; and treatment equivalent to that required to meet National Sanitation Foundation (NSF) Standard 40 be provided.

3) A discussion of alternatives considered in lieu of the requested variance

4) Technical support for the selected alternative, which may include a testing program, which confirms that the variance does not increase the risk to public health and to the environment

5) A statement of the hardship which creates the necessity for the variance

B. Prohibitions on the Granting of Variance Requests

No variance will be issued for any of the following:

1) To mitigate an error in construction involving any element of the property improvements

2) Where the property can accommodate a conforming ISDS

3) For a reduction in the setback(s) to an off-site physical feature from the minimum setbacks defined in Table 3 in Appendix B

4) For a reduction in the 4-foot separation to ground water or bedrock

5) From the horizontal setback from a well which does not also meet the variance requirements of the Board of Examiners of Water Well Construction and Pump Installation Contractors

6) Solely for economic gain

C. Burden of Proof

The applicant has the burden of proof that the variance is justified and will pose no greater risk to public health and the environment than would a system meeting the standard being varied as in A.2 above.

D. Public Hearing

Upon receipt of the request for a variance and the required information in Section 3.13 A., the Health Officer will schedule a public hearing before the Tri-County Health Department Board of Health. The Department will issue a Public Notice of the Hearing and send notice via certified mail, with a minimum 20-day reply time from the date of mailing, to all adjacent property owners. The applicant and his/her engineer may attend the hearing and present testimony regarding the request for a variance.

E. Outcome of the Variance Proceeding

1) Following the Public Hearing, the Tri-County Health Department Board of Health shall vote on the proposed variance. Approval of the variance shall require a majority vote of the Tri-County Health Department Board of Health. The applicant will receive written notification of the decision regarding the request for a variance.

2) The Tri-County Health Department Board of Health may impose requirements and conditions on the variance granted and the notice of an approval of the variance will include any conditions of the approval. The notice of a denial of a variance shall include those reasons which form the basis for the denial.

3) The variance and any conditions thereof shall be recorded on the deed to the property and any expenses associated with that recording shall be the responsibility of the party obtaining the variance.

3.14 Site Inspection Following Permit Application and Prior to Permit Issuance

After receiving an application as required in Section 3.3 for an individual sewage disposal system permit, the application shall be reviewed by the Health Officer and an inspection of the premises (site visit), unless previously made, shall be made by the Health Officer. A determination may be made as to the suitability of the site and of the proposed design based upon observation of a test pit as required in Section 5.3 B to verify depth of the ground water table, suitable soil, depth to bedrock, in addition to ground slope and pertinent physical features.

3.15 The Health Officer shall review each application along with test results and other required information. The Health Officer will determine if the proposed system is in compliance with Title 25, Article 10, C.R.S., and these regulations adopted thereunder after which a permit may be issued.

3.16 Final Inspection – Non-Engineered (Conventional) System

A. It is the responsibility of the systems contractor to notify the Department when construction, installation, alteration, or repair has been sufficiently completed to allow inspection of the conventional system before the system is placed in use.

B. Inspection of the system by the Department shall be made after being notified that the conventional system is ready for inspection.

C. Final inspection and approval of conventional individual sewage disposal systems shall be made by the Health Officer before fill is placed to cover any part of the system.

D. The Department will determine if work has been performed in accordance with the permit requirements and will determine if the system complies with Title 25, Article 10, C.R.S., and these regulations adopted thereunder.

3.17 Final Inspection – Engineered System

A. It is the responsibility of the systems contractor to notify the design engineer and the Department when construction, installation, alteration, or repair has been sufficiently completed to allow inspection of the engineered system before the system is placed in use. The system installer shall notify the design engineer to make all specified inspections during the course of construction (See Section 9.2 H.).

B. The Department may waive its inspection of the engineered system at its discretion.

C. At a minimum, the engineer must observe the infiltrative area prior to placement of rock or chambers (where applicable), approve grades and approve materials.

D. Final inspection and approval of all engineered individual sewage disposal systems shall be made by the design engineer before fill is placed to cover any part of the system.

E. If the Department determines that it is necessary for the Health Officer to inspect an engineered system, final inspection and approval of the engineered individual sewage disposal system shall be made by the Health Officer before fill is placed to cover any part of the system.

F. The Department will determine if work has been performed in accordance with the permit requirements and will determine if the system complies with Title 25, Article 10, C.R.S., and these regulations adopted thereunder.

G. Engineered systems shall be inspected by or under the supervision of the Registered Professional Engineer responsible for the design. If the design engineer is not available, another Registered Professional Engineer may provide the inspections and will become the engineer of record and be responsible for the system.

3.18 Authorization to Enter Upon Property

For the purpose of inspection and enforcing applicable rules and regulations and the terms and conditions of any permit issued, the Health Officer is authorized to enter upon private property at reasonable times and upon reasonable notice for the purpose of determining whether or not operating individual sewage disposal facilities and systems are functioning in compliance with Title 25, Article 10, C.R.S., and these regulations adopted thereunder and the terms and conditions of any permit issued and to inspect and conduct tests in evaluating any permit application. The owner or occupant of the property having an individual sewage disposal system shall permit the Health Officer access to the property to conduct required tests, take samples, monitor compliance, and make inspections.

3.19 Loan Approval Inspection

A. A Loan Approval Inspection shall be performed whenever any person, pursuant to a housing loan, requests an inspection by the Department of an existing individual sewage disposal system.

B. Application for the Loan Approval Inspection shall be made in writing on the form provided by the Department and shall be accepted and processed upon receipt of a Loan Approval Inspection fee for the amount established by resolution of the Board of Health as shown in Table #15 in Appendix B.

C. Application for this inspection shall be made a minimum of ten (10) working days prior to the time the inspection is requested.

D. The applicant shall provide the Department with a receipt from a licensed system cleaner indicating that the tank has been pumped, tank capacity and condition of the tank, tees or baffles, within the previous four (4) years.

SECTION 4.0 REGULATION OF SYSTEMS CONTRACTORS AND SYSTEMS CLEANERS

4.1 Systems Contractor License

A. No person shall install, alter, or repair an individual sewage disposal system unless he holds a valid Systems Contractor License issued by the Health Officer.

B. A system contractor license is issued to the individual who takes and passes the written systems contractor examination. The license shall follow the individual if they change employment. Each systems contractor shall have a minimum of one owner or employee with a valid systems contractor license at all times.

C. Application for Systems Contractor's Licenses or renewals shall be made on forms supplied by the Department.

D. Prior to the issuance or renewal of a license, the Health Officer may require the applicant to demonstrate adequate knowledge of these regulations. This may include, but is not limited to, passing an exam prepared by the Department or attending educational conferences conducted by the Department.

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

4.2 Systems Cleaner License

A. No person shall engage in the cleaning of individual sewage disposal systems or the transportation of sewage to a disposal site unless he holds a valid Systems Cleaner License issued by the Health Officer. Employees under direct supervision of a licensed Systems Cleaner shall not be required to be licensed.

B. Application for a Systems Cleaners License or renewals shall be made upon forms supplied by the Department.

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

4.3 License Fees

By resolution, the Board of Health of the Tri-County Health Department adopted the license fees shown in Table #14 in Appendix B for systems installers and systems cleaners.

4.4 Revocation of a Systems Contractor or Systems Cleaner License

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

B. Written notice of revocation, specifying the violations, shall be served upon the holder of the license. Service of notice as required in this section shall be as provided by the Colorado Rules of Civil Procedure, or by registered or certified mail, return receipt requested, deliverable to addressee only.

C. Failure of a systems cleaner to keep records, submit records or quarterly reports upon request, or show evidence of proper disposal, shall be cause for the Department to initiate revocation of license proceedings.

D. A person who has previously had a license revoked may be denied renewal by the Board of Health.

4.5 Standard of Performance Required of Holders of Systems Contractor License

A. The systems contractor shall be responsible for proper installation of the individual sewage disposal system. Installation, alteration, or repair of any individual sewage system shall be in compliance with these regulations and with the conditions set out in the application and installation permit.

B. Notice of a requested inspection shall be given by the license holder not less than forty-eight (48) hours before the inspection is to be made.

C. A license holder shall have made certain that an installation permit has been obtained prior to starting construction and the installer shall install the system in compliance with all plans and specifications as submitted by the applicant and approved by the Department.

D. System contractors shall have a copy of the permit, plans, and specifications on the property at all times that construction of the system is occurring and at the time of final inspection if so requested by the Department.

E. The Systems Contractor shall provide the Department or design engineer, prior to or at the time of the Department's or design engineer's final inspection of the system installation, a diagram accurately locating all parts of the system in relationship to the dwelling and/or property lines and give at least two measured points from a fixed location to the first compartment of the septic tank and two corners of the longest dimension of the absorption area with the measurements indicated on the drawing. (See Diagram 1 in Appendix A). The diagram shall be drawn on forms provided by the Department. Final approval of the system installation may be withheld for failure to submit the diagram.

F. The Systems Contractor shall be required by the Department, upon completion of the system installation, to appropriately mark and flag the system so as to identify its location in order to prevent vehicles or persons building the structure from driving over any part of the system. The contractor should also notify the general contractor of the above information.

4.6 Standard of Performance for Systems Cleaners

A. A license holder, when cleaning tanks or aeration plants, shall remove the liquid, sludge and scum from both compartments of divided tanks and both tanks that are in series, leaving only enough sludge to act as a seed for continuing operation. Three inches of remaining residue is recommended. Tanks should not be washed or disinfected after pumping. The outlet tees or baffles of tanks shall be checked for proper installation and/or damage provided they can be observed as part of the routine pumping process. Missing or damaged tees or baffles on the outlet side of tanks shall be reported to the owner and the Department for immediate repair.

B. A license holder shall maintain his equipment so as to insure that no spillage of sewage will occur during transportation, and that his employees are not subjected to undue health hazards.

C. A license holder shall dispose of the collected sewage only at sites approved by local county officials, or the Health Officer in a manner which does not create a hazard to the public health, a nuisance or an undue risk of pollution and which complies with state and local rules and applicable regulations.

D. For each tank pumped, a license holder shall be required to keep a record of location serviced, volume of septage pumped, site of disposal, and condition of tank tees or baffles. These records shall be kept on forms approved by the Department. When requested by the Department, the license holder shall submit records for review by the Department. No later than December 31 of each year, the Systems Cleaner shall submit to the Department copies of contracts with facilities approved by local county officials or the Health Officer for accepting septage.

E. Prior to the issuance of or renewal of a license, the Health Officer may require the applicant to demonstrate adequate knowledge of these regulations.

SECTION 5.0 GENERAL TECHNICAL REQUIREMENTS

5.1 Calculation of Sewage Flow and Characteristics

A. Where gallons per day and pounds of five (5) day biochemical oxygen demand (BOD_5) per day can be obtained by measurement of existing conditions, such data shall be used.

B. For new facilities, Table #2 in Appendix B of quantities and BOD_5 strength of sewage may be used as a guide to represent average conditions.

C. Maximum flow shall be considered as 150 percent of average daily flow, and shall be the basis for the design proposed unless otherwise established by evidence satisfactory to the Health Officer.

D. To calculate the sewage flow for dwellings and mobile homes, use a figure of 3.5 people per dwelling unit or at least two persons per bedroom, whichever is greater.

E. In no event may the system be designed for a lesser capacity than the anticipated maximum daily sewage flow or treatment requirements of the sewage or wastes in the system, except for design of evapotranspiration beds using the water balance method.

5.2 Minimum Horizontal Distances Between Components of a System and Physical Features

A. Minimum horizontal distances from the various components of a system to pertinent terrain features, including streams, lakes, water courses, springs, wells, subsoil drains, cisterns, water lines, suction lines, gulches, dwellings, other occupied buildings and

property lines, shall be in accordance with Table #3 in Appendix B, of minimum horizontal distances.

B. New wells, springs or potable water supply suction lines and all other construction units listed in Table #3 in Appendix B shall be installed or located in accordance with the minimum distance requirements provided by these regulations.

C. The minimum horizontal distance required from cut banks and fill areas to individual sewage disposal system components discharging effluent into or onto the surrounding soil shall be four (4) times the height of the bank, measured from the top edge of the bank (see Diagram 2 in Appendix A) unless additional geotechnical information demonstrates to the satisfaction of the Department that a minimum horizontal distance less than 4h will not result in a violation of Section 18.1.F of this regulation.

5.3 Soil Evaluation

A. Soil Profile Hole

1) One soil profile test hole at least eight (8) feet deep or to bedrock, must be completed to give an indication of the soil condition in the area including that soil zone at least four (4) feet below the bottom of the proposed absorption system. To meet this requirement on sloping lots or lots where grading will occur, the soil profile hole may have to be completed to a depth greater than eight (8) feet.

2) Soils in the soil profile hole shall be classified using the Unified System (ASTM D 2487).

3) As a minimal requirement, one undisturbed sample shall be taken at the approximate depth of the proposed system (bottom of the rock).

4) When drive samples are collected, blow counts associated with collecting this sample shall be reported.

5) The undisturbed sample shall be classified by gradation and plotted on a percent passing curve.

6) Where the minus 200 fraction is greater than fifty (50%) percent, or where Dawson Sand is encountered, Atterberg Limits (ASTM D 4318) shall be run on the sample.

7) All test results shall be shown on a log of the hole. Moist soil color shall also be reported on the log.

B. Soil Profile Test Pit

1) If determined to be necessary by the Health Officer (see Section 3.11), one soil profile test pit at least four (4) feet below the bottom of the absorption area or to bedrock must be excavated at the time of the site visit (see Section 3.14) to give an indication of the soil condition in the area including that soil zone at least four (4) feet below the bottom of the proposed absorption system.

2) The pit must be located outside the area of the proposed absorption system.

3) Any excavated pit which is not backfilled the same day which it is excavated shall be surrounded with barricades or fencing to prevent persons and animals from falling into the pit.

4) If bedrock is encountered in the test, two additional test pits shall be excavated to bedrock to determine the dip and strike of the bedrock unit and to assist in evaluation of the lateral extent of the unit.

5) If the ground surface slopes more than two (2%) percent, the two (2) additional pits shall be excavated to bedrock down slope from the location of the proposed absorption area. The two (2) additional pits shall be a sufficient distance apart such that the dip, strike and lateral extent of the bedrock unit under the proposed absorption area and down slope of the absorption area can be evaluated.

6) If bedrock is not encountered in the two (2) additional pits within eight (8) feet of the ground surface, the excavations may be terminated at the eight (8) foot depth.

5.4 Location of Maximum Seasonal Groundwater Table

The location of the maximum seasonal groundwater table shall be determined by the following methods:

A. Direct visual observation of infiltrated water at the time of year when the groundwater table is highest within an excavation

B. Observation of soil in a trench of at least ten-foot depth for evidence of crystals or salts left by the maximum seasonal groundwater table, or chemically reduced iron in the soil, reflected by a dull gray or mottled coloring

C. By other scientific methods approved by the Department

5.5 Percolation Test and Slope Calculation

The percolation test and slope calculation shall be performed by or under the supervision of a Registered Professional Engineer or by a competent technician of the Department.

5.6 Percolation Test Holes

A. **Location:** Soil percolation tests shall be performed in at least three (3) test holes in the area in which the absorption system is to be located, spaced uniformly over the proposed site, except there shall be no less than one (1) test hole in any twelve-hundred (1,200) square foot area of the absorption system.

B. **Dimensions:** The percolation test holes shall be from four (4) to twelve (12) inches in width or diameter, and shall be terminated at a minimum of six (6) inches below the bottom of the proposed absorption system in those soils comprising the four (4) feet of soils beneath the bottom of the absorption system.

C. If a change of soil type, color, or structure is present within those soils comprising the four (4) feet of soils beneath the absorption system, a minimum of two (2) soil percolation test holes shall be terminated in this soil and a percolation test shall be run in both test holes.

D. **Preparation of Percolation Test Holes:** Carefully scratch the bottom and sides of the hole with a knife blade or sharp pointed instrument in order to remove any smeared soil surfaces and to provide a natural soil interface into which water may percolate. Remove all loose material from the hole. Add two (2) inches of coarse sand or fine gravel to protect the bottom from scouring and sediment.

5.7 Percolation and Profile Test Holes – Marking and Evaluation

The engineer conducting the percolation test shall, upon completion of the tests, flag or otherwise mark each percolation hole so that they can be easily located. Percolation and profile holes must also remain open for evaluation by the Department.

5.8 Percolation Test Procedure

The percolation test shall be conducted utilizing the hole preparation, soil saturation and rate measurement procedures outlined in the U.S. Department of HEW, *Public Health Service Manual of Septic Tank Practice* (Robert A. Taft Sanitary Engineering Center Procedure). These procedures are summarized below and in Diagram 3 in Appendix A.

A. **Saturation and Swelling of the Soil:** It is important to distinguish between saturation and swelling. 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-type soil, and is the reason for requiring a prolonged soaking period.

