

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
DIVISION OF GROUNDWATER AND ISDS

**Rules and Regulations Establishing Minimum Standards Relating To  
Location, Design, Construction and Maintenance of Individual Sewage  
Disposal Systems**



**January 2002**

NOTE: All earlier amendments have been incorporated into this document.

AUTHORITY: These regulations are adopted in accordance with Chapter 42-35 pursuant to Chapters 42-17.1, 23-19.5, and 5-56.1 of the Rhode Island General Laws of 1956, as amended.



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**STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS  
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
RULES AND REGULATIONS ESTABLISHING MINIMUM STANDARDS  
RELATING TO LOCATION, DESIGN, CONSTRUCTION, AND  
MAINTENANCE OF INDIVIDUAL SEWAGE DISPOSAL SYSTEMS**

**ADMINISTRATIVE FINDINGS AND POLICY**

Whereas, the Environmental Standards Board and the Director of the Department of Environmental Management have been delegated authority by Chapters 42-17.1, 46-12 and 5-56 of the General Laws of the Rhode Island, 1956, as amended, and

Whereas, the people of the State should be assured that adequate and sanitary individual sewage disposal facilities have been and are being provided and maintained for all dwellings and buildings not served by public sewage systems, and

Whereas, the public health may be imperiled by the diseases and other health hazards which may result from the improper treatment or discharge of sanitary sewage, and

Whereas, the public health and interest may be harmed by contamination of ground water aquifers which are now used and which may be used as sources of public water supply which can result from the improper location, design, construction and maintenance of individual sewage disposal systems, and

Whereas, the public health and interest may be harmed by contamination of drinking water wells and other water supplies or tributaries thereto which has and can result from improper location, design, construction or maintenance of individual sewage disposal systems, and

Whereas, freshwater and coastal waters of the State may be imperiled by high nutrient and bacteriological contamination that has and can result from improper treatment or discharge of sanitary sewage, and

Whereas, the people of the State may be inconvenienced or harmed by nuisance conditions such as odors and overflows that have and can result from improper location, design, construction or maintenance of individual sewage disposal systems, and

Whereas, the public use and enjoyment of the recreational resources of the State may be disrupted or imperiled by contamination of those resources which has and can result from improper location, design, construction and maintenance of individual sewage disposal systems, therefore

It is the policy of the Department of Environmental Management to prohibit package treatment plants which discharge into the ground without specific authorization by the Director.

It is the policy of the Department of Environmental Management to prohibit holding tanks as a replacement for in-ground sewage disposal systems. The only exceptions shall be 1) where the applicant provides the variance board with sufficient proof that public sewers will be available within one year of construction or 2) for marine toilet pump-outs, to abate water pollution, if: a) on-site systems are unavailable and b) the owner of the property enters into a consent agreement to limit discharge to marine units which are not permanently attached to off-shore connections and to forbid the connecting of any shoreside facilities.

It is the policy of the Department of Environmental Management to assure the proper location, design, construction and maintenance of individual sewage disposal systems. The public health and environmental quality and public interest of this State requires that the hereinstituted regulations be promulgated and enforced pursuant to the authority of the General Laws.

These regulations are designed to provide minimum standards for the location, design, construction and maintenance of individual sewage disposal systems.

The following types of disposal systems may be subject to approval by the Department of Environmental Management, Division of Groundwater & Freshwater Wetlands, Underground Injection Control Program (UIC):

1. Individual sewage disposal systems discharging more than 5,000 gallons per day of wastewater; and
2. Surface impoundment systems (pits, ponds and lagoons) having no surface water discharge and designed to dispose of sewage as that term is defined in Section 46-12-1 of the General Laws of Rhode Island (1956, as amended), not subject to the provisions of the Hazardous Waste Management Act (Chapter 23 46.2 of the General Laws of Rhode Island, 1956, as amended).

#### **SD 1.00 Definitions**

As used in these rules and regulations, the following terms shall, where the context permits, be construed as follows:

**ALTERATION** - The term, "alteration," shall refer to any modernization, modification or change in the size or type of an existing individual sewage disposal system, including, but not limited to, any and all work performed in relation to a building renovation and/or change of use, or work performed to accommodate any increase in sewage flow to the system.

**ALTERATION TEST HOLE** - The term "Alteration Test Hole" shall mean dry season test holes excavated in soil other than unconsolidated sand or gravel outwash to obtain field data for an application for alteration.

**ALTERNATIVE SYSTEM OR TECHNOLOGY** means any ISDS that does not meet the location, design or construction requirements as provided by these regulations, but has been demonstrated through field testing, calculations and other engineering evaluations to comply with performance standards consistent with these regulations.

**BEDROOM** - The term, "bedroom," shall refer to any room in a residential structure which is greater than 100 square feet in area, which is susceptible to present or future use as a private sleeping area and which has at least:

- (1) One window; and
- (2) One interior method of entry and egress, excluding closets and bathrooms, allowing the room to be closed off from the remainder of the residence for privacy.



Note: In determining the number of bedrooms contained in any residence, it shall be presumed that all residences contain a living room, kitchen, bathroom, and at least one bedroom.

**BLACK WATER** - The term, "black water," shall be held to mean that portion of sanitary sewage constituted substantially of human or animal excrement.

**BUILDING RENOVATION** - The term, "building renovation," shall be held to mean any addition, replacement, demolition and reconstruction, or modification of an existing structure.

**BUILDING SEWER** - The term, "building sewer," shall be held to mean the pipe which begins outside the building wall and extends to any place or mechanism of sewage disposal, including, but not limited to a cesspool, leaching chamber, septic tank, or pressure or gravity sewer leading to a leaching system.

**CESSPOOL** - The term, "cesspool," shall be held to mean any buried chamber, including, but not limited to, any metal tank, perforated concrete vault or covered hollow or excavation, which receives discharges of sanitary sewage from a building sewer for the purpose of collecting solids and discharging liquids to the surrounding soil. Cesspools are not an approved method of sewage disposal under these regulations, and all existing cesspools are considered to be substandard.

