D H E C

PROMOTE PROTECT PROSPER

South Carolina Department of Health
and Environmental Control

R.61-56, ONSITE WASTEWATER SYSTEMS

Effective May 23, 2008
(This regulation replaces and supercedes any former regulations)

Bureau of Environmental Health
S.C. Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201
(803) 896-0646

DISCLAIMER

This copy of the regulation is provided by DHEC for the convenience of the public. Every effort has been made to ensure its accuracy; however, it is not the official text. DHEC reserves the right to withdraw or correct this text if deviations from the official text, as published in the State Register, are found.

PREAMBLE

Pursuant to South Carolina Code Section 44-1-140, the Department of Health and Environmental Control may promulgate regulations for the regulation of the methods of disposition of sewage. R.61-56 prescribes installation and construction standards for onsite wastewater systems (septic tank systems). This regulation also establishes procedures for the enforcement of violations of the regulation. The effective date of the regulation is May 23, 2008; except that, Sections 200.6(2) and 200.6(4) shall become effective on January 1, 2009, and existing Sections V.E(b) and (c) shall remain in effect until that date.

Regulation History

Promulgated pursuant to South Carolina Code Section 44-1-140 et seq., filed with the S.C. Secretary of State, effective February 21, 1940

Amended, filed with the S.C. Secretary of State, effective February 17, 1944

Amended, filed with the S.C. Secretary of State, effective June 26, 1958

Amended, filed with the S.C. Secretary of State, effective June 27, 1961

Amended, filed with the S.C. Secretary of State, effective `April 6, 1971

Amended, adopted by the S.C. Board of Health, effective February 14, 1978

Amended by publication in the S.C. State Register, effective June 27, 1986

Amended by Document No. 3154 in S.C. State Register 32-5, effective May 23, 2008

R.61-56. ONSITE WASTEWATER SYSTEMS

TABLE OF CONTENTS

100 Purposes and Scope…… 2
101 Definitions…….. 3
102 General…… 8
103 Application, Permit, Approval…… 9
200 Minimum Site Conditions……... 10
201 Minimum Requirements for Primary Treatment…… 12
202 Minimum Requirements for Final Treatment and Disposal Systems……. 14
203 Construction Criteria……... 15
204 Evaluation of Alternative Infiltration Trench Products…….. 15
300 Wastewater Treatment Facility Accessibility…….. 17
301 Discharge of Waste…….. 17
302 Enforcement Provisions……... 17
303 Repeal and Date of Effect…… 18
304 Changes in Use that Impact Existing Onsite Wastewater Systems……. 18
305 Severability Clause…….. 18
400 Appendices of Standards for Onsite Wastewater Systems…….. 18
401 Appendix A - System Standard 150 - Large (greater than 1500 gpd) and Community Systems…… 18
402 Appendix B - System Standard 210/211 - Shallow Placement With 9-Inch Aggregate Depth…….. 20
403 Appendix C - System Standard 220/221 - Shallow Placement With 6-Inch Aggregate Depth…….. 25
404 Appendix D - System Standard 230/231 - Shallow Placement With 14-Inch Aggregate Depth With Fill Cap……. 29
405 Appendix E - System Standard 240/241 - Ultra-Shallow Placement With 6-Inch Aggregate Depth With Fill Cap…… 32
406 Appendix F - System Standard 250/251 - Reservoir Infiltration System For Soils With Expansive Clay…… 35
407 Appendix G - System Standard 260/261 - 9-Inch Shallow Placement System With Fill Cap System……... 39
408 Appendix H - System Standard 270/271 - Alternative Trench Width and Depth Systems…….. 42
409 Appendix I - System Standard 280/281 - Reservoir Infiltration System for Soils With Expansive Clay Shallow Rock Formations……. 45
410 Appendix J - System Standard 370/371 - Shallow Placement With Fill Cap for Sites With Shallow Class IV Soil…….. 48
411 Appendix K - System Standard 380/381 - Double Aggregate Depth Wastewater Infiltration Trenches…… 51
412 Appendix L - System Standard 420/421 - Mounded Infiltration System…… 53
413 Appendix M - System Standard 431 - Mounded Fill System…….. 57
414 Appendix N - System Standard 601 - Elevated Infiltration System…… 61
415 Appendix O - System Standard 610 - Specialized Onsite Wastewater System Designs (lLess Than 1500 GPD)……. 67
416 Appendix P - Curtain Drain Standard…….. 68
500 Appendix Q - Long-Term Acceptance Rate Standard For Onsite Wastewater Systems…. 73
501 Appendix R - Peak Sewage Flow Rate Standard……. 74
600 Appendix S - Onsite Wastewater Pump System Standard……... 75

700 Appendix T - Minimum Design Standards For Tank Construction…… 78
800 Appendix U - Fiberglass Reinforced Plastic Tanks Standard……. 84

REFERENCES:

A. The following statutes are referenced in this regulation:

1. S.C. Code of Laws, 44-1-20 , et seq., South Carolina Department of Health and Environmental Control (1976 Code as amended)
2. S.C. Code of Laws, 1-23-10 et seq., South Carolina Administrative Procedures Act (1976 Code as amended)
3. S.C. Code of Laws, 48-1-10 et seq., South Carolina Pollution Control Act (1976 Code as amended)
4. S.C. Code of Laws, 48-39-10 et seq., South Carolina Coastal Tidelands and Wetlands (1976 Code as amended)
5. Section 208, Federal Clean Water Act, 33 U.S.C. § 1288

B. The following Departmental standards and/or publications are referenced in this regulation:

1. Regulation 61-25, Retail Food Establishments
2. Regulation 30-1, Coastal Division Regulations
3. Regulation 61-9, Water Pollution Control Permits
4. Regulation 61-58, State Primary Drinking Water Regulations
5. Regulation 61-67, Standards for Wastewater Facility Construction
6. Regulation 61-68, Water Classification and Standards
7. Regulation 61-69, Classified Waters

C. The following manufacturing and procedural standards are referenced in this regulation:

1. American Society of Agronomy (ASA)
2. American Society for Testing and Materials (ASTM) C
3. Amercian Society for Testing and Materials (ASTM) D
4. Crop Science Society of America (CSSA)
5. National Building Specification (NBS) Voluntary Product Standard PS 15-69
7. National Electrical Manufacturers Association (NEMA)
8. Soil Science Society of America (SSSA)

100 PURPOSES and SCOPE

A major factor influencing the health of individuals where public wastewater treatment facilities are not available is the proper onsite treatment and disposal of domestic wastewater. Diseases such as dysentery, cholera, infectious hepatitis, typhoid and paratyphoid are transmitted through the fecal contamination of food, water, and the land surface largely due to the improper treatment and disposal of domestic wastewater. For this reason, every effort should be made to prevent such hazards and to treat and dispose of all human waste through the practical application of the best and most cost affective technology available.

Safe treatment and disposal of domestic wastewater is necessary to protect the health of families and communities, and to prevent the occurrence of public health nuisances. Domestic wastewater can be rendered ecologically safe and public health can be protected if such wastes are disposed of so that:

A. They will not contaminate any drinking water supply.

B. They will not give rise to a public health hazard by being accessible to insects, rodents, or other possible carriers, which may come into contact with food or drinking water.

C. They will not give rise to a public health hazard by being accessible to children or adults.

D. They will not violate federal and state laws or regulations governing water pollution or sewage disposal.

E. They will not pollute or contaminate any waters of the state.

F. They will not give rise to a public health nuisance.

Where the installation of an onsite wastewater system is necessary, the basic principles of design, construction, installation, operation and maintenance shall be followed.

101 DEFINITIONS

ACCESSIBLE - For the purpose of this regulation, a wastewater treatment facility connection is accessible when it adjoins the property in question, and the sewer authority has granted permission to connect to the system. Where annexation or easements to cross adjacent property are required to connect to a wastewater treatment facility, the wastewater treatment facility shall not be considered accessible.

ALTERNATIVE SYSTEM – A system incorporating design modifications of the proposed subsurface wastewater infiltration trench area or geometry for the purpose of achieving compliance with required setbacks and offset to the zone of saturation and/or restrictive horizons. No such system shall be utilized unless the Department has established a specific standard.

ALTERNATIVE INFILTRATION TRENCH PRODUCTS- Products specifically designed to replace or eliminate the aggregate typically utilized in subsurface infiltration trenches. Such products must be approved for use by the Department and must adhere to required equivalency values established herein.

APPLICANT – A property owner, general contractor or agent representing the property owner, or developer who seeks a permit to construct and operate an onsite wastewater system.

CAMPGROUND - An organized camp in which campsites are provided for use by the general public or certain groups.

CANAL – An artificial waterway used for navigation, drainage, or irrigation.

COLOR CHARTS (Munsell System or equivalent) – Charts bearing various color chips established by a recognized color system which use three elements—hue, value, and chroma—to make up a specific color notation. The notation is recorded if the form of hue, value, and chroma (eg., 10YR 5/6). The three attributes of color are arranged in the system in orderly scales of equal visual steps, which are used to

measure and describe color accurately under standard conditions of illumination by comparing soil samples to color chips on various charts.

CONVENTIONAL SYSTEM – An onsite wastewater system that utilizes a network of conventional wastewater infiltration trenches installed in the naturally occurring soil for the treatment and disposal of domestic wastewater.

CRITICAL AREA LINE – The line, as established by the Department, that delineates the landward boundary of (1) coastal waters, (2) tidelands, (3) beach/dune systems, and (4) beaches as they are defined in the S.C. Code of Laws Section 48-39-10 et seq. and R. 30-1 et seq.

CURTAIN DRAIN – A subsurface interceptor drain that is installed to collect and redirect seasonal groundwater as it flows through the soil profile to an appropriate discharge point.

DEPARTMENT – The South Carolina Department of Health and Environmental Control.

DITCH – A long narrow excavation, intended for the purposes of drainage and/or irrigation.

DOMESTIC WASTEWATER OR SEWAGE- The untreated liquid and solid human body waste and the liquids generated by water-using fixtures and appliances, including those associated with food service operations. For the purposes of this regulation, domestic wastewater shall not include industrial process wastewater.

EFFLUENT – The liquid discharged from a septic tank, effluent pump station, or other sewage treatment device.
EMBANKMENT – A bank of soil with at least two (2) feet of vertical height from top to bottom.

ENVIRONMENTALLY SENSITIVE WATERS – Outstanding resource waters (ORW), Shellfish Harvesting Waters (SFH), and Trout-Natural Waters (TN) as defined in R.61-68 and classified in R.61-69, and including lakes greater than forty (40) acres in size and the Atlantic Ocean, regardless of their classifications in R.61-69.

EXISTING SYSTEM - An onsite wastewater system, which has received final construction approval or has been serving a legally occupied residence or structure.

EXPANSIVE SOILS – Soils containing significant amounts of expansible-layer clay minerals (smectites) as evidenced in the field by classifications of “Very Sticky” and “Very Plastic” and Structure Grades of “Weak” or “Structureless" when evaluated in accordance with the Field Book. Such soils are considered to be unsuitable for onsite wastewater systems.

FAILING ONSITE WASTEWATER SYSTEM – An onsite wastewater system that is discharging effluent in an improper manner or has ceased to function properly.

FIBERGLASS REINFORCED PLASTIC - A fibrous glass and plastic mixture that exhibits a high strength to weight ratio and is highly resistant to corrosion.

FIELD BOOK FOR DESCRIBING AND SAMPLING SOILS (Field Book) – A field guide published by the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) for making or reading soil descriptions and for sampling soils, as presently practiced in the USA.

FINAL TREATMENT AND DISPOSAL - Ultimate disposition of the effluent from a septic tank or other treatment device into the soil.

FLEXURAL MODULUS OF ELASTICITY - A measure of stiffness of a material.

FLEXURAL STRENGTH - A measure of the ability of a material to withstand rupture when subjected to bend loading.

GEL COATING - A specially formulated polyester resin, which is pigmented and contains filler materials, the purpose of which is to provide a smooth, pore-free, watertight surface for fiberglass reinforced plastic parts.

GREASE TRAP - A device designed to separate and store the oil and grease component of wastewater discharged from facilities that prepare food.

GLEYING – Bluish, greenish, or grayish colors in the soil profile that are indicative of markedly reduced conditions due to prolonged saturation. This condition can occur in both mottled and unmottled soils, and can be determined by using the Gley page of the soil color charts.

INDUSTRIAL PROCESS WASTEWATER- Non-domestic wastewater generated in a commercial or industrial operation that may or may not be combined with domestic wastewater.

LONG-TERM ACCEPTANCE RATE (LTAR) – The long-term rate, typically expressed in gallons per day per square foot of trench bottom area, at which a mature onsite wastewater system can continue to accept effluent without hydraulic failure occurring. This flow rate is a result of the interaction between unsaturated soil hydraulic conductivity and biomat resistance.

MOTTLING – Morphological features of the soil revealed as spots or blotches of different color or shades of color interspersed with the dominant matrix color.

NSF STANDARD #14 - A National Sanitation Foundation Standard relating to thermoplastics, which have been tested and found satisfactory for potable water supply uses, and for drains, waste and vent applications.

ONSITE WASTEWATER SYSTEM – A system, generally consisting of a collection sewer, septic tank(s), and subsurface wastewater infiltration area, designed to treat and dispose of domestic wastewater through a combination of natural processes that ultimately result in effluent being transmitted through the soil, renovated, and ultimately discharged to groundwater.

Small Onsite Wastewater System – An individual system serving an individually deeded residence or business that generates less than fifteen hundred (1500) gallons per day of domestic wastewater. Management and maintenance of each system is the responsibility of the individual property owner.

Large Onsite Wastewater System (General) – An individual system that treats and disposes of domestic wastewater discharges in excess of fifteen hundred (1500) gallons per day.

a. Privately Owned Large System – A large onsite wastewater collection and treatment system that serves one piece of deeded property such as a school, adult residential care facility, rental apartment complex, shopping center, campground, mobile home park, office complex, etc. Management and maintenance of the system is the responsibility of the individual property owner.

b. Community (Cluster) System – A wastewater collection and treatment system that provides shared collection, treatment, and disposal of domestic wastewater from multiple parcels or multiple units of individually deeded property. Such a system might serve a small subdivision or a condominium complex. It is imperative with such systems that some form of common ownership and management be established and approved by the Department.

OPERATION AND MAINTENANCE — Activities including tests, measurements, adjustments, replacements, and repairs that are intended to maintain all functional units of the onsite wastewater system in a manner that will allow the system to function as designed.

PARENT MATERIAL – The unconsolidated and chemically weathered mineral or organic matter from which the column of soils is developed by pedogenic processes.

PERMIT - A written document issued by the Department authorizing the construction and operation of an onsite wastewater system under this regulation. The construction and operation permit survives the life of the onsite wastewater system that it authorizes.

PLASTICITY – The degree to which "puddled" or reworked soil can be permanently deformed without rupturing. The evaluation is made in accordance with the Field Book by forming a roll (wire) of soil at a water content where the maximum plasticity is expressed.

PRIMARY TREATMENT - The initial process to separate solids from the liquid, digest organic matter and store digested solids through a period of detention and biological conditioning of liquid waste.

PROFESSIONAL SOIL CLASSIFIER – A person with special knowledge of the physical, chemical and biological sciences applicable to soils as natural bodies and of the methods and principles of soil classification as acquired by soils education and soil classification experience in the formation, morphology, description and mapping of soils; is qualified to practice soil classifying; and who has been duly registered by the South Carolina State Board of Registration for professional soil classifiers.

PUBLIC ENTITY – Any organizations such as a city, town county, municipality, or special purpose sewer district.

PUBLIC WATER SYSTEM - Any publicly or privately owned waterworks system that provides drinking water for human consumption, as defined in R. 61-58, State Primary Drinking Water Regulations.

PUMP CHAMBER - A water-tight, covered receptacle designed and constructed to receive and store the discharge from a septic tank until such time that the effluent is pumped to a final treatment and disposal site.

RECEPTOR – Any water well or surface water of the state, including estuaries.

REDOX DEPLETIONS – Mottles of chroma two (2) or less with values of four (4) or more using soil color charts.

REDOXIMORPHIC FEATURES – Morphological features that are formed by the processes of reduction, translocation, and oxidation of iron and manganese oxides in seasonally saturated soils. These include redox concentrations, redox depletions, and reduced matrices.

REMOTE SUBSURFACE WASTEWATER INFILTRATION AREA – A subsurface wastewater infiltration area that is not situated within the legal boundaries of the primary lot or tract that it serves.

REPAIR -- Any work performed on an existing onsite wastewater system for the purposes of correcting a surface failure or other unauthorized discharge, enhancing system performance, relocating the entire system or system components, provided there are no changes in use that would impact the existing system.

REPAIR OR REPLACEMENT AREA - An area reserved for the installation of additional wastewater infiltration trenches.

RESTRICTIVE HORIZON – A soil horizon that is capable of severely retarding the movement of groundwater or effluent, and may be brittle and cemented with iron, aluminum, silica, organic matter, or other compounds. Restrictive horizons may occur as fragipans, iron pans, organic pans, or shallow rock formations, and are recognized by their resistance in excavation and auger boring.

RESIN - Any number of commercially available polyester products used in the manufacture of fiberglass reinforced products which serve to contribute mechanical strength, determine chemical and thermal performance, and prevent abrasion of fibers, and which must be physically and/or chemically determined to be acceptable for the environment, and free from inert filler materials.

SAPROLITE – Soft, friable, thoroughly decomposed rock that has formed in place by chemical weathering, retaining the fabric and structure of the parent rock, and being devoid of expansive clay. Unconsolidated saprolite can be dug using a hand auger or knife. Consolidated saprolite cannot be penetrated with a hand auger or similar tool, and must be dug with a backhoe or other powered equipment.

SEALANT - A bonding agent specifically designed to bond joining sections of fiberglass reinforced plastic products to each other in such a manner so as to create a durable long lasting, watertight seal, which does not alter the structural integrity or strength of the two joined fiberglass products.

SEPTIC TANK - A water-tight, covered receptacle designed and constructed to receive the discharge of domestic wastewater from a building sewer, separate solids from the liquid, digest organic matter, store digested solids through a period of detention and biological conditioning of liquid waste, and allow the effluent to discharge for final treatment and disposal.

SERIAL DISTRIBUTION – A method for effluent distribution on sloping terrain that utilizes drop boxes or earthen dams to affect total sequential flow from upper to lower wastewater infiltration trenches.

SOIL STRUCTURE – The aggregation of primary soil particles (i.e., sand, silt, and clay) into compound particles, or clusters of primary particles, which are separated from the adjoining aggregates by surfaces of weakness. In soils with platy structure, the aggregates are plate-like and overlap one another to severely impair permeability. A massive condition can occur in soils containing considerable amounts of clay when a portion of the colloidal material, including clay particles, tends to fill the pore spaces making the soil very dense.

SOIL TEXTURE – The relative proportions of the three soil separates (sand, silt, and clay) in a given sample of soil. The percentages of each separate are used to determine which class a particular sample falls into by plotting the intersection of these three values on the United States Department of Agriculture Natural Resource Conservation Service (USDA-NRCS) Textural Triangle.

SPECIALIZED ONSITE WASTEWATER SYSTEM DESIGN (less than 1500 GPD) – An onsite wastewater system that is certified to function satisfactorily and in accordance with all requirements of

R.61-56 by virtue of it having been designed by a Registered Professional Engineer with technical input from a Professional Soil Classifier. Such systems have limited application, and can only be utilized when the required engineering design, certification, and technical soils documentation have been provided to and accepted by the Department.

STANDARD – A group of requirements developed by the Department that specifies the minimum site conditions and design criteria necessary for the approval of a specific type of onsite wastewater system (i.e., alternative system) that differs from a conventional system. A standard may also address minimum design criteria for certain components of onsite wastewater systems as well as methodologies for determining system sizing.

STICKINESS – The capacity of soil to adhere to other objects. Stickiness is estimated in accordance with the Field Book at the moisture content that displays the greatest adherence when pressed between the thumb and forefinger.

SUBSURFACE WASTEWATER INFILTRATION AREA (DRAIN FIELD) - A specific area where a network of wastewater infiltration trenches or other devices of sewage application are installed to provide the final treatment and disposal of effluent.

ULTIMATE TENSILE STRENGTH - A measure of the resistance of a material to longitudinal stress, measured by the minimum longitudinal stress required to rupture the material.

UPGRADE/EXPANSION - Any work performed on an existing onsite wastewater system for the purposes of increasing the capacity of the system above its original design and/or accommodating wastes of a different character than was originally approved.

WASTEWATER INFILTRATION TRENCH - A trench installed in the naturally occurring soil that is utilized for the treatment and disposal of domestic wastewater. A conventional trench is characterized by the following: (a) at least twenty-three (23) inches in depth; (b) thirty-six (36) inches in width; (c) filled with aggregate so that at least six (6) inches is beneath the distribution pipe, with at least five (5) inches on both sides of the pipe, and at least three (3) inches covering the pipe; and (d) at least nine (9) inches of backfill. Other trench configurations are specified in the attached Appendices of Standards for Onsite Wastewater Systems.

WASTEWATER TREATMENT FACILITY – An accessible publicly or privately owned system of structures, equipment and related appurtenances to treat, store, or manage wastewater.

ZONE OF SATURATION – Any zone in the soil profile that has soil water pressures that are zero or positive at some times during the year. For the purpose of this regulation, the beginning of such a zone shall be utilized in determining all required vertical separations from the deepest point of effluent application. This zone, therefore, shall be defined as the shallowest of those points at which either redox depletions appear or gleying is first observed; or, in the absence of other field identification methods, the maximum groundwater elevation as determined through wet season monitoring performed in accordance with criteria approved by the Department.

102 GENERAL

102.1 Each dwelling unit, building, business or other structure occupied for more than two (2) hours per day shall be provided with an approved method for the treatment and disposal of domestic wastewater.

102.2 It shall be the responsibility of the property owner to ensure that a permit to construct and operate any new, upgraded, or expanded onsite wastewater system is obtained from the Department prior to construction and operation of the system.

102.3 No person shall begin construction of a building to be served by an onsite wastewater system until a permit to construct and operate such a system is issued by the Department. Mobile or modular structures intended for occupancy shall not be moved onto the site until the permit to construct and operate an onsite wastewater system has been issued.

102.4 The permit holder shall be required to properly operate and maintain in good working order, and operate as efficiently as possible, all facilities and systems which are installed pursuant to the permit and to comply with all terms and conditions of the permit.

102.5 An onsite wastewater system serving more than one (1) piece of deeded property shall be considered as a community or cluster collection and treatment system and shall comply with the following:

(1) A permit activity will not occur that is inconsistent with a plan or plan amendment approved under section 208(b) of the Clean Water Act unless the Department finds such variance necessary to protect the public's health, safety and welfare.

(2) A public entity shall own the system and shall be responsible for the operation, maintenance and replacement of all components unless otherwise approved by the Department. The Department may consider a request from a private entity or person; however, such proposals must be evaluated on a case-by-case basis. The Department will evaluate the capability of long-term, reliable system operation in its evaluation of a permit request.

(3) If the project is owned by a private entity or person, the Department shall require financial assurances for the operation, maintenance, and replacement of the tank(s) and subsurface wastewater infiltration area system and relevant collection/pumping components.

(4) Sufficient area meeting the minimum requirements for large onsite wastewater systems shall be provided for at least one hundred (100) percent repair or replacement of the primary subsurface wastewater infiltration area.

(5) The collection sewer and pumping portions of a community onsite wastewater system shall receive a separate Construction Permit under R. 61-67.300.

102.6 When the actual or estimated peak sewage flow will exceed fifteen hundred (1500) gallons per day (gpd), the Department may require that the design of the onsite wastewater system be prepared by a Registered Professional Engineer licensed in the State of South Carolina.

102.7 Large (greater than 1500gpd) and community onsite wastewater systems incorporating advanced treatment methods, including but not limited to aerobic pre-treatment, lagoons, surface or subsurface drip irrigation, low pressure pipe distribution and other maintenance intensive methods, shall be required to obtain a Land Application Permit under R. 61-9.505.