B. **Pre-soak:** In the conduct of the test, carefully fill the hole with clear water to minimum depth of twelve (12) inches over the gravel. In most soils, it is necessary to refill the hole by supplying a surplus reservoir of water, possibly by means of an automatic siphon, to keep water in the hole for at least four (4) hours and preferably overnight. Determine the percolation rate twenty-four (24) hours after water is first added to the hole. This procedure is to insure that the soil is given ample opportunity to swell and to approach the condition it will be in during the wettest season of the year. Thus, the test will give comparable results in the same soil, whether made in a dry or in a wet season. In soils classified as SW or SP (containing five (5%) percent or less minus 200 particles), the swelling procedure is not essential and the test may be made as described under Section 5.8 F. after the water from one filling of the hole has completely seeped away.

C. **Percolation Rate Measurement:** With the exception of sandy soils (classified as SW or SP), percolation rate measurements shall be made on the day following the pre-soak procedure described under item B, above.

D. If the water remains in the test hole after the overnight swelling period, adjust the depth to approximately six (6) inches over the gravel. From a fixed reference point, measure the drop in water level over a thirty (30) minute period. This drop is used to calculate the percolation rate.

E. If no water remains in the hole after the overnight swelling period, add clear water to bring the depth of water in the hole approximately six (6) inches over gravel. From a fixed reference point, measure the drop in water level at approximately thirty (30) minute intervals for four (4) hours, refilling to six (6) inches over the gravel as necessary. The drop that occurs during the final thirty (30) minute period is used to calculate the percolation rate. The drops during prior periods provide information for possible modification of the procedure to suit local circumstances. The requirement to conduct a four (4) hour test under this section is waived if three (3) successive water level drops do not vary by more than one-sixteenth (1/16) inch; however, in no case shall the test under this section be less than two (2) hours in length.

F. In sandy soils classified as SW or SP, (or other soils in which the first six (6) inches of water seeps away in less than thirty (30) minutes, after the twenty-four (24) hour swelling period), the time interval between measurements shall be taken as ten (10) minutes and the test run for one (1) hour. The drop that occurs during the final ten (10) minutes is used to calculate the percolation rate.

G. In Dawson Sands, the test shall be a minimum of four (4) hours, or until the last three (3) successive drops vary by less than one-sixteenth (1/16) inch, whichever is greater.

5.9 Percolation Rate Calculation and Reporting

The field percolation rate shall be the average rate of the percolation tests in the test holes observed in the proposed absorption area. A percolation rate determined by the test shall be used in calculating the absorption area required for the proposed system. The engineer shall supply an

accurate site plan drawn to scale showing the location of the soils tests tied to lot corners or other permanent markers. For all lots less than five (5) acres, the site plan shall show the entire lot. Reporting of all data generated under the requirements of Sections 5.3, 5.6, and 5.8 shall only be done on forms provided by the Department.

5.10 Percolation Test Waiver

If the applicant demonstrates to the satisfaction of the Board of Health that the system is not dependent upon soil absorption, the requirement of percolation tests may be waived.

5.11 Alternate Percolation Test

Alternate percolation test procedures may be approved providing the test results of alternate procedures are substantially equivalent to those determined using the test procedure described in this section. Prior approval from the Health Officer for use of alternate test procedures is required.

SECTION 6.0 COMPONENT DESIGN CRITERIA

6.1 Reliability

Individual sewage disposal systems shall be designed and constructed such that each component shall function, when installed and operated, in a manner not adversely affected by the normal operating conditions including erosion, vibration, shock, climate conditions, and usual household chemicals used. Each component shall be free of non-functional protrusions or sharp edges, or other hazards, which could cause injury to persons, animals, or properties. The design shall be such as to exclude flies and rodents and to prevent the creation of nuisances and public health hazards and shall provide for efficient operation and maintenance.

6.2 Plumbing Codes

Plumbing fixtures, grease traps, building sewers, vents, sewer lines and other appurtenances shall be designed, operated and maintained so as to comply with the minimum requirements of the Uniform Plumbing Code in force as of the effective date of these regulations or those revisions of said Code as are adopted.

6.3 Electrical Equipment (if used)

All electrical work, equipment, and material shall comply with the requirements of the National Electrical Code in force on the effective date of these regulations, or those revisions of said Code as are adopted by the State Electrical Board.

6.4 Identification and Data Marking

A permanent type plate or other indelible marking on major components not constructed on the site where installed shall be provided, so inscribed as to be easily read and visible for the purpose of inspection. Said inscription shall include the following:

A. Name of manufacturer

B. Model or serial number of designation

C. Maximum design capacity of the unit and the unit of measurement

6.5 Structural Integrity

Tanks shall be so constructed and installed so as to withstand earth and hydrostatic pressures when full and when empty. All metal surfaces shall be properly coated to prevent corrosion. All treatment tanks shall be installed and maintained in accordance with the tank manufacturer's installation and maintenance instructions.

6.6 Water Tightness

Septic tanks, vaults, or other units shall not allow infiltration of groundwater or surface water and shall not permit the release of wastewater or liquids through other than designed openings.

6.7 Accessibility for Inspection and Maintenance

Each treatment unit shall be equipped with an access manhole located within eight (8) inches of the ground surface to permit periodic physical inspection, collection and testing of samples and maintenance of all components and compartments, including but not limited to: submerged bearings, moving parts, tubes, intakes, slots, filters, inlet and outlet baffles, and other devices.

6.8 Serviceability

Components shall be so designed and constructed that when installed in accordance with manufacturer's recommendations, they shall be capable of being easily maintained, sampled, drained, pumped, inspected and cleaned.

6.9 Sampling Access

Where a required final effluent sample cannot be easily obtained, a sampling well shall be constructed. The sampling well shall be accessible and provided with a properly secured cover.

6.10 Instructions

The manufacturer shall provide clear, concise instructions covering the unit which, when followed, will assure proper installation and safe and satisfactory operation.

6.11 Surface Activity

The surface of the ground over the individual sewage disposal system or any part thereof must be restricted to activity or use which will permit the system to function as designed and which will not contribute to compaction of the soil nor to structural loading detrimental to the capability of the component to function as designed.

6.12 Building Sewers

A. **Materials**: All piping used in individual sewage disposal systems shall be constructed of approved plastic pipe as shown in Table #4 of Appendix B or other durable material. All joints in the sewer shall be watertight and root proof. That portion of the sewer line within fifth (50) feet of any well or suction line from a well, or within ten (10) feet of any drinking water supply line under pressure or within five (5) feet of any basement foundation shall be durable, corrosion resistant, root proof, and so installed as to remain water tight.

B. **Excavation**: Excavations for pipelines, fittings, and appurtenances shall be open trench to the depth, grade and in the direction necessary. The trench bottom shall be graded to provide a smooth, firm and stable foundation at every point throughout the length of the pipe, fitting or appurtenance. Should large gravel, cobbles, rocks, clods, or other unsuitable material be encountered at the trench bottom, they shall be removed. (See Diagram 4 in Appendix A). Where necessary, approved fill as specified in Section C below shall be placed to provide uniform support between the pipe, fitting or appurtenance and undisturbed trench bottom. The area of the trench at pipe joints (bells) shall be over excavated as necessary to provide uniform bearing of the bells on undisturbed ground. Each joint shall be recessed in undisturbed soil or approved fill in such a manner as to relieve the bell of the pipe of all load and to ensure continuous bearing along the pipe barrel upon the pipe subgrade (trench bottom).

C. **Approved Fill**: Approved fill shall be as specified in Table #5 in Appendix B. All voids between the pipe and undisturbed soils shall be filled with approved fill. Approved fill shall be worked into place or tamped, as necessary, to consolidate the fill material and completely fill all void space between the pipe and undisturbed trench bottom. (See Diagram 4 in Appendix A). Alternate fill materials and/or methods may be allowed upon prior approval from the Department. The Department may require that an alternate fill material or method be specified and approved by a Registered Professional Engineer.

D. **Pipe Bedding**: All system piping, except for distribution laterals and manifolds within the absorption area, shall be bedded with select material. Select bedding material shall consist of loose, granular material, free from stones, clods, frozen soils, and other deleterious material. Select material may consist of job excavated or imported material and shall be placed as shown in Diagram 4 in Appendix A. All piping within ten (10) feet of the building foundation shall be bedded with sufficiently fine grained material to minimize the transmission of water to soils adjacent to the foundation.

E. **Pipe Grade**: The grade of the building sewer shall be at least two (2%) percent (two [2] foot-fall per hundred [100] feet or one-fourth [1/4] inch per foot), except for the ten (10) feet immediately preceding the septic tank, where it shall not exceed two (2%) percent. Buildings shall be planned so that a proper slope can be obtained. Where the terrain is extremely flat, the Department may allow a slope of only six (6) inches per one-hundred (100) feet, or five-tenths (0.5%) percent (six [6] inch-fall per one hundred [100] feet or one-sixteenth [1/16] inch per foot).

6.13 Cleanouts

A. Cleanouts shall consist of a sanitary wye, riser to grade and screw cap. All cleanouts shall be extended to grade.

B. Cleanouts shall be provided at the following locations:

1) Within five (5) feet of the outside of the building

2) Upstream at each change of direction of the building sewer greater than forty-five (45) degrees and at any combination of bends greater than forty-five (45) degrees occurring within any ten (10) foot section of building sewer, except between the septic tank and absorption area

3) At intervals of not more than one-hundred (100) feet, except between the septic tank and absorption area

6.14 Bends

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

6.15 Lift Stations

Lift stations intended solely for the purpose of delivering septic tank effluent to a non-engineered (conventional) absorption area that is located such that it is not possible to provide gravity flow from the septic tank to the absorption area are not required to be designed by a Registered Professional engineer. Lift stations are subject to the applicable sections of these regulations. The system contractor shall apply for a lift station on a form provided by the Department and shall receive approval prior to installation of the lift station.

SECTION 7.0 SEPTIC TANKS

7.1 Approval by Department

No septic tank shall be used in the Tri-County area unless it has been approved by the Department.

7.2 Septic Tank Design Criteria (See Diagram 5 in Appendix A)

A. A septic tank shall be constructed to permit detention of incoming sewage for a minimum of thirty (30) hours, based on peak flow (1.5 x average flow), or the capacity shall be based upon the number of bedrooms according to Table #6 in Appendix B.

B. Except for gray water systems, the effective liquid capacity shall be no less than one-thousand (1,000) gallons.

C. The inlet invert shall be a minimum of three (3) inches higher than the outlet invert.

D. The outlet tee or baffle shall extend above the surface of the liquid to within one (1) inch of the underside of the tank top and shall extend at least fourteen (14) inches below the outlet invert.

E. The distance from the outlet invert to the underside of the tank top shall be at least ten (10) inches.

F. The liquid depth shall be a minimum of thirty (30) inches and the maximum depth shall not exceed the tank length or sixty (60) inches, whichever is less.

G. A septic tank shall have two (2) or more compartments or more than one (1) tank may be used in series to provide the required capacity arrangement. The first compartment of a septic tank shall hold between fifty (50%) percent and sixty-seven (67%) percent of the required effective capacity.

H. The transfer of liquid from the first compartment to the second or successive compartment shall be made at a liquid depth of at least fourteen (14) inches below the outlet invert but not in the sludge zone.

I. At least one (1) access no less than twenty (20) inches across shall be provided in each compartment of a tank.

J. The opening cover of a septic tank manhole, inspection port, or sampling access port shall be no deeper than eight (8) inches below the finished grade. Risers, where used, shall be sealed at the manhole with mastic rope or by other means such that they are water tight.

K. Septic tanks and vaults shall be set on a firm, level, stable footing so as to avoid settling.

L. Backfilling around a septic tank shall be accomplished in a manner to prevent tank settlement and avoid undue strain on the tank and the pipes entering and leaving the tank.

M. Tanks shall be constructed and installed to withstand earth and hydrostatic pressures while either full or empty.

N. Unless otherwise approved by the Department, concrete tanks shall have a minimum thickness as follows: Outside Walls: three-and-one-half (3-1/2) inches; Lids: six (6) inches; Top of Tank: six (6) inches; Divider Walls: three (3) inches; Bottom: four (4) inches.

O. PVC SDR 35 or ASTM D 3034 pipe of equal strength shall extend from the building or dwelling to the septic tank, and from the septic tank to the absorption system. The inlet and outlet tee or baffle shall be sealed with mastic rope or cement grout to prevent leakage into or out of the septic tank.

P. Septic tanks shall contain all liquids and solids within the tank, without leaking. The Department may require a water tightness test prior to approval of a system.

Q. The contents of a septic tank, the use of which has been terminated, shall be properly disposed of and the emptied tank shall be filled with soil or rock, collapsed and buried, or crushed and removed.

SECTION 8.0 ABSORPTION SYSTEMS

8.1 Suitable Soil

For a system treating and disposing of effluent through a soil absorption system, the method for calculating the minimum absorption area shall be based upon the amount of suitable soil and the capacity of the soil to absorb liquids as established by the percolation test and upon the design criteria and construction standards for such type of absorption system as set forth in this Regulation. Soil building or replacement may be permitted to bring the soil within the requirements of suitable soil.

8.2 Floodplains

Except as prohibited in Sections 16.0.C and 18.2.B., when a system is installed in a 100-year floodplain, then the new or repaired system shall meet or exceed the requirements of the National Flood Insurance Program. The system, as approved by the Health Officer, shall be designed to minimize or eliminate infiltration of flood waters into the system and discharge of the system into the flood waters.

8.3 Absorption Area

A. The minimum absorption area in square feet for an individual sewage disposal system shall be determined as set forth in Table #7 in Appendix B.

B. The minimum absorption areas for absorption beds and trenches shown in Table #7 in Appendix B are calculated by System Sizing Formula #1 in Appendix C.

C. Soils with percolation rates exceeding 60 min./in. are unsuitable for absorption systems sized by the criteria in Table #7 in Appendix B.

8.4 Additional Area

The absorption area so calculated shall be the minimum required area. The Department may recommend additional area if soils, percolation, flow or other data indicate that the minimum required area may be insufficient.

8.5 Alternating Systems

A. A diversion valve or other approved diversion mechanism may be installed on the septic tank effluent line allowing alternating soil absorption systems.

B. The diversion mechanism shall be readily accessible from the finished grade and shall be switched on an annual basis in the summer.

C. Where a repair is made requiring an additional absorption area, a diversion valve or other approved diversion mechanism shall be installed to allow alternating effluent flow.

D. Each soil absorption system shall be a minimum of fifty (50%) percent of the total area required in Table #7 in Appendix B.

E. Reductions in absorption field area are not applicable to alternating systems.

8.6 Commercial, Business, Institutional or Industrial Property

A. For an individual sewage disposal system serving a commercial, business, institutional or industrial property with percolation rates between 5 and 60 minutes per inch, the absorption area shall be sized using System Sizing Formula #3 in Appendix C.

B. For an individual sewage disposal system serving a commercial, business, institutional or industrial property, the system must be designed by a Registered Professional Engineer.

C. The maximum application rates (in gallons per square foot per day) given in Table #7 in Appendix B for commercial, business, institutional or industrial installations, are calculated by System Sizing Formula #2 in Appendix C.

8.7 Adjustment for Deep Gravel

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 System Sizing Formula #4 in Appendix C.

8.8 Adjustment for Dosing

If dosing is used in conjunction with an absorption trench or bed system, a reduction of twenty-five (25%) percent is allowed.

8.9 Large Absorption Fields

Any absorption area which exceeds two-thousand (2,000) square feet in area or more than four hundred (400) lineal feet of distribution pipe shall be dosed.

8.10 Protection of Absorption Areas

A. The ground surface shall be graded to deflect precipitation or other outside water from the absorption area.

B. The absorption area shall be protected against erosion.

C. Absorption areas should be seeded with a low water demand grass as recommended by the County Extension Office.

D. After installation, the surface area of absorption areas has limited uses. Nothing shall be placed or constructed on the finished absorption areas that will seal the surface of the soil or cause compaction, i.e., concrete, asphalt, driveways, and corrals.

8.11 Additional Requirements During Construction

A. Trenches or beds shall not be excavated when the soil is wet enough to smear or compact easily.

B. Care must be taken to prevent sealing of the soil on the bottom and sides of the rock to reduce the effects of compaction. The bottom of absorption beds shall be deeply raked or ripped to eliminate compaction before placement of rock.

C. Open excavations shall be protected from surface runoff to prevent the entrance of silt and debris.

8.12 Maximum Length

Trenches or beds shall not exceed one hundred (100) feet in length in any one direction from the point of effluent entry and the bottom shall be excavated level.

8.13 Rock or Gravel

A. Clean graded gravel, rock or material of equal efficiency shall cover the entire bed or trench to an average depth of one (1) foot, as indicated in Diagram 6 in Appendix A.

B. Rock used in absorption beds shall be clean, graded rock, one-half (1/2) inch to two-and-one-half (2-1/2) inch in size, with the amount of rock less than one-half (1/2) inch not to exceed ten (10%) percent by volume.

8.14 Distribution Pipe (See Diagram #6 in Appendix A)

A. Perforated distribution pipe PVC (rigid type) not less than three (3) inches in diameter shall be required in beds and trenches.