**CHANGE OF USE** - The term, "change of use," shall refer to any change in use or occupancy of any structure or part thereof which would violate any provision of the Rhode Island State Building Code, R.I. General Laws Chapter 23-27.3, as amended, and/or any regulation promulgated thereto without first obtaining the approval of the appropriate building official and/or without the issuance of a certificate of occupancy indicating that the structure complies with the provisions of the state building code for the proposed new use.

**CONVENTIONAL SYSTEM** means a traditional ISDS with a septic tank, pump chamber with pump or siphon (if needed), distribution box and a leach field with gravity distribution.

**DEPARTMENT or DEM** - The terms, "Department" or "DEM," shall refer to the Rhode Island Department of Environmental Management.

**DIRECTOR** - The term, "Director," shall mean the Director of the Rhode Island Department of Environmental Management or any subordinate(s) to whom the Director has delegated the powers and duties vested in him/her pursuant to Rhode Island General Laws Chapters 46-12 and 42-17.1, as amended, or any other duly authorized Agent.

**DISPOSAL BED** - A "disposal bed" for sewage shall be held to mean a shallow excavation in the ground, backfilled with stone, in which perforated distribution lines, or other suitable distribution devices, are laid and over which a cover of earth is placed.

**DISPOSAL TRENCH** - A "disposal trench" shall be held to mean a shallow ditch with vertical sides, filled with stone, in which a single perforated distribution line or other suitable distribution devices is laid and over which a cover of earth is placed.

**DISTRIBUTION BOX** - A "distribution box" shall be held to mean a water-tight compartment which receives septic tank effluent and distributes it in approximately equal portions to two or more pipe lines leading to some type of seepage system.

**DISTRIBUTION LINE** - A "distribution line" shall be held to mean a perforated pipe or other suitable distribution device used to disperse septic tank effluent.

**DIVISION** - The term, "Division," shall refer to the Rhode Island Department of Environmental Management's Division of Groundwater and ISDS.

**DOSING TANK** - A "dosing tank" shall be held to mean a water tight structure equipped with one or more siphons or pumps designed to discharge sewage intermittently into a seepage system.

**DRY SEASON TEST HOLE** - The term "Dry Season Test Hole" shall mean test holes excavated in the proposed leach field area as determined by the Director.

**EXPERIMENTAL SYSTEM OR TECHNOLOGY** means any innovative ISDS that does not meet the location, design or construction requirements as provided by these regulations, but may demonstrate through field testing, calculations and other engineering evaluations the ability to comply with the performance standards consistent with these regulations.

**FAILED SYSTEM** - The term, "failed system," shall be held to mean any sewage disposal system that does not adequately treat and dispose of sewage so as to create a public or private nuisance or threat to public health and/or environmental quality, as evidenced by, but not limited to, one or more of the following conditions:

- (1) Failure to accept sanitary sewage into the building sewer;
- (2) Discharge of sanitary sewage to a basement, subsurface drain, surface drain or surface water unless expressly permitted by the Department.
- (3) Sanitary sewage rising to the surface of the ground over or near any part of an individual sewage disposal system or seeping downgradient from the absorption area at any change in grade, bank or road cut.
- (4) Any deterioration or damage to any individual sewage disposal system that would preclude adequate treatment and disposal of wastewater. (For example, contact between the bottom of the ISDS and the water table.)

**FILL TEST HOLE** - The term "Fill Test Hole" shall mean test holes excavated to determine the depth of original ground surface in relation to fill material in the proposed leach field area.

**FILLED SYSTEM** - The term, "filled system," shall be held to mean any system where the groundwater table is less than four feet from the original ground surface and depth to ledge is less than six feet from original ground surface.

**FRESHWATER WETLAND** - The term, "freshwater wetland," shall be defined as set forth in Rhode Island General Laws Section 2-1-20(d), as amended, and as further defined by the Department's "Rules and Regulations Governing the Administration and Enforcement of the Fresh Water Wetlands Act." The term shall further be held to include those wetland types defined by the remainder of section 2-1-20 and the wetland regulations, including, but not limited to: marshes, swamps, bogs, ponds, rivers, river and stream flood plains and banks, areas subject to flooding or stream water, including rivers and streams, and that area of land within 50 feet of the edge of any bog, marsh, swamp or pond or that area within 100 feet of a flowing body of water less than 10 feet wide or that area within 200 feet of a flowing body of water greater than 10 feet in width.

**GREY WATER** - The term, "grey water," shall be held to mean any wastewater discharge from a structure excluding the waste discharges from water closets and waste discharges containing human or animal excrement.

**HIGHLY PERMEABLE** - The term, "highly permeable," shall be held to mean any gravel and/or coarse sand fill or naturally occurring soil with a percolation rate (equivalent permeability) faster than 3 minutes per inch.

**HUMUS TOILET** - A "humus toilet" is any self-contained toilet from which no liquid or solid waste materials are regularly discharged and from which a humus-like end product is produced

**IMPERVIOUS** - The term, "impervious," shall be held to mean any ledge, shale, bedrock or rotten rock and, for the purpose of these regulations, any soil with a percolation rate slower than 40 minutes per inch.

**INDIVIDUAL SEWAGE DISPOSAL SYSTEM or ISDS** - The term, "individual sewage disposal system" or "ISDS," shall be held to mean any system of piping, tanks, disposal areas, alternative toilets or other facilities designed to function as a unit to convey, store, treat and/or dispose of sanitary sewage by means other than discharge into a public sewer system.

**INVERT** - The term, "invert," shall be held to mean the lowest portion of the interior of a pipe or fitting.

**LEACH FIELD** - The term "Leach Field" shall mean a group of one or more disposal chambers, trenches or beds designed for the final disposal of a septic tank or equivalent effluent in the underlying soil. The leach field shall be the horizontal and vertical lines circumscribing the outermost edges including the area between the chambers or trenches and the depth to the bottom of stone.

**LEACH FIELD AREA** - The term "Leach Field Area" shall mean the Leach Field and the Leach Field Perimeter.

**LEACH FIELD PERIMETER** - The term "Leach Field Perimeter" shall mean the twenty-five foot area surrounding the leach field.

**LEACHING CHAMBER** - The term, "leaching chamber," shall be held to mean any of a number and type of shallow, hollow, open bottom structures with perforated sidewall into which septic tank effluent is discharged for leaching into the ground.