102.8 Facilities that generate industrial process or any other non-domestic wastewater shall not be granted a permit under this regulation unless the Department determines that the proposed discharge would not pose a significant environmental risk. In such a determination, the Department would assess the risk to public health and/or groundwater contamination regardless of whether or not the wastewater

were discharged continuously or intermittently to the onsite wastewater system. Plumbing appurtenances that facilitate the transport of such wastewater, including floor drains, trench drains, utility sinks, equipment drains, or any other conduit shall not be installed in facilities served by onsite wastewater systems unless specifically approved by the Department as a result of the above-described determination.

102.9 Campgrounds

(1) Onsite wastewater systems serving campgrounds shall comply with all applicable requirements of this regulation. Such campgrounds shall be provided with adequate toilet and bathing facilities, except in those cases where all campsites are furnished with individual sewer service connections, and each site is exclusively designated for use by camping units equipped to access such connections.

(2) Individual sewer service connections shall be part of an approved sewage collection system and shall be equipped with removable, tight fitting covers.

(3) Where individual sewer service connections are not furnished at all campsites, an approved sanitary dump station(s) shall be provided at a convenient location(s) within the campground at the ratio of one dump station per one hundred (100) unsewered campsites or fractions thereof.

(a) A dump station shall consist of one or more trapped four inch sewer risers surrounded by a concrete apron having a diameter of at least two (2) feet and sloped to drain. Sewer risers must be equipped with removable, tight fitting covers.

(b) Each dump station shall be equipped with pressurized water to be used for washing the concrete apron. The water outlet shall be protected from back siphonage by a vacuum breaker installed at its highest point, or by other approved means. A sign shall be placed at this water outlet stating: THIS WATER IS FOR CLEANING PURPOSES ONLY.

103 APPLICATION, PERMIT, APPROVAL

103.1 Application

(1) The applicant shall furnish, on the application form provided by the Department, correct information necessary for determining the feasibility of an onsite wastewater system.

(2) A boundary plat, deed or other legal document specifying the lot size and its boundaries shall be furnished by the applicant. When a dwelling or facility is to be served by a remote subsurface wastewater infiltration area, the applicant must provide appropriate easement(s). An appropriate easement must allow ingress and egress for construction, operation, maintenance, replacement and repair and must run with the land.

(3) Soil boring descriptions, backhoe pits, and soils classifications from specifically identified locations, including other tests or information, shall be required when deemed necessary by the Department.

(4) Before a site evaluation of the lot is performed by the Department, the applicant may be required to: clear and mark property boundary lines and corners; post an identification marker in the front center of the lot; place stakes at the corners of the proposed building; mark the proposed point of stub-out and septic tank; locate the proposed or existing well location; and identify the proposed location of any additional structures or facilities on the property that may influence the placement and configuration of

the onsite wastewater system. Also, the applicant may be required to clear underbrush from the property in order to facilitate the evaluation.

103.2 Permit

(1) It shall be unlawful to construct, upgrade, expand, or operate an onsite wastewater system unless the Department has issued a permit for the specific construction and operation proposed. The system shall be constructed and operated in accordance with the permit, and the Department must authorize any changes prior to the construction and operation of the system. The applicant shall be required to make a written request or submit a new application if the permit modifications require another site evaluation. The Department may also require a permit for the repair of an onsite wastewater system when deemed necessary.

(2) The onsite wastewater system shall be constructed and operated according to the specifications and conditions of the permit, and in compliance with this regulation.

(3) In the case of repairs to existing onsite wastewater systems, the Department may authorize the best possible method of repair that, in the opinion of Department staff, may improve the operation of the system, regardless of site conditions.

(4) Permits issued after the effective date of this regulation shall remain valid for a period of five (5) years from the date of issuance, provided the physical character of the property has not changed and the conditions of the original permit can be met. Exceptions may be granted for those permits addressed by other statutes.

103.3 Approval

(1) Any repair, extension or alteration for which a permit has been issued and all newly constructed systems shall remain in an exposed condition until a final inspection and approval has been completed by the Department or a licensed contractor certified by the Department to conduct final inspections.

(2) An onsite wastewater system shall not be placed into operation prior to final inspection and approval by the Department or by an authority approved by the Department.

200 MINIMUM SITE CONDITIONS

200.1 Soil texture, depth of soil to restrictive horizons and depth to the zone of saturation shall meet minimum standards approved by the Department. These characteristics shall be determined using accepted methodologies in the field of soil science.

200.2 Soils exhibiting massive or platy structure, and soils which have been identified as having substantial amounts of expansible layer clay minerals or smectites, are unsuitable for onsite wastewater systems.

200.3 Where the estimated peak sewage flow will not exceed fifteen hundred (1500) gpd, the minimum vertical separation between the deepest point of effluent application and the zone of saturation shall be at least six (6) inches.

200.4 Where the estimated peak sewage flow will exceed fifteen hundred (1500) gpd, the depth to the zone of saturation shall be at least thirty six (36) inches below the naturally occurring soil surface, and at least six (6) inches below the deepest point of effluent application.

200.5 Depth to rock and other restrictive horizons shall be greater than twelve (12) inches below the deepest point of effluent application.

200.6 The area of the lot or plot of ground where the onsite wastewater system is to be installed shall be of sufficient size so that no part of the system will be:

(1) Within five (5) linear feet of a building, or under a driveway or parking area;

(2) Within seventy-five (75) linear feet of a private well (less than 1500 gpd sewage flow), one hundred (100) linear feet of a receptor (greater than 1500 gpd sewage flow), and within the Department's established minimum distance from a public well;

(3) With in one hundred (100) linear feet of a public well;

(4) Within seventy-five (75) linear feet of the critical area line (tidal waters) as determined by the Department; or within seventy-five (75) linear feet of the ordinary high water (within the banks) elevation (non-tidal waters) of an impounded or natural body of water, including streams and canals;

(5) Within ten (10) feet of upslope and twenty-five (25) feet of down slope curtain drains;

(6) Within twenty-five (25) feet of a drainage ditch or stormwater treatment system;

(7) Within fifteen (15) feet of the top of the slope of embankments or cuts of two (2) feet or more vertical height when any part of the wastewater infiltration trench is to be placed higher in elevation than the invert of the cut or embankment;

(8) Within five (5) feet of a property line.

(9) Greater protective offsets shall be required when utilizing certain alternative system standards contained within this Regulation.

200.7 In addition to the minimum space required in Section 200.6, minimum repair area shall be set aside as follows:

(1) Any new site meeting the minimum design criteria for an onsite wastewater system shall have a usable repair or replacement area equivalent to at least fifty (50) percent of the size of the original system. Where community onsite wastewater systems are utilized, there must be at least one hundred (100) percent repair or replacement area. This area cannot be covered with structures or impervious materials.

(2) Usable repair or replacement area shall be demonstrated to include suitable soil conditions, and shall be free of buildings or other improvements, setbacks, easements, and other encroachments that would prevent system construction. The undisturbed area between the wastewater infiltration trenches shall not be credited towards this requirement.

200.8 Multiple, individually owned remote subsurface wastewater infiltration areas may be considered for mass installation in a defined area where the wastewater infiltration trenches will be adjacently located to each other, provided that the combined peak wastewater loading is less than fifteen hundred (1500)

gpd. In such cases, each subsurface wastewater infiltration area plot shall be sized such that there is sufficient area for one hundred (100) percent subsurface wastewater infiltration area replacement.. Each plot shall be deeded, with all appropriate easements, as a lot in conjunction with the specific unit that it serves, and required protective offsets, as described in Section 200.6, shall apply to each individual remote subsurface wastewater infiltration area. A plan shall be prepared by a Registered Professional Engineer licensed in the State of South Carolina that illustrates the overall plan; specifies the route and identification of effluent sewers and/or forcemains; specifies the entity responsible for perpetual maintenance of the sewer lines and mass subsurface wastewater infiltration area; specifies the configuration and identification of the individual subsurface wastewater infiltration area parcels; and specifies the manner in which ingress and egress will be provided to the individual subsurface wastewater infiltration area parcels. When the combined peak wastewater loading of the adjacently loading subsurface wastewater infiltration area will exceed fifteen hundred (1500) gpd, the project shall be considered as a public (community) collection and treatment system, then the onsite wastewater system must comply with the requirements in Section 102.5.

201 MINIMUM REQUIREMENTS FOR PRIMARY TREATMENT

201.1 Septic Tanks

(1) All persons or firms manufacturing septic tanks for use in South Carolina shall submit detailed plans for each size tank to the Department, and shall receive written approval for such tanks prior to their installation in the state.

(2) The design and construction of each septic tank shall be in accordance with minimum standards contained within this Regulation.

(3) No septic tank shall be installed which has a net liquid capacity of less than one thousand (1000) gallons. Such tanks shall be sufficient to serve dwellings of four (4) bedrooms or less. Two hundred fifty (250) gallons additional capacity shall be required for each bedroom over four (4).

(4) When multiple dwellings, including condominiums, apartments, and mobile homes, share a common onsite wastewater system, each dwelling unit shall either have its own properly sized septic tank, or it must discharge to a larger tank(s) that provides the combined total of the minimum capacities required for each contributing unit. Exception may be granted when a public entity, or private entity with financial assurances, is approved by the Department to provide operation and maintenance of the system. In such cases, the formula in Section 201.1(5) may be considered.

(5) Septic tanks serving establishments other than individual dwellings shall be sized according to actual peak flow data, when available, or by estimates of peak sewage flow, as set forth in standards established by the Department. For those septic tanks receiving peak flows less than fifteen hundred (1500) gpd, the net liquid capacity shall be calculated by multiplying 1.5 times the peak flow expressed in gallons per day. For those septic tanks receiving peak flows between fifteen hundred (1500) and forty five hundred (4500) gpd, the net liquid capacity shall be calculated as follows:

Volume (V) = 1125 gal. plus (0.75 x Peak Flow(gpd)).

For those septic tanks receiving peak flows in excess of forty five hundred (4500) gpd, the net liquid capacity shall be at least equal to the peak flow:

Volume (V) = Peak Flow (gpd)

(6) The minimum liquid capacity requirements shall be met by the use of a single septic tank or two or more tanks installed in series. Septic tanks joined in series shall be interconnected by an upper effluent pipe(s) with a minimum diameter of four (4) inches and a lower sludge pipe(s) with a minimum diameter of twelve (12) inches. The upper connection(s) shall be installed level from tank to tank, and the lower sludge pipe connection(s) shall be installed level and shall be placed twelve (12) inches above the bottoms of the tanks. The lower sludge pipe connection(s) can be eliminated if the first tank in series contains at least two-thirds of the total required liquid capacity. There shall be no more than two (2) inches of fall from the inlet invert of the first tank to the outlet invert of the last tank in series.

201.2 Grease Traps

(1) Any new food service facilities permitted under R. 61-25 and served by an onsite wastewater system that is permitted after the effective date of this regulation shall be required to have a properly sized grease trap. This requirement shall also apply to new facilities not requiring a food service permit under R. 61-25 where cooking operations are performed. Exception may be granted in cases where a retail food service establishment is permitted but does not perform any cooking or food preparation operations.

(2) Existing food service establishments permitted under R. 61-25 prior to the effective date of this regulation shall not be required to immediately comply with this section, provided the facility does not experience an onsite wastewater system malfunction. Those existing establishments that experience a future malfunction as a result of problems associated with the accumulation of grease shall be required to comply with all portions of this section. Also, food service facilities that were permitted prior to the effective date of this regulation, were closed, and then reopened at any time thereafter, provided the facility was not experiencing a malfunction prior to closure and the original peak design flow will not be exceeded, shall not be required to immediately comply with this section provided the facility does not experience an onsite wastewater system malfunction.

(3) Any food service facility requiring a grease trap shall provide two separate plumbing stub-outs, one serving the food preparation area and the other serving the restrooms. The stub-out from the restrooms shall discharge directly into the main building septic tank. The stub-out from the food preparation area shall discharge directly into the grease trap with the effluent then directed to the main building septic tank. In order to enhance grease separation while the liquids are hot, the grease trap shall be placed as close as possible to the source of wastewater. Garbage grinders shall not be allowed to discharge to such systems.

(4) All grease traps must be directly accessible from the surface, and must be equipped with an extended outlet sanitary tee terminating six (6) to twelve (12) inches above the tank bottom. The minimum access opening shall be eighteen (18) inches in diameter.

(5) All grease traps serving facilities from which the peak sewage flow exceeds fifteen hundred (1500) gpd shall either be dual chambered or individual tanks in series. If dual chambered, both the dividing wall and the second chamber must be equipped with a sanitary tee terminating six (6) to twelve (12) inches above the tank bottom.

(6) It shall be the responsibility of the owner/manager to ensure that the grease trap(s) is cleaned by a licensed septage pumper at frequent intervals to prevent the carryover of grease into other parts of the onsite wastewater system.

(7) Determination of Minimum Net Liquid Capacity

(a) No grease trap used as part of an onsite wastewater system shall have a net liquid capacity of less than one thousand (1000) gallons. Also, commercial interior-type grease interceptors shall not be utilized in lieu of a properly sized exterior grease trap.

(b) Minimum net liquid capacities of grease traps shall be determined as follows:

NLC = GPD x LF x RF, where
NLC = Net Liquid Capacity of Grease Trap (gallons)
GPD = Total Maximum Estimated Sewage Flow (gpd)
LF = Loading Factor (the approximate portion of the total maximum daily flow generated in food preparation areas)
0.3 - Schools and Other Institutions
0.4 - Restaurants
0.5 - Retail Food Stores
RF = Minimum Retention and Storage Factor of 2.5 for Onsite Wastewater Systems

201.3 Other Primary Treatment Methods

The Department, at its discretion, may consider other methods of primary treatment where conditions are warranted.

202 MINIMUM REQUIREMENTS FOR FINAL TREATMENT AND DISPOSAL SYSTEMS

202.1 General

(1) All pipe utilized in onsite wastewater systems shall meet applicable ASTM standards. All piping utilized in the connection of a septic tank to a subsurface wastewater infiltration area, including that which is utilized in the connection of adjacent wastewater infiltration trenches, whether they be level or serially fed, shall be non-perforated Schedule 40 PVC pipe. Such pipe, excluding force mains, shall be a minimum of three (3) inches in diameter. The connecting pipe shall not be surrounded by aggregate.

(2) At least seven (7) feet of undisturbed earth shall exist between wastewater infiltration trenches.

(3) The aggregate used in onsite wastewater systems shall be a material approved by the Department, and shall range in size from one-half (1/2) inch to two and one-half (2 1/2) inches. Fines shall be prohibited. Tire chips shall range in size from one-half (1/2) inch to four (4) inches in size, and wire strands shall not protrude more than one-half (1/2) inch from the sides.

(4) Drop boxes shall be utilized when deemed necessary by the Department. When required, they shall be surrounded and stabilized by at least two (2) feet of undisturbed or manually compacted earth, and the wastewater infiltration trenches shall be fed with non-perforated Schedule 40 PVC pipe. The invert of the drop box overflow pipe shall be at the same elevation as the top of the aggregate in the trenches fed by that box, and the top of the aggregate shall be level throughout the trench run. Other methods that affect serial distribution shall also overflow at the same elevation as the top of the aggregate.

(5) There shall be at least two (2) feet of earthen buffer between the septic tank and all portions of adjacent wastewater infiltration trenches. Where gravity flow is utilized, the invert elevation of the septic tank outlet shall be at the same elevation or higher than the top of the aggregate in the highest placed wastewater infiltration trench.

(6) To ensure proper operation and protection of onsite wastewater systems, the Department may require individual or combined installation of drainage swales, curtain or interceptor drains, protective barriers, or protective ground cover. Final approval of the permit may be withheld until such time as these improvements are completed.

(7) The bottom of each wastewater infiltration trench, including the distribution pipe contained within, shall be as level as possible, with an elevation differential not to exceed two (2) inches throughout the trench run.

(8) The required number, length and configuration of wastewater infiltration trenches shall be determined by the Department, and shall be based upon the Standard for Determining Peak Sewage Flow Rates (Appendix R) from Commercial and Recreational Establishments in conjunction with the Long-Term Acceptance Rate Standard for Onsite Wastewater Systems (Appendix Q). All systems shall be sized based upon the most hydraulically limiting, naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(9) The aggregate over the distribution pipe shall be covered with a strong, untreated pervious material to prevent infiltration of backfill material.

203 CONSTRUCTION CRITERIA

203.1 On sloping terrain, wastewater infiltration trenches shall be installed perpendicular to the direction of slope and parallel to the contours of the land.

203.2 Where deemed necessary by the Department, all required site alterations (swales, fill, shaping, etc.) shall be done prior to permitting the installation of the onsite wastewater system.

203.3 The area in which the onsite wastewater system is to be located shall be protected from surface water and roof or downspout drainage by the installation of drainage swales and small amounts of fill to achieve positive surface drainage.

203.4 Gross amounts of dirt, mud and debris shall be removed from the septic tank before backfilling. All backfilling around the tank shall be tamped to facilitate stabilization.

203.5 If septic tank lids are of multi-part, slab-type construction, all joints shall be caulked or covered with heavy roofing paper or similar material.

203.6 All septic tanks of two-piece construction joined by tongue and groove shall be sealed with either bituminous mastic or other watertight caulking material placed in the groove in such quantity that the sealant is clearly visible around the entire tank after the two pieces are joined.

203.7 When effluent pumping is required, all components of the pumping system shall adhere to standards contained within this Regulation.

203.8 The Department may restrict, delay, or prohibit the installation or final approval of any onsite wastewater system when adverse soil or site conditions exist. These may include, but not be limited to, wet soil conditions in textural classes III and IV as described in the Long-Term Acceptance Rate Standard for Onsite Wastewater Systems approved by the Department.

204 EVALUATION OF ALTERNATIVE INFILTRATION TRENCH PRODUCTS

The Department shall be responsible for the evaluation and approval of alternative infiltration trench products prior to their use in the State, unless otherwise regulated by statute. This evaluation shall include a review of available research data; a review of parameters relating to structure, geometry, and volume; and the establishment of required equivalency values for comparing the product to a conventional wastewater infiltration trench.

204.1 Application

(1) All requests for approval of alternative infiltration trench products must be submitted in writing to the Department, and must include the following:

(a) Complete description of the product and its intended use.

(b) Complete listing of materials used in the construction of the product, including specifications.

(c) Copies of all available literature pertaining to the product, and a listing of all appropriate reference materials.

(d) Copies of any and all available research, testing and monitoring data, to include records of performance and/or prior experience in actual field conditions.

(2) The Department will review the application, and may seek other information, including additional evaluations.

204.2 Equivalency Value For Infiltrative Surface

(1) The total infiltrative surface area surrounding the sides and bottom of a conventional wastewater infiltration trench (i.e., 5.33 sq.ft./lin.ft.) shall serve as the basis for all geometric comparisons to alternative infiltration trench products.

(2) The effective infiltrative surface area of a conventional trench shall include the total of both rectangular sidewalls, beginning at the top of the aggregate and extending to the trench bottom, in addition to the width of the trench bottom. Similarly, the effective infiltrative surface area of a product shall include the total of both immediately adjacent, rectangular sidewalls, beginning at the top of louvers, slits, holes or similar orifices, in addition to the rectangular width of the trench immediately beneath the product.

(3) The equivalency value (E) for any given product is determined by comparing the total effective surface area of the product, as defined above, with that of a conventional wastewater infiltration trench as follows:

(a) Total Infiltrative Surface Area for One Foot of Conventional Trench:

Trench Sidewalls = 2 x (1.16ft.H ÷ 1.0 ft.L) = 2.33 sq.ft./lin.ft.
Trench Bottom = 1 x (3ft.W x 1ft.L) = 3.0 sq.ft./lin.ft.
Total Infiltrative Surface Area = 5.33 sq.ft./lin.ft.

(b) Equivalency Value (E) Shall Be Computed As Follows:

E = 5.33 sq.ft./ft ÷ Sum of Three Rectangular Interfaces Immediately Adjacent to Product (sq.ft./ft.)

(c) The Required Total Length of the Product Shall Be Calculated As Follows:

Length of Product (L) = E x Length of Conventional 36 in. Wide Trenches Required By DHEC Regulations and Standards

204.3 Other parameters to be evaluated for alternative infiltration trench products may include the following:

(1) Structural Integrity - Products must be of sound construction and able to adequately withstand the normal pressures and stressed associated with installation and use.

(2) Inertness - No product can be approved unless it will remain relatively unaffected for extended periods of time while in contact with typical domestic wastewater.

(3) Storage Volume - The effluent storage capacity of a product must closely approximate or exceed that of a comparable conventional system.

(4) Maintenance of Permeable Interfaces - A product shall have a direct interface with the effective infiltrative surface (undisturbed natural soil) or, if backfill is required, backfill material shall not create a permeability barrier and shall not hinder the downward or horizontal flow of effluent into the undisturbed natural soil.

(5) The unique characteristics of a given product may warrant the evaluation of other parameters not specifically mentioned in this section of the regulation.

(6) The design, construction, or installation methods used with any product shall not conflict nor violate any other requirements established by the Department.

204.4 Approval For General Use

If warranted, the Department will issue a letter of approval for general use of the alternative infiltration trench product in accordance with equivalency values and other requirements determined herein.

300 WASTEWATER TREATMENT FACILITY ACCESSIBILITY

300.1 Permits for new onsite wastewater systems shall not be issued where a wastewater treatment facility is accessible for connection.

300.2 Repairs to or replacement of failing onsite wastewater systems shall not be allowed where a wastewater treatment facility is accessible for connection.

301 DISCHARGE OF WASTE

No septic tank effluent or domestic wastewater or sewage shall be discharged to the surface of the ground or into any stream or body of water in South Carolina without an appropriate permit from the Department.

302 ENFORCEMENT PROVISIONS

(1) This regulation is issued under the authority of Section 44-1-140(11) of the 1976 Code of Laws, as amended, and Section 48-1-10 et seq. of the 1976 Code of Laws, as amended. It shall be enforced in accordance with interpretations and public health reasons approved by the Department.

(2) The Department may temporarily suspend a permit for a violation of this regulation.

(3) The Department may revoke a permit for a violation of this regulation. The Department will revoke a permit when:

(a) the onsite wastewater system is malfunctioning and sewage is discharging to the ground or the groundwater, the holder of the permit has received notice that the system is malfunctioning, the Department has given notice that repairs must be made within a reasonable period of time, the holder of the permit has not made the repairs, and the system continues to discharge sewage to the ground or the groundwater; or

(b) the onsite wastewater system is malfunctioning and sewage is discharging to the ground or the groundwater, the holder of the permit has received notice that the system is malfunctioning, the Department has given notice that a wastewater treatment facility is accessible for connection.

(4) Following revocation under R.61-56.302.3.a, the holder of the revoked permit can obtain a repair permit and make the necessary repairs to the system. After the Department approves the repairs pursuant to Section 103.3 of this regulation, the holder of the permit will operate the onsite wastewater system under the terms of the new permit.

(5) In addition to the authority to suspend and revoke permits, the Department may seek enforcement and issue civil penalties in accordance with SC Code Ann. Sections 44-1-150 and 48-1-320, 330, and 340. The Department shall have the authority to assess and suspend civil penalties if the violations of this regulation are corrected in a period of time established by the Department.

(6) A Department decision involving the issuance, denial, renewal, modification, suspension, or revocation of a permit may be appealed by an affected person with standing pursuant to applicable law, including S.C. Code Title 44, Chapter 1 and Title 1, Chapter 23. Any person to whom an order or enforcement letter is issued may appeal it pursuant to applicable law, including S.C. Code Title 44, Chapter 1 and Title 1, Chapter 23.

303 REPEAL AND DATE OF EFFECT

This regulation shall become effective as provided in Section 1-23-10 et seq. of the 1976 Code of Laws of South Carolina, as amended, and shall repeal Department of Health and Environmental Control R. 61-56 of the Code of Laws of South Carolina, 1976; except that, Sections 200.6(2) and 200.6(4) shall become effective on January 1, 2009, and existing Sections V.E(b) and (c) shall remain in effect until that date.