B. The pipe shall be laid level and surrounded by gravel or rock.

C. The pipe shall be placed so that there is a minimum of at least two (2) inches of rock above the top of the pipe. The rock may be mounded over the top of the pipe provided there is no less than six (6) inches of rock in the valley between the pipes.

D. The separating distance between parallel distribution pipes in an absorption bed shall not exceed six (6) feet.

E. The pipe shall be no more than three (3) feet from sides and end walls of the absorption bed.

F. The pipe within absorption beds with two or more distribution lines shall be tied or looped together so that effluent can reach all parts of the system.

G. The perforations shall be placed so that they are opposite each other at the bottom of the pipe. Most perforated PVC has a printed data line stenciled directly on the top so that if the print is on top, the perforations will be in proper position at the bottom.

8.15 Inspection Pipes

Inspection pipes shall be installed at the opposite ends of the absorption area from where the effluent enters. If trenches are constructed, an inspection pipe shall be installed at the end of each individual trench. Inspection pipes must extend to finished grade (see Diagram 6 in Appendix A).

8.16 Soil Cover

A. Before the final cover of soil, the top of the rock shall be covered with untreated building paper, a two (2) inch layer of hay, straw, or similar pervious material to prevent the stone from becoming clogged by the earth backfill.

B. At least ten (10) inches of soil shall be placed over the paper, straw or hay to finished surface grade of the seepage bed or trench. The final cover shall be graded to deflect runoff water away from the absorption area.

C. Machine tamping, rolling or hydraulic compaction of final cover shall not be permitted; however, hand tamping may be allowed, where necessary, to stabilize the soil to prevent erosion or the intrusion of extraneous water.

8.17 Absorption or Seepage Pits

A. Absorption or seepage pits in an area having adequate soil absorption may be permitted as an alternative when seepage beds are impractical and where the subsurface conditions are otherwise suitable for pit installations.

B. The capacity of a pit shall be computed on the basis of percolation tests made in each vertical stratum penetrated. The weighted average of the results shall be used to obtain a design figure.

C. Soil strata in which the percolation rate is over thirty (30) minutes per inch shall not be used for absorption or seepage pits.

D. The effective area of the pit is the vertical sidewall area (based on dug perimeter) of the pervious strata below the inlet. No allowance shall be made for impervious strata or bottom area.

E. Pits shall be separated by a distance equal to three (3) times the greatest lateral dimension of the largest pit.

F. For pits over twenty (20) feet in depth, the minimum space between pits shall be twenty (20) feet.

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

H. Adequate safety protection shall be provided to protect against personal injury during construction or use.

8.18 Drywells

A. Drywells shall be filled with clean, graded rock from one-half (1/2) to two and one-half (2-1/2) inches in diameter. The rock shall extend from the bottom of the pit to at least two (2) inches above the inlet pipe.

B. At least one (1) four (4) inch perforated vertical standpipe will be attached to the end of the distribution line and fitted with a removable cap to be used as an inspection pipe.

C. The absorption area of the drywell shall be computed on the basis of percolation rates. The weighted average of the results shall be used to obtain a design figure. The effective area of the pit will be calculated by adding the area of the sidewalls below the horizontal inlet line and the area of the bottom of the pit excluding any impermeable stratum penetrated. Drywells so sized may only be permitted in soils with a percolation rate less than sixty (60) minutes per inch.

D. Drywells shall be separated by a distance equal to the depth of the excavation or ten (10) feet, whichever is greater.

8.19 Serial Distribution System

A. A serial distribution system may be used in all situations where a soil absorption system is permitted and may be used where the ground slope does not allow for suitable installation of a single-level seepage bed.

B. The horizontal distance from the side of the absorption trench to the surface of the ground shall be adequate to prevent lateral flow and eruption of effluent above ground.

C. When a serial distribution system is used, the following design and construction procedures shall be followed:

1) The bottom of each absorption trench and its distribution line shall be level

2) There shall be a minimum of ten (10) inches of backfill over the rock

3) An absorption trench shall follow approximately the ground surface contours so that variation in trench depth will be minimized

4) There shall be a minimum of six (6) feet (horizontal measurement) of undisturbed earth between adjacent absorption trenches and between the septic tank or other treatment unit and the nearest absorption trench

5) Adjacent absorption trenches shall be connected with a relief line or a drop box arrangement such that each trench fills with effluent to the top of the rock before flowing to succeeding trenches

6) Relief lines connecting adjacent trenches shall be constructed on undisturbed ground to prevent “short-circuiting” of effluent to the lower trenches. An impermeable collar may be required to be constructed around the relief line at each upper trench to prevent “short-circuiting” of effluent from a higher trench to a lower trench.

8.20 Systems Not Using Gravel

Systems not using gravel may be allowed by the Department provided they have been approved by the Colorado Department of Public Health and Environment (CDPHE) in accordance with C.R.S., 25-10-108. Specific Department requirements for systems not using gravel which have been approved by CDPHE prior to the effective date of this regulation are presented below.

A. SB-2 Systems

SB-2 Systems are acceptable as non-engineered systems in areas where trenches and seepage beds are allowed by the Department. SB-2 Systems may be allowed by the Department provided the installation meets the following requirements:

1) Four (4) feet of suitable soil shall be provided below the bottom of the SB-2 trench

2) SB-2 trench width shall not be less than twenty-four (24) inches

3) Trench depth shall not exceed thirty-six (36) inches and a minimum of six (6) inches of backfill shall be provided over the SB-2 pipe

4) Trench length shall not exceed eighty (80) feet and the trench bottom shall be level to plus or minus one (1) inch in eighty (80) feet

5) A minimum of six (6) feet of undisturbed soil shall exist between successive trenches. All trench bottoms shall be at the same elevation unless a serial distribution system is utilized. The Department may approve the use of distribution boxes and manifold lines on SB-2 systems on a case-by-case basis.

6) System sizing requirements are presented in Table #7 in Appendix B and as follows: For ten (10) inch SB-2 pipe, 1 L.F. of pipe = three (3) sq. ft.; for eight (8) inch SB-2 pipe, 1 L.F. = two (2) sq. ft.

7) SB-2 pipe shall be placed in the trench with the green stripe at the top. Pipe shall be joined with acceptable corrugated polyethylene couplings. Drain guard protective wrap shall be installed following manufacturer's recommendations. Inspection/cleaning ports shall be installed on each line for serially distributed systems and on a minimum of one line when all trenches are installed at the same elevation. Any line not ending with a port shall have a polyethylene (PE) cap. All PVC to PE pipe connections shall be made with approved fittings including but not limited to offset adapters and reducing tees. PE to PE connections shall use PE fittings.

8) Rock and soil clumps exceeding two (2) inches in diameter shall not be used as backfill

9) For soils with percolation rates exceeding forty (40) min./in., or fine textured soils, a loose backfill may be required by the Department

10) Any system installer who cannot prove to the satisfaction of the Department that he/she has previously installed a SB-2 system shall have an SB-2 authorized factory representative onsite for the installer's first SB-2 installation in Tri-County. The SB-2 factory representative shall instruct the installer in proper SB-2 installation technique and shall report to the Department in writing whether or not the system was installed in conformance with manufacturer's recommendations. As a substitute for the onsite factory representative, the Department may accept certification that the installer has attended a factory sponsored SB-2 training program.

B. Chamber Systems

1) Approved chamber systems are acceptable in areas where trenches and absorption beds are allowed by the Department. Chamber systems shall be installed in accordance with all manufacturers' requirements. For single-family residential systems utilizing Infiltrator H-10, High Capacity H-10, or H-20 units, Hancor Envirochamber or Biodiffuser units, the minimum number of chambers per bedroom is determined using System Sizing Formula #6 in Appendix C.

2) For single-family residential systems utilizing Infiltrator EQ-36 units, the minimum number of chambers per bedroom (bed configuration) is determined by dividing the appropriate "Minimum Area for Seepage Beds" in Table #7 in Appendix B by 20.8 square feet. For single-family residential systems utilizing Infiltrator EQ-36 units, the minimum number of chambers per bedroom (trench configuration) is determined by dividing the "Minimum Area for Seepage Beds" in Table #7 in Appendix B by 31.93 square feet.

3) For business, commercial, industrial, or institutional installations utilizing Infiltrator H-10, High Capacity H-10, or H-20 units, Hancor Envirochamber or Biodiffuser units, the minimum number of chambers shall be determined using System Sizing Formula #7 in Appendix C.

4) For business, commercial, industrial, or institutional installations utilizing Infiltrator EQ-36 units, the minimum number of chambers is determined by dividing the "Area A" from System Sizing Formula #3 in Appendix C by 20.8 square feet (bed configuration), or by 31.93 square feet (trench configuration).

5) Chamber units not mentioned in Sections 8.20.B. 1-4 above which receive approval from the Colorado Department of Public Health and Environment (CDPHE) will be considered on a case-by-case basis. If approved by Tri-County Health Department, the Department will provide criteria for determining the appropriate number of chamber units.

SECTION 9.0 ENGINEERED SYSTEMS

9.1 Conditions When Required

One or more of the following conditions will require that the system be designed by a Registered Professional Engineer and be approved by the Department:

A. Where the soil percolation rate is slower than one (1) inch in sixty (60) minutes or faster than one (1) inch in five (5) minutes. A non-engineered system may be allowed with a percolation rate faster than one (1) inch in five (5) minutes in soils of sandy texture.

B. Where the maximum seasonal level of the groundwater table is less than four (4) feet below the bottom of the proposed absorption system

C. Where bedrock or Dawson Sand exists less than four (4) feet below the bottom of the proposed absorption system

D. Where the ground slope is in excess of twenty (20%) percent

E. Where the individual sewage disposal system will service a commercial, business, institutional or industrial property or multi-family dwelling(s)

F. Where the system must be dosed due to site conditions (except lift stations) or requirements of this regulation

G. Where the system will discharge effluent directly to the atmosphere, the ground surface, or below ground, or which employ aerobic principles of sewage treatment or a dispersal system

H. Where the system is considered to be “Experimental” as described in Section 12.0

I. Where the system will dispose of effluent by discharging into State Waters as described in Section 15.0

9.2 Plans and Specifications

Plans and specifications for systems designed by a Registered Professional Engineer shall include, as a minimum, the following elements:

A. A plan view to scale of the system on the property including the building sewer

B. All distribution piping and the septic tank

C. A cross section through the system

D. Pipeline slopes and materials

E. Specifications for all materials used in the system

F. Any other information required by the Department in order to determine that the proposed system is designed in accordance with this regulation

G. Plans and specifications shall be stamped and signed by the engineer responsible for the design

H. The design engineer shall specify in the plans what inspections will be required during construction of the engineered system

9.3 Inspections (See Section 3.17)

9.4 System Approval and System Diagrams

A. At the completion of the installation of an engineered system, the engineer shall submit to the Department a letter stating that the system has been installed in conformance with the plans and specifications approved by the Department and a diagram of the system as required in Section 4.5 E. of these regulations. The engineer's letter shall include a list of all inspections made and whether those inspections were satisfactory.

B. In conjunction with a field visit by a Department representative prior to backfill, unless waived as provided for in Section 3.17 B. of this regulation, the final determination by the Department as to whether the work has been performed in accordance with permit requirements will be withheld until the letter is received and approved.

C. The engineer shall review and approve the system diagram and indicate on the diagram that he/she has reviewed and approved it. A Professional Engineer Seal on the drawing is not necessary.

9.5 Evapotranspiration System

A. An evapotranspiration system (ET) may be used exclusively or in combination with a soil absorption system (see Diagram 7 in Appendix A).

B. An evapotranspiration system shall be designed by a Registered Professional Engineer who shall furnish design data for a complete review of the design.

C. Data to be furnished shall include, but shall not be limited to: liner material and bedding, properties of the soil in the evapotranspiration bed, and provision for vegetation cover.

D. An evapotranspiration system shall be located in an area where there is unobstructed exposure to sunshine.

E. The system bed shall be crowned and covered with a minimum of four (4) inches of selected backfill material and with a vegetation cover.

F. **Flow Rates**: Flow rates are based upon the number of bedrooms. Flow rates shown in the second column of Table #8 in Appendix B entitled "Design Residential Flow Rate (Formula Method)" are calculated as indicated for "Q" in System Sizing Formula #1 in Appendix C and discussed in Section 5.1. Flow rates shown in the third column of Table #8 in Appendix B entitled "Design Flow Rate (Water Balance Method)" are calculated as indicated for "Q" in System Sizing Formula #1 in Appendix C, omitting the 1.5.

G. **Sizing**: Evapotranspiration Systems shall be sized using one of the following methods:

1) Formula Method

If this method is selected, System Sizing Formula #5 in Appendix C shall be used for determining the area necessary for total evapotranspiration of septic tank effluent.

Lake evaporation in the Tri-County area is shown on U.S. Department of Commerce Weather Bureau, Technical Paper #17, as ranging from 40 to 50 inches/year with the Front Range area at approximately 40 inches/year or an application rate of approximately 0.07-gal/sq. ft./day. This translates to the minimum sizes shown in Table #9 in Appendix B.

2) Water Balance Method

An evapotranspiration system may be designed on the basis of a monthly water balance for the system. Such a design shall provide for total storage of average daily flows for all periods in which evapotranspiration is not shown to occur. Table #10 in Appendix B shall be used to determine the maximum allowable soil absorption rate based on the maximum percolation rate from the set of percolation test holes.

If the water balance method is selected, the following minimum information shall be provided in a table or spreadsheet format:

a. Monthly wastewater flow into system

b. Monthly precipitation infiltrating into system

c. Initial moisture content in bed sand and topsoil cover

d. Monthly evapotranspiration rate

e. Amount absorbed into soils

f. Storage capacity of bed in gallons

g. Monthly precipitation and evapotranspiration shall be from a reputable source such as the National Oceanic and Atmospheric Administration

H. **Design**: The design shall conform to Diagram 7 in Appendix A.

I. **Topsoil**: This material should be selected or mixed to provide a cover that will promote the movement of water to the surface and provide a base for good vegetative cover.

J. **Sand**: Sand utilized in ET beds shall meet the gradation requirements shown in Table #11 in Appendix B. Sand shall be well graded as defined by ASTM D 2487, particularly between the #40 and #200 sieve sizes. Design engineers shall approve systems contractor's sand prior to delivery of material to the site and shall submit to the Department, prior to final approval, sand gradation results showing conformance with this Section.

K. **Gravel**: Clean one-half (1/2) inch to two and one-half (2-1/2) inch rock.

L. **Line Separation**: Line separation shall not exceed six (6) feet.

M. **Chamber Systems Within ET Beds**: Approved chamber systems may be utilized in evapotranspiration beds. The chamber units must be spaced to provide an equal or greater amount of storage within the bed than would be provided by gravel as required in Diagram #7 in Appendix A.

N. **Liner**: When high groundwater table, permeable bedrock, fractured rock, or highly pervious material (percolation faster than five [5] minutes per one [1] inch) endanger the groundwater, a durable and impermeable liner shall be installed in the bed to prevent the sewage effluent from entering the underlying formation or groundwater table. Liners, if required, are to be a minimum of 20 mil. thickness. Surfaces on which liners are to be placed shall be thoroughly prepared to be free of protrusions and materials which could puncture or otherwise damage or weaken the liner. If it is not possible to remove protrusions which may damage the liner, the systems installer shall provide sand bedding for the liner of adequate thickness to protect the liner.

O. **Drainage**: All surface drainage must be diverted around the field and the field must be sufficiently crowned to provide good runoff.

P. **Vegetation**: It will be necessary to contact the Soil Conservation Service or County Extension Agent to determine what grasses are best suited for each area and landscaping plan. Trees should not be planted at any location which will eventually shade the field.

Q. **Plans**: Provide a good set of plans, including a topographical map and plot plan showing the location of the system and any feature on the lot that might affect the location or operation of the system. This will expedite the Department review and subsequent issuance of an installation permit.

R. The bed area shall be protected to prevent damage from vehicular, pedestrian, or equestrian travel. A diversion ditch and/or berm shall be provided on the uphill side(s) of the bed to deflect precipitation and other outside water away from the evapotranspiration system.

9.6 Drip Irrigation or Low Pressure Pipe Systems

Drip irrigation or low pressure pipe systems may be allowed by the Department provided the system is designed by a Registered Professional Engineer and approved by the Department. All drip irrigation or low pressure pipe systems shall meet the following minimum requirements:

A. Trenching shall not occur when soils are wet.

B. Trench depth shall not exceed thirty (30) inches and trench length shall not exceed one hundred (100) feet. Trench bottom shall be level ± one and one-half (1-1/2) inches.

C. System dosing shall comply with the requirements of Section 9.11.

D. No irrigation shall be allowed over the disposal area.

E. The system shall only be utilized when a four-foot separation can be obtained between the bottom of the trench and fractured bedrock and/or seasonally high water table.

F. Systems shall not be located upgradient from structures unless the design engineer makes a determination and certifies in writing to the Department that it is his/her professional opinion that effluent from the system will not enter foundation drains and/or will not have any structural impact on the building.