**LEDGE TEST HOLE** - The term "Ledge Test Hole" shall mean test holes excavated to determine the depth to impervious material in the proposed leach field area.

**MAINTENANCE** - The term, "maintenance," shall be held to mean the regular cleaning of any leaching chamber, cesspool, septic tank, building sewer, distribution lines or any other component of an ISDS for the purpose of removing any accumulated liquid, scum and/or sludge. The term, "maintenance," shall also be held to include any regularly required servicing or replacement of any related mechanical, electrical, or other equipment.

**MAXIMUM GROUND WATER TABLE ELEVATION** - The term, "maximum ground water table elevation," shall be held to mean the elevation of the water table that is observed when the ground water is at its highest level during the year or highest level observed in past years when such information is available.

**ORIGINAL GROUND** - The term, "original ground," shall be held to mean those soils or other natural geological features which have been deposited or developed by natural processes.

**OWNER** - The term, "owner," shall be held to mean any person who alone, or jointly or severally with others: (a) holds legal title to any real property; or (b) has possession or control of any real property through any agent, executor, executrix, administrator, administratrix, trustee or guardian of the estate of a holder of a legal title or has possession or control through any lease or purchase and sale agreement. Each such person is bound to comply with the provisions of these rules and regulations.

**PACKAGE TREATMENT PLANT** - The term, "package treatment plant," shall be held to mean a modular treatment facility of the extended aeration type, which design shall be consistent with criteria set forth for the activated sludge process in "Guides for the Design of Wastewater Treatment Works," (NEIWPCC, TR-16, latest edition), or other acceptable design standards. The effluent shall normally be disposed of into the soil through a surface sand filter.

**PERCOLATION TEST** - The term, "percolation test," shall be held to mean a test to determine the absorption capacity of the soil.

**PERSON** - The term, "person," shall be held to include any individual, group of individuals, firm, corporation, association, partnership or any federal, state or municipal governmental entity.

**PRIVATE WELL** - The term, "private well," shall be held to mean any manmade opening into the ground developed for the purpose of meeting all or part of a person's potable water needs provided said well does not supply a public water system.

**PRIVY** - The term, "privy," shall be held to mean any facility used for a toilet lacking the flushing aid of water and consisting of a pit or vault into which the waste matter falls.

**PROBES** - The term "Probe" shall mean any exploratory test employing a driving rod, tool or other device to establish the depth of ledge in the proposed leach field perimeter.

**PROPERTY IMPROVEMENT** - The term, "property improvement," shall be held to mean any structure or residence, as defined herein, or any other building, construction, excavation or other manmade feature added to a raw, unimproved parcel of real property.

**PUBLIC DRINKING WATER SUPPLY WELL or PUBLIC WELL** - the term, "public drinking water supply well" or "public well," shall mean any manmade opening into the ground developed for the purpose of meeting all or part of a public water system needs.

**PUBLIC WATER SYSTEM** - The term, "public water system," shall be held to mean any water system that provides piped water to the public for human consumption, provided that such system has at least 15 service connections or serves an average of 25 individuals daily at least 60 days out of the year. A public water system shall include all sources and facilities involved in collecting, treating, storing and distributing the water.

**REPAIR** - The term, "repair," shall be held to mean work performed on an ISDS in order to mend or remedy a specific defect or deficiency after the failure, injury, deterioration or partial destruction of a previously existing ISDS or component thereof. A repair shall not include any work performed on an existing ISDS which increases the flow capacity of the system.

**RESIDENCE** - The term, "residence," shall be held to mean any structure used for housing purposes, including, but not limited to, single or multiple family dwellings, duplexes, tenements, apartment buildings, condominiums, mobile homes, recreational vehicles or trailers.

**ROTTEN ROCK** - The term, "rotten rock," shall be held to mean any highly decomposed but still coherent rock, including, but not limited to, highly weathered granite bedrock.

**SANITARY SEWAGE** - The term, "sanitary sewage," shall be held to mean any human or animal excremental liquid or substance, any putrescible animal or vegetable matter and/or any garbage and filth, including, but not limited to, any grey water or black water discharged from toilets, laundry tubs, washing machines, sinks, and dishwashers as well as the content of septic tanks, cesspools, or privies.

**SEEPAGE PIT** - The term, "seepage pit," shall be held to mean a covered pit with open jointed sidewalls and bottom, from which septic tank effluent or waste containing little or no solids is leached into the soil.

**SEPTIC TANK** - The term, "septic tank," shall be held to mean a watertight receptacle which receives the discharge of sewage from a building sewer, and is designed and constructed to permit the deposition of settled solids, the digestion of the matter deposited, and the discharge of the liquid portion into a leaching system.

**SHORELINE FEATURE** - The term, "shoreline feature," shall be held to include, but not be limited to the following:

- (1) **Barrier Beaches:** Barrier beaches are narrow strips of land made of unconsolidated material, usually extending parallel to the coast and separated from the mainland by a coastal pond, tidal water body or coastal wetland. In most cases, barrier beaches contain dunes or dune fields. The lateral limits of barrier beaches are defined by the area where unconsolidated sand or cobble abut rock, glacial till or other sediments unrelated to deposits made by the forces of the wind and water. This definition of a barrier beach system is commonly associated with many geomorphic descriptions. These descriptions include, but are not limited to, barrier islands, bay barriers, and spits. Spits are further described as tombolo, shingle, cusped and flying spits. The terms "bar" and "ridge" were once used to describe a barrier system but have since been replaced with the term "barrier".
- (2) **Coastal Beaches:** Coastal beaches include expanses of unconsolidated, usually unvegetated sediments that are commonly subject to wave action. They generally parallel the coastal trend and extend from low water landward to an upland rise, usually the foot of a dune, cliff, bank or manmade structure.
- (3) **Dunes:** Dunes are hills, mounds or ridges of sand formed by wind action and usually follow the general coastal trend immediately inland of a coastal beach. Dunes which are undisturbed are usually vegetated with beach grass and shrubs.
- (4) **Coastal Cliffs, Bluffs and Banks:** Coastal cliffs, bluffs and banks are the seaward face of any elevated landform directly abutting coastal waters, a beach, coastal wetland or rocky shore.
- (5) **Manmade Shorelines:** Manmade shorelines are those characterized by manmade shoreline protection structures and other alterations that have effected the shoreline to such an extent that natural shoreline features are no longer dominant.
- (6) **Rocky Shores:** Rocky shores include naturally occurring shorelines composed of bedrock ledge or cobble or boulder-strewn areas, extending from below the mean low water mark to above the mean high water mark. These areas frequently contain tide pools.