304 CHANGES IN USE THAT IMPACT EXISTING ONSITE WASTEWATER SYSTEMS

If the use of a dwelling or facility is changed such that additions or alterations are proposed which increase wastewater flow, change wastewater characteristics, or compromise the integrity or function of

the system, the onsite wastewater system shall be brought into full compliance with this regulation. Alterations that change the wastewater characteristics or increase wastewater flow will require the owner to apply for and receive an approval for the upgrade/expansion prior to any alterations.

305 SEVERABILITY CLAUSE

Should any section, paragraph, sentence, clause or phrase of this regulation be declared unconstitutional or invalid for any reason, the remainder of this regulation shall not be affected thereby.

400 APPENDICES OF STANDARDS FOR ONSITE WASTEWATER SYSTEMS

401 APPENDIX A - SYSTEM STANDARD 150 – LARGE (greater than 1500 GPD) AND COMMUNITY ONSITE WASTEWATER SYSTEMS

401.1 SITE/PERMITTING REQUIREMENTS

(1) The Department may require that designs for large and community onsite wastewater systems be prepared by a Registered Professional Engineer licensed in the State of South Carolina. Further, the Department may require whatever engineering and soils based submittals are deemed necessary to determine the feasibility and acceptability of any site for such a system.

(2) The depth to the zone of saturation (ZOS) shall be at least thirty-six (36) inches below the naturally occurring soil surface, and at least six (6) inches below the deepest point of effluent application.

(3) The depth to any restrictive horizon must be greater than twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(4) The Long-Term Acceptance Rate for system sizing shall be based upon the most hydraulically limiting, naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(5) There shall be at least fifty (50) percent reserved subsurface wastewater infiltration area repair or replacement area available consisting of soils suitable for a large onsite wastewater system, except where public (community) systems are utilized, in which case there must be at least one hundred (100) percent repair or replacement area.

(6) Large (greater than 1500 gpd) and community onsite wastewater systems incorporating advanced treatment methods, including but not limited to aerobic pre-treatment, lagoons, surface or subsurface drip irrigation, low pressure pipe distribution, and other maintenance intensive methods, shall be required to obtain a Land Application Permit under R. 61-9.505.

(7) Efforts to circumvent the requirements of this standard by configuring remote, individually deeded, adjacently located subsurface wastewater infiltration areas in lieu of a community onsite wastewater system shall not be permitted. On a very limited basis, a few of these individual systems may be considered for mass installation where the wastewater infiltration trenches will be adjacent to each other in a defined area, provided that the combined peak wastewater loading is less than fifteen hundred (1500) gpd. In such cases:

(a) each subsurface wastewater infiltration area plot shall be sized such that there is sufficient area for one hundred (100) percent subsurface wastewater infiltration area replacement.

(b) Each plot shall be deeded with all appropriate easements as a lot in conjunction with the specific unit that it serves, and required protective offsets, as described in Section 200.6, shall apply to each individual remote subsurface wastewater infiltration area.

(c) A plan shall be prepared by a Registered Professional Engineer licensed in the State of South Carolina that illustrates the overall plan; specifies the route and identification of effluent sewers and forcemains; specifies the entity responsible for perpetual maintenance of the sewer lines and mass subsurface wastewater infiltration area; specifies the configuration and identification of the individual subsurface wastewater infiltration area parcels; and specifies the manner in which ingress and egress will be provided to the individual subsurface wastewater infiltration area parcels.

(d) When the combined peak wastewater loading of the adjacently located subsurface wastewater infiltration areas from the entire project will exceed fifteen hundred (1500) gpd, the project shall be considered as a public (community) collection and treatment system, and all requirements described in Section 102.5 and this standard shall apply.

401.2 INSTALLATION REQUIREMENTS

(1) Large (greater than 1500 gpd) and community onsite wastewater systems shall not be constructed in fill material, and shall not be placed any closer to receptors than one hundred (100) feet.

(2) Conventional wastewater infiltration trenches installed in the naturally occurring soil and having a width of thirty-six (36) inches shall be utilized.

(3) Wherever possible, designs that favor long wastewater infiltration trenches, convex landscape positions, and rectangular subsurface wastewater infiltration area configurations shall be required.

(4) All tree/brush removal shall be done in a manner that minimizes the disturbance or loss of naturally occurring soil.

401.3 COMMUNITY OR CLUSTER COLLECTION AND TREATMENT ONSITE WASTEWATER SYSTEMS

(1) An onsite wastewater system serving more than one (1) piece of deeded property shall be considered as a public (community) collection and treatment system.

(2) A permit activity will not occur that is inconsistent with a plan or plan amendment approved under Section 208(b) of the Clean Water Act, unless the Department finds such variance necessary to protect the public's health, safety and welfare.

(3) A public entity shall own the system and shall be responsible for the operation, maintenance and replacement of all components unless otherwise approved by the Department. The Department may consider a request from a private entity or person; however such proposals must be evaluated on a case-by-case basis. The Department will evaluate the capability of long-term, reliable system operation in its evaluation of a permit request.

(4) If the project is owned by a private entity or person, the Department shall require financial assurances for the operation, maintenance, and replacement of the tank(s) and subsurface wastewater infiltration area system and relevant collection/pumping components.

(5) Sufficient area meeting the minimum requirements for large onsite wastewater systems shall be provided for at least one hundred (100) percent repair or replacement of the primary subsurface wastewater infiltration area.

(6) The collection sewer and pumping portions of a community onsite wastewater system shall receive a separate Construction Permit under R. 61-67.300.

(7) The permit holder shall be required to properly operate and maintain in good working order, and operate as efficiently as possible, all facilities and systems which are installed or used to achieve compliance with the terms and conditions of the permit.

402 APPENDIX B - SYSTEM STANDARD 210/211 – SHALLOW PLACEMENT WITH 9-INCH AGGREGATE DEPTH

402.1 SITE/PERMITTING REQUIREMENTS

(1) There must not be a zone of saturation (ZOS) within twenty-four (24) inches of the naturally occurring soil surface.

(2) The depth to any restrictive horizon must be greater than twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(3) The texture in the upper eighteen (18) inches of naturally occurring soil may either be Class I, II, III, or IV.

(4) The Long-Term Acceptance Rate for system sizing shall be based upon the most hydraulically limiting naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(5) Due to the decreased sidewall absorption area and the increased potential for ground water mounding near the surface, the Equivalency Factors for these systems shall be calculated by conventional wastewater infiltration trenches and increased by an additional factor of 0.09 times.

(6) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(7) This system must not be used on sloping sites that require serial distribution unless it can be demonstrated that the entire wastewater infiltration trench installation (i.e., side wall to side wall and end to end) can meet the required textural limitations and the required offsets to the zone of saturation and restrictive horizons. Level installations on slightly sloping sites can be considered if the above requirements can be met.

(8) This system cannot be considered for facilities with peak flow rates in excess of fifteen hundred (1500) gallons per day.

402.2 INSTALLATION REQUIREMENTS

(1) Serial distribution is restricted (see item 7. above).

(2) The wastewater infiltration trench aggregate shall be nine (9) inches in depth and shall be covered with at least nine (9) inches of backfill.

(3) The maximum wastewater infiltration trench width shall be thirty-six (36) inches; the minimum width shall be eighteen (18) inches.

(4) The maximum depth of the bottom of the wastewater infiltration trench shall be eighteen (18) inches below the naturally occurring soil surface unless it can be demonstrated that deeper placement can meet the required textural limitations and the offsets to the zone of saturation and restrictive horizons.

(5) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

(6) All tree and brush removal shall be done in a manner that minimizes the disturbance or loss of naturally occurring soil.

402.3 FINAL LANDSCAPING AND DRAINAGE

(1) Installation of drainage swales, ditches, curtain drains, and rain gutters may be required to divert or intercept water away from the onsite wastewater system location to a positive outfall. The septic tank and subsurface wastewater infiltration area shall be backfilled and shaped to promote surface water runoff.

(2) A barrier to preclude parking and vehicular traffic over the system area may be required.

(3) Following final landscaping, seeding or sodding may be required to prevent erosion.

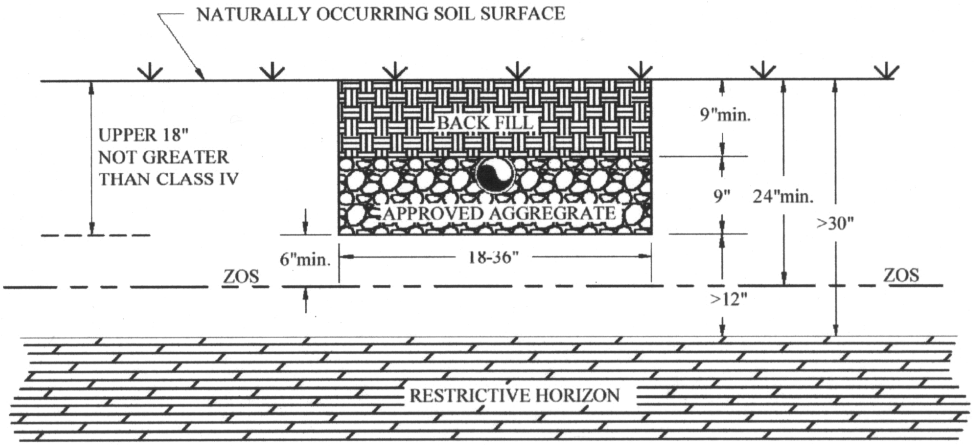
(4) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
SHALLOW PLACEMENT WITH NINE (9) INCH AGGREGATE DEPTH

PROGRAM 362 / CODE 210 / CODE 211 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



SCALE: 3/4"=1'

TLS REV. 03/16/07

403 APPENDIX C - SYSTEM STANDARD 220/221 – SHALLOW PLACEMENT WITH 6-INCH AGGREGATE DEPTH

403.1 SITE/PERMITTING REQUIREMENTS

(1) There must not be a zone of saturation (ZOS) within twenty-one (21) inches of the naturally occurring soil surface.

(2) The depth to any restrictive horizon must be greater than twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(3) The texture in the upper eighteen (18) inches of naturally occurring soil may either be Class I, II, III, or IV.

(4) The Long-Term Acceptance Rate for system sizing shall be based upon the most hydraulically limiting naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(5) Due to the decreased sidewall absorption area and the increased potential for ground water mounding near the surface, the Equivalency Factors for these systems shall be calculated by conventional wastewater infiltration trenches and increased by an additional factor of 0.12 times.

(6) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(7) This system must not be used on sloping sites that require serial distribution unless it can be demonstrated that the entire wastewater infiltration trench installation (i.e., side wall to side wall and end to end) can meet the required textural limitations and the required offsets to the zone of saturation and restrictive horizons. Level installations on slightly sloping sites can be considered if the above limitations can be met.

(8) This system cannot be considered for facilities with peak flow rates in excess of fifteen hundred (1500) gallons per day.

403.2 INSTALLATION REQUIREMENTS

(1) Serial distribution is restricted (see Section 403.1(7)).

(2) The wastewater infiltration trench aggregate shall be six (6) inches in depth and shall be covered with at least nine (9) inches of backfill.

(3) The maximum wastewater infiltration trench width shall be thirty-six (36) inches; the minimum width shall be eighteen (18) inches.

(4) The maximum depth of the bottom of the wastewater infiltration trench shall be fifteen (15) inches below the naturally occurring soil surface unless it can be demonstrated that deeper placement can meet the required textural limitations and the offsets to the zone of saturation and restrictive horizons.

(5) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

(6) All tree and brush removal shall be done in a manner that minimizes the disturbance or loss of naturally occurring soil.

403.3 FINAL LANDSCAPING AND DRAINAGE

(1) Installation of drainage swales, ditches, curtain drains, and rain gutters may be required to divert or intercept water away from the onsite wastewater system location to a positive outfall. The septic tank and subsurface wastewater infiltration area shall be backfilled and shaped to promote surface water runoff.

(2) A barrier to preclude parking and vehicular traffic over the system area may be required.

(3) Following final landscaping, seeding or sodding may be required to prevent erosion.

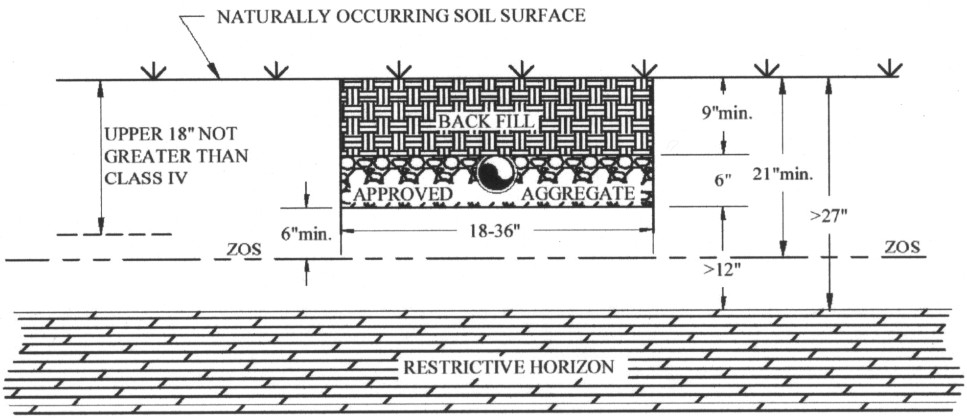
(4) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
SHALLOW PLACEMENT WITH SIX (6) INCH AGGREGATE DEPTH

PROGRAM 362 / CODE 220 / CODE 221 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



SCALE: 3/4"=1'

TLS REV. 03/16/07

404 APPENDIX D - SYSTEM STANDARD 230/231 – SHALLOW PLACEMENT SYSTEM WITH 14-INCH AGGREGATE DEPTH WITH FILL CAP

404.1 SITE/PERMITTING REQUIREMENTS

(1) There must not be a zone of saturation (ZOS) within twenty (20) inches of the naturally occurring soil surface.

(2) The depth to any restrictive horizon must be greater than twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(3) The texture in the upper eighteen (18) inches of naturally occurring soil must be no more limiting than Class III.

(4) This system must not be utilized on sites that require serial distribution. Level installations on slightly sloping sites can be considered if it can be demonstrated that the entire installation (i.e., side wall to side wall and end to end) will meet the required textural limitations and the required offsets to the zone of saturation and restrictive horizons.

(5) The Long-Term Acceptance Rate for system sizing shall be based upon the most hydraulically limiting naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(6) The total linear footage of wastewater infiltration trenches shall be the same as that required for conventional systems.

(7) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(8) This system cannot be considered for facilities with peak flow rates in excess of fifteen hundred (1500) gallons per day.

404.2 INSTALLATION REQUIREMENTS

(1) The maximum wastewater infiltration trench width must not exceed thirty-six (36) inches; the minimum width shall be eighteen (18) inches.

(2) The maximum depth of the bottom of the wastewater infiltration trench shall be fourteen (14) inches below the naturally occurring soil surface unless it can be demonstrated that deeper placement can meet the required textural limitations and the offsets to the zone of saturation and restrictive horizons.

(3) The depth of the fill cap shall provide a minimum of twelve (12) inches backfill above the top of the wastewater infiltration trench aggregate. (see attached illustration)

(4) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

(5) The required fill cap must extend at least five (5) feet beyond the limits of the subsurface wastewater infiltration trenches, and must taper to the original soil surface at a slope not to exceed 10

percent. (see attached illustration). The required property line setback shall be measured from the point at which the fill cap taper intersects with the natural soil surface.

(6) The required fill material must be soil texture Class I, Class II or Class III and be devoid of extraneous debris such as organic matter, building materials, etc.

(7) The wastewater infiltration trench aggregate shall be fourteen (14) inches in depth.

(8) All tree/brush removal shall be done in a manner that minimizes the disturbance or loss of naturally occurring soil.

404.3 FINAL LANDSCAPING AND DRAINAGE

(1) The septic tank and fill cap area shall be backfilled and shaped to promote the runoff of surface water.

(2) Where natural surface drainage does not exist, a swale shall be constructed adjacent to the fill cap area to divert surface water away from the onsite wastewater system to a positive outfall. The installation of ditches, curtain drains, and rain gutters may be required to intercept and divert water away from the onsite wastewater system location.

(3) A barrier to preclude parking and vehicular traffic over the system area may be required.

(4) Following final landscaping, seeding or sodding may be required to prevent erosion.

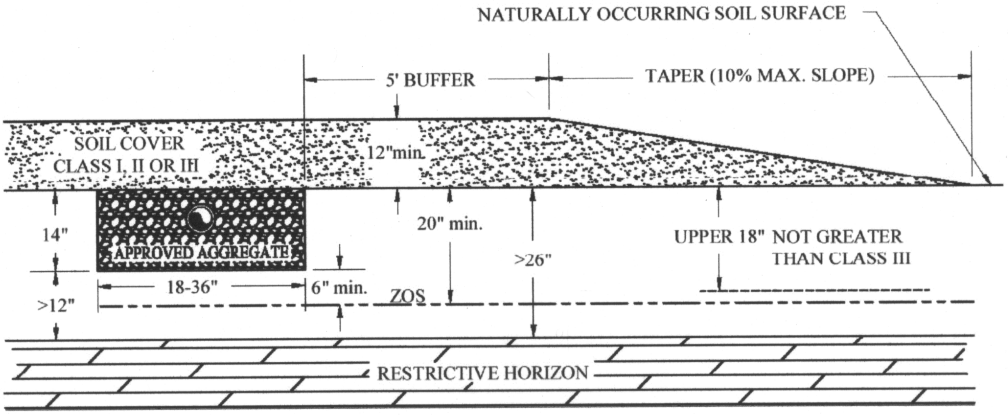
(5) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
SHALLOW PLACEMENT SYSTEM WITH FILL CAP

PROGRAM 362 / CODE 230 / CODE 231 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



NOT TO SCALE

TLS REV. 03/16/07

405 APPENDIX E - SYSTEM STANDARD 240/241 – ULTRA-SHALLOW PLACEMENT WITH 6-INCH AGGREGATE DEPTH WITH FILL CAP

405.1 SITE/PERMITTING REQUIREMENTS

(1) There must not be a zone of saturation (ZOS) within twelve (12) inches of the naturally occurring soil surface.

(2) The depth to any restrictive horizon must be greater than twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(3) The soil texture in the upper eighteen (18) inches of naturally occurring soil must be no more limiting than Class III.

(4) This system must not be utilized on sites that require serial distribution. Level installations on slightly sloping sites can be considered if it can be demonstrated that the entire installation (i.e., side wall to side wall and end to end) will meet the required textural limitations and the required offsets to the zone of saturation and restrictive horizons.

(5) No part of this system can be installed within one hundred twenty-five (125) feet of the critical area line or tidal waters as determined by the Department; or within one hundred twenty-five (125) feet of the ordinary high water elevation within the banks of non-tidal, environmentally sensitive waters.

(6) The Long-Term Acceptance Rate for system sizing shall be based upon the most hydraulically limiting naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(7) Due to the decreased sidewall area and the increased potential for ground water mounding near the surface, the Equivalency Factors for these systems shall be calculated by conventional wastewater infiltration trenches and increased by an additional factor of 0.12 times.

(8) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(9) This system cannot be considered for facilities with peak flow rates in excess of fifteen hundred (1500) gallons per day.

405.2 INSTALLATION REQUIREMENTS

(1) The maximum wastewater infiltration trench width must not exceed thirty-six (36) inches; the minimum width shall be 18 inches.

(2) The maximum depth of the bottom of the wastewater infiltration trench shall be six (6) inches below the naturally occurring soil surface unless it can be demonstrated that deeper placement can meet the required textural limitations and offsets to the zone of saturation and restrictive horizons.

(3) The depth of the fill cap shall provide a minimum of twelve (12) inches backfill above the top of the wastewater infiltration trench aggregate (see attached illustration).

(4) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

(5) The required fill cap must extend at least five (5) feet beyond the limits of the subsurface wastewater infiltration trenches, and must taper to the original soil surface at a slope not to exceed of 10 percent. (see attached illustration) The required property line setback shall be measured from the point at which the fill cap taper intersects with the natural soil surface.

(6) The required fill material must be soil texture Class I, Class II, or Class III, and be devoid of extraneous debris such as organic matter, building materials, etc.

(7) The wastewater infiltration trench aggregate shall be six (6) inches in depth.

(8) All tree/brush removal shall be done in a manner that minimizes the disturbance or loss of naturally occurring soil.

405.3 FINAL LANDSCAPING AND DRAINAGE

(1) The septic tank and fill cap area shall be backfilled and shaped to promote the runoff of surface water.

(2) Where natural surface drainage does not exist, a swale shall be constructed adjacent to the fill cap area to divert surface water away from the onsite wastewater system to a positive outfall. The installation of ditches, curtain drains, and rain gutters may be required to intercept and divert water away from the onsite wastewater system location.

(3) A barrier to preclude parking and vehicular traffic over the system area may be required.

(4) Following final landscaping, seeding or sodding may be required to prevent erosion.

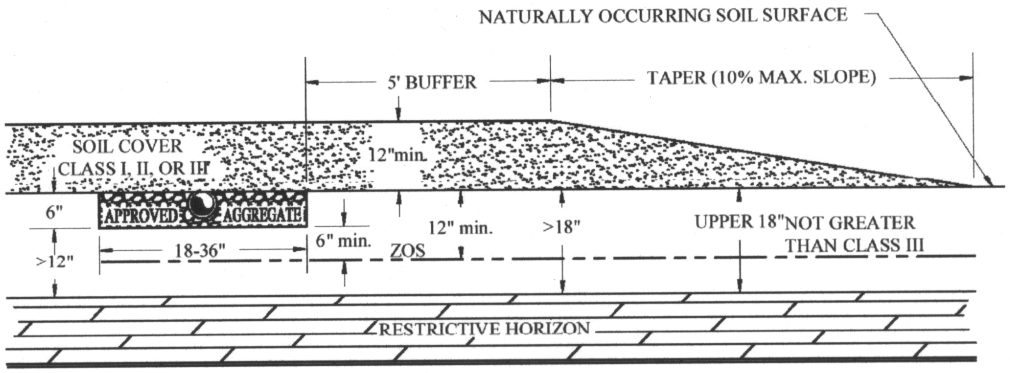
(5) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
ULTRA-SHALLOW PLACEMENT SYSTEM WITH FILL CAP

PROGRAM 362 / CODE 240 / CODE 241 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



NOT TO SCALE

TLS REV. 03/16/07

406 APPENDIX F - SYSTEM STANDARD 250/251 – RESERVOIR INFILTRATION SYSTEM FOR SOILS WITH EXPANSIVE CLAY

406.1 SITE/PERMITTING REQUIREMENTS

(1) Rock formations must be greater than four (4) feet below the naturally occurring soil surface.

(2) For standard installations (see Typical Design Illustration A), the wastewater infiltration trenches must penetrate the saprolite at least six (6) inches. Also, there must be an offset greater than twelve (12) inches between the bottom of the trenches and any rock formations. (i.e. there must be greater than eighteen (18) inches of clean, unconsolidated saprolite below the expansive clay layer.)

(3) If the unconsolidated saprolite layer is greater than sixty (60) inches below the naturally occurring soil surface (see Typical Design Illustration B), item 2. (above) shall apply and clean medium sand shall be added to the trenches so that the top of the aggregate will be twelve (12) inches below finished grade.

(4) There must be no evidence of a zone of saturation (ZOS) in the unconsolidated saprolite layer.

(5) The Long-Term Acceptance Rate shall not exceed 0.25 gpd/sq. ft.

(6) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(7) Sites to be considered for this system shall be evaluated using backhoe pits to describe the soil profile.

(8) This system cannot be considered for facilities with peak flow rates in excess of fifteen hundred (1500) gallons per day.