G. In observing the construction of the system, the engineer shall inspect and survey with appropriate level, tripod and survey rod the alignment, elevation and grade of manifold and distribution lines to assure that they conform with approved plans. The engineer's written final report to the Department shall certify that this work was performed and that the construction is approved.

H. Engineers designing Drip Irrigation or Low Pressure Pipe systems shall submit design criteria for system sizing for review and approval by the Department. The effects of soil permeability (percolation rate), slope, and depth to the bedrock must be addressed by the criteria. The criteria must include soil and site conditions under which system installation is unacceptable. Design criteria shall also estimate the percent disposal by evapotranspiration and absorption.

9.7 Sand Filter

A. A sand filter shall be designed by a Registered Professional Engineer. The filtering material shall be clean, coarse sand, all passing a screen having four meshes to the inch.

The sand shall have an effective size (D_{10}) between 0.24 and 1 mm. The uniformity coefficient (C_u) shall be 4.0 or less.

B. The sand shall be at least two (2) feet deep. The distributors and underdrain shall be surrounded by coarse screened gravel or crushed stone.

C. All of the gravel or stone shall pass a two and one-half (2-1/2) inch screen and shall be retained on a three-fourths (3/4) inch screen. Fine gravel one-fourth (1/4) inch size or less may be used above and around the coarse material, both at the distributor and underdrains. The separating distance between parallel distribution lines shall not exceed six (6) feet and underdrains shall be sloped at five-tenths (0.5%) percent to one (1%) percent. It is required that the sand be thoroughly settled by flooding or other means before the distributors are placed at the final grade. The distributor and underdrains shall be of PVC perforated pipe. The top of the sand bed shall be no less than four (4) feet above the high groundwater table for installations in which effluent percolates downward through the soil.

D. The minimum area for a sand filter shall be computed as a function of the maximum daily sewage flow according to Table #12 in Appendix B. A dosing system shall be designed to provide uniform distribution of effluent over the filter. Uniform Dosing shall comply with the provisions of Section 9.12. The size of the dose shall be at least five (5) times the volume of the distributors, plus the supply line volume.

9.8 Recirculating Sand Filter

A system utilizing a recirculating sand filter shall be designed by a Registered Professional Engineer and shall comply with the requirements listed below:

A. Filter Design and Dosing

1) Filter area shall be sized based on a maximum organic load. The area shall mean basal or bottom area. For residential strength septic tank effluent, the maximum hydraulic load shall be 5 gal/sq. ft./day.

2) For BOD_5 waste strength stronger than residential septic tank effluent, but not exceeding 400 mg/l, the filter size shall be increased proportionately.

3) Higher strength wastewaters shall be pretreated or will require special consideration. The concentration of greases and oil applied shall in no case exceed 30 mg/l.

B. Filter Media

1) Filter media shall consist of a minimum of two (2) feet of very coarse washed sand, conforming to the maximum and minimum sand gradation shown in Table #13 in Appendix B.

2) Design engineers shall approve the filter media prior to delivery of the material and shall submit to the Department, prior to final approval, media gradation results showing conformance with this section.

3) Filter media shall be overlain by a three (3) inch bed of one-half (1/2) inch to three-fourths (3/4) inch washed gravel. It shall be only lightly covering the distribution piping. Unless otherwise authorized, each orifice shall be covered by an orifice shield.

4) Filter dosing shall be designed to provide uniform dosing to comply with Section 9.12.

5) Filter media shall be underlain by a six (6) inch bed of three-eighths (3/8) inch to three-fourths (3/4) inch washed gravel underdrain media. There shall be no filter fabric over the underdrain media.

6) Perforated collection pipes shall be bedded in the underdrain media. Pipes shall be a four (4) inch minimum diameter with no filter fabric wrap. There should be at least fifteen (15) lineal feet of collection pipe for each 225 square feet of filter basal area.

7) The filter container shall be watertight to suit the design conditions. Underflow shall be contained. A concrete container may be used. Other materials may be used where equivalent function, workmanship, water tightness and at least a twenty (20) year service life can be expected.

C. Recirculation/Dilution Tank

1) A recirculation tank receives septic tank effluent and underflow from the filter. A pumping system at this tank delivers flow to the filter dose piping network according to design. The recirculation tank volume shall be equal to the projected daily sewage flow volume.

2) The recirculation ratio at design flow shall not be less than four (4). Recirculation ratio is the daily volume of recycle divided by design daily volume of the wastewater. A fabricated “T” or “Splitter T” float valve located in the recirculation tank should be used whenever possible. Minimum recirculation tank liquid volume should be no less than eighty (80) percent of the gross tank volume when a float valve is used. Alternatively, a splitter basin using orifice or weir control may be used where required and reasonable to divide underflow twenty (20) percent to disposal and eighty (80) percent to recycle on a daily basis. Orifice control should be used wherever possible. Minimum recirculation tank liquid volume should be no less than fifty (50) percent of the gross tank volume when a splitter basin is used.

3) An evaluation and design for overflow and surge control at the recirculation tank shall be included in each design.

4) A high water alarm shall be included in the recirculation tank immediately below the overflow level.

5) Parallel pump start/stop electric controls (usually floats) should be installed to correct any unforeseen high liquid level and keep sewage contained. This pump start function merely precludes overflow and shall operate in parallel with the start/stop function of a timer. It shall not interfere with or depend upon a timer position.

6) All areas of the filter should be dosed forty-eight (48) times a day or each thirty (30) minutes to achieve the recirculation ratio of at least four (4).

7) Access openings to the recirculation tank shall be provided at each end. Larger tanks should have additional openings.

D. Operation and Maintenance (O & M) Manual

The design engineer shall provide an operation and maintenance manual to the property owner and the Department before the system commences operation. The manual shall incorporate "as built" details, certification that all system components have been identified in accordance with plans and specifications, and shall specify routine system inspections and frequency of those inspections.

9.9 Mound Systems

A mound soil absorption system shall be designed by a Registered Professional Engineer, and the design shall be site-specific and include specifications for fill material, fill area and basal area size calculations, distribution networks, cap, topsoil, final grading, and other pertinent information to the construction of the system as may be requested by the Health Officer. The design engineer shall submit a plan and cross-sectional view with all dimensions indicated in Diagram 8 in Appendix A.

A. The distribution system shall be designed for uniform effluent distribution over the absorption area in accordance with Section 9.12 of this Regulation.

B. The effluent supply line to the distribution network within the mound shall be graded to drain back to the dosing chamber or be buried below the frost line.

C. The final slope of the mound backfill shall be no steeper than 3 to 1 (three [3] feet horizontally to one [1] foot vertically).

D. The mound shall be planted with suitable vegetative cover. A typical mound plan and cross-section is shown in Diagram 8 in Appendix A.

9.10 Constructed Wetland Systems

A constructed wetland treatment system shall be designed by a Registered Professional Engineer and the design shall be site-specific and include specifications for loading, capacity, liner material, filter media, density and species of plant material, effluent level, final discharge type, and other pertinent information as requested by the Health Officer. Constructed wetlands shall conform to the following criteria:

A. A level control structure that allows for the altering of water level or complete drainage of water from the wetland shall be installed in each wetland treatment cell.

B. Neither the common reed (Phragmites communis) nor purple loosestrife (Lythrum salicaria) shall be intentionally planted within a constructed wetland.

C. All constructed wetlands shall be designed as sub-surface flow through the treatment area.

D. The minimum residence time within the constructed wetland shall not be less than four (4) days for residential sewage flows.

E. The length to width ratio of a constructed wetland shall not exceed 5:1.

F. The design shall include estimates of effluent quality at the inlet and outlet. If discharge from the constructed wetland will be directly to the atmosphere, the ground surface, or below ground through unsuitable soil, sampling ports, or some other means of effluent sampling, to demonstrate compliance with Section 11 of these regulations, shall be required. Sampling, if required, is to be paid for by the property owner.

9.11 Dosing Systems

A. All dosing systems shall be designed by a Registered Professional Engineer. The engineer shall submit design calculations and drawings for the system to include the following minimum information:

1) Manufacturer's pump performance curve for pump selected, showing capacities, heads, and efficiencies for the entire range of the pump

2) If a dosing siphon is selected, provide manufacturer, model number, and all other relevant information

3) System curve

4) Size of dose

5) Drawing showing the layout of supply piping and distribution network, including diameter of piping, spacing and lengths of piping, perforation (orifice) size and spacing

B. Lift stations intended solely for the purpose of delivering septic tank effluent to a non-engineered (conventional) absorption area that is located such that it is not possible to provide gravity flow from the septic tank to the absorption area are not required to be designed by a Registered Professional Engineer.

C. Prior to installing a lift station, the systems installer shall submit to the department, in writing, the following information for review and approval:

1) Pump manufacturer and pump model

2) Size and manufacturer of the dosing tank

3) Elevation difference between the pump intake and the absorption area

D. A non-clog pump opening shall have at least two (2) inch diameter solids handling capacity where raw sewage is pumped or at least one-half (1/2) inch diameter solids handling capacity if previously settled effluent is pumped.

E. Automatic liquid level controls shall be provided to start and shut off pumps at a frequency required by the design.

F. Pressure pipe shall be of sufficient strength to accommodate pump discharge pressure and the pipe shall be sized to maintain a velocity of two (2) or more feet per second.

G. Automatic air release valves shall be installed at high points in the pressure line where necessary to prevent air locking.

H. Provision shall be made to prevent siphoning of effluent within the absorption system back to the dosing tank, and to drain effluent within the supply line back to the dosing tank between doses, to prevent freezing of the effluent within the supply line.

I. A dosing tank shall be provided to allow pump cycling commensurate with pump and system design capacity and to allow a minimum of three hundred (300) gallons for emergency storage.

J. The Dosing Siphon or Pump cannot be a part of the digestive or clarification compartments of a two (2) compartment septic tank.

K. Pumps shall be installed at least four (4) inches off the floor of the tank.

L. The system must be provided with both an audible and visual alarm located inside the dwelling, garage or building to signal malfunction of the system.

M. **Dosing of Chamber Systems**: If a dosing system is utilized in conjunction with chambers in the absorption area, the following criteria shall apply:

1) Distribution piping shall be installed the full length of the chambers

2) Discharge orifices shall be placed in the top of the piping such that discharge is directed upward

3) Provision shall be made to drain the distribution piping between doses to prevent freezing

9.12 Uniform Dosing

Engineered or other systems utilizing uniform dosing shall meet the following minimum requirements.

A. Each dose shall be at least five (5) and no more than ten (10) times the volume of the distribution lines within the disposal area, plus the volume of the supply line

B. The system shall be designed such that the distribution network is pressurized sufficiently to provide a minimum of 2.5 feet of head at each discharge orifice

C. The length of the laterals shall be such that the difference in discharge volume between the supply end orifice and the distal end orifice is no more than ten (10%) percent

D. Designs for uniform dosing shall include all additional information required for dosing systems in Section 9.11

SECTION 10.0 ALTERNATE SYSTEMS

10.1 Greywater System

A greywater system shall meet a least all minimum design and construction standards for a septic tank system based on the amount and character of wastes for the fixtures and the number of persons to be served.

10.2 Vault

A vault shall have a minimum one thousand (1,000) gallon effective capacity and may be permitted by the Health Officer under limited use occupancy for water carriage sewage systems on property which cannot accommodate a sewage treatment system. An audio and visual signal device set at seventy-five (75%) percent of tank capacity shall be installed to indicate when pumping is necessary. Vault permits are valid for six (6) months and may be renewed depending on sewer availability.

10.3 Vault Privy

A vault privy may be permitted by the Board of Health and shall be built to include: Fly-tight construction; a superstructure affording complete privacy; an earth mound around the top of the vault and below floor level which slopes downward away from the superstructure base; a floor and riser of concrete or other impervious material; and with seats and covers of easily cleanable, impervious material, hinged, self-closing and fly proof. All venting shall be fly-proofed with No. 16 or tighter mesh screening. Effective capacity of the vault shall be no less than four hundred (400) gallons.

10.4 Pit Privy

A pit privy constructed in soil may be permitted by the Board of Health and shall be built to include: fly-tight construction; a superstructure affording complete privacy; an earth mound around the top of the compartment and below the floor level which slopes downward away from the superstructure base; a floor and riser of concrete or other impervious material; and with seats and covers of easily cleanable, impervious material, hinged, self-closing and fly-proof. All venting shall be fly-proofed with No. 16 or tighter screening. Effective capacity of the pit shall be not less than four hundred (400) gallons. The pit shall be located in soil where the maximum seasonal level of the groundwater table or fractured bedrock will be no closer than four (4) feet below the bottom of the pit.

10.5 Incineration and Chemical Toilets

An incineration toilet which may be used in connection with a greywater system by permit from the Board of Health shall be designed and installed in accordance with all applicable federal, state and local air pollution requirements. A portable chemical toilet which may be used by permit from the Board of Health shall have a superstructure which meets the requirements of the paragraph titled “Vault Privy”. Use of a portable chemical toilet in permanently occupied buildings shall be prohibited except during construction or under emergency circumstances as determined by the Department.

10.6 Slit Trench

A slit trench may be permitted by the Board of Health and shall be located in suitable soil and shall be excavated approximately one (1) foot wide and two (2) feet deep for the required length. Excrement shall be covered with at least two (2) inches of soil at least once a day or more frequently if required by the Health Officer. A superstructure of a temporary nature shall be provided to afford privacy. A slit trench shall be considered a temporary convenience to be used no longer than seven (7) days and shall be backfilled with at least one (1) foot of soil with additional allowance for settling to grade when use has been discontinued.

10.7 Greywater Disposal and Reuse

Greywater disposal shall be administered by the Department in the same manner as sewage disposal is regulated (see Section 10.1, Greywater System). Greywater reuse must comply with

the applicable provisions of Section 11. In addition, surface irrigation of greywater which complies with the requirements of Section 11 shall not be approved by the Department if use of the water in this manner violates a condition of approval of a well permit issued by the Colorado Department of Water Resources.

10.8 Composting Toilets

A. Deposits of feces, urine and readily decomposable household garbage that are not diluted with water or other fluids may be retained in a compartment in which aerobic composting will occur. The compartment may be located, subject to the Board of Health or other applicable regulations or codes, within a dwelling or building provided the unit complies with the applicable requirements of these regulations, and provided the installation will not result in conditions considered to be a health hazard as determined by the Department. The effective volume of the receptacle must be sufficient to accommodate the number of persons served.

B. Adequate additional volume shall be provided for the use of composting materials which shall not be toxic to the process or hazardous to persons and shall be used in sufficient quantity to assure proper decomposition.

C. Compartment and appurtenances related to the unit shall include fly-tight construction and exterior ventilation as required by the plumbing code.

D. When the available effective volume is filled to seventy-five (75%) percent of capacity, residue from the unit shall be properly disposed of by acceptable solid waste practices.

E. If a system will be installed where low temperatures may be a factor, design shall compensate for the effects of the low temperature.

F. Manufactured composting toilets shall bear the seal of approval of the National Sanitation Foundation or an equivalent testing program and are otherwise approved by the Department. Composting toilets shall be operated and maintained according to manufacturer's specifications.

10.9 Wastewater Pond

A. A wastewater pond to provide tertiary treatment, where permitted by the Board of Health, may be used to provide an additional degree of treatment following secondary stage treatment. A wastewater pond shall be designed by a Registered Professional Engineer. The pond shall be designed for a loading not to exceed 0.46 pounds of BOD_5 per 1,000 square feet of water surface area. Special design shall be required in each case in which non-domestic kinds of individual sewage disposal system wastes will be received.

B. Maximum water depth in the pond shall not exceed three (3) feet. The inside slope of the pond, dike or embankment shall not be steeper than 3:1 (3 feet measured horizontally for each foot measured vertically). A center inlet shall be provided.

C. Unless constructed in impervious soil, the pond shall be lined to prevent excess seepage of wastewater.

D. Adequate safety protection shall be provided, such as fencing, to protect against personal injury.

E. Surface runoff shall be diverted away from the pond except where controlled by design.

10.10 Systems Which Recycle Treated Wastewater for Non-Potable Purposes

Systems which recycle treated wastewater for non-potable purposes such as flushing water closets or urinals:

A. That portion of the wastewater recycled for non-potable purposes such as flushing water closets or urinals must meet the requirements of Section 11 of these regulations for effluent in which the possibility exists for occasional direct human contact.

B. No cross-connection to a pipe, fixture, or supply containing potable water shall be permitted.

10.11 Systems Which Recycle Treated Wastewater for Potable Purposes

No system shall be permitted which will recycle wastewater for potable purposes except a system which shall consistently meet all of the sanitation and maximum contaminant level requirements of rules, regulations and standards of the Colorado Department of Public Health and Environment and the Board of Health.

SECTION 11.0 TREATMENT SYSTEMS OTHER THAN THOSE DISCHARGING THROUGH A SOIL ABSORPTION OR SAND FILTER SYSTEM AND NON-DISCHARGING SYSTEMS

11.1 Those systems which will discharge effluent directly to the atmosphere, the ground surface or below ground, or which employ aerobic principles of sewage treatment or a dispersal system, may be permitted only if designed by a Registered Professional Engineer. This section shall not apply to systems discharging below ground through a soil absorption system or sand filter system or to a non-discharging system.