**SIPHON** - The term, "siphon," shall be held to mean a hydraulic device designed to discharge the contents of a dosing tank rapidly when a predetermined level is reached.

**SLOPE OR GRADE** - The terms, "slope" or "grade," shall be held to mean the rate of rise or fall of a pipeline or of the ground surface in reference to a horizontal plane. Slope or grade are commonly referred to as 'rise over run;' a measurement which is a function of the rise or fall of the pipe or ground surface (as measured in inches or feet or a metric equivalent) divided by the linear distance over which the rise or fall occurs (as measured in inches or feet or a metric equivalent, respectively).

**SPECIALLY ENGINEERED SYSTEM** - The term "specially engineered system" shall be held to mean any ISDS which does not meet the location, design or construction requirements as provided by these regulations but which, through additional field testing, calculations and other engineering evaluations, may be demonstrated to comply with intent of these regulations.

**STORM DRAIN** - The term, "storm drain," shall be held to mean any pipe or structure designed to collect, carry and/or divert surface runoff.

**STRUCTURE** - The term, "structure," shall be held to mean any residence (as defined herein), building, garage, shack, trailer or other permanent or semi-permanent facility, whether commercial or non-commercial in use, which is proposed to be placed or has been built or otherwise placed on a parcel of real property.

**SUBDIVISION** - The term, "subdivision," shall be held to mean three (3) or more contiguous lots of record under common ownership or the division of a single lot, or parcel of land into three (3) or more lots or other divisions of land for the purpose of making said lot(s) more susceptible to present or future development, sale or transfer.

**SUBDIVISION LAYOUT** - The term, "subdivision layout," shall be held to mean any proposed design or arrangement of lots, roads, structures, easements, utilities or other features to be incorporated into a subdivision.

**SUBSURFACE DRAINS** - The term, "subsurface drain," shall be held to mean any system of below-surface piping and/or highly permeable material intended to lower the water table of an area. A foundation drain is a category of subsurface drain for the purpose of protecting the building foundation.

**SYSTEM COMPONENT** means any part of an ISDS that does not meet the design or construction requirements as provided by these regulations, but has been demonstrated through field testing, calculations and other engineering evaluations to be equal to, or provide the equivalent performance of any part of an ISDS within these regulations or to enhance or facilitate treatment, maintenance, longevity or efficiency of an ISDS.

**TEST HOLE** -The term "Test Hole" shall mean any excavation holes in the proposed leach field area to establish the soil profile, density, structure, texture, mottling, color, depth to impervious material, depth to groundwater table or any other applicable field information. The five types of test holes are alteration, dry season, fill, ledge and wet season.

**TIDALWATER or TIDEWATER** - The terms, "tidalwater" or "tidewater," shall be held to mean any watercourse, coastal wetland, freshwater wetland, river, stream, brook, pond, lake, swamp, marsh, bog, fen, wet meadow or any other standing or flowing body of water effected by the tides.

**WATERCOURSE** - The term, "watercourse," shall be held to mean any river, stream, brook, pond, lake, swamp, marsh, bog, fen, wet meadow, tidewater or any other standing or flowing body of water.

**WET SEASON TEST HOLE** - The term "Wet Season Test Hole" shall mean test holes excavated in the proposed leach field area for monitoring during the designated "wet season" as determined by the Director.

## APPLICATION AND CONDITIONS FOR APPROVAL

### **SD 2.00 Construction, Renovation and/or Change of Use of Structures Using Individual Sewage Disposal Systems**

(a) No person shall begin any building construction, building renovation and/or change of use of any structure from which sewage is being or will have to be disposed of by means of an individual sewage disposal system, including improvements which will result in increased sewage flow, without first obtaining the Director's written approval in accordance with this section:

(1) Construction of New Structures - Whenever an applicant proposes to construct a new structure from which sewage will be disposed of by means of an individual sewage disposal system, an application for new system shall be made in accordance with SD 2.01(b) and SD 2.02 below. All applications for new systems shall conform with all requirements under these regulations.

(A) Construction of New Structures in Subdivisions - No person shall begin construction of any new structure in a subdivision located in an area where sewage will have to be disposed by means of an ISDS until he/she has applied for and obtained a Certification of Site Suitability from the Director in accordance with SD 18.00 et seq. An approved Certification of Site Suitability shall not operate as an approval for the construction of any ISDS as required by SD 2.01.

(2) Building Renovations and Changes of Use to Existing Structures - Whenever an applicant proposes any building renovation or change of use (as defined in SD 1.00) of an existing structure from which sewage is disposed of by means of an ISDS, an Application for a System Suitability Determination shall be made. For the purposes of this section, the term "building renovation," shall also be defined as including any addition, replacement, demolition and reconstruction, or modification of an existing structure on the subject property which:

(A) Results in an increase in sewage flow into the system\*; or

(B) Affects fifty (50%) percent or more of the floor space of the existing structure; or

(C) Is valued at greater than twenty-five (25%) percent of the current replacement value of the subject structure where the existing sewage disposal system is a cesspool. For the purposes of this section, current replacement value may be established by using the BOCA cost index, or the owner may provide the pre-renovation replacement value as established by a qualified appraiser or estimator.\*\*

\* NOTE: All sewage flows shall be determined in conformance with SD 3.00.

\*\* NOTE: The Department recommends that whenever an owner proposes a building renovation or change of use of a structure using a cesspool-type ISDS, that the owner consider proceeding directly to an Application for Alteration under SD 2.01(c) rather than applying for a System Suitability Determination (see SD 2.00(a)(4), below).