(a) Clean, unconsolidated saprolite shall be defined as: Soft, friable, thoroughly decomposed rock that has formed in place by chemical weathering, retaining the fabric and structure of the parent rock, and being devoid of expansive clay. Unconsolidated saprolite can be dug using a hand auger or knife. Consolidated saprolite cannot be penetrated with a hand auger or similar tool, and must be dug with a backhoe or other powered equipment.

(b) Expansive clay shall be defined as soils containing significant amounts of expansible-layer clay minerals or smectites as evidenced in the field by classifications of Very Sticky and Very Plastic and Structure Grades of Weak or Structureless when evaluated in accordance with the Field Book. Such soils are considered to be unsuitable for onsite wastewater systems.

406.2 INSTALLATION REQUIREMENTS

(1) The aggregate depth shall be twenty-four (24) inches.

(2) The depth of medium sand will vary between zero (0) and one hundred twenty (120) inches, depending upon the depth to the saprolite layer.

(3) The trench width shall be thirty-six (36) inches.

(4) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

(5) The backfill shall range from twelve (12) inches to thirty-six (36) inches for standard installations (see Typical Design Illustration A), and shall be twelve (12) inches where the depth to saprolite is greater than sixty (60) inches below the naturally occurring soil surface (see Typical Design Illustration B).

406.3 FINAL LANDSCAPING AND DRAINAGE

(1) On sites where there is evidence of a zone of saturation at the soil-expansive clay interface, a curtain drain must be placed upslope along a contour and must extend the entire length of the subsurface wastewater infiltration area. The curtain drain shall extend a minimum of six (6) inches into the expansive clay layer. The septic tank and subsurface wastewater infiltration area shall be backfilled and shaped to promote surface water runoff.

(2) Following final landscaping, seeding or sodding may be required to prevent erosion.

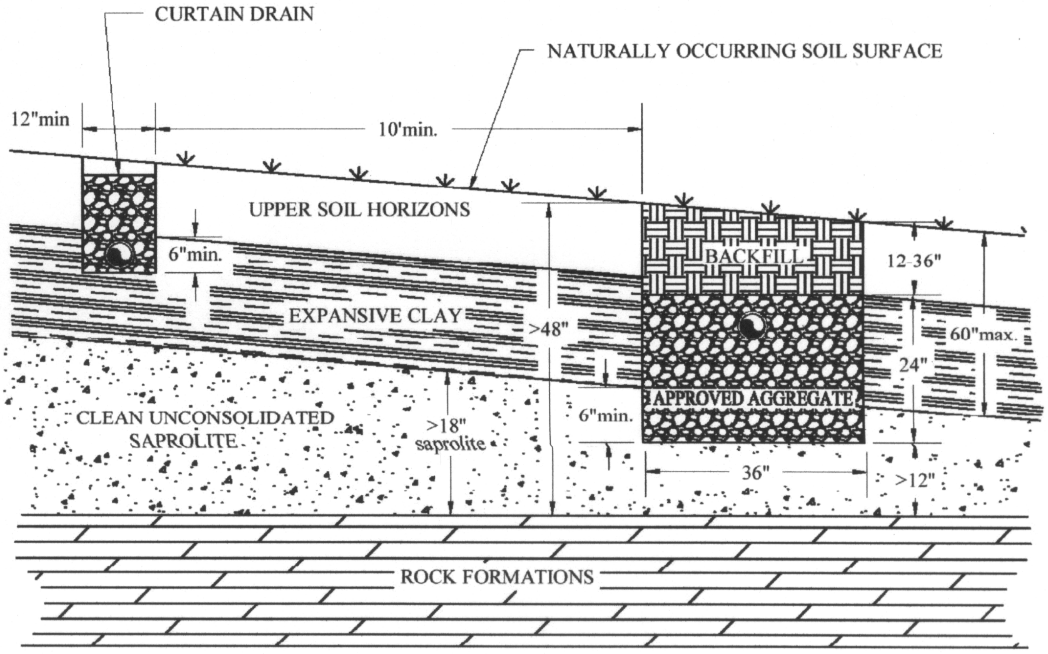
(3) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
RESERVOIR INFILTRATION SYSTEM FOR SOILS WITH EXPANSIVE CLAY

PROGRAM 362 / CODE 250 / CODE 251 IF PUMPED

TYPICAL DESIGN ILLUSTRATION (A)
STANDARD INSTALLATION



NOTE: FOR SOILS WITH THICK EXPANSIVE CLAY HORIZONS
(i.e., DEPTH TO SAPROLITE > 60 INCHES BELOW NATURALLY OCCURRING SOIL SURFACE)
SEE TYPICAL DESIGN ILLUSTRATION (B)

NOT TO SCALE

TLS REV. 03/16/07

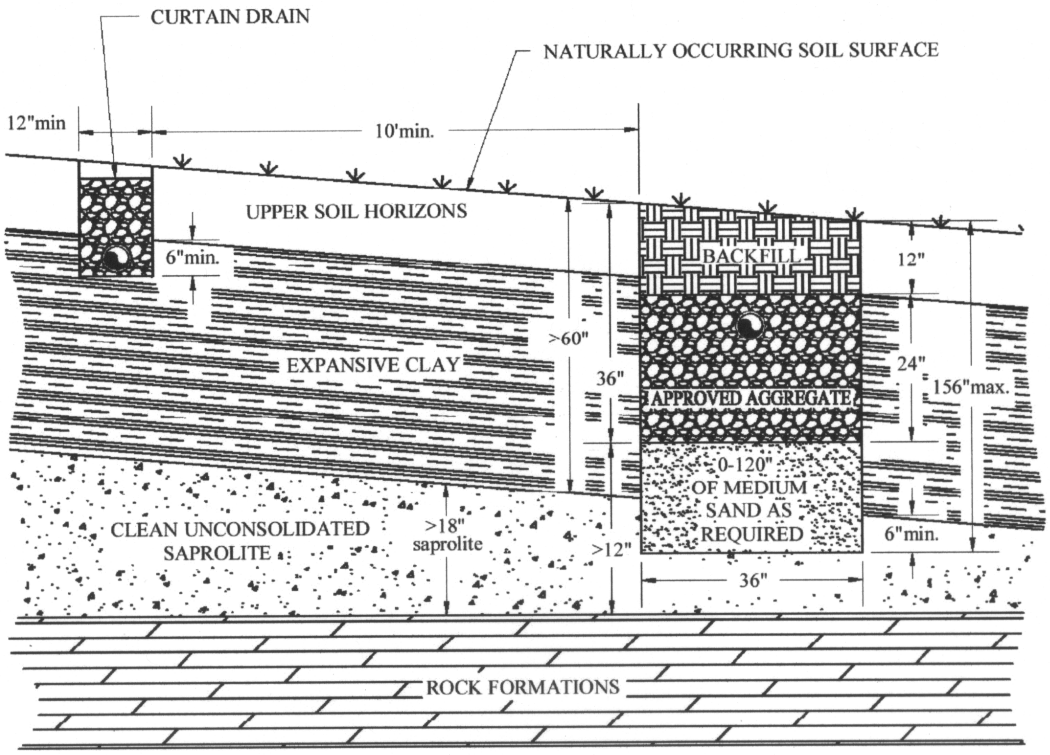
SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
RESERVOIR INFILTRATION SYSTEM FOR SOILS WITH EXPANSIVE CLAY

PROGRAM 362 / CODE 250 / CODE 251 IF PUMPED

TYPICAL DESIGN ILLUSTRATION (B)

WHERE DEPTH TO SAPROLITE > 60in. BELOW SURFACE



NOTE: FOR SOILS WITH THINNER EXPANSIVE CLAY HORIZONS
(i.e., DEPTH TO SAPROLITE NOT >60in. BELOW NATURALLY OCCURRING SOIL SURFACE)
SEE TYPICAL DESIGN ILLUSTRATION (A)

NOT TO SCALE

TLS REV. 03/16/07

407 APPENDIX G - SYSTEM STANDARD 260/261 – 9-INCH SHALLOW PLACEMENT SYSTEM WITH FILL CAP

407.1 SITE/PERMITTING REQUIREMENTS

(1) There must not be a zone of saturation (ZOS) within fifteen (15) inches of the naturally occurring soil surface.

(2) The depth to any restrictive horizon must be greater than twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(3) The texture in the upper eighteen (18) inches of naturally occurring soil must be no more limiting than Class III.

(4) This system must not be utilized on sites that require serial distribution. Level installations on slightly sloping sites can be considered if it can be demonstrated that the entire installation (i.e., side wall to side wall and end to end) will meet the required textural limitations and the required offsets to the zone of saturation and restrictive horizons.

(5) The Long-Term Acceptance Rate for system sizing shall be based upon the most hydraulically limiting naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(6) Due to the decreased sidewall absorption area and the increased potential for ground water mounding near the surface, the Equivalency Factors for these systems shall be calculated by conventional wastewater infiltration trenches and increased by an additional factor of 0.09 times.

(7) No part of this system can be installed within 125 feet of the critical area line or tidal waters as determined by the Department; or within 125 feet of the ordinary high water elevation within the banks of non-tidal, environmentally sensitive waters.

(8) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(9) This system cannot be considered for facilities with peak flow rates in excess of fifteen hundred (1500) gallons per day.

407.2 INSTALLATION REQUIREMENTS

(1) The maximum wastewater infiltration trench width must not exceed thirty-six (36) inches; the minimum width shall be eighteen (18) inches.

(2) The maximum depth of the bottom of the wastewater infiltration trench shall be nine (9) inches below the naturally occurring soil surface unless it can be demonstrated that deeper placement can meet the required textural limitations and the offsets to the zone of saturation and restrictive horizons.

(3) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

(4) The depth of the fill cap shall provide a minimum of twelve (12) inches backfill above the top of the wastewater infiltration trench aggregate (see attached illustration).

(5) The required fill cap must extend at least five (5) feet beyond the limits of the wastewater infiltration trenches, and must taper to the original soil surface at a slope not to exceed 10 percent (see attached illustration). The required property line setback shall be measured from the point at which the fill cap taper intersects with the naturally occurring soil surface.

(6) The required fill material must be soil texture Class I, Class II, or Class III, and be devoid of extraneous debris such as organic matter, building materials, etc.

(7) The wastewater infiltration trench aggregate shall be nine (9) inches in depth.

(8) All trees/brush removal shall be done in a manner that minimizes the disturbance or loss of naturally occurring soil.

407.3 FINAL LANDSCAPING AND DRAINAGE

(1) The septic tank and fill cap area shall be backfilled and shaped to promote the runoff of surface water.

(2) Where natural surface drainage does not exist, a swale shall be constructed adjacent to the fill cap area to divert surface water away from the onsite wastewater system to a positive outfall. The installation of ditches, curtain drains, and rain gutters may be required to intercept and divert water away from the onsite wastewater system location.

(3) A barrier to preclude parking and vehicular traffic over the system area may be required.

(4) Following final landscaping, seeding or sodding may be required to prevent erosion.

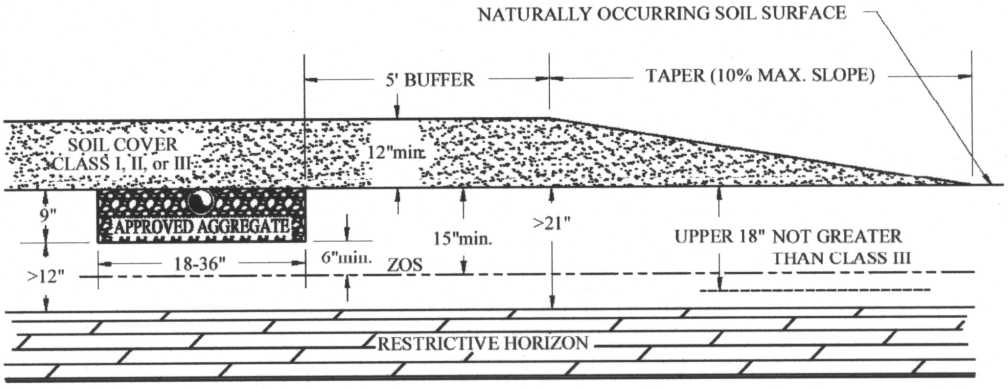
(5) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
NINE INCH SHALLOW PLACEMENT WITH FILL CAP

PROGRAM 362 / CODE 260 / CODE 261 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



NOT TO SCALE

TIS REV. 03/16/07

408 APPENDIX H - SYSTEM STANDARD 270/271 – ALTERNATIVE TRENCH WIDTH AND DEPTH SYSTEMS

408.1 SITE/PERMITTING REQUIREMENTS

(1) Lot size or suitable area must be too small to accommodate a conventional or alternative onsite wastewater system.

(2) This Standard and associated systems shall not be used to calculate minimum lot sizes in new subdivisions approved after the effective date of this standard.

(3) Soil conditions, the depth to rock and other restrictive horizons, the depth to the zone of saturation (ZOS), and the elevation differential between the septic tank outlet and the highest wastewater infiltration trench(es) must meet applicable standards for conventional or alternative onsite wastewater systems.

(4) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(5) This system cannot be considered for facilities with peak flow rates in excess of fifteen hundred (1500) gallons per day unless the trench width is three (3) feet and the aggregate depth is between fourteen (14) and twenty-eight (28) inches.

(6) The linear footage requirement for an alternative width and depth system shall be determined by first figuring the conventional (36 inch wide with 14 inch aggregate depth) linear footage requirements and then multiplying by the appropriate factor based on desired trench width and aggregate depth as computed in the following table:

FACTORS (F) FOR MAINTAINING EQUIVALENT INFILTRATIVE SURFACE AREA						
TRENCH WIDTH (ft.)	**AGGREGATE DEPTH (in.)**					
XXXXXXXX	**6"** *	**9"** **	**14"**	**20"**	**24"**	**28"**
1.5'	2.39	1.94	1.39	1.10	0.97	0.87
2.0'	1.99	1.66	1.23	1.00	0.89	0.80
2.5'	1.71	1.46	1.10	0.91	0.82	0.75
3'	1.50	1.30	1.00	0.84	0.76	0.70***
4'	1.20	1.06	0.84	0.73	0.67	0.62
5'	1.00	0.89	0.73	0.64	0.59	0.55
6'	0.85	0.78	0.64	0.57	0.53	0.50
7'	0.74	0.68	0.57	0.52	0.49	0.46
8'	0.66	0.61	0.52	0.47	0.45	0.42
9'	0.59	0.55	0.47	0.43	0.41	0.39
10'	0.54	0.51	0.43	0.40	0.38	0.36

FACTORS (F) FOR MAINTAINING EQUIVALENT INFILTRATIVE SURFACE AREA						
TRENCH WIDTH (ft.)	**AGGREGATE DEPTH (in.)**					
XXXXXXXX	**6"** *	**9"** **	**14"**	**20"**	**24"**	**28"**
F = 5.34 ft^2/ ft____ **2 (SwD / 12) + TW** *** Factors reflect a 12 percent increase** **** Factors reflect a 9 percent increase** ***** Use system code 360/380**	Where, 5.34 ft^2/ft = total infiltrative surface area per linear foot of conventional type trench 36 in. wide, 14 in. deep SwD = Side Wall Depth (in.) TW = Trench Width (ft)					

408.2 INSTALLATION REQUIREMENTS

(1) Trench widths shall always be kept as narrow as possible and shall not exceed 10 feet.

(2) The aggregate depth shall be between six (6) inches and twenty-eight (28) inches when considering trench widths ranging from one and one-half (1½) to ten (10) feet (see chart). The aggregate depth may be increased to a maximum of forty-two (42) inches, provided the trench width does not exceed thirty-six (36) inches (Note: in these cases, the equivalency formula should be utilized to determine the appropriate factor (F) when considering aggregate depths between 28 and 42 inches). All trenches shall be covered with at least nine (9) inch of backfill.

(3) Methods of construction which preclude vehicular compaction of the trench bottom must always be utilized.

408.3 FINAL LANDSCAPING AND DRAINAGE

(1) Installation of drainage swales, ditches, diversion drains, or rain gutters may be required to divert or intercept water away from the onsite wastewater system location. The septic tank and subsurface wastewater infiltration area shall be backfilled and shaped to promote surface water runoff.

(2) A barrier to preclude parking and vehicular traffic over the area of the system may be required.

(3) Following final landscaping, seeding or sodding may be required to prevent erosion.

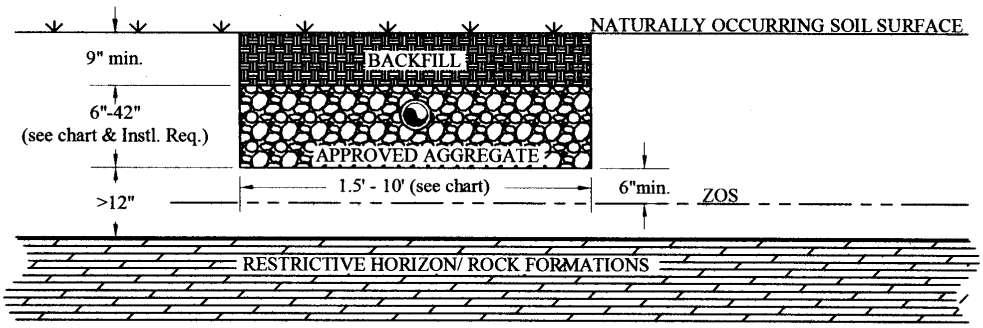
(4) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
ALTERNATIVE TRENCH WIDTH & DEPTH SYSTEMS

PROGRAM 362 / CODE 270 / CODE 271 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



NOT TO SCALE

FACTORS (F) FOR MAINTAINING EQUIVALENT INFILTRATIVE SURFACE AREA

TRENCH WIDTH (ft.)	AGGREGATE DEPTH (in.)					
	6" *	9" **	14"	20"	24"	28"
1.5'	2.39	1.94	1.39	1.10	0.97	0.87
2.0'	1.99	1.66	1.23	1.00	0.89	0.80
2.5'	1.71	1.46	1.10	0.91	0.82	0.75
3.0'	1.50	1.30	1.00	0.84	0.76	0.70***
4.0'	1.20	1.06	0.84	0.73	0.67	0.62
5.0'	1.00	0.89	0.73	0.64	0.59	0.55
6.0'	0.85	0.78	0.64	0.57	0.53	0.50
7.0'	0.74	0.68	0.57	0.52	0.49	0.46
8.0'	0.66	0.61	0.52	0.47	0.45	0.42
9.0'	0.59	0.55	0.47	0.43	0.41	0.39
10.0'	0.54	0.51	0.43	0.40	0.38	0.36

$$F = \frac{5.34 \text{ sqft. / ft}}{2\,(SwD / 12) + TW}$$

* Factors (F) reflect 12% increase
** Factors (F) reflect 9% increase
*** Use system code 360/380
(See notes in text)

Where, 5.34 sqft/ft = total infiltrative surface area per linear foot of conventional type trench (36in. wide, 14in. deep)
SwD = Side Wall Depth (in)
TW = Trench Width (ft.)

TLS REV. 05/15/07

409 APPENDIX I - SYSTEM STANDARD 280/281 – RESERVOIR INFILTRATION SYSTEM FOR SOILS WITH EXPANSIVE CLAY SHALLOW ROCK FORMATIONS

409.1 SITE/PERMITTING REQUIREMENTS

(1) Rock formations must be rippable (see Section 409.1(9)(b)) to a depth greater than four (4) feet below the naturally occurring soil surface.

(2) The soil wastewater infiltration trenches must penetrate the saprolite at least six (6) inches, and there must be an offset greater than twelve (12) inches between the trench bottoms and any rock formations (i.e., there must be at least six (6) inches of clean, unconsolidated saprolite below the expansive clay layer, and medium sand may be added to the excavation to achieve an offset from rock that exceeds twelve (12) inches).

(3) There must be no evidence of a zone of saturation (ZOS) in the unconsolidated saprolite layer.

(4) The Long-Term Acceptance Rate shall not exceed 0.20-gpd/sqft.

(5) Effluent discharged to this system must receive a higher degree of treatment than that provided by a conventional septic tank. (i.e. two compartment septic tank or two septic tanks in series)

(6) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(7) No part of this system can be installed within one hundred twenty-five (125) feet of the ordinary high water elevation within the banks of environmentally sensitive waters.

(8) Sites to be considered for this system shall be evaluated using backhoe pits to describe the soil profile.

(9) This system cannot be considered for facilities with peak flow rates in excess of fifteen hundred (1500) gallons per day.

(a) Clean, unconsolidated saprolite shall be defined as: Soft, friable thoroughly decomposed rock that has formed in place by chemical weathering, retaining the fabric and structure of the parent rock, and being devoid expansive clay. Unconsolidated saprolite can be dug using a hand auger or knife. Consolidated saprolite cannot be penetrated with a hand auger or similar tool, and must be dug with a backhoe or other powered equipment.

(b) Rippable rock shall be defined as formations that can be readily dug with a standard rubber-tired backhoe.

(c) Expansive clay shall be defined as soils containing significant amounts of expansible-layer clay minerals (smectites) as evidenced in the field by classifications of Very Sticky and Very Plastic and Structure Grades of Weak or Structureless when evaluated in accordance with the Field Books. Such soils are considered to be unsuitable for onsite wastewater systems.

409.2 INSTALLATION REQUIREMENTS

(1) The aggregate depth shall be at least twenty-four (24) inches.

(2) The trench width shall be thirty-six (36) inches.

(3) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

409.3 FINAL LANDSCAPING AND DRAINAGE

(1) On sites where there is evidence of a zone of saturation at the soil-expansive clay interface, a curtain drain must be placed upslope along a contour and must extend the entire length of the subsurface wastewater infiltration area. The curtain drain shall extend a minimum of six (6) inches into the expansive clay layer. Also, the septic tank and subsurface wastewater infiltration area shall be backfilled and shaped to promote surface water runoff.

(2) Final approval shall be withheld until all landscaping, drainage, and other requirements have been satisfactorily completed.

(3) Following final landscaping, seeding or sodding may be required to prevent erosion.

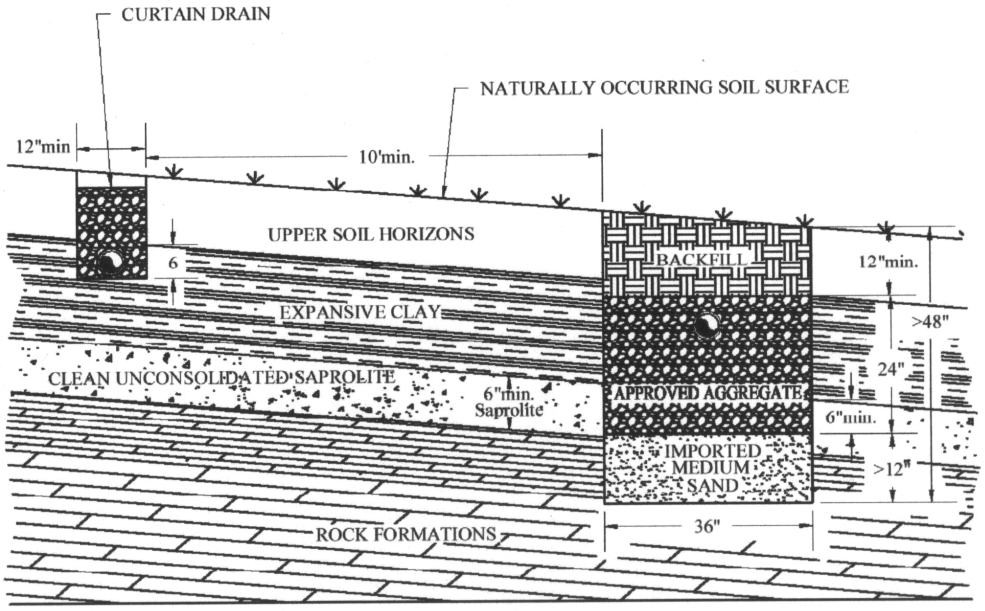
(4) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
RESERVOIR INFILTRATION SYSTEM FOR SOILS WITH EXPANSIVE CLAY
OVER SHALLOW ROCK FORMATIONS

PROGRAM 362 / CODE 280 / CODE 281 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



NOT TO SCALE

TL3 REV. 03/10/07

410 APPENDIX J - SYSTEM STANDARD 370/371 – SHALLOW PLACEMENT WITH FILL CAP FOR SITES WITH SHALLOW CLASS IV SOIL

410.1 SITE/PERMITTING REQUIREMENTS

(1) There must not be a zone of saturation (ZOS) within twelve (12) inches of the naturally occurring soil surface.