11.2 Review of Application

The Board of Health shall review all applications for such systems which may result in discharge or drainage of effluent from the property of origin. No permit shall be issued for such a system if the Board of Health determines that a potential health hazard or private or public nuisance or undue risk of contamination exists. The Board of Health authorizes the Department to review applications and issue permits for systems which do not permit the drainage of effluent off the property of origin. For systems discharging to State Waters, see Section 15.

11.3 Minimum Performance Criteria

The following minimum performance criteria shall be required for all systems pursuant to this section.

A. If effluent discharge is made into the atmosphere or upon the ground surface in areas in which the possibility exists for occasional direct human contact with the effluent discharge, the effluent at the point of sampling shall consistently meet each of the following standards:

1) The fecal coliform density shall not exceed two (2) per one hundred (100) milliliters

2) The standard five (5) day biochemical oxygen demand (BOD_5) shall not exceed twenty (20) milligrams per liter

3) The total suspended matter shall not exceed forty (40) milligrams per liter

B. If effluent discharge is made into the atmosphere or upon the ground surface in an area so restricted as to protect against the likelihood of direct human contact with the discharged effluent, the effluent at the point of sampling shall consistently meet each of the following standards:

1) The fecal coliform density shall not exceed five hundred (500) per one hundred (100) milliliters

2) The standard five (5) day biochemical oxygen demand (BOD_5) shall not exceed twenty (20) milligrams per liter

3) The total suspended matter shall not exceed forty (40) milligrams per liter

C. If effluent discharge is made beneath the surface of the ground and discharge will not be made through suitable soil, either existing or constructed, or through a sand filter, the following standards shall be met:

1) There shall be at least four (4) feet of soil between the maximum seasonable high water table and the level of effluent discharge

2) The standard five (5) day biochemical oxygen demand (BOD_5) shall not exceed sixty (60) milligrams per liter

3) The total suspended matter shall not exceed one hundred (100) milligrams per liter

D. Methods of Analysis – Sampling Points

All effluent samples shall be analyzed according to methods prescribed in the most recent edition of "Standard Methods for the Examination of Water and Wastewater" (American Public Health Association). The point of sampling shall be a location that is representative of final discharge from the system. The cost of effluent sampling shall be borne by the property owner.

E. Frequency of Analysis

To determine compliance with the standards contained in this section, samples should be taken at least once per week but no more frequently than once per day.

SECTION 12.0 EXPERIMENTAL SYSTEM

Except for designs or types of systems which have been approved by the Colorado Department of Public Health and Environment, Water Quality Control Division, pursuant to Title 25-10-108-(1), C.R.S., the Board of Health may approve an application for a type of system not otherwise provided for in paragraphs (e) to (k) of Title 25-10-105, C.R.S., only if the system has been designed by a Registered Professional Engineer, and only if the application provides for the timely installation of a backup system of a type described in said paragraphs in the event of a failure of the experimental system. The Board of Health shall not arbitrarily deny any person the right to consideration of an application for such a system and shall apply reasonable performance standards in determining whether to approve such an application.

SECTION 13.0 MANUFACTURED UNITS UTILIZING MECHANICAL APPARATUS FOR TREATMENT OF SEWAGE AND SYSTEMS EMPLOYING NEW TECHNOLOGY

13.1 Minimum Requirements

Individual sewage disposal systems utilizing mechanical apparatus and furnished for installation in Colorado shall comply with the minimum requirements of criteria and construction standards set forth in these regulations and NSF Standard No. 40.

13.2 Operation and Maintenance

No such unit utilizing mechanical apparatus and which is designed for discharge either upon the ground or beneath the ground surface or which may adversely affect State Waters shall be permitted unless (1) the system is installed within a geographic area wherein a public, quasi-public, or private entity, or political subdivision is continually responsible for the efficient operation and maintenance of said unit, or (2) the operator of the system insures an efficient operation of all mechanical and electrical component parts provided prior to and during continuing use.

13.3 Indicators of Failure for Systems Utilizing Mechanical Apparatus

A signal device shall be installed which will provide a recognizable indication or warning to the user that the system or component is not operating or is operating but malfunctioning. This indication or warning shall be in the form of a visual and audible signal acceptable to the Department.

13.4 Aerobic Sewage Treatment System

A. General Design – The shape and design of an aeration compartment, its inlet and outlet arrangement, baffling, and air application shall:

1) Allow for intimate mixing of applied sewage, return solids, and applied air

2) Prevent excessive short-circuiting of flow

3) Prevent the deposition and build-up of solids in the aeration compartment

B. Method of Aeration – The method of aeration shall be accomplished by mechanical aeration, diffused air, or a combination of these. The method of aeration shall at all times maintain aerobic conditions at the maximum organic loading in both the aeration and settling compartments.

13.5 General – Treatment units shall be set on a firm and level base except as otherwise provided in these guidelines and shall be capable of accommodating flow with hydraulic efficiency.

13.6 Mechanical Components

A. **Ventilation and Air Systems:** Mechanical components shall be installed in a properly vented location and all vents, air intakes, and air hoses shall be protected from snow, ice, or water vapor accumulations.

B. **Components Installation:** Mechanical components installed in or at the unit must be protected against damage or impairment of their efficiency by flooding, foaming, or surcharging.

C. **Covers, Barriers or Other Protection:** All systems must be installed to include protection of openings against entrance of insects and rodents. Barriers shall be provided to prevent entrance by unauthorized persons.

SECTION 14.0 NEW TECHNOLOGY

For the purpose of this section, a system employing new technology is a system based on improvements and developments in technology or sewage disposal not otherwise provided in Section 25-10-105-(1)-(e) to (k), C.R.S.

Such systems may be considered by the Board of Health provided they have been certified by the Colorado Department of Public Health and Environment according to Section XI of the *Colorado Department of Public Health and Environment Guidelines on Individual Sewage Disposal Systems*, as adopted in 2000.

SECTION 15.0 EFFLUENT DISCHARGED TO STATE WATERS

Any system which will dispose of effluent by discharging into State Waters shall be designed by a Registered Professional Engineer, and the application shall be submitted for preliminary approval to the Board of Health. Once approved, the application shall be forwarded to the Water Quality Division of the Colorado Department of Public Health and Environment for issuance of a permit in compliance with all applicable regulations of the Water Quality Control Commission. Compliance with such a permit shall be deemed in full compliance with all individual sewage disposal system regulations.

SECTION 16.0 IMPACT OF CHERRY CREEK BASIN CONTROL REGULATION ON INDIVIDUAL SEWAGE DISPOSAL SYSTEMS

A. The water quality management master plan (Master Plan), prepared for the Cherry Creek Basin by the Cherry Creek Basin Water Quality Authority, determined that phosphorous loading from septic systems should be limited to four hundred fifty (450) pounds per year. The Colorado Water Quality Control Commission adopted the four hundred fifty (450) pounds per year phosphorous limit as regulation on November 6, 1985.

B. The Master Plan has charged Tri-County Health Department with developing regulations to require Best Management Practices (BMPs) to limit phosphorous contributions from individual sewage disposal systems within the basin. Consequently, new systems permitted and installed within the Cherry Creek Basin in soils classified as gravels or sands and/or having percolation rates faster (less than) twenty (20) minutes per inch shall be subject to the following additional requirements:

   1) Two alternating absorption areas shall be constructed. The absorption areas shall be sized based on the criteria given in Table #7 in Appendix B, with no reduction in size allowed.

   2) A diverter valve shall be installed to allow wastewater to be applied to one absorption area at a time for a period of one year. The diverter valve shall be changed during the summer. Each field shall be dosed in accordance with Section 9.12.

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

SECTION 17.0 OPERATION, MAINTENANCE AND CLEANING

17.1 Rules and Regulations – Board of Health Authority to Adopt

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

17.2 Responsibility

The owner and the party in possession of real property upon which an individual sewage disposal system is used shall be jointly and severally responsible for operation and maintenance of the system and for abatement of any nuisance arising from its failure unless jurisdiction for responsibility has been transferred to a public, quasi-public, or political subdivision. The person denying such responsibility shall bear the burden of proof for such denial upon establishment of ownership or possessor rights in the property served by the system.

17.3 Maintenance, Cleaning and Effluent Testing Schedules

In order to insure good working order, the schedule in Table #1 in Appendix B shall apply to all individual sewage disposal systems.

17.4 Service Label

For treatment plants utilizing mechanical apparatus or under a service policy, a clearly visible, permanently attached label or plate giving instructions for obtaining service shall be placed at a conspicuous location.

17.5 Maintenance and Cleaning

When directed by the Department for the purpose of obtaining compliance with rules and regulations, the owner or user of a system shall provide for maintenance and cleaning of an individual sewage disposal system and shall notify the Department upon completion of any maintenance work and report to said Department and submit such evidence of compliance with any maintenance and cleaning schedule in the form and as the Department requires.

17.6 Monitoring and Sampling

A. Reasonable periodic collection and testing by the Department of effluent samples from individual sewage disposal systems for which monitoring of effluent is necessary in order to insure compliance with the provisions of rules and regulations may be performed not more than two times a year, except when required by the Health Officer in conjunction with an enforcement action.

B. Any owner or occupant of property on which an individual sewage disposal system is located may request the Department to collect and test an effluent sample from the system. The Department may perform such collection and testing services.

C. A fee to be fixed by the Board of Health by separate resolution shall be charged by the Department for each sample collected and tested, and payment of such charge may be stated in the permit as a condition for its continued use.

17.7 Disposal of Waste Materials

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

17.8 Termination (Abandonment) of Use of System

The contents of a septic tank, vault, seepage pit, or cesspool, the use of which has been terminated, shall be properly disposed of and the emptied tank, vault, pit, or cesspool shall be filled with soil or rock, collapsed and buried, or crushed and removed.

SECTION 18.0 GENERAL PROHIBITIONS AND PENALTIES

18.1 For purposes of administration and enforcement of the "Individual Sewage Disposal Systems Act" (Title 25, Article 10, C.R.S.), the following provisions of said Act specifying general prohibitions and penalties are set forth:

A. No person shall establish, construct, or maintain any premises having a dwelling or other structure which is not equipped with approved facilities for the disposal of sewage in a sanitary manner. Under no condition shall sewage or effluent from any premises having a dwelling or other structure be deposited upon the surface of the ground, into a stream, irrigation ditch, drainage ditch, or other water course, except in such manner as provided by these regulations, the *Statutes of the State of Colorado*, the Standards, Rules, and Regulations adopted by the Colorado Department of Public Health and Environment, and the Colorado Water Quality Control Commission.

B. No person or persons shall install, alter, or repair an individual sewage disposal system (ISDS) within the counties of Adams, Arapahoe and Douglas, State of Colorado, unless such person holds a valid permit, issued by the Health Officer in the name of the property owner for the specific construction, remodeling, installation, or use proposed at the location described on the permit.

C. No city, county, or city and county shall issue to any person a permit to construct or remodel a building or structure which is not serviced by a sewage treatment works until a permit for an individual sewage disposal system has been issued by the Department.

D. No city, county, or city and county occupancy permit shall be issued to any person for the use of a building which is not serviced by a sewage treatment works until a final inspection of the individual sewage disposal system has been issued by the Department as provided for in Section 25-10-106-(1)-(h), C.R.S., and the installation has received the approval of the Department.

E. No individual sewage disposal system presently in use which does not comply with the provisions of Section 25-10-105-(1)-(d), C.R.S., regarding minimum separation between the maximum seasonal level of the groundwater table and the bottom of an absorption system shall be permitted to remain in use without compliance with this article and these Regulations.

F. No sewage or effluent shall be permitted to be discharged into or upon the surface of the ground or into state waters unless the sewage system and effluent meets the minimum requirements of applicable rules and regulations (see Sections 11 and 15.0).

G. No new or expanded system shall be installed in a floodway.

H. Construction and/or use of cesspools defined as covered underground receptacles which receive untreated sewage from a building and permit the untreated sewage to seep into surrounding soil is prohibited.

I. Not more than one dwelling, commercial, business, institutional, or industrial unit shall be connected to the same individual sewage disposal system unless such multiple connection was specified in the application submitted and in the permit issued for the system.

J. No person shall construct or maintain any dwelling or other occupied structure which is not equipped with adequate facilities for the sanitary disposal of sewage without endangering the public health.

18.2 Prohibition of Individual Sewage Disposal Systems in Unsuitable Areas

A. The Board of Health may conduct a public hearing after written notice to all affected property owners as shown in the records of the county assessor and publication of notice in a newspaper of general circulation at least ten days prior to the hearing to consider the prohibition of permits of individual sewage disposal systems in defined areas which contain or are subdivided for a density of more than two dwelling units per acre. The Board of Health may order such prohibition upon a finding that the construction and use of additional individual sewage disposal systems in the defined area will constitute a hazard to the public health. In such a hearing, the Board of Health may request affected property owners to submit engineering and geological reports concerning the defined area and provide a study of the economic feasibility of constructing a sewage treatment works.

B. Within the Cherry Creek watershed in Arapahoe and Douglas counties, no new individual sewage disposal systems shall be constructed within the 100-year flood plain as

designated by the Urban Drainage and Flood Control District, or the Federal Emergency Management Agency if no Urban Drainage and Flood Control District designation exists. This restriction shall not apply to the replacement of, or improvements to the operation of, existing individual sewage disposal systems located within the 100-year flood plain.

18.3 Class I Petty Offense

A. Any person who commits any of the following acts or violates any of the provisions of this article commits a Class I Petty Offense as defined in Section 18-1-107, C.R.S.:

1) Constructs, alters, installs, or permits the use of any individual sewage disposal system without first having applied for and received a permit as provided for in Section 25-10-106, C.R.S.

2) Constructs, alters, or installs an individual sewage disposal system in a manner which involves a knowing and material variation from the terms or specifications contained in the application or permit

3) Violates the terms of a cease and desist order which has become final under the terms of Section 25-10-106-(1)-(k), C.R.S.

4) Conducts a business as a systems contractor without having obtained the license provided for in Section 25-10-109 (1), C.R.S., which the Board of Health has adopted licensing regulations pursuant to said Section

5) Conducts a business as a systems cleaner without having obtained the license provided for in Section 25-10-109 (1), C.R.S., which the Board of Health has adopted licensing regulations pursuant to said Section

6) Willfully fails to submit proof of proper maintenance and cleaning of a system as required by rules and regulations adopted pursuant to Section 25-10-106(1)-(m), C.R.S.

18.4 Civil Penalty

A. Assessment

Upon a finding by the Board of Health that a person is in violation of the provisions of this regulation, the Board of Health may assess a penalty of up to fifty dollars ($50.00) for each day of violation. In determining the amount of the penalty to be assessed, the local board of health shall consider the seriousness of the danger to the health of the public caused by the violation, the duration of the violation, and whether the person has previously been determined to have committed a similar violation.

B. Appeal of Civil Penalty Assessment

A person subject to a penalty assessed pursuant to Section 18.4 may appeal the penalty to the Board of Health by requesting a hearing before the appropriate body. Such a request shall be filed within thirty days after the penalty assessment is issued. A hearing before the Board of Health shall be conducted in accordance with Section 24-4-105, C.R.S.

SECTION 19.0 ENFORCEMENT

19.1 Hearings

The State Administrative Procedure Act (Article 4 of Title 24, C.R.S.) shall govern any hearings held by the Department under the "Individual Sewage Disposal Systems Act."

19.2 Notice of Violation

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

19.3 Cease and Desist

A. The Health Officer shall issue an order to cease and desist from the use of any system found not to be functioning in compliance with these regulations and standards or otherwise to constitute a nuisance or a hazard to public health and which has not received timely repairs in accordance with the notice issued under these regulations.

B. Such an order will be issued only after a hearing which shall be conducted by the Health Officer not less than forty-eight (48) hours after written notice thereof is given to the owner or occupant of the property on which the system is located and at which the owner and occupant may be present, with counsel, and be heard.

C. The order shall require that the owner or occupant bring the system into compliance or eliminate the nuisance or hazard within a reasonable period of time not to exceed thirty (30) days, or thereafter cease and desist from the use of the system.

D. A cease and desist order issued by the Health Officer shall be reviewable in the district court for the county wherein the system is located and upon a petition filed not later than ten (10) days after the order is issued.

SECTION 20.0 BOARD OF HEALTH ADMINISTRATIVE PROCEDURES

20.1 Revocation of Systems Contractor's or Cleaner's Licenses

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

20.2 Prohibition of Individual Sewage Disposal Systems in Unsuitable Areas

The Board of Health may conduct a public hearing, after written notice to all affected property owners as shown in the records of the county assessor and publication of notice in a newspaper of general circulation at least ten (10) days prior to the hearing, to consider the prohibition of permits of individual sewage disposal systems in defined areas which contain or are subdivided for a density of more than two dwelling units per acre. The Board of Health may order such prohibition upon a finding that the construction and use of additional individual sewage disposal systems in the defined area will constitute a hazard to the public health. In such a hearing, the Board of Health may request affected property owners to submit engineering and geological reports concerning the defined area and provide a study of the economic feasibility of constructing a sewage treatment works.