(3) Application for System Suitability Determination - An Application for System Suitability Determination shall be required as specified in SD 2.00(a)(2), above, in order to determine whether the existing individual sewage disposal system is suitable for the purposes proposed by the applicant. In reviewing any Application for System Suitability Determination, the Director may consider the cumulative effects resulting from past Change of Use Applications, Applications for System Suitability Determination, building permits and/or deed restrictions relating to the subject property. After reviewing an Application for System Suitability Determination, the Director shall determine whether the existing system:

(A) Is suitable to adequately dispose of the proposed sewage flows so as to protect the public health and the environment; or

(B) Is unsuitable and requires an approved Application for New System or Application for Alteration, in conformance with SD 2.01(b) or 2.01(c), respectively, and SD 2.02, before the proposed building renovation or change of use may be allowed.

(4) System Suitability Determinations for Structures Served by Cesspools - Cesspools are defined by these regulations to be a substandard method of sewage disposal. Accordingly, any Application for System Suitability Determination relating to a structure serviced by a cesspool which is filed for review with the Department pursuant to SD 2.00(a)(2) and (3), above will be presumed to be unsuitable and an Application for New System or Alteration will be required in accordance with SD 2.00(a)(3)(B), above.

(A) For System Suitability Determinations required under SD 2.00(a)(2)(C) only, the Department's presumption of unsuitability may be rebutted by supplying the Department with affirmative engineering and geohydrological data indicating that the cesspool functions adequately to protect the public health, public interest and the environment in accordance with these regulations.

(B) In rebutting the Department's presumption of unsuitability, the applicant shall be required to demonstrate the following minimum criteria and setback requirements:

- (i) 75 feet to private well;
- (ii) 200 feet to public well;
- (iii) 3 feet separation between seasonal high groundwater table and the bottom of stone under cesspool;
- (iv) 200 feet to surface drinking water supply or tributary stream or drain thereto;
- (v) 150 feet to critical resource area as defined in these regulations;
- (vi) fecal coliform measured in groundwater within 50 feet of cesspool does not exceed an MPN of 10 per 100 ml;
- (vii) no history of sewage overflow or other septic system failure.

(5) Exceptions to Requirement for Application for System Suitability Determination - No Application for System Suitability Determination shall be required where a valid permit for New System or Alteration exists at the time of the issuance of the building permit and the ISDS design approved by said permit accounts for the proposed improvements to be performed.



(b) Issuance of Building Permits For Activities Requiring Approval Under These Regulations - A municipality shall not issue a building permit pursuant to Rhode Island General Laws Chapter 23-27.3, as amended, unless all written approvals by the Director required by these regulations have been presented to the municipality and said approvals are valid at the time of the issuance of the building permit.

### **SD 2.01 Applications for the Installation of New Systems or the Alteration or Repair of Existing Individual Sewage Disposal Systems**

(a) No person shall install, construct, alter or repair or cause to be installed, constructed, altered or repaired any individual sewage disposal system without first obtaining the Director's written approval of the plans and specifications for such work. Certifications of Site Suitability approved in accordance with SD 18.00 et seq. shall not be construed to operate as an approval for the construction of any ISDS.

(b) Application for New System - All applications for new systems shall be made in conformance with all requirements under these regulations. Applications not in conformance with these regulations may be approved only through the variance procedures set forth in SD 20.00 through SD 20.03.

(1) Except as provided for in (A) - (D) below, a site evaluation shall be performed at the proposed site of any new system in accordance with SD 26.00 and SD 26.01. No person shall submit applications, plans and specifications to the Director for a new system without first obtaining the Director's approval of a site evaluation report or field concurrence with the soil evaluation portion of a site evaluation report in accordance with SD 26.00 and SD 26.01. A site evaluation will **not** be required for the following, provided the applicant has valid field data, as defined by SD 2.02(g), for ground water table elevations compiled prior to January 31, 2001 in accordance with SD 17.01 or SD 17.02:

(A) Applications submitted to the Director for lots within a subdivision that have a valid determination of suitability pursuant to a Certification of Subdivision Site Suitability, provided that the field data was compiled on or after July 21, 1987;

(B) Applications submitted to the Director prior to May 10, 2002;

(C) Applications submitted to the Director after May 10, 2002 where the field data is less than five years old; or

(D) Applications submitted to the Director after May 10, 2002 where the field data is more than five years old, provided that the field data is renewed in accordance with SD 2.02(g)(2) and the following criteria are met:

(i) The field data was compiled after January 1, 1993;

(ii) The approved ground water table is at a depth of 4 feet or greater from the original grade; and

(iii) The test hole where the field data was collected is not located in any of the following areas:

(aa) Within 100 feet of any watercourse;

(bb) Within 150 feet of the shoreline of the Narrow River or the shoreline of one of the coastal ponds as specified in SD 19.00(c)(1); or

(cc) Within 200 feet of a surface water drinking water supply.

(c) Application for Alteration

(1) All plans and specifications for an alteration to an ISDS shall be prepared by a person licensed as a Class II or Class III designer in accordance with SD 25.00. The applicant is not required to have a site evaluation report prepared unless the Department specifies otherwise. The Director reserves the right to require that the plans and specifications for an alteration be prepared by a Class III designer.

(2) An application for an alteration of an existing individual sewage disposal system shall be made whenever an applicant proposes a change in the size of an ISDS, a modification of an ISDS, or a building renovation or change of use (as defined in SD 1.00) of any structure discharging sewage into the system.

(A) The phrase "change in size," as used herein, shall mean any physical alteration to a system which will allow the system to accommodate:

(i) In the case of a residence, the additional sewage flow resulting from the addition of not more than one bedroom; or

(ii) In all other cases, an increased flow of sewage in an amount less than or equal to twenty-five percent (25%) of the design flow.

(B) Changes in size which will accommodate increased sewage flows resulting from more than one bedroom or in an amount greater than twenty-five percent (25%) of the design flow must obtain a permit for a new system in conformance with SD 2.01(b), above. All sewage flows will be determined in conformance with SD 3.00.

(C) The phrase "modification of an ISDS," as used herein, shall mean a change in the type of system or a modernization of an existing system.

(D) An application for alteration shall be made when required by the Individual Sewage Disposal System Program in response to an application for System Suitability Determination, as described in SD 2.00(a)(2).