(2) The depth to any restrictive horizon must be greater than twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(3) This system must not be utilized on sites that require serial distribution. Level installations on slightly sloping sites can be considered if it can be demonstrated that the entire installation (i.e., side wall to side wall and end to end) will meet the required textural limitations and the required offsets to the zone of saturation and restrictive horizons.

(4) No part of this system can be installed within 125 feet of the ordinary high water elevation within the banks of environmentally sensitive waters.

(5) This system may be considered for installation on contiguous lots in new subdivisions approved after the effective date of this standard provided a setback of at least seventy-five (75) feet is maintained between the system and all adjacent property lines. The seventy-five (75) foot setback shall be measured from the point at which the fill cap taper intersects with the naturally occurring soil surface.

(6) This system cannot be considered for facilities with peak sewage flow rates in excess of four hundred eighty (480) gallons per day. In addition, this system shall not be considered for facilities requiring grease traps.

(7) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(8) The Long-Term Acceptance Rate for system sizing shall be based upon the most hydraulically limiting naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

410.2 INSTALLATION REQUIREMENTS

(1) This system cannot utilize serial distribution.

(2) Effluent discharged to this system must receive a higher degree of treatment than that provided by a conventional septic tank (i.e. two compartment septic tank or two septic tanks in series).

(3) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

(4) The required fill cap must extend at least five (5) feet beyond the limits of the wastewater infiltration trenches, and it must taper to the original soil surface at a slope not to exceed 10 percent (see attached sketch). The required seventy-five (75) feet property line setback shall be measured from the point at which the fill cap taper intersects with the naturally occurring soil surface.

(5) The required fill material must be soil texture Class I, Class II or Class III and be void of extraneous debris such as organic matter, building materials, etc.

(6) The depth of the fill cap shall provide a minimum of twelve (12) inches backfill above the top of the wastewater infiltration trench aggregate.

(7) The wastewater infiltration trench width shall be thirty-six (36) inches**.**

(8) All tree and brush removal shall be done in a manner that minimizes the disturbance or loss of naturally occurring soil.

(9) The following criteria shall be utilized in the selection and design of these systems:

Depth to ZOS (Inches)	**Depth to Class IV Soil (Inches)**	**Amount of Imported Fill Cap/Aggregate Depth (Inches)**	**Extension Factor**
12	18	12/6	1.5
13	17	12/6	1.5
14	16	12/6	1.5
15	15	12/9	1.3
16	14	12/9	1.3
17	13	12/9	1.3
18	12	12/9	1.3
19	11	12/9	1.3
20	10	12/9	1.3

Note: refer to the design sketch (typical) for detail.

410.3 FINAL LANDSCAPING AND DRAINAGE

(1) The septic tank and fill cap area shall be backfilled and shaped to promote the runoff of surface water.

(2) Where natural surface drainage does not exist, a swale shall be constructed adjacent to the filled area to divert surface water away from the onsite wastewater system to a positive outfall. The installation of ditches, curtain drains, and rain gutters may be required to intercept and divert water away from the onsite wastewater system location.

(3) A barrier to preclude parking and vehicular traffic over the system area may be required.

(4) Following final landscaping, seeding or sodding may be required to prevent erosion.

(5) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

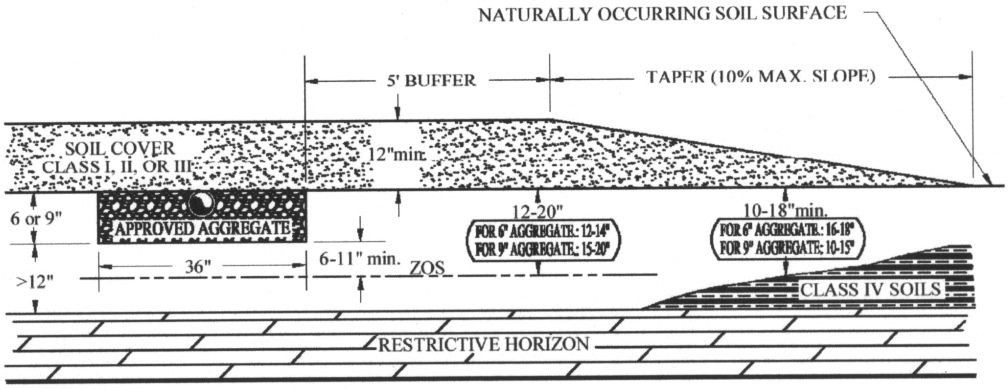
SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM

SHALLOW PLACEMENT SYSTEM WITH FILL CAP FOR SITES WITH SHALLOW CLASS IV SOILS

PROGRAM 362 / CODE 370 / CODE 371 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



Depth to ZOS (in)	Depth to Class IV Soil (in)	Amount of Imported Fill Cap / Aggregate Depth (in)	Extension Factor
12	18	12 / 6	1.5
13	17	12 / 6	1.5
14	16	12 / 6	1.5
---	---	---	---
15	15	12 / 9	1.3
16	14	12 / 9	1.3
17	13	12 / 9	1.3
18	12	12 / 9	1.3
19	11	12 / 9	1.3
20	10	12 / 9	1.3

NOT TO SCALE

TLS REV. 03/16/07

411 APPENDIX K - SYSTEM STANDARD 380/381 – DOUBLE AGGREGATE DEPTH WASTEWATER INFILTRATION TRENCHES

411.1 SITE/PERMITTING REQUIREMENTS

(1) Use of the double aggregate depth option must be restricted to soils that meet all textural limitations and required offsets to the zone of saturation (ZOS) and restrictive horizons.

(2) Systems incorporating the double aggregate depth option shall be loaded on the basis of the most hydraulically limiting naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(3) In order to maintain the same total absorptive area as that provided by conventional aggregate depth systems, the equivalent linear footage requirement for thirty-six (36) inch wide double aggregate depth trenches shall be determined by multiplying the conventional trench requirement by a factor of 0.7.

(4) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

411.2 INSTALLATION REQUIREMENTS

(1) The wastewater infiltration trench aggregate shall be twenty-eight (28) inches in depth, and shall be placed so as to provide twenty (20) inches of aggregate below the pipe, five (5) inches beside the pipe, and three (3) inches above the pipe. The aggregate shall be covered with at least nine (9) inches of backfill.

(2) The wastewater infiltration trench width shall be thirty-six (36) inches.

(3) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

411.3 FINAL LANDSCAPING AND DRAINAGE

(1) Installation of drainage swales, ditches, curtain drains, and rain gutters may be required to divert or intercept water away from the onsite wastewater system location. The septic tank and subsurface wastewater infiltration area shall be backfilled and shaped to promote surface water runoff.

(2) Following final landscaping, seeding or sodding may be required to prevent erosion.

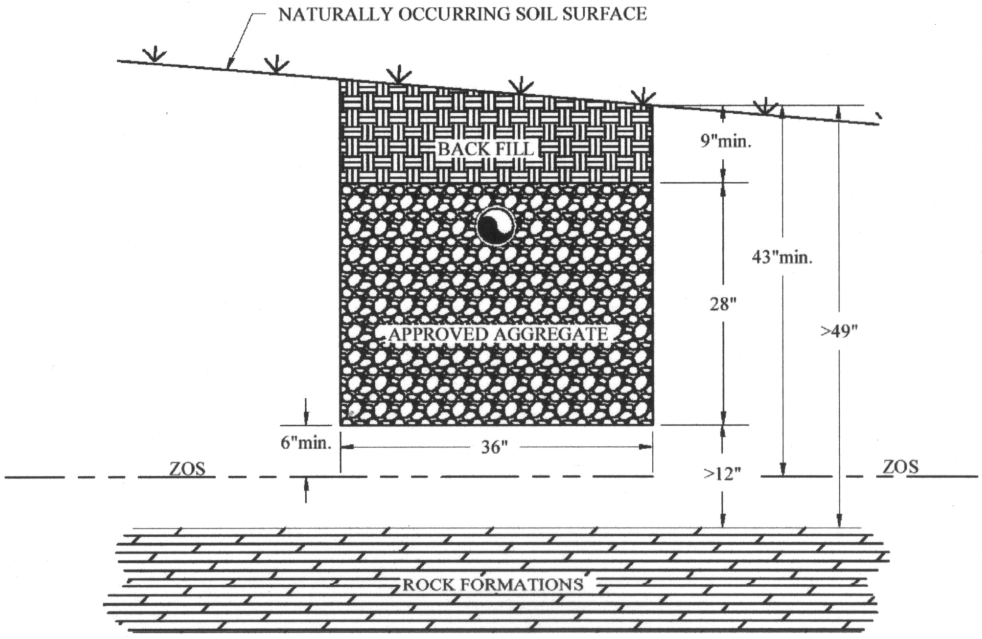
(3) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
DOUBLE AGGREGATE DEPTH SOIL ABSORPTION TRENCHES

PROGRAM 360 / CODE 380 / CODE 381 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



SCALE: 3/4"=1'

TLS REV. 03/16/07

412 APPENDIX L - SYSTEM STANDARD 420/421 – MOUNDED INFILTRATION SYSTEM

412.1 SITE/PERMITTING REQUIREMENTS

(1) The texture in the upper twelve (12) inches of naturally occurring soil must be Class I or Class II.

(2) The soil texture in the permeable substratum must be no more limiting than Class II.

(3) There must not be a zone of saturation (ZOS) within six (6) inches of the naturally occurring soil surface.

(4) The depth to any restrictive horizon must be greater than twelve (12) inches below the bottom of the proposed wastewater infiltration trenches.

(5) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(6) Prior to permitting the onsite wastewater system, delineation of any affected jurisdictional wetlands may be required. Should any part of the proposed onsite wastewater system be located in jurisdictional wetlands, approval from the appropriate permitting agency(s) (i.e., US Army Corp. of Engineers, SCDHEC OCRM, etc.) shall be received, and proof of such provided to the Department.

(7) No part of this system can be installed within 125 feet of the critical area line or tidal waters as determined by the Department; or within 125 feet of the ordinary high water elevation within the banks of non-tidal, environmentally sensitive waters.

(8) This system cannot be considered for facilities with peak flow rates in excess of four hundred eighty (480) gallons per day. In addition, this system shall not be considered for facilities requiring grease traps.

(9) This system may not be installed on sites that flood.

(10) This system must not be utilized on sites that require serial distribution. Level installations on slightly sloping sites can be considered if it can be demonstrated that the entire installation (i.e., side wall to side wall and end to end) will meet the required textural limitations and the required offsets to the zone of saturation and restrictive horizons.

(11) The total linear footage of six (6) inch deep, thirty-six (36) inch wide wastewater infiltration trenches shall be increased by 100 percent over that which would be required for conventional trenches, as determined by the Long-Term Acceptance Rate of the permeable substratum.

(12) This system may be considered for installation on contiguous lots in new subdivisions approved after the effective date of this standard provided a setback of at least seventy-five (75) feet is maintained between the system and all adjacent property lines. The seventy-five (75) foot setback shall be measured from the point at which the fill cap taper intersects with the naturally occurring soil surface.

412.2 INSTALLATION REQUIREMENTS

(1) Site Preparation

(a) The naturally occurring soil surface underlying the area of the wastewater infiltration trenches shall be thoroughly tilled and mixed with the imported medium sand to a depth of six (6) inches.

(b) All tree and brush removal shall be done in a manner that minimizes the disturbance or loss of naturally occurring soil.

(2) Fill and System (see ref. sketch)

(a) The fill cap and buffer shall be Class I, Class II, or Class III.

(b) The depth of the fill cap shall provide a minimum of twelve (12) inches backfill above the top of the wastewater infiltration trench aggregate (see ref. sketch).

(c) Where gravity flow from the septic tank to the subsurface wastewater infiltration area is utilized, the invert elevation of the septic tank outlet shall be installed at an elevation at least equal to or higher than the top of the aggregate in the highest wastewater infiltration trench(es).

(d) The fill buffer shall be at least fifteen (15) feet in width.

(e) The fill taper shall be at least twenty (20) feet in width.

(f) The required property line setback shall be measured from the point at which the fill cap taper intersects with the naturally occurring soil surface.

(g) The total fill depth, excluding the taper zone, shall be at least eighteen (18) inches above the naturally occurring soil surface.

(h) The wastewater infiltration trenches shall be installed in a Class I fill pad at least six (6) inches in depth, which extends five (5) feet beyond the trenches in all directions.

(i) The wastewater infiltration trenches require a total aggregate depth of six (6) inches.

(j) The wastewater infiltration trench width shall be thirty-six (36) inches.

(k) Infiltration trenches shall penetrate the permeable substratum and shall be at least two (2) feet in width containing USDA medium sand, washed concrete sand, or other material approved by the Department.

(l) Effluent discharged to this system must receive a higher degree of treatment than that provided by a conventional septic tank (i.e. two compartment septic tank or two septic tanks in series).

412.3 FINAL LANDSCAPING AND DRAINAGE

(1) The septic tank and fill cap area shall be backfilled and shaped to promote the runoff of surface water.

(2) Where natural surface drainage does not exist, a swale shall be constructed adjacent to the filled area to divert surface water away from the onsite wastewater system to a positive outfall. The installation of ditches, curtain drains, and rain gutters may be required to intercept and divert water away from the onsite wastewater system location.

(3) A barrier to preclude parking and vehicular traffic over the system area may be required.

(4) Following final landscaping, seeding or sodding may be required to prevent erosion.

(5) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

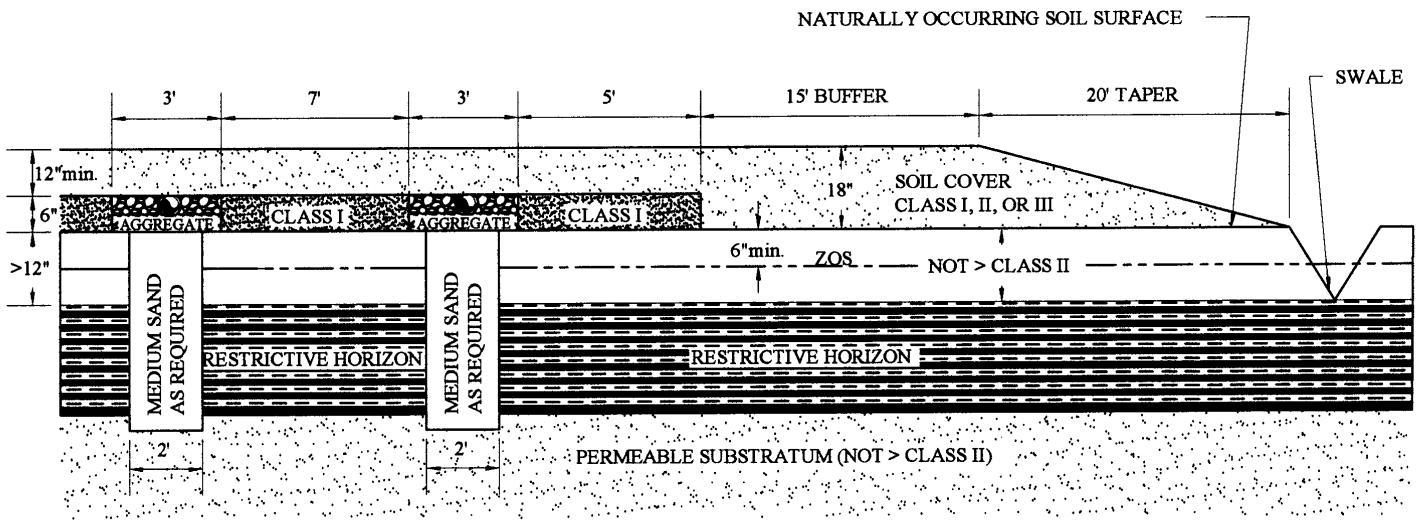
SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE STANDARD

MOUNDED INFILTRATION SYSTEM FOR PERMEABLE SANDS UNDERLYING RESTRICTIVE HORIZONS

PROGRAM 362 / CODE 420 / CODE 421 IF PUMPED

TYPICAL DESIGN ILLUSTRATION



NOT TO SCALE

TLS REV. 08/28/06

413 APPENDIX M - SYSTEM STANDARD 431 – MOUNDED FILL SYSTEM

413.1 SITE/PERMITTING REQUIREMENTS

(1) This system shall not be used on sites that are subject to flooding.

(2) The texture in the upper eightenn (18) inches of naturally occurring soil must be Class I or Class II.

(3) The absorption bed within the mound shall be sized on the Long-Term Acceptance Rate of the most limiting texture in the upper eighteen (18) inches of naturally occurring soil.

(4) The linear footage of the absorption bed shall be determined in accordance with Standard 270.

(5) The absorption bed width shall be minimum of five (5) feet and a maximum of 10 feet.

(6) Mounded fill systems must not be placed on sites with a slope in excess of three (3) percent.

(7) No part of this system can be installed within 125 feet of the critical area line or tidal waters as determined by the Department; or within 125 feet of the ordinary high water elevation within the banks of non-tidal, environmentally sensitive waters. Because of the long buffer, side slope, fill pad, and taper associated with this system, the one hundred twenty-five (125) foot setback shall be measured from the outer edge of the aggregate bed within the mound.

(8) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(9) Prior to permitting the onsite wastewater system, delineation of any affected jurisdictional wetlands may be required. Should any part of the proposed onsite wastewater system be located in jurisdictional wetlands, approval from the appropriate permitting agency(s) (i.e., US Army Corp. of Engineers, SCDHEC Ocean and Coastal Resource Management, etc.) shall be received and proof of such provided to the Department.

(10) This system cannot be considered for facilities with peak flow rates in excess of four hundred eighty (480) gallons per day. In addition, this system shall not be considered for facilities requiring grease traps.

(11) Effluent discharged to this system must receive a higher degree of treatment than that provided by a conventional septic tank (i.e. two compartment septic tank or two septic tanks in series).

(12) This system may be considered for installation on contiguous lots in new subdivisions approved after the effective date of this standard provided a setback of at least seventy-five (75)_feet is maintained between the system and all adjacent property lines. Because of the long buffer, side slope, fill pad, and taper associated with this system, the seventy-five (75) foot setback shall be measured from the outer edge of the aggregate bed within the mound.

413.2 INSTALLATION REQUIREMENTS

(1) Site Preparation

(a) If present within eighteen (18) inches of the naturally occurring soil surface, organic material and restrictive horizons must be removed from beneath the mound and replaced with USDA medium sand, washed concrete sand, or an equivalent material approved by the Department. The replacement area must extend five (5) feet in all directions beyond the edges of the aggregate filled absorption bed.

(b) The naturally occurring soil surface underlying the mound shall be thoroughly tilled and mixed with the imported mound fill material to a depth of six (6) inches.

(2) Mound/Absorption Bed Requirements

(a) Low Pressure Pipe Distribution (LPP) must be utilized to preclude localized hydraulic overloading of the imported fill material and to minimize the impact on the shallow zone of seasonal saturation.

(b) There must be at least twenty-four (24) inches of medium sand placed between the naturally occurring soil surface and the bottom of the absorption bed. Also, the bottom surface of the absorption bed must be placed at least twenty-four (24) inches above the zone of saturation.

(c) If the slope of the site in the proposed mound area is one (1) percent or less, then the mound shall be placed on a twelve (12) inch fill pad which must extend twenty (20) feet beyond the mound in all directions. If the slope of the site in the proposed mound area is greater than one (1) percent but less than or equal to three (3) percent, then the mound shall be placed on a twelve (12) inch deep fill pad which must extend twenty (20) feet beyond the mound area on the sides of the mound; forty (40) feet beyond the mound area on the down slope side of the mound; with no fill pad required on the upslope side of the mound.

(d) The mound and fill pad material shall be USDA medium sand, washed concrete sand, or other equivalent material approved by the Department.

(e) The depth of the fill cap material above the absorption bed shall be nine (9) to fifteen (15) inches of soil texture Class II or III. Sod may be substituted for four (4) inches of this portion of the fill cap material. (see attached illustration).

(f) The depth of the fill cap material above the mound side-slope, the twelve (12) inch deep fill pad, and the taper shall be at least four (4) inches of soil texture Class II or III. Sod may be substituted for this portion of the fill cap material. (see attached illustration).

(g) A 1:2 maximum slope is required if the mound side-slope and taper are sodded.

(h) A 1:4 maximum slope is required if the mound side-slope and taper are mulched and seeded.

(3) Final Landscaping And Drainage Requirements

(a) The septic tank and mound area shall be backfilled and shaped to promote the runoff of surface water.

(b) Where natural surface drainage does not exist, a swale shall be constructed adjacent to the filled area to divert surface water away from the onsite wastewater system to a positive outfall. The installation of ditches, curtain drains, and rain gutters may be required to intercept and divert water away from the onsite wastewater system location.

(c) A barrier to preclude parking and vehicular traffic over the system area may be required.

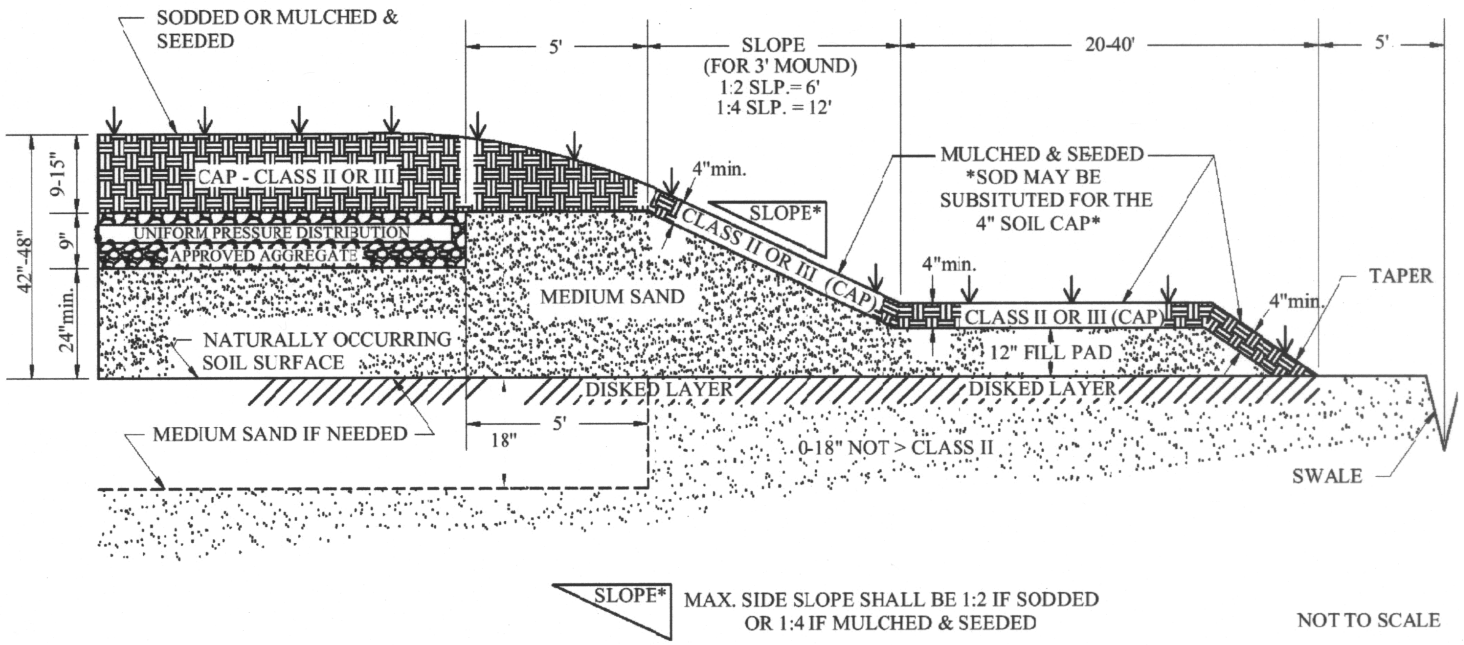
(d) Following final landscaping, seeding or sodding may be required to prevent erosion.