20.3 Rules and Regulations for Maintenance and Cleaning of Individual Sewage Disposal Systems

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

20.4 Hearing and Review of Permit Denials

A. Any applicant who is denied a construction permit, or any person who is adversely affected by the denial or issuance of a permit, within thirty (30) days following such denial, may request and receive a hearing before the Board of Health.

B. Upon a finding, by the Board of Health after the review of a denial of the issuance of a permit as provided by Section 25-10-106-(1)-(f), C.R.S., that an applicant for individual sewage disposal system has demonstrated that said system will be constructed and used in such a manner as to comply with the declaration and intent of these regulations and all applicable state and local rules and regulations and required terms and conditions in any permit issued pursuant thereto, a permit may be issued therefore.

20.5 Hearing and Review of Variance Requests

A. Upon receipt of the request for a variance and the required information in Section 3.13.A., the Health Officer will schedule a public hearing before the Tri-County Health Department Board of Health. The Department will issue a Public Notice of the Hearing and send notice via certified mail, with a minimum 20-day reply time from the date of mailing, to all adjacent property owners. The applicant and his/her engineer may attend the hearing and present testimony regarding the request for a variance.

B. Following the Public Hearing, the Tri-County Health Department Board of Health shall vote on the proposed variance. Approval of the variance shall require a majority vote of the Tri-County Health Department Board of Health.

C. The applicant will receive written notification of the decision regarding the request for a variance.

D. Tri-County Health Department Board of Health may impose requirements and conditions on the variance granted and the notice of an approval of the variance will include any conditions of the approval. The notice of a denial or a variance shall include those reasons which form the basis for the denial.

E. The variance and any conditions thereof shall be recorded on the deed to the property and any expenses associated with that recording shall be the responsibility of the party obtaining the variance.

20.6 Civil Penalty

A. Assessment

Upon a finding by the Board of Health that a person is in violation of the provisions of this regulation, the Board of Health may assess a penalty of up to fifty dollars ($50.00) for each day of violation. In determining the amount of the penalty to be assessed, the Board of Health shall consider the seriousness of the danger to the health of the public caused by the violation, the duration of the violation, and whether the person has previously been determined to have committed a similar violation.

B. Appeal

A person subject to a penalty assessed pursuant to Section 20.5 may appeal the penalty to the Board of Health by requesting a hearing before the appropriate body. Such a request shall be filed within thirty (30) days after the penalty assessment is issued. A hearing before the Board of Health shall be conducted in accordance with Section 24-4-105, C.R.S.

APPENDIX A

DIAGRAMS

Onsite System
As-Built
Drawing

Property Address _____
Permit # _____
Date System Completed _____
System's Contractor Name _____
System's Contractor License # _____
System's Contractor Address and Phone _____
_____

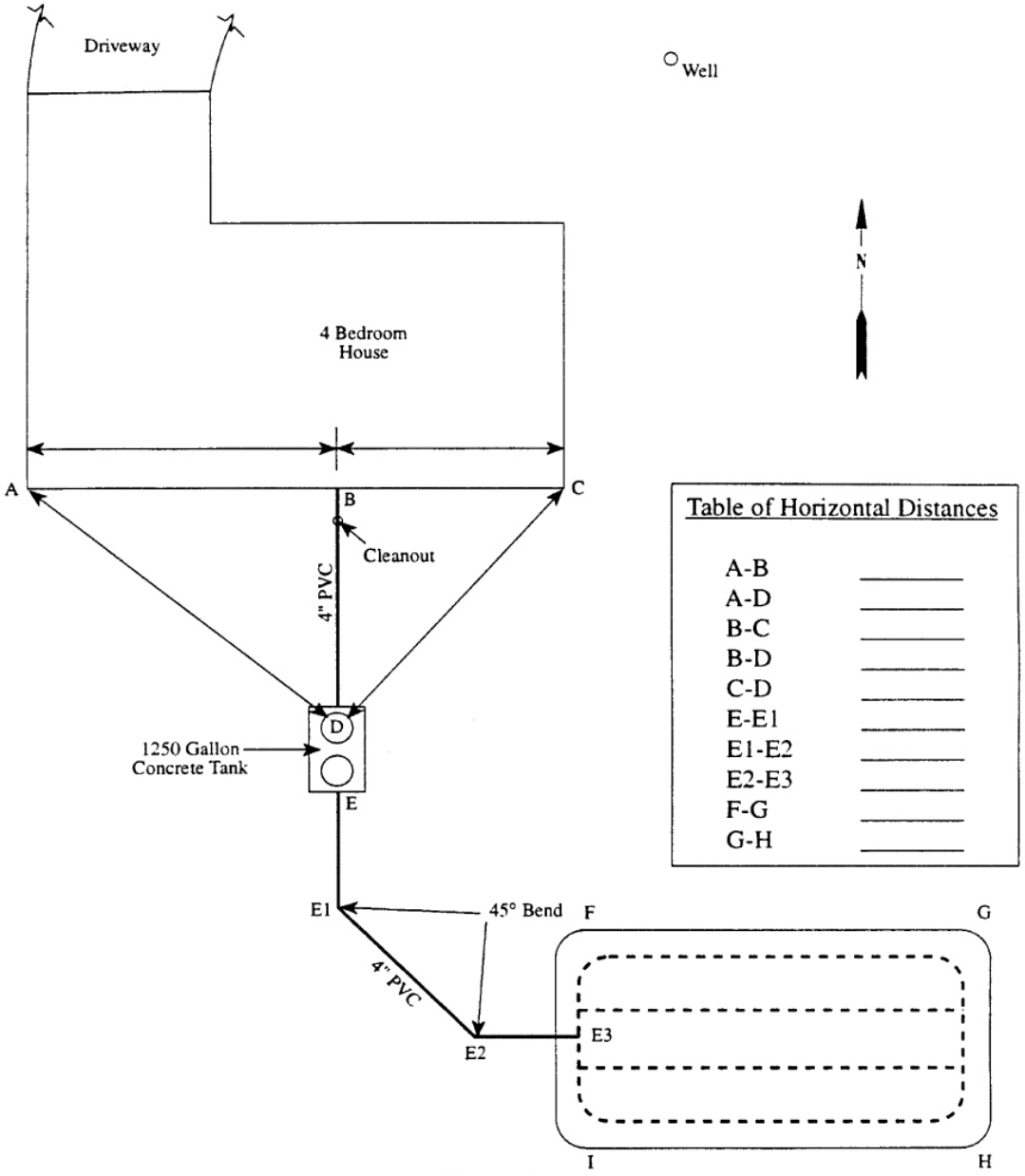


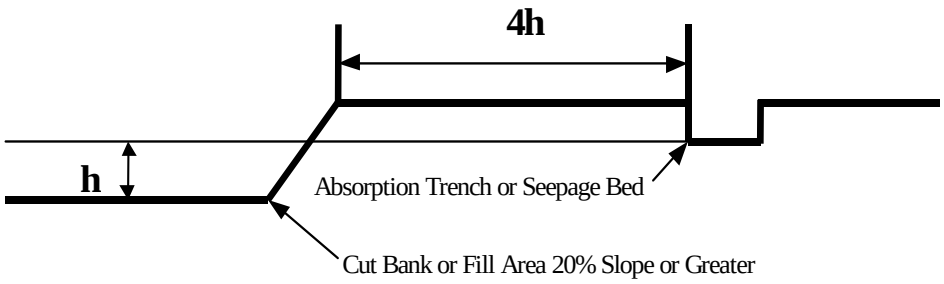
Table of Horizontal Distances

A-B	_____
A-D	_____
B-C	_____
B-D	_____
C-D	_____
E-E1	_____
E1-E2	_____
E2-E3	_____
F-G	_____
G-H	_____

Diagram 1

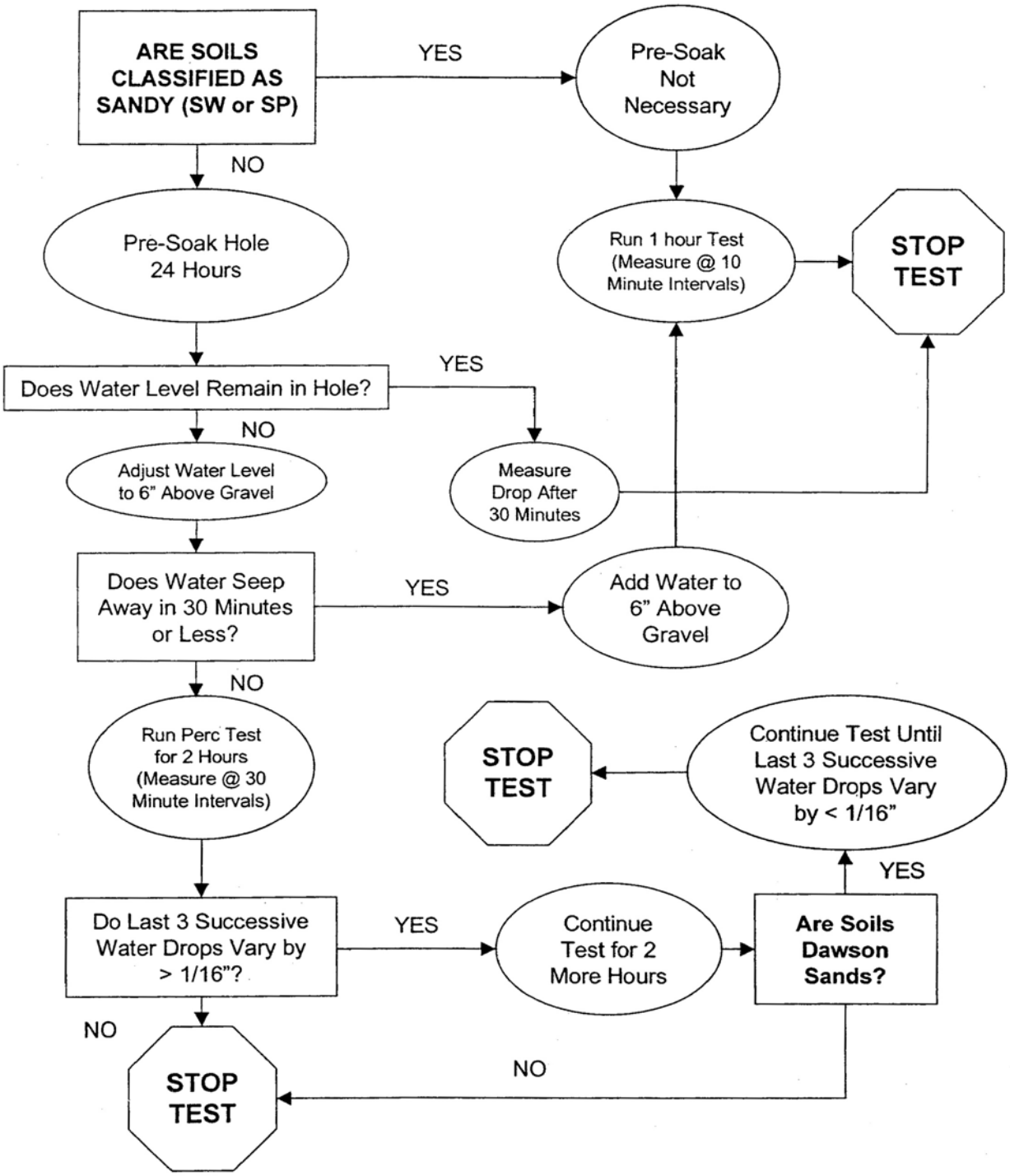
Onsite System As-Built Drawing

Diagram 2
Setback From Cut Banks or Fill Areas



(See 5.2.C., Page 18)