(E) Applicants shall meet the requirements of these regulations to the greatest extent possible. If necessary, certain requirements under these regulations may be relaxed at the discretion of the Director, provided that the applicant consider the Department approved innovative or alternative technology in accordance with SD 14.06 that may allow the applicant to meet most of the requirements of these regulations. The protection of the public health and the environment shall be given priority over all other considerations. Nothing herein shall prevent the Director from requesting additional information or imposing any requirement under these regulations that he/she may deem appropriate including request for variance SD 20.00.

(d) Application for Repair - An application for a repair of any individual sewage disposal system, or any component thereof, shall be made when an existing system or component has failed, as defined by SD 1.00.

(1) All plans and specifications for a repair to an ISDS shall be prepared by a person licensed as a Class I, II or III designer in accordance with SD 25.00. The applicant is not required to have a site evaluation report prepared unless the Department specifies otherwise. The Director reserves the right to require that the plans and specifications for a repair be prepared by a Class II or Class III licensed designer.

(2) An application for repair shall not propose any construction, building renovation or change of use of a structure pursuant to SD 2.00.

(3) An application for repair shall not propose any increase in the original design flow of the system. Sewage flows shall be determined in conformance with SD 3.00.

(4) The approval of an application for repair shall not authorize any building renovation of any structure.

(5) Applicants shall meet the requirements of these regulations to the greatest extent possible. If necessary, certain requirements under these regulations may be relaxed at the discretion of the Director, provided that such modification is consistent with the protection of the public health and the environment. In reviewing any request for relaxation of these regulations, the protection of the public health and the environment shall be given priority over all other considerations.

### **SD 2.02 Content of Applications for Approval of Individual Sewage Disposal System Permits**

(a) Form of Application - All applications for the approval of plans and specifications for sewage disposal system permits shall be made on forms provided by the Director.

(b) Applications Involving Freshwater Wetlands - All applications submitted in accordance with these regulations which also involve freshwater wetlands shall be accompanied by all appropriate determination(s), approval(s) or permit(s) required by the Department of Environmental Management. Accordingly, where an applicant proposes to construct a new individual sewage disposal system, he/she must first apply for and receive the appropriate determination, approval or permit. No individual sewage disposal system application will be approved unless it is accompanied by the appropriate determination, approval or permit issued by the Department. Effective August 18, 1999, review of impacts to freshwater wetlands in the vicinity of the coast are under the sole jurisdiction of the Rhode Island Coastal Resources Management Council in accordance with the "Rule and Regulations Governing the Protection and Management of Freshwater Wetlands in the Vicinity of the Coast" (August 1999). See SD 2.17 Individual Sewage Disposal System Application Involving Shoreline Features.

(c) Basic Design Data - All applications shall be accompanied by basic design data and a plan, to scale, of the property or the pertinent portion thereof showing the size and location of the sewage disposal system, building sewer lines, manholes, cleanout plugs, essential invert elevations and a fixed bench mark within 150 feet of the system that will not be disturbed during construction.

(d) Required Information - Other information to be provided by the applicant shall include, but not be limited to, the following:

- (1) The existing and proposed finished grades in the vicinity of the system;
- (2) The location of an alternate disposal area in those areas served by wells, in conformance with SD 2.14;
- (3) The results and location of water table test pits, in conformance with SD 17.00 et seq.;
- (4) The results and location of the percolation tests, in conformance with SD 15.00 et seq.;
- (5) A description of the soil profile, in conformance with SD 15.00 et seq.;
- (6) The maximum elevation of the ground water table in the location of the proposed system, in conformance with SD 17.00 et seq.;
- (7) The size and location of all existing and proposed buildings and the number of bedrooms, or other building features used to determine the maximum daily flow, contained therein;
- (8) The location of any public sewer line within 200 feet of the property lines;
- (9) The location of any drinking water line within 25 feet of the proposed disposal system or alternate area;

- (10) The location of any watercourse, wetlands, and/or any existing or proposed private wells or drains within 200 feet of the proposed disposal system and/or alternate area;
- (11) The location of the proposed disposal system or alternate area relative to any watershed of a public water supply or critical resource area in conformance with SD 19.00, 19.02 & 19.03;
- (12) The location of all existing or proposed public drinking water supply wells within 500 feet of the proposed disposal system or alternate area;
- (13) The location of any surface waters or tributaries thereto, including storm and subsurface drains discharging thereto, within 200 feet of the proposed disposal system and/or alternate area and whether said drain discharges, directly or indirectly, into a critical resource area as identified in SD 19.00 through 19.03; and
- (14) The location of all existing individual sewage disposal systems within 100 feet of any well to be installed on the subject property. **\*NOTE:** Records and data on file with the Department of Environmental Management may be used to obtain information on proposed individual sewage disposal systems and wells.

The Director reserves the right to require any additional information which he/she deems necessary.

(e) Systems Disposing of 5,000 GPD or More - Each application relating to a sewage disposal system that will service either a proposed new building or the expansion of an existing building or system, which system will dispose of 5,000 gallons per day or more of sewage as a result of said construction or expansion, shall be accompanied by a list identifying the names and addresses of the local building official, the water supply agency whose water supply is drawn from the watershed wherein the property is located, if applicable, and all property owners within 200 feet of any component of the proposed system.

- (1) Upon application, the applicant shall notify each person identified in SD 2.03(e), above, of the application by certified mail, return receipt requested.
- (2) Each notice shall substantially conform to a form to be provided by the Director and shall include the application number and a certificate of service.
- (3) The applicant shall clearly mark each return receipt with the application number and the words "5000 Gallon System."
- (4) All persons subject to the notice shall be permitted twenty (20) days from the date specified in the certificates of service within which to submit written comments or information bearing upon the subject application.
- (5) All timely submitted comments or information bearing upon the subject application and relating to the intent and purpose of these regulations shall be considered by the Individual Sewage Disposal System program staff as part of their review of the application.
- (6) When all certified receipts have been returned to the applicant, copies of each notice, accompanied by the appropriate certified receipt, shall be filed with the Individual Sewage Disposal System Program along with a letter requesting that the application be reviewed for final determination.
- (7) If a correctly addressed, certified notice is returned to the applicant, the applicant may submit the returned envelope and certified receipt, unopened, along with the other return receipts as proof of the applicant's good faith attempt to serve the notice.