(e) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
MOUNDED FILL SYSTEMS
PROGRAM 362 / CODE 431

TYPICAL DESIGN ILLUSTRATION



TLS REV. 03/16/07

414 APPENDIX N - SYSTEM STANDARD 601 – ELEVATED INFILTRATION SYSTEM

414.1 SITE/PERMITTING REQUIREMENTS

(1) The texture in the upper eighteen (18) inches of naturally occurring soil must be Class I or Class II.

(2) The filter shall not be placed on slopes greater than three (3) percent.

(3) This system cannot be considered for facilities with peak flow rates in excess of four hundred eighty (480) gallons per day. In addition, this system shall not be considered for facilities requiring grease traps.

(4) There shall be a buffer of at least fifty (50) feet surrounding and separating the system from all adjacent property lines. This buffer shall be measured from the retaining wall.

(5) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(6) This system shall not be placed on sites that flood.

(7) No part of this system can be installed within 125 feet of the critical area line or tidal waters as determined by the Department; or within 125 feet of the ordinary high water elevation within the banks of non-tidal, environmentally sensitive waters.

(8) Prior to permitting the onsite wastewater system, delineation of any affected jurisdictional wetlands may be required. Should any part of the proposed onsite wastewater system be located in jurisdictional wetlands, approval from the appropriate permitting agency(s) (i.e., US Army Corp. of Engineers, SCDHEC Ocean and Coastal Resource Management, etc.) shall be received, and proof of such provided to the Department. The absorption bed shall be sized on the most limiting soil texture class in the upper eighteen (18) inches of naturally occurring soil.

(9) The total bottom area of the filter must be increased by fifty (50) percent above that required for conventional trenches.

(10) This system may be considered for installation on contiguous lots in new subdivisions approved after the effective date of this standard provided a setback of at least seventy-five (75) feet is maintained between the system and all adjacent property lines. The seventy-five (75) foot setback shall be measured from the point at which the retaining wall intersects the naturally occurring soil surface.

414.2 INSTALLATION REQUIREMENTS

(1) Site Preparation

(a) If present within eighteen (18) inches of the naturally occurring soil surface, organic material and restrictive horizons must be removed from beneath the filter and replaced with USDA medium sand, washed concrete sand, or an equivalent material approved by the Department.

(b) The naturally occurring soil surface underlying the filter shall be thoroughly tilled and mixed with the imported filter material to a depth of six (6) inches.

(2) System Requirements

(a) The filter must be constructed to a height of at least thirty-six (36) inches above the original grade, with the sewage effluent passing through at least twenty-four (24) inches of filter material.

(b) The filter material shall be USDA medium sand, washed concrete sand or other material approved by the Department.

(c) The filter retaining wall shall extend at least four (4) inches above the surface of the filter material and shall penetrate the naturally occurring soil surface at least four (4) inches.

(d) The filter retaining wall shall be constructed in accordance with the accompanying design illustrations.

(e) Effluent discharged to this system must receive a higher degree of treatment than that provided by a conventional septic tank (i.e., two compartment septic tank or two septic tanks in series).

(f) The top of the filter shall be capped with Class II or Class III soil, and shall slope from center to edges in order to promote surface runoff.

(3) Distribution Requirements

(a) Low Pressure Pipe Distribution (LPP) must be utilized to preclude localized hydraulic overloading of the imported fill material and to minimize the impact on the shallow zone of saturation.

(b) Pump design shall be in accordance with Department standards.

414.3 FINAL LANDSCAPING AND DRAINAGE REQUIREMENTS

(1) Fill material shall be placed around the outside of the filter to a depth of 1 foot, and shall slope to original grade at a point five (5) feet from the retaining wall.

(2) The septic tank and filter area shall be backfilled and shaped to promote the runoff of surface water.

(3) Where natural surface drainage does not exist, a swale shall be constructed adjacent to the filter to divert surface water away from the onsite wastewater system to a positive outfall. The installation of ditches, curtain drains, and/or rain gutters may be required to intercept and divert water away from the onsite wastewater system location.

(4) Following final landscaping, seeding or sodding may be required to prevent erosion.

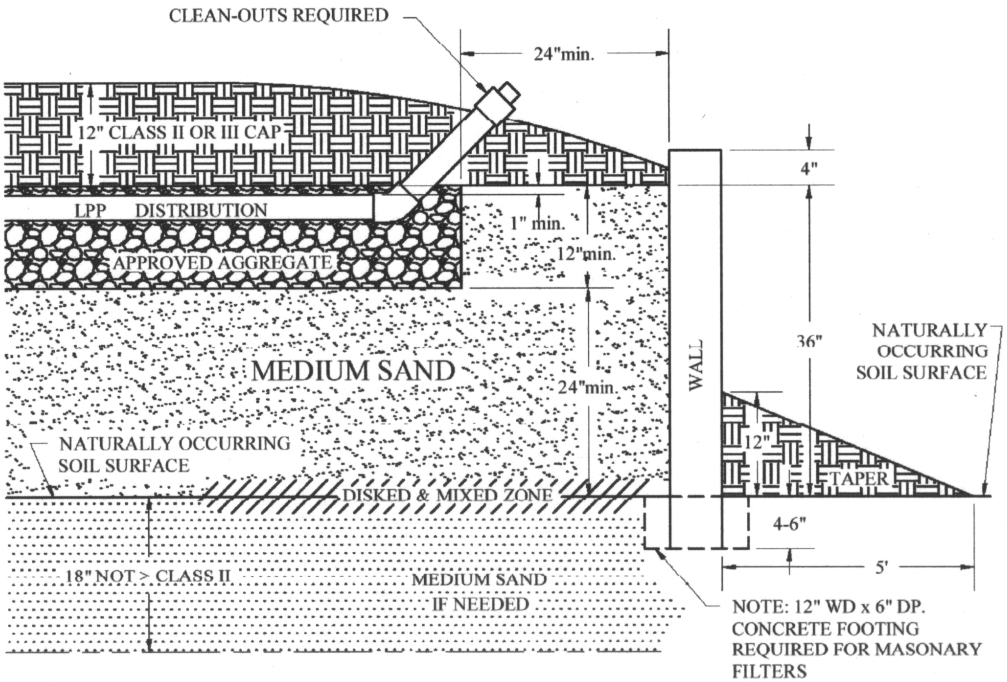
(5) Final approval shall be withheld until all landscaping and drainage improvements have been satisfactorily completed.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
ELEVATED INFILTRATION SYSTEM

PROGRAM 362 / CODE 601

TYPICAL DESIGN ILLUSTRATION



SECTION A-A

NOT TO SCALE

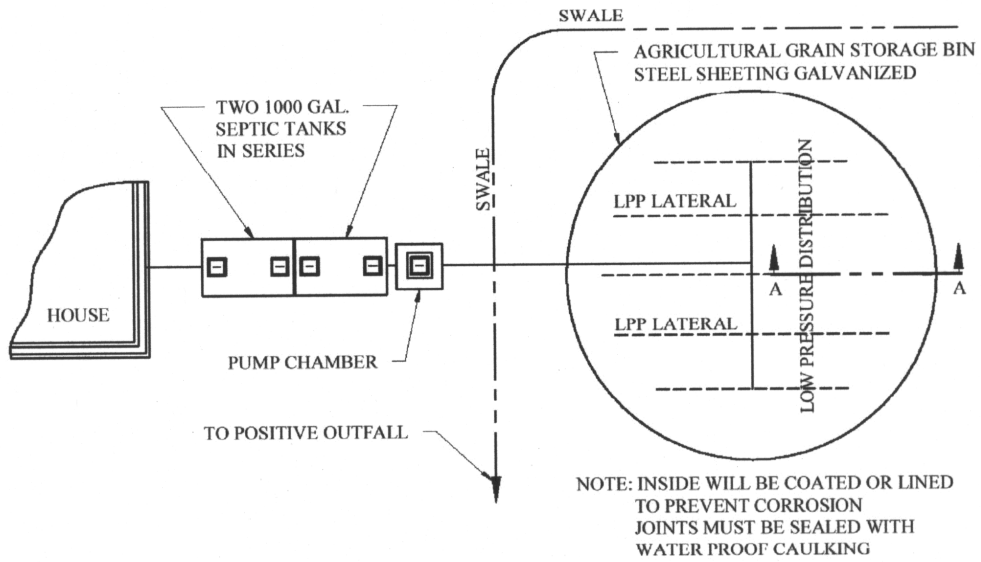
TLS REV. 03/16/07

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

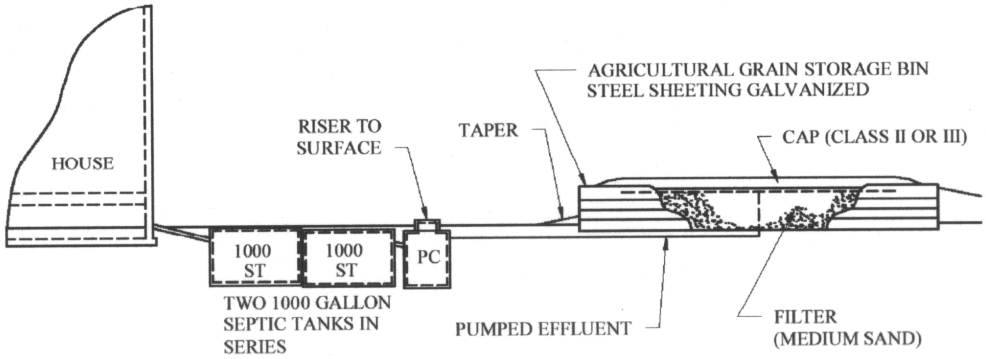
ALTERNATIVE SYSTEM
ELEVATED INFILTRATION SYSTEM

PROGRAM 362 / CODE 601

TYPICAL DESIGN ILLUSTRATION
CIRCULAR STEEL FILTER DETAILS



PLAN VIEW
NOT TO SCALE



ELEVATION
NOT TO SCALE

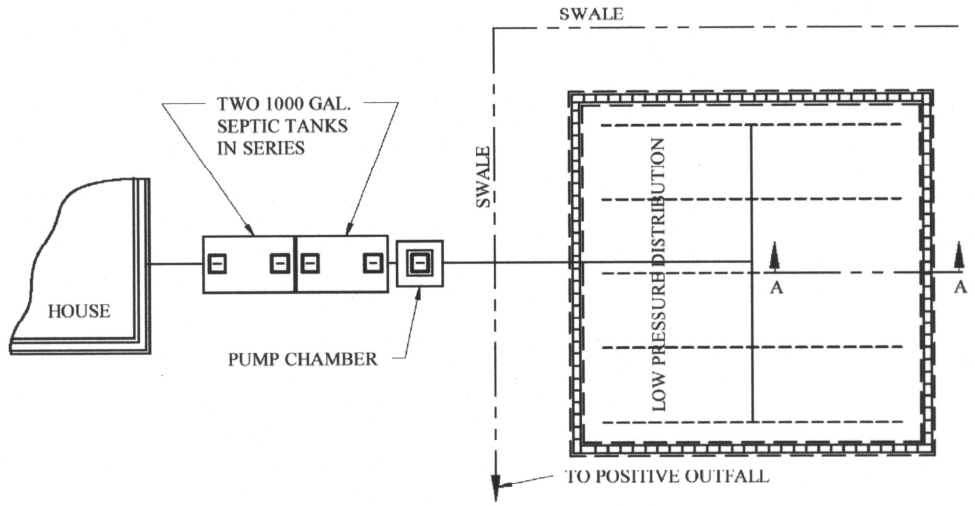
TLS REV. 03/16/07

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

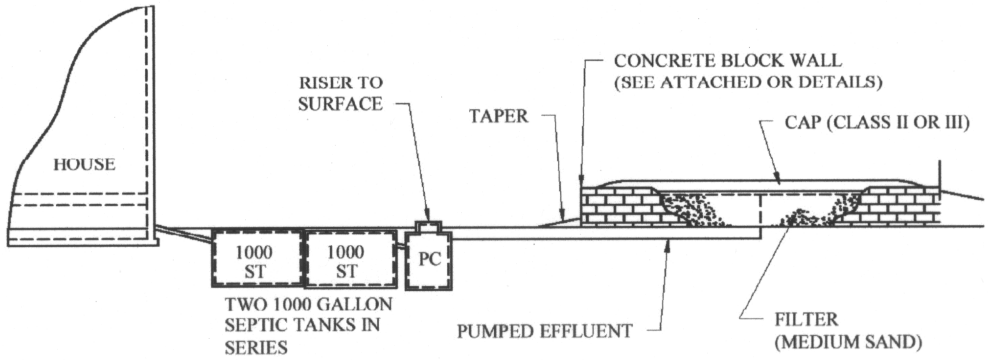
ALTERNATIVE SYSTEM
ELEVATED INFILTRATION SYSTEM

PROGRAM 362 / CODE 601

TYPICAL DESIGN ILLUSTRATION
SQUARE CONCRETE & BLOCK FILTER DETAILS



PLAN VIEW
NOT TO SCALE



ELEVATION
NOT TO SCALE

TLS REV. 03/16/07

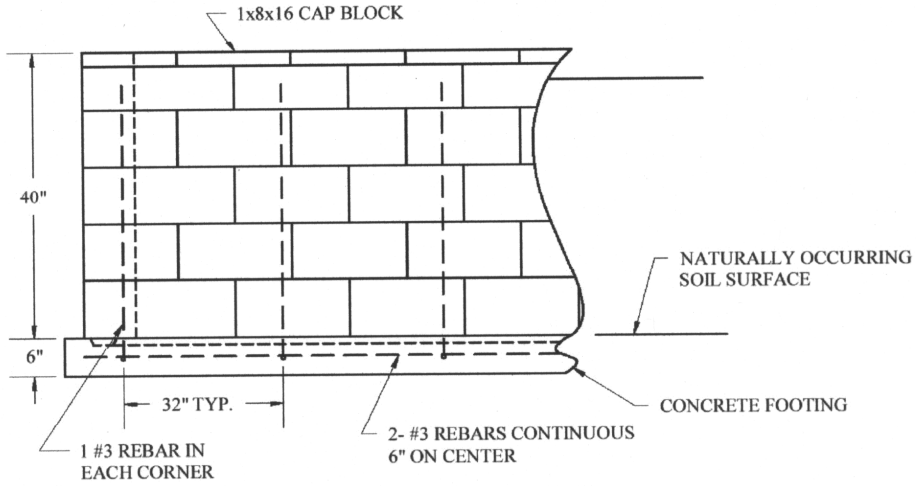
SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

ALTERNATIVE SYSTEM
ELEVATED INFILTRATION SYSTEM

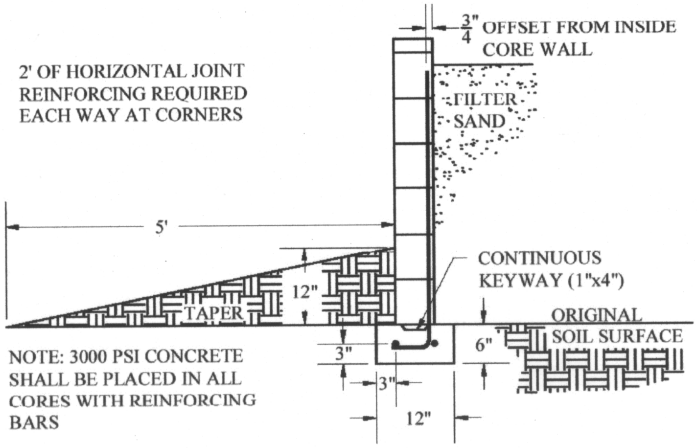
PROGRAM 362 / CODE 601

TYPICAL DESIGN ILLUSTRATION

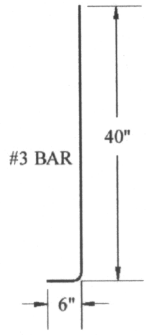
SQUARE CONCRETE & BLOCK FILTER - WALL & FOUNDATION DETAIL



WALL & FOUNDATION DETAIL
NOT TO SCALE



WALL SECTION DETAIL
NOT TO SCALE



REBAR DETAIL
NOT TO SCALE

NOTE: 14 DAY MINIMUM CURE TIME FOR WALL & FOUNDATION REQUIRED BEFORE INSTALLING FILTER SAND

TLS REV. 03/16/07

415 APPENDIX O - SYSTEM STANDARD 610 – SPECIALIZED ONSITE WASTEWATER SYSTEM DESIGNS (LESS THAN 1500 GPD)

(1) This Standard shall not apply to the following:

(a) Projects where two or more pieces of deeded property will share a common system.

(b) Residential or commercial projects where the individual or combined peak sewage flow is estimated to be in excess of fifteen hundred (1500) gpd.

(c) Projects that discharge wastes containing high amounts of fats, grease, and oil, including restaurants and other food service facilities, unless the system manufacturer certifies that the proposed system is designed to treat such high strength wastes.

(d) Industrial process wastewater.

(2) Each site must first be evaluated by the county health department in accordance with R. 61-56 and approved standards.

(a) If the site is found to be unsuitable, the applicant will be notified of these findings in the review letter and offered the opportunity to pursue an approval for a specialized onsite wastewater system design.

(b) If the site is found to be suitable for a conventional or alternative system, a Permit To Construct will be issued for the appropriate system. Following this activity, the applicant still has the right to pursue a specialized onsite wastewater system design in accordance with the procedures outlined herein. In such cases, the required engineering and soils documentation shall be submitted and the Permit To Construct shall be revised to reflect the specific system to be utilized before construction begins.

(3) After the requirements listed in Item 2. (above) are satisfied, a site may be considered for a specialized onsite wastewater system design if written documentation provided by the consulting engineer, including soil studies performed by a Professional Soil Classifier, indicates that the proposed system will function satisfactorily and in accordance with all requirements of R. 61-56. Such substantiating documentation must include the following:

(a) A Soils Report from a Professional Soil Classifier licensed in the State of South Carolina including detailed soil profile descriptions and Soil Series classification(s) utilizing methods and terminology specified in the Field Book for Describing and Sampling Soils; depth to the zone of saturation utilizing methods and terminology outlined in Redoximorphic Features for Identifying Aquic Conditions, and other appropriate principles specified in Soil Taxonomy; the depth to restrictive horizons; and a description of topography and other pertinent land features.

(b) Delineation of any affected jurisdictional wetlands, if applicable. Should any part of the proposed onsite wastewater system be located in jurisdictional wetlands, approval from the appropriate permitting agency(s) {i.e., US Army Corps of Engineers, SCDHEC Ocean and Coastal Resource Management, etc.} shall accompany the application for a specialized onsite wastewater system design.

(c) There shall be a replacement area equivalent to at least fifty (50) percent in size of the original system area held in reserve for system repair. This area shall have a suitable configuration, and shall meet the minimum soil and site conditions of R. 61-56.

(d) A plan that has been sealed, signed, and dated by a Professional Engineer licensed in the State of South Carolina certifying that the proposed onsite wastewater system has been designed in accordance with the requirements of R. 61-56 and will function satisfactorily. The plan should also show an area equivalent to at least fifty (50) percent in size of the original system held in reserve for system repair.

(e) The manufacturer's recommendations for operation and maintenance of the system, and the consulting engineer's management plan to meet this.

(4) Any Permit To Construct that is issued pursuant to this standard shall be based upon the consulting engineer's design, certification, and other supporting documentation provided by the Professional Soil Classifier.

(5) The consulting engineer shall be responsible for supervising construction of the system and providing the county health department with a certified "as built" plan of the actual installation. Any Final Approval that is released pursuant to this standard shall be based upon this engineering certification.

416 APPENDIX P - CURTAIN DRAIN STANDARD

416.1 MINIMUM CONSTRUCTION REQUIREMENTS

(1) Only pipe having received written approval from the Department may be utilized in curtain drains. This approval shall be based upon the pipe meeting all applicable ASTM standards.

(2) The aggregate used in curtain drains shall be a material approved by the Department and shall range in size from one-half (½) inch to two and one-half (2 ½) inches. Fines are prohibited.

(3) The curtain drain trench shall be at least six (6) inches wide.

(4) The curtain drain shall be placed ten (10) feet upslope and twenty-five (25) feet down slope of a subsurface wastewater infiltration area or repair area. Where the aggregate portion of the curtain is installed at the same or lower (down slope) elevation relative to an adjacent subsurface wastewater infiltration area or repair area, the aggregate portion of the curtain must be a minimum of twenty-five (25) feet from adjacent the subsurface wastewater infiltration area or repair area.

(5) The trench bottom shall have a uniform slope to the discharge point. A minimum one (1) percent fall (12 inches per 100 feet) shall be utilized. Trench excavation with a ditch witch is permissible provided the trench bottom has a uniform down slope gradient.

(6) The solid discharge (non-aggregate) line shall be fifteen (15) feet from adjacent subsurface wastewater infiltration area or repair area.

(7) The down slope side of the trench toward the subsurface wastewater infiltration area shall have a minimum six (6) mil poly or an equivalent strong, treated impervious material draped from the trench surface to the trench bottom to prevent groundwater from bridging the curtain drain.

(8) Agricultural drainpipe (slitted) with a minimum diameter of four (4) inches shall be placed along the trench bottom in the aggregate portion. Perforated pipe is acceptable, provided the perforations are installed facing either sideways or upward.

(9) There shall be at least two (2) inches of aggregate beneath the drainpipe.

(10) The aggregate shall be brought to at least six (6) inches from the ground surface.

(11) The aggregate shall be covered with a strong, untreated pervious material to prevent infiltration of back fill material.

(12) Solid drainpipe with a minimum diameter of four (4) inches shall be placed along the trench bottom from the aggregate to the discharge point.

(13) The curtain drain must discharge to the ground surface past the last wastewater infiltration trench line.

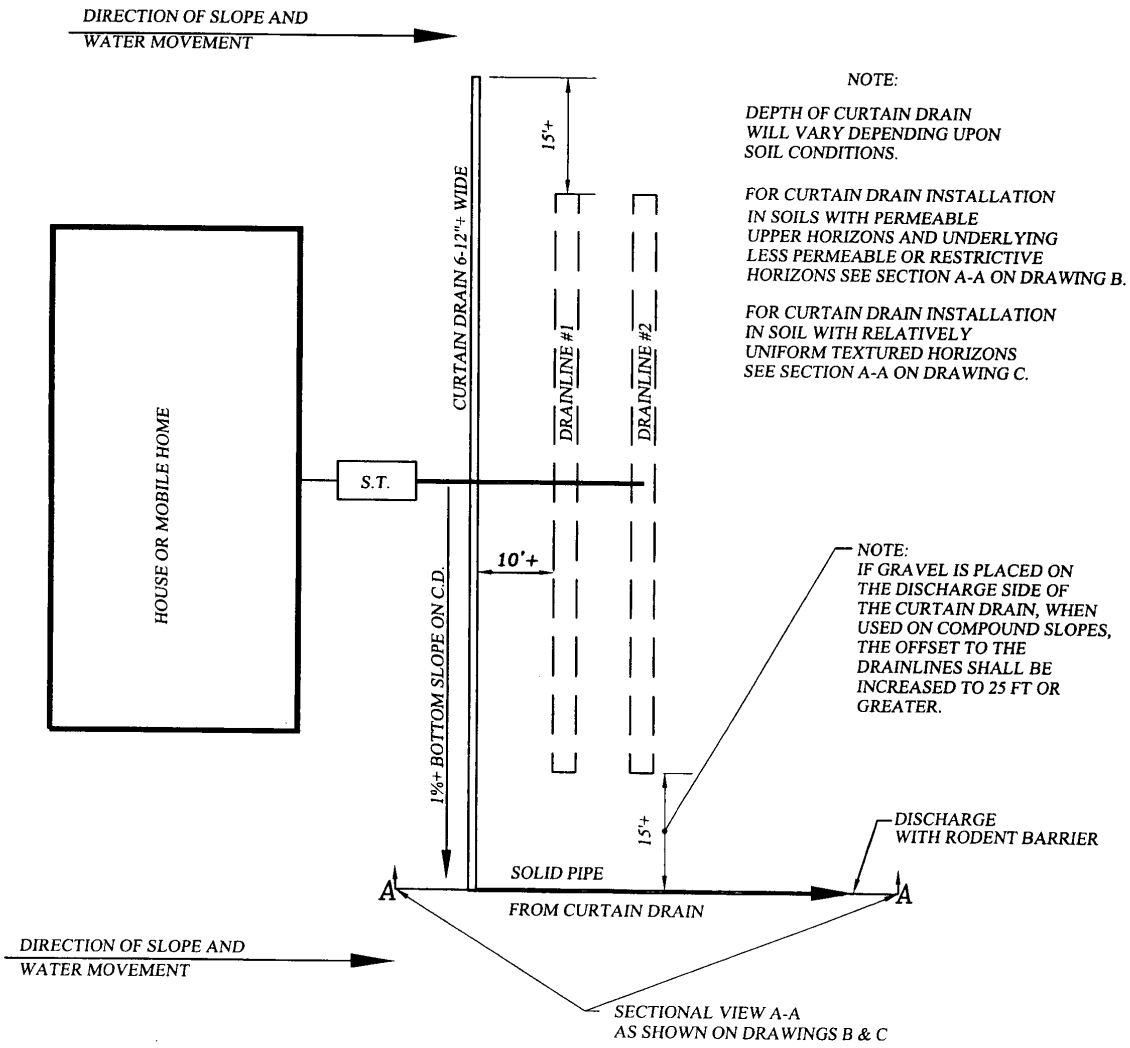
(14) Rodent barriers on discharge pipe outlet(s) are required.