DIAGRAM 3: PERCOLATION TEST PROCEDURE



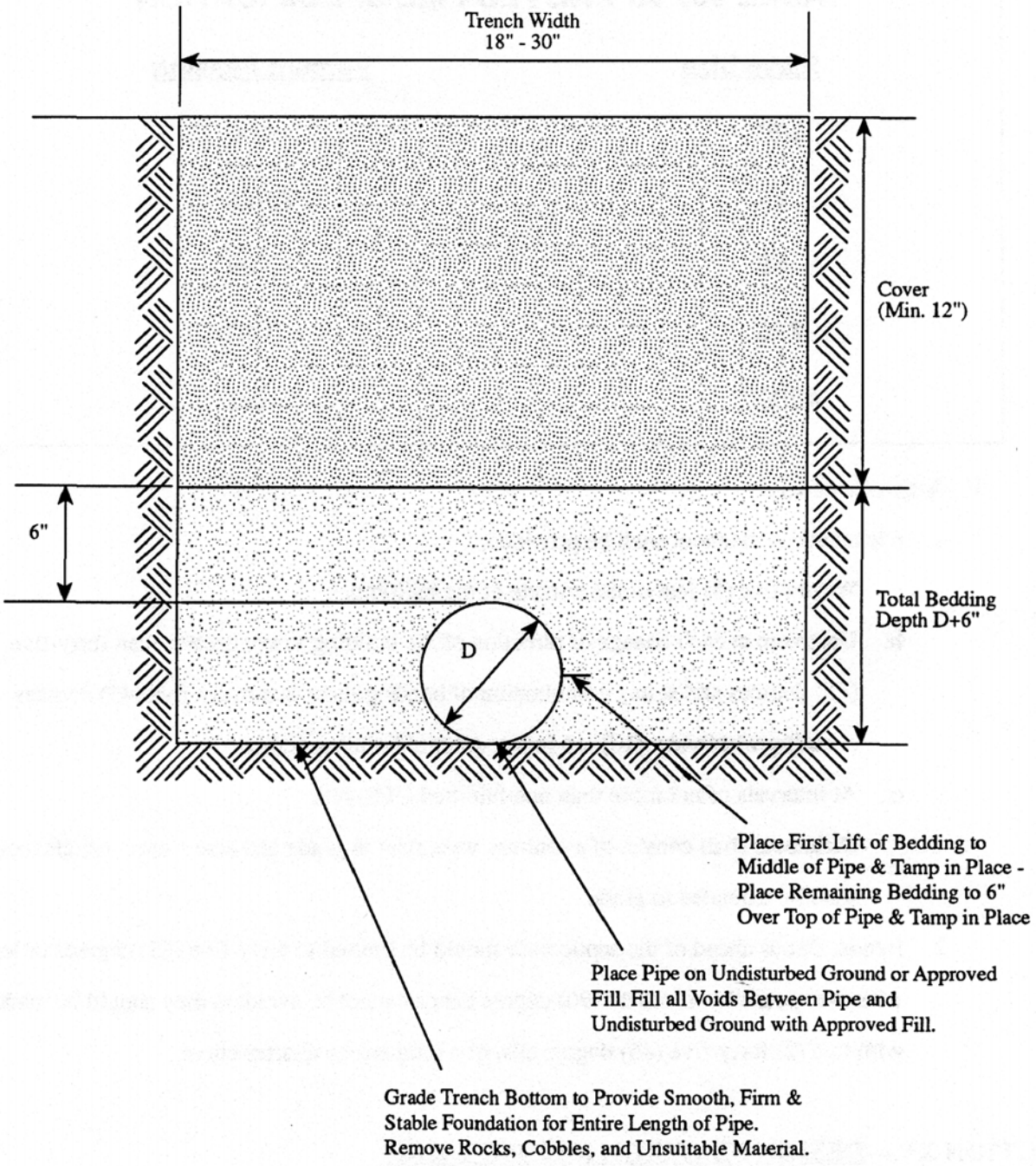


Diagram 4

Pipe Bedding Detail

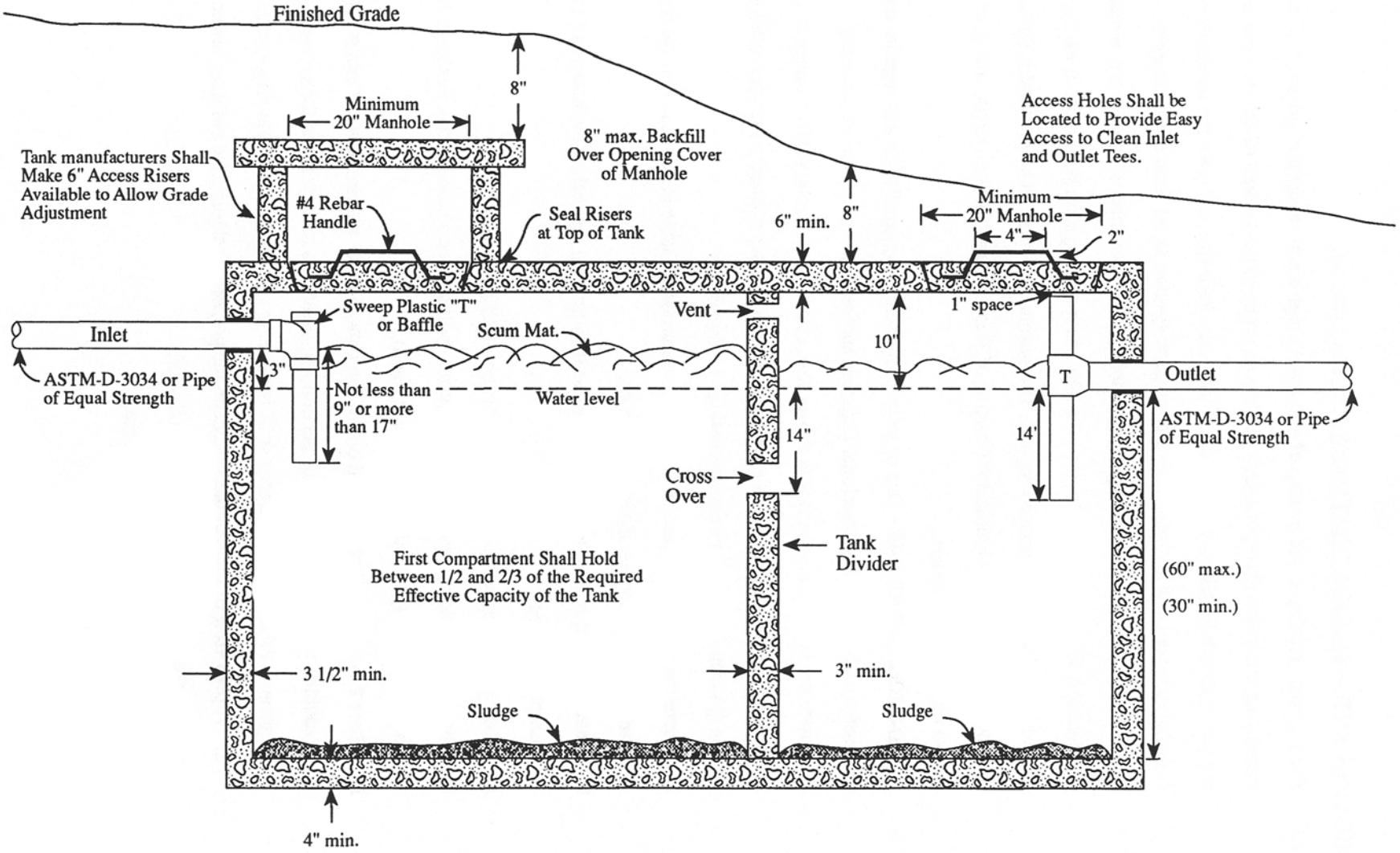
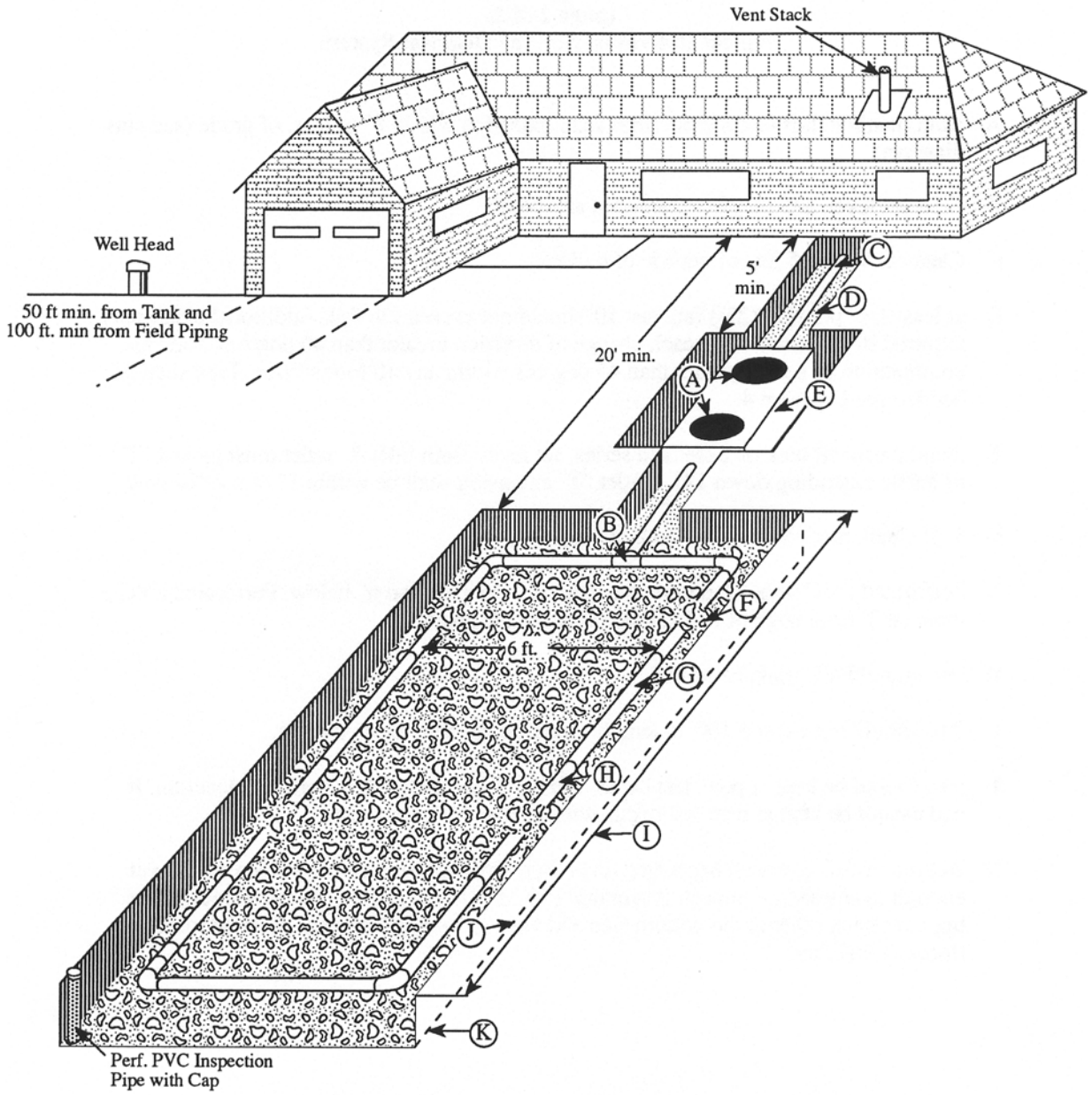


Diagram 5

Typical Concrete Septic Tank



No Part of the System can be Backfilled Prior to Inspection

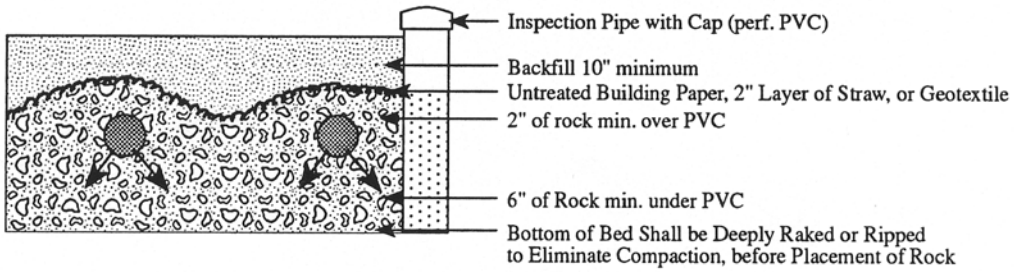


Diagram 6
(Page 1 of 2)
Typical Individual Sewage Disposal System

TYPICAL INDIVIDUAL SEWAGE DISPOSAL SYSTEM

A. Both manhole lids or concrete rings shall extend to within eight (8) inches or less of grade (see tank diagram).

B. "T" – set level and may be attached at any point.

C. Five (5) foot cast iron or local plumbing code.

D. At least one-quarter (1/4) inch per foot (2%) fall. Last ten (10) feet should not exceed 2% fall. Clean-out required if one hundred (100) feet or more. Pipe shall be embedded per Diagram 4.

E. Two-compartment tank or two (2) tanks in series, set level. Both inlet and outlet must have a "T" or baffle extending down fourteen (14) inches. Outlet "T" extension shall be within one (1) inch of roof of tank.

F. One (1) foot of clean, graded rock, one-half (1/2) inch to two and one-half (2-1/2) inch in size.

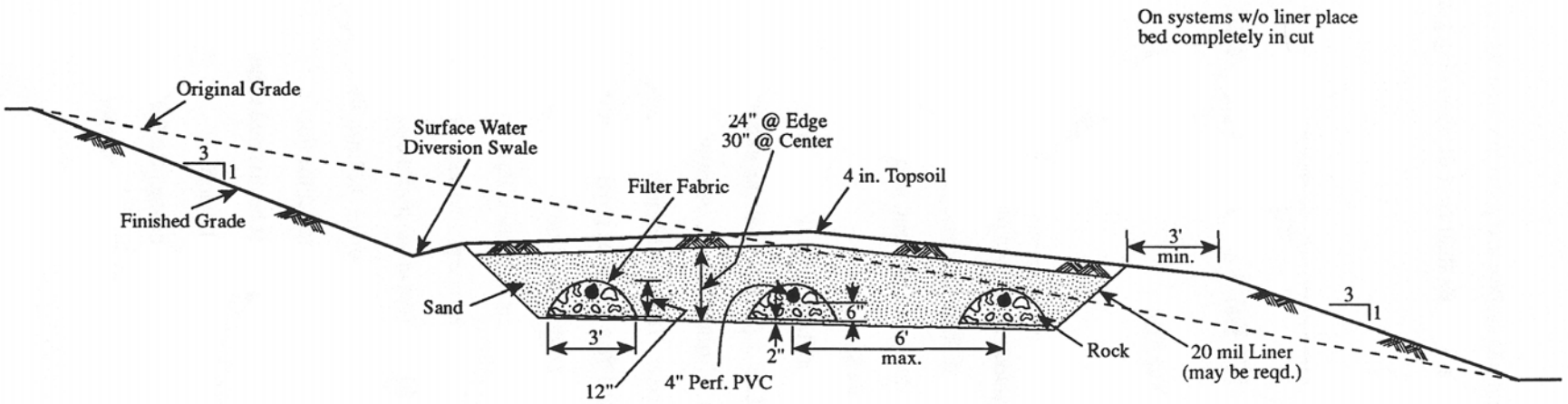
G. Perforated PVC imbedded in rock at least two (2) inches over top and six (6) inches below. Perforated PVC must be three (3) feet from edge of bed and no more than six (6) feet apart.

H. Perforated PVC must be level.

I. Bed should not exceed one hundred (100) feet in length – must be ten (10) feet from property line.

J. Bed should be kept at percolation test depth, usually three (3) feet, and installed in percolation test location. If bed cannot be kept at percolation test depth, contact the Health Department.

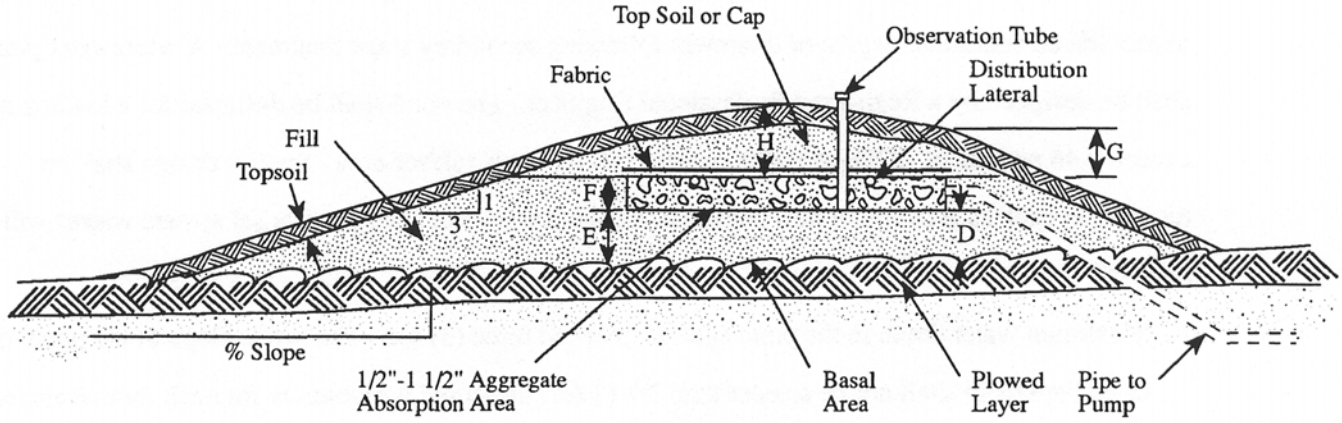
K. Bottom of bed or trench excavated level. Bed shall not be excavated when soil is wet enough to smear or compact. Perforated PVC shall be placed so that perforations are opposite each other at the bottom (see end view drawing). The ends must be joined (looped) together.



Not To Scale

Diagram 7

Typical ET Bed Section



Section A-A

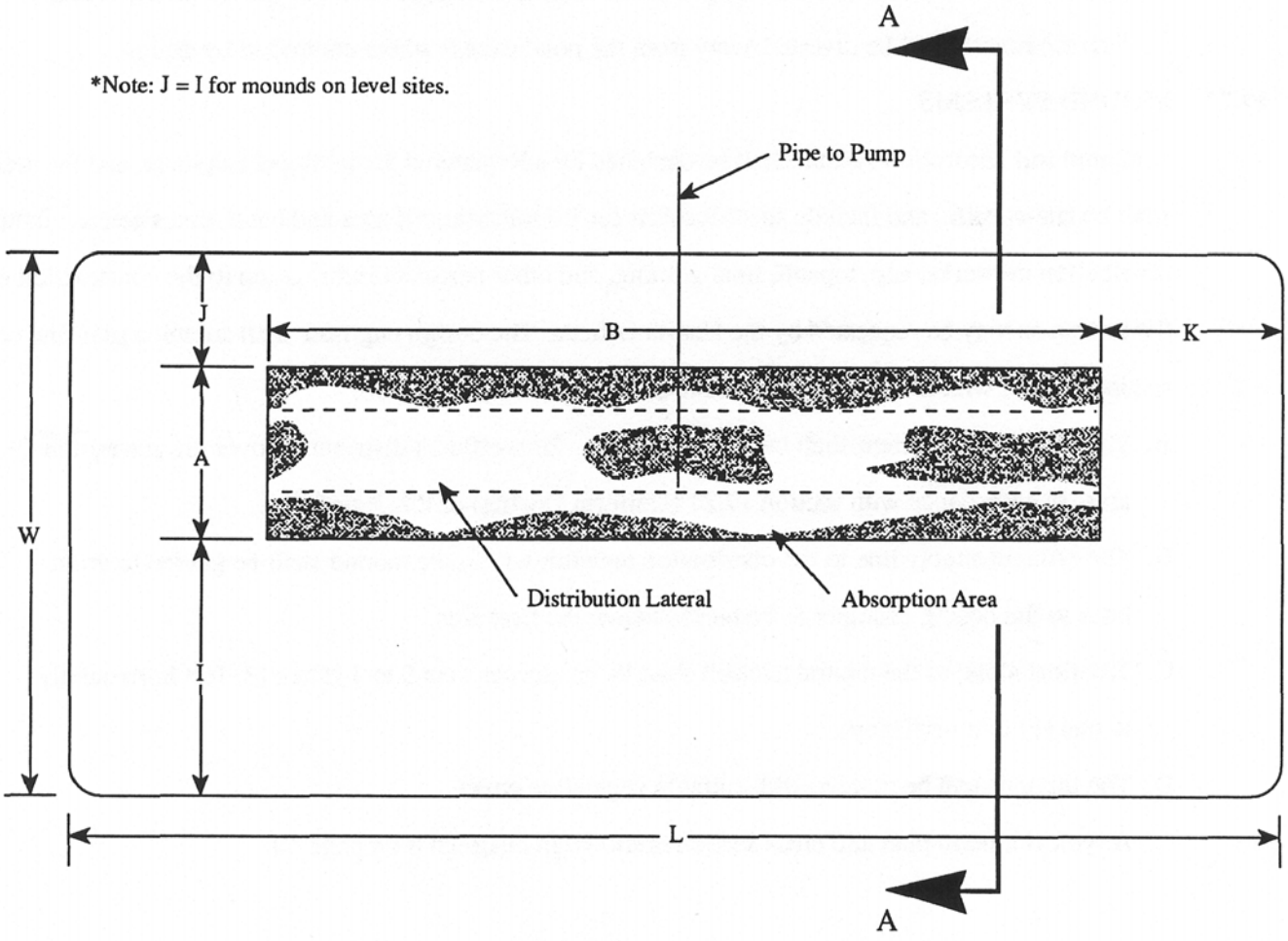


Diagram 8

Cross Section and Plan View of a Mound System on a Site

APPENDIX B

TABLES

TABLE #1
SEPTIC TANK CLEANING AND EFFLUENT TESTING SCHEDULE

Type of Treatment	Inspection or Maintenance	Cleaned or Pumped	Routine Effluent Testing
Septic Tank	4 years	4 years	None
Vaults, Privies	Annually	at 75% Capacity	None
Aeration Plants	6 months	4 years	a) Not more than 2 times/year b) Weekly, if surface discharged.