(f) Applicant's Responsibilities - The applicant shall be responsible for providing all information required by these regulations in a complete and accurate manner. Nothing in these regulations shall prevent the Director from requiring any additional information he/she deems necessary to carry out his/her obligations in enforcing these regulations.

(g) Field Data - Field data shall be considered valid for a period of five (5) years from the time of initial certification by the Department or five (5) years from the date of initial approval of any ISDS application, design, or subdivision suitability where the data were used, whichever occurred most recently.

(1) Field data compiled prior to July 21, 1987 may not be revalidated.

(2) Field data older than five (5) years may be used provided that:

(A) The field conditions are essentially unchanged;

(B) The field data was initially compiled and certified on or after July 21, 1987;

(C) Its continuing validity is properly certified using the Department's affidavit form (i.e., Designer's Affidavit of Continuing Validity of Field Data);

(D) The affidavit submittal is accompanied by the submission of a complete ISDS or subdivision suitability application; and

(E) The proper fees accompany the submittal.

(3) Affidavits will not be accepted to renew field data only, apart from an ISDS application/suitability submittal. The affidavit does not renew an ISDS system approval. A new original application and four sets of new plans meeting all current regulations must be submitted. The old approval is not renewable even if the design is unchanged.

(4) Previously renewed field data older than July 21, 1987 are not affected provided that the data are part of a currently approved ISDS application or subdivision suitability. All currently approved applications are valid until their expiration date regardless of field data age.

(5) When an application is received for an approved lot within a subdivision with a valid Subdivision Suitability certification issued pursuant to SD 18.01, the field data within that subdivision is considered valid for a period of five (5) years from the date the suitability was approved.

(h) Public Records - All applications received by the Department of Environmental Management are subject to the Public Records Act, R.I. General Laws Chapter 38-2, and are available in accordance with the Act for public inspection and copying at the Individual Sewage Disposal System Program of DEM between the hours of 8:30 AM and 4:00 PM; a prior appointment may be required. A fee for such copying shall be charged in accordance with R.I. General Laws Section 38-2-4, as amended.

(i) Systems Disposing of 10,000 GPD or More - Applicants for individual sewage disposal systems designed to dispose of ten thousand (10,000) gallons or more per day shall obtain a groundwater quality certification in accordance with RIDEM's Rules and Regulations on Groundwater Quality sections 17.01(e), 17.02 and 17.03, as amended, prior to approval of the application by the ISDS Section.

### **SD 2.03 Permit Expiration**

- (a) No applications, plans or specifications shall be approved if based on field data which is more than five (5) years old, in accordance with Rhode Island General Laws Section 23-19.5-2, as amended and SD 2.02(g).
- (b) All permits for new systems or alterations to existing systems approved in accordance with SD 2.01(b) or SD 2.01(c) shall expire as specified below:
- (1) Any currently valid permit as of October 1, 1998 shall expire on September 30, 2001;
  - (2) Any permit issued between October 1, 1998 and September 30, 1999 shall expire as follows:
    - (A) For applications submitted by a designer licensed in accordance with Section 25.00, the permit shall expire five (5) years from the date of the issuance of the permit; or
    - (B) For applications submitted by a person **not** licensed in accordance with Section 25.00, the permit shall expire on September 30, 2001.
  - (3) Any permit issued on or after October 1, 1999 shall expire five (5) years from the date of the issuance of the permit.
- (c) Notwithstanding SD 2.03(b) above, where a permit for a new system has been issued to service new construction, and construction of the building foundation or sewage disposal system has begun, the applicant shall have at least one year, within which to complete both the foundation and system. If the building foundation and sewage disposal system are not completed within one year of the commencement of construction, the permit, including any variances or decisions issued through the variance process or by the Director, shall expire.
- (d) Expiration of Permits Relating to Repairs of Existing Systems - All permits for repairs to existing systems issued in accordance with SD 2.01(d) shall expire as follows:
- (1) Where a permit for repair is issued following the property owner's receipt of a Notice of Violation issued by the Department, all repair work must be completed within the time periods set forth in the Notice of Violation;
  - (2) In all other cases, permits for repairs shall expire as specified in the permit itself. In no case shall any permit for a repair to an existing system be valid for more than one year from the date of issuance of the permit.
- (e) Expiration of Certification of Subdivision Site Suitability - All data submitted in support of an Application for a Certification of Subdivision Site Suitability shall not be greater than five years old. Certifications of Site Suitability for a subdivision shall expire five years from the date of issuance, unless the subdivision has been platted or recorded as evidenced by the submission of a copy of the recorded subdivision plat map. After the five year period, certification may be obtained only by reapplying under the regulations in effect at the time of re-application. Once a subdivision has been platted or recorded, no further certification shall be required and all lots may proceed with the application process for their individual sewage disposal system in accordance with these regulations.

(1) In the event that there is any change in the configuration of any lot or road depicted in an approved Certification of Subdivision Site Suitability, the applicant shall submit revised subdivision layout plans to the Department for its review. If the changes to the subdivision are found to be substantial, the Director may order the applicant to apply for a new Certification of Subdivision Site Suitability based on the new plans.

(2) Whenever the configuration of any lot or road in a subdivision depicted in an approved Certification of Subdivision Site Suitability is altered so as to affect twenty-five (25%) percent or more of the original lots, a new Application for Certification of Subdivision Site Suitability shall be submitted.

(f) Expiration of Unconformed Installed Systems - Existing sewage disposal systems that have been installed but not conformed, as of the effective date of these amendments or regulations, because they have not been connected to a building foundation shall be reviewed on a case-by-case basis in accordance with the rules and regulations in effect at the time of the system's installation.

(g) When the Department determines that an application is unacceptable for any reason, the application shall become void if:

(1) The applicant fails to rectify the deficiencies identified by the Department within one year of the date the "unacceptable notice" is forwarded to the applicant or the applicant's designer by the Department; and/or

(2) The applicant or the applicant's designer fails to notify the Director in writing of attempts to rectify the deficiencies within one year of the date the "unacceptable notice" is forwarded to the applicant or the applicant's designer; and/or

(3) The file remains inactive for one year.