(15) If the curtain drain's trench bottom depth exceeds thirty (30) inches, it shall be inspected prior to the aggregate being installed to insure proper trench depth and grade. It is acceptable to place the pipe and aggregate in the trench prior to the final inspection when a probe rod can be used to accurately measure trench bottom depth.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

CURTAIN DRAIN STANDARD

TYPICAL DESIGN SKETCH



NOTE:

DEPTH OF CURTAIN DRAIN WILL VARY DEPENDING UPON SOIL CONDITIONS.

FOR CURTAIN DRAIN INSTALLATION IN SOILS WITH PERMEABLE UPPER HORIZONS AND UNDERLYING LESS PERMEABLE OR RESTRICTIVE HORIZONS SEE SECTION A-A ON DRAWING B.

FOR CURTAIN DRAIN INSTALLATION IN SOIL WITH RELATIVELY UNIFORM TEXTURED HORIZONS SEE SECTION A-A ON DRAWING C.

DRAWING A

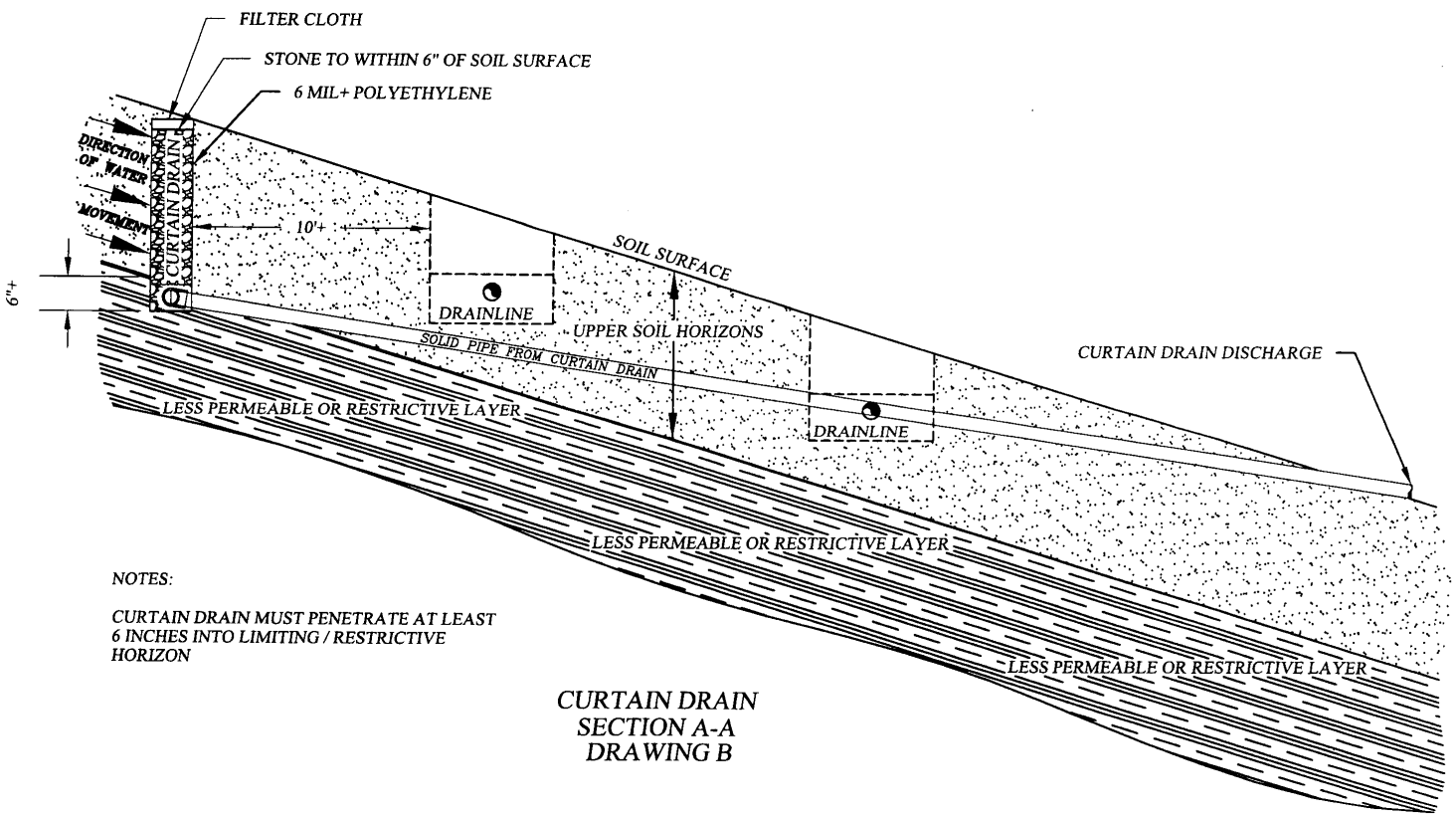
T.L.S.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

CURTAIN DRAIN STANDARDS

CURTAIN DRAIN INSTALLATION IN SOILS WITH RESTRICTIVE OR LESS PERMEABLE HORIZONS BELOW THE DRAINFIELD

TYPICAL DESIGN SKETCH



NOTES:

CURTAIN DRAIN MUST PENETRATE AT LEAST 6 INCHES INTO LIMITING / RESTRICTIVE HORIZON

CURTAIN DRAIN
SECTION A-A
DRAWING B

DRAWING NOT TO SCALE

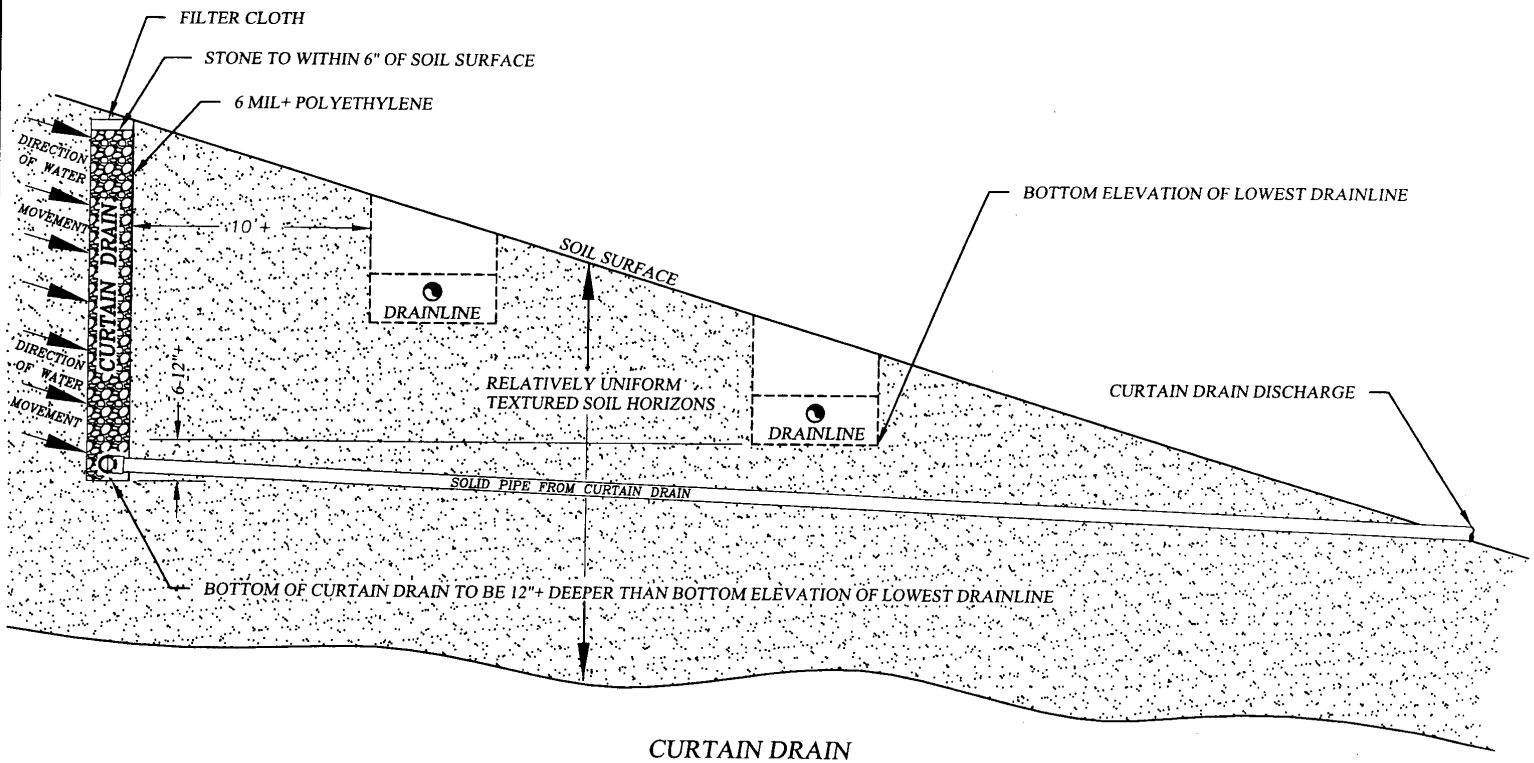
T.L.S.

SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL
BUREAU OF ENVIRONMENTAL HEALTH

CURTAIN DRAIN STANDARDS

CURTAIN DRAIN INSTALLATION IN SOILS WITH RELATIVELY UNIFORM HORIZONS

TYPICAL DESIGN SKETCH



CURTAIN DRAIN
SECTION A-A
DRAWING C

DRAWING NOT TO SCALE

T.L.S.

500 APPENDIX Q - LONG-TERM ACCEPTANCE RATE STANDARD FOR ONSITE WASTEWATER SYSTEMS

USDA-NRCS SOIL TEXTURE	SOIL CHARACTERISTICS WHEN MOIST (FIELD TEST)	LONG-TERM ACCEPTANCE RATE (GPD/SF)	
Sand (S)	Sandy has a gritty feel, does not stain the fingers, and does not form ribbon or ball when wet or moist.	0.9 – 1.0	Class I
Loamy Sand (LS)	Loamy sand has a gritty feel, stains the fingers, forms a weak ball, and cannot be handled without breaking.		
Sandy Loam (SL)	Sandy loam has a gritty feel and forms a ball that can be picked up with the fingers and handled with care without breaking.	0.7 – 0.8	Class II
Loam (L)	Loam may have a slightly gritty feel but does not show a fingerprint, and forms only short ribbons of from 0.25 – 0.50 inch. Loam will form a ball that can be handled without breaking.		
Sandy Clay Loam (SCL)	Sandy clay loam has a gritty feel but contains enough clay to form a firm ball, and may ribbon from 0.75 – 1.0 inch.	0.5 – 0.6	Class III
Clay Loam (CL)	Clay loam is sticky when moist, forms a ribbon of 1.0 – 2.0 inches, and produces a slight sheen when rubbed with the thumbnail. Clay loam produces a nondistinct fingerprint.		
Silt Loam (SiL)	Silt loam has a floury feel when moist and will show a fingerprint, but will not ribbon and forms only a weak ball.		
Silty Clay Loam (SiCL)	Silty clay loam has a slight floury feel, is sticky when moist, and will ribbon from 1.0 – 2.0 inches. Rubbing with thumbnail produces a moderate sheen. Silty clay loam produces a distinct fingerprint.	0.1 – 0.4	Class IV
Sandy Clay (SC)	Sandy clay is plastic, gritty, and sticky when moist, forms a firm ball, and produces a ribbon in excess of 2.0 inches.		
Clay (C)	Clay is both sticky and plastic when moist, produces a ribbon in excess of 2.0 inches, produces a high sheen when rubbed with the thumbnail, and forms a strong ball resistant to breaking.		
Silty Clay (SiC)	Silty clay has a slight floury feel, is both sticky and plastic when moist, forms a ball, and produces a ribbon in excess of 2.0 inches.		

(1) The long-term acceptance rate for system sizing shall be based upon the most hydraulically limiting naturally occurring soil texture from the ground surface to twelve (12) inches below the bottom of the proposed wastewater infiltration trenches. Alternative and experimental systems installed beneath expansive soils shall be sized at a long-term acceptance rate not to exceed 0.2-0.25 GPD/SF as specified in approved standards.

(2) Soil texture shall be estimated by field testing as described above. Laboratory determination of soil texture may be substituted for field testing when conducted in accordance with: (1) Bouyoucos, G.J. 1962. Hydrometer Method Improved for Making Particle Size Analyses of Soils. Agron. J. 53:464-465; (2) ASTM D-422 Procedures for Sieve and Hydrometer Analyses; or (3) the Pipette Method (ASA-CSSA-SSSA), USDA Methods of Soils Analysis, Soil Survey Laboratory Information Manual, and Soil Survey Laboratory Methods Manual.

(3) The total linear feet (LF) for conventional onsite wastewater systems shall be calculated by dividing the peak daily flow (GPD) by the long-term acceptance rate (GPD/SF) and dividing the result by the trench width (FT): LF = GPD ÷ GPD/SF ÷ FT. The total linear feet for alternative systems may either be increased or decreased in accordance with factors specified in alternative standards.

501 APPENDIX R - PEAK SEWAGE FLOW RATE STANDARD

ESTABLISHMENT	UNIT	PEAK FLOW RATE GAL/UNIT/DAY
Airport (Not Including Food Service)	Passenger	3
Assembly Halls	Person	3
Bar (Not Including Food Service)	Customer Seat	5 15
Beauty/Style Shops/Barber Shops	Chair	100
Businesses/Offices/Factories (Add for Showers)	Employee/Shift Transient Employee (4 hrs or Less/Shift) Employee	15 10 10
Camps (No Laundry) -Labor/Summer/Retreat (Separate Food Service) (Separate Bath House) -Day Camps (with meal) (without meal)	 Person Person Person Person Person	 35 10 25 15 10
Campgrounds (No Laundry) -Full Water/Sewer -No Sewer Risers, Bathhouse only (Add for Dump Station)	 Campsite Campsite Campsite	 120 50 40
Car Wash (Non-automatic)	Bay	500
Church (No Daycare) -With Kitchen -Without Kitchen -Family Life Center	 Seat Seat Person	 3 2 5
Day Care	Child	10
Food Service -Full Service Utensils -Paper/Plastic Utensils	 Meal Person Seat	 4 10 40 Reduce by 50 percent
Golf Course Club House (Not Including Foodservice)	Player	10
Kennel	Run	25
Laundromat	Machine	500
ESTABLISHMENT	UNIT	PEAK FLOW RATE **GAL/UNIT/DAY**
Mortuary	Body	25
Motel (Not Including Food Service)	Room	100
Picnic Park	Visitor	10
Public Restroom	User	3
Residential (i.e., Apartment/Condominium/Individual Dwelling, including Resort Rental and Resort Residence)	Bedroom	120

Residential Care	Resident	100
School -With Cafeteria, Gym & Showers -With Cafeteria only -Without Cafeteria, Gym or Showers -Boarding School	 Student Student Student Person	 15 10 8 60
Stadium (Not Including Food Service)	Seat/Occupancy	3
Swimming Area Bathhouse	Person	10
Visitor Center	Visitor	5

The peak flow rate (GPD) for non-residential facilities may either be increased or reduced when comparable peak water consumption data for similar establishments in similar locations vary from the requirement. When considering such data, at least twelve (12) consecutive months must be presented with the maximum month of consumption and the days of operation per month being utilized to arrive at the peak flow rate (GPD).

600 APPENDIX S - ONSITE WASTEWATER PUMP SYSTEM STANDARD

600.1 PUMP TANK (GENERAL)

(1) The submersible sewage effluent pump(s) must be housed in a properly vented, watertight tank that is readily accessible from the surface.

(2) A watertight access opening with removable lid shall be provided, and shall be designed and maintained to prevent surface water inflow. Risers and other pump tank sections, where present, shall be joined using mastic, butyl rubber, or other pliable sealant that is waterproof, corrosion-resistant, and approved for use in septic tanks.

(3) When the pump tank must be located in an area characterized by a shallow zone of seasonal saturation, the Department may require the use of a pre-cast manhole, a fiberglass or polyethylene basin, or any other acceptable method for preventing groundwater intrusion.

(4) When the pump tank must be located in an area that is environmentally sensitive or subject to flooding, applicable portions of R. 61-67, Standards for Wastewater Facility Construction, shall apply.

(5) The pump tank shall have sufficient capacity to accommodate all level control and alarm switches; to keep the pump(s) totally submersed in liquid at all times; and to provide the required dosing volume and minimum pump run time. It is strongly recommended that pump tank capacities be as large as possible (i.e., 500-1000 gal.) in order to provide emergency storage in the event of pump or power failure.

(6) Pre-engineered, manufactured packaged pump stations can be utilized in lieu of the composite design described herein, provided the pump meets the minimum capacity requirements of the system and no alterations are made to the pump station other than those specifically authorized by the manufacturer.

600.2 MINIMUM PUMPING RATES (PEAK INFLOW) AND MINIMUM RUN TIMES

(1) For residential systems, the maximum daily flow entering the pump tank shall be based upon one hundred twenty (120) gpd per bedroom. For commercial and other facilities, this value shall be based upon the Standard for Determining Sewage Flow Rates from Commercial and Recreational Establishments.

(2) The minimum pumping rate (peak inflow) for discharges up to fifteen hundred (1500) gpd shall be determined as follows:

Maximum Estimated Daily Flow (gpd)	Minimum Pumping Rate (peak inflow) (gpm)
480 and less	10
481 - 720	15
721 - 1500	20

(3) The minimum pumping rate (peak inflow) for discharges in excess of fifteen hundred (1500) gpd shall be determined by multiplying the average flow rate (gpm) times a peaking factor of not less than 2.5, where the average flow rate is based upon actual minutes per day of facility operation.

(4) The minimum pump run time for all pump systems shall be determined as follows:

Minimum Pumping Rate (peak inflow) (gpm)	Minimum Pump Run time (min)
10 - 14	3
15 - 24	4
25 and above	5

600.3 MINIMUM DOSING VOLUME, SCOURING VELOCITY, AND PUMP CAPACITY

(1) The minimum dosing volume (gal) shall be determined by multiplying the minimum pumping rate (gpm) times the minimum pump run time (min).

(2) The selected pump(s) must have the capacity to deliver the minimum pumping rate (gpm) at a scouring velocity of at least one (1) ft/sec (effluent) or two (2) ft/sec (raw) against the total dynamic head of the system. This minimum pump capacity (gpm at total feet of dynamic head) shall be specified on SCDHEC Form 1739.

(3) Duplex pumps shall be required when the maximum estimated daily flow is equal to or greater than fifteen hundred (1500) gallons, and each pump shall meet the minimum capacity as stated above.

(4) In those cases where the minimum pump capacity or any other system requirements exceed what can be specified thru the use of this Standard, the Department shall require the applicant to retain the services of a Registered Professional Engineer.

600.4 FORCE MAIN, VALVES, AND FITTINGS

(1) The force main shall be Schedule 40 PVC, and the diameter shall be sufficient to provide a velocity of at least one (1)_ft/sec (effluent) or two (2) ft/sec (raw) using a C Factor of 150 (effluent) or 140 (raw) at the minimum pumping rate (peak inflow). Fittings and valves shall be of compatible corrosion resistant material.

(2) A threaded union, flange, or similar disconnect device shall be provided in each pump discharge line. The pump(s) shall be easily removable at ground surface without requiring entrance into the tank. Valves shall also be readily accessible from the ground surface. Duplex pump systems shall be equipped with a separate pit or box for the placement and operation of valves.

(3) A shutoff valve (eg., gate valve) and a check valve shall be located on the discharge line from each pump. The check valve shall be placed between the pump and the shutoff valve.

(4) A three-sixteenths (3/16) inch anti-siphon hole(s) shall be placed between the pump(s) and the check valve(s) when the discharge elevation of the distribution system is below the inlet to the pump tank.

(5) In cases where the force main must be installed over undulating terrain, automatic air relief valves shall be placed at high points in the line to prevent air locking.

(6) The force main effluent shall discharge into a separate discharge box or distribution manifold before entering either a septic tank or a soil wastewater infiltration trench. The flow shall be directed to the bottom of the box thru a PVC elbow, or into a distribution manifold at an angle of ninety (90) degrees to the septic tank or first wastewater infiltration trench.

600.5 Pumps, Control Devices and Electrical Connections

(1) Pumps shall be listed by Underwriter's Laboratory or an equivalent third party testing and listing agency, and shall be specifically manufactured for use with domestic wastewater.

(2) Sealed mercury control floats or similar devices designed for detecting liquid levels in septic tank effluent shall be provided to control pump cycles. A separate level sensing device shall be provided to activate an audible and visible high water alarm. Pump-off levels shall be set to keep the pump submerged at all times.

(3) Pump and control circuits shall be provided with manual circuit disconnects within a watertight, corrosion resistant, outside enclosure (NEMA 4X or equivalent) adjacent to the pump tank, securely mounted at least twelve (12) in. above finished grade, unless installed within a weather-tight building. Alarm circuits shall be supplied ahead of any pump overload or short circuit protective devices. The pump(s) shall be manually operable without requiring special tools or entrance into the tank for testing purposes. Conductors shall be conveyed to the disconnect enclosure through water proof, gas proof, and corrosion resistant conduit(s), with no splices or junction boxes provided inside the tank. Wire grips, duct seal, or other suitable material shall be used to seal around wire and wire conduit openings inside the pump tank and disconnect enclosure.

(4) For systems requiring duplex pumps, each pump shall operate in a lead-lag sequence and be on an alternating cycle. A control panel shall be provided which shall include short circuit protection for each pump and for the control system, independent disconnects, automatic pump sequencer, hands-off-automatic (H-O-A) switches, run lights, and elapsed time counters for each pump.

600.6 FINAL INSPECTION AND APPROVAL

(1) Before or during final inspection, the property owner or agent shall provide literature, including a pump curve, describing the specific pump installed. The inspector shall evaluate the system in accordance with this Standard, and shall confirm that all items, including the minimum pump capacity specified on SCDHEC Form 1739, have been satisfied.