TABLE #2 TABLE OF QUANTITIES AND BOD_5 STRENGTH OF SEWAGE		
TYPE OF ESTABLISHMENT	**GALLONS/PERSON/DAY (Average, Unless Otherwise Stated**	**LBS BOD_5 PER PERSON/DAY (Unless Otherwise Stated)**
Residential		
Hotels & Motels without private baths	50	0.15
Hotels & Motels with private baths	75	0.15
Multiple family dwellings or apartments	75	0.20
Rooming houses	50	0.15
Single family dwellings	75	0.20
Commercial & Miscellaneous		
Airline	3 gal/meal served	0.03 lbs/meal served
Airports (not including food)	5 gal/passenger	0.02 lbs/passenger
Airports	10 gal/employee/day	0.06 lbs/employee/day
Bus service station (not including food)	5	0.02
Country clubs (not including food)	30	0.02
Day workers at offices	15	0.06
Drive-in theaters (not including food)	10 gal/space/day	0.06 lbs/space/day
Factories and plants (excl. of indust. wastes)	35	0.08
Laundries, self-service	400 gal/washer/day	2.00 lbs/washer/day
Food service estab. (toilet & kitchen wastes)	10 gal/patron/day	0.06 lbs/meal served
Food service estab.(kitchen wastes)	3 gal/meal served	0.03 lbs/meal served
Food service estab. (with paper service)	1.5 gal/meal served	0.01 lbs/meal served
Additional for bars & cocktail lounges	2	0.02
Movie theaters, churches (not including food)	5 gal/seat/day	0.03 lbs/seat/day
Stores	400 gal/public toilet	2.00 lbs/public toilet/day
Work or construction camps (semi-permanent) w/ flush toilets	50	0.17
Work or construction camps (semi-permanent) w/o flush toilets	35	0.02
Travel trailer parks with individual water & sewer hook-up	100 gal/unit/day	0.50 lbs/unit/day
Travel trailer parks without individual water & sewer hook-up	50 gal/unit/day	0.17 lbs/unit/day
Institutional		
Hospital	250 gal/bed space/day	0.20 lbs/bed space/day
Institutions other than hospitals	125 gal/bed space/day	0.17 lbs/bed space/day
Mobile home parks	75	0.20
Schools, boarding	100	0.17
Schools, day (w/o cafeterias, gym or showers)	15	0.04
Schools, day (with cafeterias, but not gym or shower)	20	0.08
Schools, day (with cafeterias, gym and showers)	25	0.10
Recreational & Seasonal		
Camps, day (no meals served	15	0.12
Camps, Luxury resort	125	0.17
Camps, resort (night & day) with limited plumbing	50	0.12
Camps, tourist, trailer or campground	100 gal/unit/day	0.50 lbs/unit/day
Cottages and small dwellings (seasonal)	50	0.17

TABLE #2 - Continued TABLE OF QUANTITIES AND BOD_5 STRENGTH OF SEWAGE		
TYPE OF ESTABLISHMENT	**GALLONS/PERSON/DAY (Average, Unless Otherwise Stated**	**LBS BOD_5 PER PERSON/DAY (Unless Otherwise Stated)**
Country Club		
Shower	500 gal/fixture/day	0.48 lbs/fixture/day
Bath	300 gal/fixture/day	0.29 lbs/fixture/day
Lavatory	100 gal/fixture/day	0.25 lbs/fixture/day
Toilet	150 gal/fixture/day	0.18 lbs/fixture/day
Sink	50 gal/fixture/day	0.51 lbs/fixture/day
Public Park:		
Flush toilet	36 gal/fixture/hour	0.04 lbs/fixture/hour
Urinal	10 gal/fixture/hour	0.01 lbs/fixture/hour
Shower	100 gal/fixture/hour	0.10 lbs/fixture/hour
Faucet	15 gal/fixture/hour	0.04 lbs/fixture/hour
Swimming Pools and Bath Houses	10	0.06
Separate Flow - Residential Use		
Bath/shower	14.7	0.014
Dishwasher	1.8	0.002
Kitchen Sink	4.4	0.045
Additional for Garbage Grinder	1.4	0.052
Laundry Washer	19.5	0.037
Lavatory	8.4	0.021
Water Closet	24.8	0.029

TABLE 3
MINIMUM HORIZONTAL DISTANCES IN FEET BETWEEN COMPONENTS OF A SEWAGE DISPOSAL SYSTEM INSTALLED AFTER NOVEMBER 15, 1973, AND PERTINENT PHYSICAL FEATURES

	Spring, Wells, Suction Lines	Potable Water Supply Line	Potable Water Supply Cistern	Dwelling Occupied Building	Property Lines, Piped or Lined Irrigation Ditch	Subsoil Drains, Intermittent Irrigation Lateral	Lake, Water Course, Irrigation Ditch or Stream	Dry Gulches	Septic Tanks
Dispersal System Utilizing Aerosol Methods	(3) 100	(4) (2) 10	50	125	10	0	(3) 25	(3) 10	10
Seepage Pit or Slit Trench	(3) 100	(4) (2) 50	25	20	25	10	(3) 50	(3) 25	6
Absorption Trench, Seepage Bed, Sand Filter, Sub-surface Dispersal System, or Drywell	(3) 100	(4) (2) 25	25	20	10	10	(3) 50	(3) 25	6
Unlined Sand Filter in Soil With a Percolation Rate Slower than 60 Minutes per inch.	100	(4) (2) 25	25	15	10	10	25	15	10
Unlined or Partially Lined Evapotranspiration System, Wastewater Pond, or Surface Disposal System other than Aerosol	100	(4) (2) 25	25	15	10	10	25	15	10
Lined Sand Filter	60	(4) (2) 10	25	15	10	10	25	10	5
Lined Evapotranspiration Field or Lined Wastewater Pond	60	(4) (2) 10	25	15	10	10	25	10	5
Pit Privy or Vault Privy	50	(4) (2) 10	25	15	10	10	25	10	--------
Septic Tanks, Treatment Plants, Dosing Tanks, Vaults	(2) 50	(4) (2) 10	25	(1) 5	10	10	50	10	-------
Building Sewer or Effluent Lines	(2) (4) 50	(4) (2) 10	(4) 25	0	(4) (2) 10	(4) 10	(4) (2) 50	(2) (4) 10	-------

Note: The minimum distance shown above shall be maintained between the system components and the physical features described. Where soil, geological or other conditions warrant, greater distances may be required by the local board of health or by the Water Quality Control Commission pursuant to C.R.S. 25-8-206 in accordance with authority prescribed by law and rules and regulations implemental of said section. Components which are not water tight should not extend into areas of the root system of nearby trees. For repair or upgrading of existing systems where the size of lot precludes adherence to these distances, repaired facility shall not be closer to water supply components than the existing facilities.

(1) Distance shown shall not apply to treatment plants or effluent lines where recycling is permitted.

(2) Crossings or encroachments may be permitted at the points as noted above provided that the water conveyance pipe is encased for a minimum distance of ten (10) feet on each side of the crossing. A length of pipe shall be used with a minimum Schedule 40 rating of sufficient diameter to easily slide over and completely encase the water conveyance. Ridged end caps of at least Schedule 40 rating must be glued or secured in a watertight fashion to the ends of the encasement pipe. A hole of sufficient size to accommodate the pipe shall be drilled in the lowermost section of the ridged cap so that the conveyance pipe rests on the bottom of the encasement pipe. The area which the pipe passes through the endcaps shall be sealed with an approved underground sealant compatible with the piping used.

(3) Add 8 feet additional distance for each 100 gallons per day of design flow over 1000 gallons per day as specified in the table, unless it can be demonstrated by a Registered Professional Engineer or Geologist that a mechanical or natural barrier will prevent contamination.

(4) Encroachments may be permitted provided the water or wastewater conveyance pipe is encased as in (2) above, specified in the table.

TABLE #4
LIST OF APPROVED PLASTIC PIPE FOR SEPTIC USES

TYPES OF PIPES	ASTM STANDARD	BUILDING SEWER LINES (1)	OTHER SEWER LINES (4)	ALL LINES IN ABSORPTION SYSTEM
PVC (Type PS-46)	F787-82	YES	YES	YES
ABS (Sewer Pipe)	D2751-80	YES (2)	YES (2)	YES (2)
ABS (DMV Schedule 40)	D2661-78	YES	YES	YES
PVC (Type PSM)	D3034-80	YES (2)	YES (2)	YES (2)
PVC (STD or Perforated)	D2729-80	NO	NO	YES
PE (Corrugated-Perforated)	F405-82(3)	NO	NO	YES

1. From building to septic/aeration tank to absorption system or trenches. Commingling of plastic materials shall not be done within this area except through the use of proper adapters. When the building sewer is of a type of material that is different from the building drain, proper transition fittings shall be used.
2. Pipe shall not have an SDR (Standard Dimension Ratio) number greater than 35.
3. Heavy duty (only)
4. Additional treatment facilities and sand filter collection lines and distribution lines. ASTM- American Society for Testing and Materials.

Note: The last two numbers of the ASTM Standard indicate the date of the edition. The latest edition shall be the basis for this regulation.

TABLE #5
APPROVED FILL SPECIFICATION

Sieve Size	Percent Passing
3/8”	100
#4	70-80
#8	10-25
#16	0-10
#200	0-2

TABLE #6
SEPTIC TANK SIZE BASED UPON NUMBER OF BEDROOMS

Number of Bedrooms	Minimum Effective Liquid Tank Capacity (gallons)
3 or less	1,000
4	1,250
Each Additional	250

TABLE #7
MODIFIED SYSTEM SIZING CRITERIA
(only applicable with percolation rates from 5 to 60 mpi)

Percolation Rate Range (min/in)	Minimum Area for Seepage Beds* (square feet/bedroom)	Minimum Area for Trenches & SB-2* (square feet/bedroom)	Maximum Application Rate Commercial, Business, Institutional or Industrial Installations ** (gal/sq.ft./day)
5-20	325	250	1.1
21-40	450	360	0.8
41-60	560	435	0.6

* See System Sizing Formula #1 in Appendix C.
** See System Sizing Formula #2 in Appendix C.

TABLE # 8
DESIGN RESIDENTIAL FLOW RATES-ET SYSTEMS

Bedrooms	DESIGN FLOW RATE (FORMULA METHOD) (Gallons Per Day)	DESIGN FLOW RATE (WATER BALANCE METHOD) (Gallons Per Day)
2	450	300
3	675	450
4	900	600

TABLE # 9
MINIMUM ET BED SIZES USING FORMULA METHOD

Bedrooms	Minimum Area
2 Bedroom	6,430 sq. ft.
3 Bedroom	9,645 sq. ft.
4 Bedroom	12,860 sq. ft.

TABLE #10
MAXIMUM ALLOWABLE SOIL ABSORPTION RATES
USING WATER BALANCE METHOD

MAXIMUM PERCOLATION RATE (Min/Inch)	MAXIMUM ALLOWABLE SOIL ABSORPTION RATE (gal/sq. ft./day)
61-90	0.20
91-120	0.15
121+	0.10
Fully Lined Bed	0.00

TABLE #11
ET BED SAND SPECIFICATION

Sieve Size	Percent Passing
# 4	100
# 40	50-55
#200	<15

TABLE #12
LOADING RATES FOR A SAND FILTER

TYPE OF SERVICE	APPLICATION RATE (Gallons/Sq.Ft./Day)
Without garbage grinder	1.15
With garbage grinder	0.95

TABLE #13
MAXIMUM AND MINIMUM MEDIA SIZE FOR RECIRCULATING SAND FILTERS

Sieve Size	Maximum Media Size (Percent Passing)	Minimum Media Size (Percent Passing)
3/8”	100	100
#4	60	100
#8	7	75
#16	0	5
#30	0	3
#50	0	2

Effective Size (D_{10}): 1.5 to 2.5 mm

TABLE #14
LICENSE FEES

New License Fee for Systems Installers and Cleaners	$30.00
Annual Renewal Fee For Systems Installers and Cleaners (Received by 12/31)	$20.00
Renewal Fee For Those Applications Received Late	$30.00

TABLE #15
PERMIT AND INSPECTION FEES

1. New System Permit	$ 985.00
2. New Permit with a Variance Request	$1,000.00
3. Repair or Expansion Permit	$ 575.00
4. Repair or Expansion Permit with a Variance Request	$ 745.00
5. Reinspection Fee	$ 50.00
6. Loan Approval Inspection	$ 315.00

APPENDIX C

SYSTEM SIZING FORMULAS

SYSTEM SIZING FORMULA #1
MINIMUM BED AND TRENCH ABSORPTION AREA PER BEDROOM

$$A = 1.6 \text{ (BED) OR } 1.25 \text{ (TRENCH) X } \frac{Q\sqrt{t}}{5}$$

Where:

A = Minimum area for absorption beds or trenches (sq.ft./bedroom)

Q = Total daily peak flow per bedroom (1.5 x 2 persons/bedroom x 75 gallons/person/day) = 225 gals.

t = Average Percolation Rate, in minutes per inch, *Rounded upward to 20, 40, or 60 mpi*

1.6 = Bed sizing Factor for additional BOD_5 loading from garbage disposal and washing machine

1.25 = Trench Sizing Factor for additional BOD_5 loading from garbage disposal and washing machine (includes credit for sidewall absorptive area)

NOTE: Values appearing in Table #7 in Appendix B are rounded.

SYSTEM SIZING FORMULA #2
COMMERCIAL, BUSINESS, INSTITUTIONAL, OR INDUSTRIAL SYSTEMS

$$\text{MAXIMUM APPLICATION RATE (gallons/sq.ft./day)} = \frac{5}{\sqrt{t}}$$

Where:

t = average percolation rate, *Rounded upward* to 20, 40, or 60 minutes per inch

SYSTEM SIZING FORMULA #3
COMMERCIAL, BUSINESS, INSTITUTIONAL, OR INDUSTRIAL SYSTEMS

$$A = \frac{Q}{\text{Maximum Application Rate (gal/sq.ft./day), from System Sizing Formula \#2 and Table \#7}}$$

Where:

A = Minimum area for absorption beds (percolation rate between 5 and 60 mpi)

Q = Maximum Flow (1.5 x average flow): (See Section 5.1)

SYSTEM SIZING FORMULA #4
ADJUSTMENT FOR DEEP GRAVEL

$$\text{CALCULATED LENGTH} = \text{length required prior to adjustment} \times \frac{W + 2}{W + 1 + 2d}$$

Where: W = width of field or trench (in feet)

d = depth of gravel below distribution pipe (in feet)

SYSTEM SIZING FORMULA # 5
EVAPOTRANSPIRATION SYSTEMS (FORMULA METHOD)

$$\text{Area (in square feet)} = \frac{\text{Design Flow (gal/day)} \times 586}{\text{Lake Evaporation (in/year)}}$$

SYSTEM SIZING FORMULA #6
CHAMBER SYSTEMS FOR SINGLE FAMILY DWELLING
ABSORPTION AREAS (Except EQ-36)

$$\text{Number of Chambers Per Bedroom (Bed Configuration)} = \frac{[0.6\ (1.40 \times Q\ \sqrt{t}\ /5\ ]}{\text{Open Area (square feet) per chamber *}}$$

$$\text{Number of Chamber Per Bedroom (Trench Configuration)} = \frac{[0.5\ (1.40 \times Q\ \sqrt{t}\ /5)\ ]}{\text{Open Area (square feet) per chamber *}}$$

Where:

Q = Total daily peak flow per bedroom (1.5 x 2 persons/bedroom x 75 gallons/person/day) = 225 gallons

t = Average Percolation Rate, in minutes per inch, *Rounded upward* to 20, 40, or 60 mpi

* OPEN AREA PER CHAMBER:

Hancor Envirochamber = 15.5 square feet

Infiltrator (H-10, High Capacity H-10, and H-20) = 15.5 square feet
Note: For sizing of systems using the Infiltrator EQ-36, refer to Section 8.20 B.2)

Biodiffuser = 15.5 square feet

SYSTEM SIZING FORMULA #7
CHAMBER SYSTEMS FOR COMMERCIAL, BUSINESS, INSTITUTIONAL OR INDUSTRIAL ABSORPTION AREAS (Except EQ-36)

Number of Chambers (Bed Configuration) = $\frac{A \times 0.60}{\text{Open Area (square feet) per Chamber*}}$

Number of Chambers (Trench Configuration) = $\frac{A \times 0.50}{\text{Open Area (square feet) per Chamber*}}$

Where the Area A is determined from System Sizing Formula #3

*OPEN AREA PER CHAMBER:

Hancor Envirochamber = 15.5 square feet

Infiltrator (H-10, High Capacity H-10, and H-20) = 15.5 square feet
Note: For sizing of systems using the Infiltrator EQ-36, refer to Section 8.20 B. 4
Biodiffuser = 15.5 square feet

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Appendix B

Appendix C