(2) Prior to final approval, the installer or electrician shall provide the Department with written documentation verifying that pump system electrical connections were made in accordance with all applicable codes. The Department may require testing of the pump system, demonstration of watertight integrity, or any other procedure deemed necessary to confirm the acceptability of the installation.

600.7 Raw Sewage Pump Stations

(1) In those cases where it is necessary to pump raw sewage from a residence or facility to an onsite wastewater system, the pump station shall meet all applicable portions of this Standard and R. 61-67, Standards for Wastewater Facility Construction.

(2) Adherence to the pump manufacturer's recommendations shall also be a major consideration with such systems.

700 APPENDIX T - MINIMUM DESIGN STANDARDS FOR TANK CONSTRUCTION

700.1 INTRODUCTION

The following standards describing tank designs intended to be utilized for septic tanks, grease traps, or pump chambers for onsite wastewater disposal systems have been adopted in an effort to assure a quality product of sufficient strength and resistance, capable of fulfilling its intended purpose.

700.2 DESIGN APPROVAL

(1) No person shall manufacture tanks intended to be utilized for septic tanks, grease traps, or pump chambers for onsite wastewater disposal systems without receiving approval from the Department. All manufactured tanks must receive approval of design and reinforcement methods prior to manufacturing.

(2) Any person desiring to manufacture tanks shall make written application on forms provided by the Department. Such application shall include the name and address, the location of the facility, tank capacity and design information.

(3) Prior to approval, the Department shall review the tank design, reinforcement and manufacturing methods to determine compliance.

(4) The Department shall approve plans for manufactured tanks to insure compliance with the South Carolina Minimum Design Standards for Tank Construction.

(5) The Department shall approve plans for fabricated tanks, other than those for precast reinforced concrete tanks, on an individual basis. Fabricated tanks shall meet the requirements of precast reinforced concrete tanks to provide equivalent effectiveness.

(6) The Department shall issue an approval to the tank manufacturer if the tank design, reinforcement and manufacturing method complies with the South Carolina Minimum Design Standards for Tank Construction. Tank manufacturing approvals are not transferable. When a change of ownership occurs, the new owner shall make written application on forms provided by the Department.

(7) The Department shall revoke approval to manufacture tanks for onsite wastewater disposal systems if the tank manufacturer fails to comply with the South Carolina Minimum Design Standards for Tank Construction.

700.3 GENERAL

(1) Septic tanks and grease traps shall be manufactured as single compartment or partitioned tanks.

(2) If septic tanks and grease traps are manufactured with a partition so that the tank contains two (2) compartments, the inlet compartment of the tank shall contain two-thirds (2/3) of the overall capacity and the outlet compartment shall contain one-third (1/3) of the overall capacity. The top of the partition shall terminate two inches below the bottom side of the tank top in order to leave space for air or gas passage between compartments. The top and bottom halves of the partition shall be constructed in such manner as to leave a four (4) inch water passage at the vertical mid point of the partition wall for the full width of the tank.

(3) The minimum liquid capacity requirements shall be met by the use of a single septic tank or two or more tanks installed in series. Septic tanks joined in series shall be interconnected by an upper effluent pipe(s) with a minimum diameter of four (4) inches and a lower sludge pipe(s) with a minimum diameter of twelve (12) inches. The upper connection(s) shall be installed level from tank to tank, and the lower sludge pipe connection(s) shall be installed level and shall be placed twelve (12) inches above the bottoms of the tanks. The lower sludge pipe connection(s) can be eliminated if the first tank in series contains at least two-thirds of the total required liquid capacity. There shall be no more than two (2) inches of fall from the inlet invert of the first tank to the outlet invert of the last tank in series.

(4) It is required that all pump chambers function as a single compartment tank. If a two (2) compartment tank is used, at least two (2) six (6) inch diameter holes or equivalent, must be provided in the partition wall six (6) inches from the tank bottom.

(5) The septic tank and grease trap tank length shall be at least two (2) but not more than three (3) times the width.

(6) The liquid depth shall not be less than four (4) feet.

(7) A minimum of nine (9) inches of freeboard shall be provided in all tanks, unless otherwise approved by the Department.

(8) Useable liquid capacity for septic tanks or grease traps shall not be less than one thousand (1000) gallons.

(9) The pump tank shall have sufficient capacity to accommodate all level control and alarm switches; to keep the pump(s) totally submersed in liquid at all times; and to provide the required dosing volume and minimum pump run time. It is strongly recommended that pump tank capacities be as large as possible in order to provide emergency storage in the event of pump or power failure.

(10) There shall be a minimum of two (2) openings in the tank wall, located at inlet and outlet ends of the tank. The knockouts for the inlet and outlet openings of pre-cast tanks shall have a concrete thickness of not less than one (1) inch in the tank wall. The openings shall allow for a minimum of four (4) inch pipe or a maximum of six (6) inch pipe. No openings shall be permitted below the tank liquid level.

(11) The inlet and outlet for septic tanks and grease traps shall be a cast-in-place concrete tee, a polyvinyl chloride (PVC) tee, or a polyethylene (PE) tee, made of not less than Schedule 40 pipe or equivalent fittings and material. The cast-in-place concrete tees shall have a minimum thickness of not

less than two (2) inches. The invert of the outlet shall be at least two (2) inches lower in elevation than the invert of the inlet. The inlet and outlet tees shall extend above liquid depth to approximately one (1) inch from the top of the tank to allow venting between tank compartments and multiple tank configurations.

(12) The inlet tee for septic tanks and grease traps shall extend sixteen (16) inches below the liquid level.

(13) The outlet tee for a septic tank shall extend eighteen (18) inches below the liquid level and the outlet tee for a grease trap shall extend between six (6) and twelve (12) inches above the tank bottom.

(14) The inlet, outlet and wiring conduit openings of all tanks must utilize a resilient, watertight, non-corrosive connective sleeve. The use of grout is prohibited.

(15) Access to each tank or compartment shall be provided by an opening located above the inlet and outlet with an inside dimension of at least eighteen (18) inches square (18 x 18) or in diameter, with removable tank access lids.

(16) Concrete tank access lids shall be equipped with steel lift rings at least three-eighths (3/8) inch diameter, or by an alternative method approved by the Department.

(17) Should risers or manholes be utilized to allow access into septic tanks, grease traps or pump chambers, the risers/manholes cover shall be constructed to prevent the release of odors, entry of vectors and water. Grade level riser/manhole covers shall be secured by bolts or locking mechanisms, or have sufficient weight to prevent unauthorized access. The ground shall slope away from any access extended to grade level.

(18) Risers/manholes shall be sealed to the tank by using bituminous mastic, butyl rubber, or other pliable sealant that is waterproof, corrosion-resistant, and approved for use in tank construction. The sealant shall have a minimum size of one (1) inch diameter or equivalent. The joint shall be smooth, intact, and free of all deleterious substances before sealing.

(19) After curing, all multi-piece tanks shall be joined and sealed at the joints by using a bituminous mastic, butyl rubber, or other pliable sealant that is waterproof, corrosion-resistant, and approved for use in tank construction. The sealant shall have a minimum size of one (1) inch diameter or equivalent. The joint shall be smooth, intact, and free of all deleterious substances before sealing. The use of grout is prohibited.

(20) All tanks must pass the ASTM C–1227 Standard for watertight testing. The Department will choose tanks at random for testing. Tanks will be approved for use in South Carolina after the Department ascertains that the standard is met. After joining, tanks manufactured in multiple sections shall be plastered along the section joints with hydraulic cement or other waterproofing sealant. Other methods of waterproofing tanks may be used as specifically approved in the plans and specifications for the tank. Prior to backfilling, the local health department shall make a finding that multiple section tanks are watertight if a soil wetness condition is present within five feet of the elevation of the top of the tank. Any tank found to be improperly sealed, having cracks or holes, which will allow for water infiltration or discharge of sewage from the tank bottom, walls or top, will not be approved for use.

(21) Tank manufacturers must have equipment and capabilities for portion control to maintain constant mixture formulation ratios and provide for systematic inspection of finished products to insure compliance with the minimum tank construction and design standards.

(22) The concrete mix used for concrete tank components must be formulated to yield a minimum twenty-eight (28) day compressive strength of four thousand (4,000) pounds per square inch (psi).

(23) The aggregate size utilized in the concrete mix shall not exceed one-third (1/3) of the wall thickness. Suitable aggregates include sand particle sizes from a fine to one-fourth (1/4) inch gravel or crushed stone. Granite dust or fine screenings from a crusher operation may be used in lieu of sand.

(24) An identifying seal must be cast or permanently affixed by an approved method from the Department on the outlet tank wall within six (6) inches of the top. The identifying seal shall identify the manufacturer and the liquid capacity of the tank. The tank's cast date shall be located on the identifying seal or imprinted on the top of the tank within six (6) inches from outlet tank wall near the identifying seal. The lettering on the identifying seal or date imprinted on the top of the tank shall be no more than six (6) inches in height.

(25) The tank manufacturer shall guarantee all tanks in writing for two (2) years against failure due to poor workmanship and materials.

(26) Changes in approved tank design, construction, and alternative reinforcing methods will not be allowed without prior approval from the Department.

700.4 PRE-CAST CONCRETE NON-FIBER REINFORCED SEPTIC TANKS AND GREASE TRAPS

(1) The tank walls and bottom shall be reinforced with six inch by six inch (6 x 6) ten (10) gauge wire mesh.

(2) Tank tops shall be reinforced with six by six inch (6 x 6) ten (10) gauge wire mesh, a minimum of five (5) sections of three-eighths (3/8) inch diameter steel reinforcing bars oriented perpendicular to the tank sidewalls beginning at the center spaced twelve (12) inches apart, and four (4) sections of three-eighths (3/8) inch diameter steel reinforcing bars placed diagonally from the corners to the center of the tank. The length of the perpendicular reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall. The length of the four (4) diagonal steel reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall and six (6) inches beyond the closest perpendicular steel reinforcing bar.

(3) If a septic tank or grease trap is manufactured with a partition, the tank partition (both halves) shall be reinforced with six by six inch (6 x 6) ten (10) gauge wire mesh. The reinforcing wire shall be bent to form an angle of ninety (90) degrees on the ends in order to form a leg not less than four (4) inches long. When the wire is placed in the mold the four-inch legs shall lay parallel with the sidewall wire and adjacent to it.

(4) The tank walls and bottom thickness shall be at least two and one-half (2½) inches, and top thickness shall be at least three (3) inches.

(5) All reinforcing wire and rods must be covered by at least one-half (1/2) inch of concrete.

(6) An acceptable vibration method shall be employed in the construction of the tank to prevent voids in the tank walls, bottom and top.

700.5 PRE-CAST CONCRETE FIBER REINFORCED SEPTIC TANKS AND GREASE TRAPS

(1) Tank tops shall be reinforced with a minimum of five (5) sections of three-eighths (3/8) inch diameter steel reinforcing bars oriented perpendicular to the tank sidewalls beginning at the center spaced twelve (12) inches apart, and four (4) sections of three-eighths (3/8) inch diameter steel reinforcing bars placed diagonally from the corners to the center of the tank. The length of the perpendicular reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall. The length of the four (4) diagonal steel reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall and six (6) inches beyond the closest perpendicular steel reinforcing bar.

(2) Tank bottoms shall be reinforced with a minimum of seven (7) sections of three-eighths (3/8) inch diameter steel reinforcing bars oriented perpendicular to the tank sidewalls beginning at the center spaced twelve (12) inches apart. The length of the perpendicular reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall.

(3) If a septic tank or grease trap is manufactured with a partition, the tank partition (both halves) shall be reinforced with six by six inch (6 x 6) ten (10) gauge wire mesh. The reinforcing wire shall be bent to form an angle of ninety (90) degrees on the ends in order to form a leg not less than four (4) inches long. When the wire is placed in the mold the four-inch legs shall lay parallel with the sidewall wire and adjacent to it.

(4) The tank perimeter walls shall be reinforced with three-eighths (3/8) diameter steel reinforcing bars located one (1) inch from the tank's top and bottom section seams.

(5) The tank walls and bottom thickness shall be at least two and one-half (2½) inches, and top thickness shall be at least three (3) inches.

(6) All reinforcing wire and rods must be covered by at least one-half (1/2) inch of concrete.

(7) Fiber products used with this reinforcement design must be added during the mixing process in order to achieve even distribution throughout the concrete mixture.

(8) Fiber length must range from at least one (1) to no more than two (2) inches.

(9) The fiber must be specifically manufactured for use as a concrete secondary reinforcement and be a polypropylene fibrillated (two-dimensional fiber mesh network) material.

(10) An acceptable vibration method shall be employed in the construction of the tank to prevent voids in the tank walls, bottom and top.

700.6 CONCRETE BLOCK SEPTIC TANKS AND GREASE TRAPS

(1) The tank walls and partition thickness shall be at least eight (8) inches and the top cover slabs thickness shall be at least four (4) inches.

(2) The tank bottom shall be a single pour concrete slab to a depth of at least four (4) inches within the first block course.

(3) If a septic tank or grease trap is manufactured with a partition, the tank walls and partition shall be constructed of solid sixteen inch by eight inch by eight inch (16 x 8 x 8) concrete blocks. The use of hollow blocks is prohibited.

(4) All joints between concrete blocks shall be mortared using masonry cement mortar or equivalent. The joints shall have a nominal thickness of three-eighths (3/8) inch.

(5) The upper partition wall may be supported by the use of two inch by four inch by eight (2 x 4 x 8) inch bricks (or equivalent support material) standing on edge located at the block seams of the upper partition wall.

(6) The top cover slabs shall be constructed such that the individual slabs will not exceed two (2) feet in width and the length will be sufficient to extend to the outside tank width with a minimum slab thickness of four (4) inches.

(7) The individual top cover slabs shall be reinforced with a minimum of two (2) sections of three-eighths (3/8) inch diameter steel reinforcing bars oriented perpendicular to the tank sidewalls spaced twelve (12) inches apart from the center. The length of the perpendicular reinforcing bars shall be of sufficient length to extend the full length of the slab.

(8) The end cover slabs shall be constructed such that the individual slabs will not exceed three (3) feet in width and the length will be sufficient to extend to the outside tank width with a minimum slab thickness of four (4) inches.

(9) The end cover slabs shall be cast to allow access to each tank or compartment by providing an opening located above the inlet and outlet tee with an inside dimension of eighteen (18) inches square (18 x 18) or in diameter with removable tank access lids.

(10) The individual end cover slabs shall be reinforced with two (2) sections of three-eighths (3/8) inch diameter steel reinforcing bars oriented perpendicular to the tank sidewalls spaced twelve (12) inches apart from the center and two (2) sections of three-eighths (3/8) inch diameter steel reinforcing bars oriented perpendicular to the tank sidewalls spaced sixteen (16) inches apart from the center. The length of the perpendicular reinforcing bars shall be of sufficient length to extend the full length of the slab.

(11) The top and end cover slab seams shall be sealed to the tank walls and at all joints by using a bituminous mastic, butyl rubber, or other pliable sealant that is waterproof, corrosion-resistant, and approved for use in septic tanks. The sealant shall have a minimum size of one (1) inch diameter or equivalent. The use of grout is prohibited.

(12) The tank top and end cover slabs shall be equipped with steel lift handles at least one half (1/2) inch diameter, or by an alternative method approved by the Department.

(13) All reinforcing rods must be covered by at least one-half (1/2) inch of concrete.

(14) The interior of the tank (walls and bottom) shall be plastered with a waterproofing cement compound.

(15) An acceptable vibration method shall be employed in the construction of the tank to prevent voids in the tank access lids, tank bottom, and top and end slabs.

700.7 PRE-CAST CONCRETE NON-FIBER REINFORCED PUMP CHAMBERS

(1) The tank walls and bottom shall be reinforced with six inch by six inch (6 x 6) ten (10) gauge wire mesh.

(2) Tank tops shall be reinforced with six by six inch (6 x 6) ten (10) gauge wire mesh, a minimum of five (5) sections of three-eighths (3/8) inch diameter steel reinforcing bars oriented perpendicular to the

tank sidewalls beginning at the center spaced twelve (12) inches apart, and four (4) sections of three-eighths (3/8) inch diameter steel reinforcing bars placed diagonally from the corners to the center of the tank. The length of the perpendicular reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall. The length of the four (4) diagonal steel reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall and six (6) inches beyond the closest perpendicular steel reinforcing bar.

(3) The tank walls and bottom thickness shall be at least two and one-half (2½) inches, and top thickness shall be at least three (3) inches.

(4) All reinforcing wire and rods must be covered by at least one-half (1/2) inch of concrete.

(5) An acceptable vibration method shall be employed in the construction of the tank to prevent voids in the tank walls, bottom and top.

700.8 PRE-CAST CONCRETE FIBER REINFORCED PUMP CHAMBERS

(1) Tank tops shall be reinforced with a minimum of five (5) sections of three-eighths (3/8) inch diameter steel reinforcing bars oriented perpendicular to the tank sidewalls beginning at the center spaced twelve (12) inches apart, and four (4) sections of three-eighths (3/8) inch diameter steel reinforcing bars placed diagonally from the corners to the center of the tank. The length of the perpendicular reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall. The length of the four (4) diagonal steel reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall and six (6) inches beyond the closest perpendicular steel reinforcing bar.

(2) Tank bottoms shall be reinforced with a minimum of seven (7) sections of three-eighths (3/8) inch diameter steel reinforcing bars oriented perpendicular to the tank sidewalls beginning at the center spaced twelve (12) inches apart. The length of the perpendicular reinforcing bars shall be of sufficient length to extend two (2) inches into the sidewall.

(3) The tank perimeter walls shall be reinforced with three-eighths (3/8) inch diameter steel reinforcing bars located one (1) inch from the tank's top and bottom section seams.

(4) The tank walls and bottom thickness shall be at least two and one-half (2½) inches, and top thickness shall be at least three (3) inches.

(5) All reinforcing wire and rods must be covered by at least one-half (1/2) inch of concrete.

(6) Fiber products used with this reinforcement design must be added during the mixing process in order to achieve even distribution throughout the concrete mixture.

(7) Fiber length must range from at least one (1) to no more than two (2) inches.

(8) The fiber must be specifically manufactured for use as a concrete secondary reinforcement and be a polypropylene fibrillated (two-dimensional fiber mesh network) material.

(9) An acceptable vibration method shall be employed in the construction of the tank to prevent voids in the tank walls, bottom and top.

800 APPENDIX U - FIBERGLASS REINFORCED PLASTIC TANKS STANDARD

Standards describing fiberglass reinforced plastic septic tanks have been adopted assure a quality product of sufficient strength and resistance, capable of fulfilling its intended purpose. Many of these standards were derived from NBS Voluntary Product Standard PS 15-69, which covers custom contact-molded reinforced polyester chemical resistant process equipment.

800.1 GENERAL REQUIREMNETS

The following general requirements are applicable to fiberglass reinforced plastic septic tanks as defined herein, and approved design standards and structural properties of the same shall be not less than those stated herein.

(1) Material

Resins and sealants used in the tank manufacturing process shall be capable of effectively resisting corrosive influences of liquid components of sewage, gases generated by the digestion of sewage, and soil burial. Materials used shall be formulated to withstand vibration, shock, normal household chemicals, earth and hydrostatic pressure both when full and empty. Not less than thirty (30) percent of the total weight of the tank shall be fiberglass reinforcement. For tanks not exceeding fifteen hundred (1500) gallons liquid capacity, the minimum wall thickness shall be three-sixteenths (3/16) inch, provided however, that isolated small spots may be as thin as eighty (80) percent of the minimum.

(2) Inner Coating

Internal surfaces shall be coated with an appropriate gel coating to provide a smooth, pore-free, watertight surface for fiberglass reinforced plastic parts.

(3) Physical Properties

Tanks shall be so constructed that all parts of the tank shall meet the following requirements:

(a) Ultimate Tensile Strength (Minimum) - 9,000 psi when tested in accordance with ASTM D 638-7la, Standard Method of Test for Tensile Properties of Plastics.

(b) Flexural Strength (Minimum) - 16,000 psi when tested in accordance with ASTM D 790-71, Standard Method of Test for Flexural Properties of Plastics.

(c) Flexural Modulus of Elasticity Tangent (Minimum) - 700,000 psi when tested in accordance with ASTM D 790-71, Standard Method of Test for Flexural Properties of Plastics.

(4) Watertight Integrity

Tanks shall be so constructed as to be watertight for the designed life of the tank. Lids or covers shall be sufficiently tight when installed to preclude the entrance of surface or ground water into the tank.

(5) Longevity

Proof from an independent testing laboratory shall be submitted substantiating a minimum life expectancy of twenty years service for the intended use of the tank and appurtenant components such as necessary sealants, connective fastenings, resins, etc.

(6) Safety

As a safety measure, provision shall be made in the construction of septic tank lids or covers to preclude unauthorized entry or removal when the use of the tank necessitates positioning of access openings at or above ground level.

(7) Workmanship

Tanks shall be of uniform thickness and free from defects that may affect their serviceability or durability. Completed tanks are to present a smooth inside finish free of spills, pits, and honeycombs. Plant quality control shall be sufficient to maintain a high degree of uniformity in tank quality.

800.2 SPECIFIC REQUIREMENTS

Specific requirements for design and construction shall be not less than those specified herein, and shall be in conformity with recognized National Standards for design and construction and in accordance with this regulation.

800.3 CAPACITY AND DESIGN LIMITS

(1) Dimensions

(a) The inside length of a horizontal cylindrical tank shall be at least two (2) but not more than three (3) times the width.

(b) The uniform liquid depth shall not be less than four (4) feet.

(c) At least fifteen (15) percent of the total volume of the tank shall be above the liquid level.

(d) If tanks of other shapes are proposed, specifications must be submitted to the Division of Onsite Wastewater Management for approval.

(2) Inlet

(a) Provisions shall be made for the building sewer to enter the center of one end of the septic tank two (2) inches above the normal liquid level of the tank.

(b) A tee shall be constructed as an integral part of the tank to receive the building sewer, or as an alternative, an integrally constructed baffle may be used.

(c) If baffles are used, suitable integrally fitted sleeves or collars shall be provided in the inlet openings of the tank to provide surface areas sufficient to insure capability of watertight bonding between the tank and the inlet sewer.

(d) If the tee or baffle is constructed of plastic material, it shall meet NSF Standard #14 for drain, waste, and vent system application.

(e) If fiberglass reinforced plastic is used, it shall be of the same constituency as material of which the tank is constructed.

(f) The inlet tee of baffle shall extend sixteen (16) inches below the designed liquid level and be placed and secured in a vertical position so as to be watertight and preclude dislodgement during installation, operation or maintenance activities.

(3) Outlet

(a) Provisions shall be made for the outlet sewer to receive the discharge from the tank by providing an opening in the center of the end of the tank opposite the inlet, the invert elevation of which shall be at the liquid level of the tank.

(b) A tee shall be constructed as an integral part of the tank to connect to the outlet sewer, or as an alternative, an integrally constructed baffle may be used.

(c) If baffles are used, suitable integrally fitted sleeves or collars shall be provided in the outlet opening of the tank to provide surface areas sufficient to insure capability of water tight bonding between the tank and the outlet sewer.

(d) If the tee or baffle is constructed of plastic material, it shall meet NSF Standard #14 for drain, waste, and vent system application.

(e) If fiberglass reinforced plastic is used, it shall be of the same constituency as material of which the tank is constructed.

(f) The outlet tee or baffle shall extend eighteen inches below the design liquid level and be placed and secured in a vertical position so as to be watertight and preclude dislodgement during installation, operation or maintenance activities.

(g) A one (1) inch opening between the top of the inlet tee and top of the tank shall be provided to permit free passage of gas back to the house vent.

(4) Access Openings

Openings in the top of the septic tank shall be provided over the inlet and outlet tees or baffles with sufficient area to enable maintenance service to such tees or baffles.

(5) Identifying Markings

Fiberglass septic tanks shall be provided with a suitable legend, cast or stamped into the wall at the outlet end, and within six inches of the top of the tank, identifying the manufacturer, and indicating the liquid capacity of the tank in gallons.