Once the application is deemed void a new application with four (4) sets of plans and an application fee shall be required.

#### **SD 2.04 Use**

The use of an individual sewage disposal system shall conform to the terms of the approval; its designed capacity must not be exceeded.

#### **SD 2.05A System Installation for Applications Not Prepared by Designers Licensed in Accordance with Section 25.00**

(a) The construction, alteration, or reconstruction of any individual sewage disposal system shall be performed by an installer licensed under Chapter 5-56 of the General Laws of Rhode Island, as amended, or a master plumber licensed under Chapter 5-20 of the General Laws of Rhode Island, as amended. The installer of the system shall certify that the system was installed in conformance with the permit and plans for such system approved by the Director and any terms stipulated by the Director as part of the approval (\*). The certification shall be on forms provided by the Director. The signed certification shall be sent to the Director within three (3) days after the system is installed. The installer shall notify the Director at least twenty-four (24) hours before any approved individual sewage disposal system is to be installed to permit the Director at his discretion, to inspect the system during or after installation before covering any component of the system with earth; however, such covering must be completed within 48 hours of authorization by the Director to cover.

Whenever the Director requires the bottom of leaching area inspection as term of his approval, the installer shall notify the Director at least twenty-four (24) hours in advance for said inspection prior to construction of the system or any gravel placement. In such cases, the installer shall have the gravel base material to be used on the site when ever possible.

If the installer encounters unanticipated conditions during construction which indicates that the system cannot be installed in accordance with the original approved application, plan and specifications, or any terms and conditions contained therein, he shall stop the construction and notify the designer and the Director. A revised application and/or plan must be filed showing any change from the original approved application, plan and specifications for approval.

(b) The Director may require, at his discretion, that the construction, alteration or reconstruction of any individual sewage disposal system, or portion thereof, be supervised and certified by a registered professional engineer or registered land surveyor. The construction, alteration or reconstruction of any such system designed to dispose of over 2,000 gallons per day must be certified by a registered professional engineer.

NOTE: Installers should leave a copy of the certificate of construction which details the location of the septic system, in the home in the vicinity of the building sewer.

(\*) Where installed by the homeowner in accordance with Section 5-56-1 of the General Laws of Rhode Island 1956, as amended, the homeowner may execute the certification of construction.

#### **SD 2.05B System Installation for Applications Prepared by Designers Licensed in Accordance with Section 25.00**

(a) The construction, alteration, or reconstruction of any individual sewage disposal system shall be performed by an installer licensed under Chapter 5-56 of the General Laws of Rhode Island, as amended, or a master plumber licensed under Chapter 5-20 of the General Laws of Rhode Island, as amended.

(b) If the installer encounters unanticipated conditions during construction which indicates that the system cannot be installed in accordance with the original approved application, plan and specifications, or any terms and conditions contained therein, he shall stop the construction and notify the licensed designer that is responsible for witnessing and inspecting the installation in accordance with SD 27.00(c).

(c) The licensed designer that witnesses and inspects the installation of the ISDS in accordance with SD 27.00(c) shall be responsible for issuing the certificate of construction in accordance with SD 27.00(i).

#### **SD 2.06 Certificate of Conformance**

(a) A newly constructed, altered or rebuilt individual sewage disposal system, shall not be used nor shall any dwelling, building, or additions thereto, to be serviced by such system be sold or occupied until the certification of conformance is issued.

(b) A municipality may only grant a Certificate of Occupancy pursuant to Rhode Island General Law Section 23-27.2-13 and Chapter 23-27.3, where the person applying for such Certificate of Occupancy presents to the municipality the written Certificate of Conformance of the Director as required in SD 2.06(a) herein.



### **SD 2.07 Discharge to a Watercourse**

No person shall discharge or permit the entrance of sanitary sewage, treated or untreated, into any watercourse, nor shall they discharge or permit the entrance of such sewage into any open or covered drain tributary to such waters, without having obtained an order for the Director approving the same.

### **SD 2.08 Discharge on or to the Surface of the Ground**

No person shall discharge or permit the overflow or spillage of any treated or untreated sanitary sewage on or to the surface of the ground unless permitted by the Director. However, this shall not interfere with the spreading of animal manure on the surface of the ground in accordance with normal agricultural practices.

### **SD 2.09 Dwelling or Building**

Each dwelling or other building having plumbing fixtures from which sanitary sewage is produced, in a location where no public sanitary sewage system is available or accessible, shall be provided with an individual sewage disposal system of type and design approved by the Director. All of the components of such system shall be located within the property boundary upon which the building or dwelling is located. Exception to this requirement shall only be granted where a valid, recorded easement exists over adjacent property sufficient to allow for the construction, repair and maintenance of all components of the system not located within the property boundaries whereupon the building or dwelling is located.

### **SD 2.10 Connection to a Public Sanitary Sewer**

An individual sewage disposal system shall not be approved for use on any premises if a public sanitary sewer is reasonably accessible to such premises as determined by the Director, and permission to enter it can be obtained from the authority having jurisdiction. When problems are encountered in the operation of an individual sewage disposal system and public sewage service is reasonably accessible as determined by the Director and available to the property on which it is located and where permission to enter such a sewer can be obtained from the authority having jurisdiction over it, the Director may require the owner or occupant of an existing building or buildings to be connected thereto within a period of time as specified by him.

### **SD 2.11 Maintenance**

All building sewers and individual sewage disposal systems shall be maintained in good repair by the owner. The Director may order the owner to clean or repair such sewers or systems within a reasonable time if the Director finds them to be in need of the same. In order to maintain long-term viability of the individual sewage disposal system, it is the property owner's responsibility to:

- (a) Ensure that the system is used only for sanitary wastewater in amounts that do not exceed the design flow;
- (b) Properly maintain the system, including but not limited to, inspection of the system every 2-3 years with pumping of septic tank as needed;
- (c) Protect the system from physical disturbance.

### **SD 2.12 Septic System Additives**

The use of acid and organic chemical solvents in any individual sewage disposal system is hereby prohibited.

### **SD 2.13 Septic Tank Cleaners**

Reference Chapter 23-49 Rhode Island General Laws of 1956, as amended Entitled: Septage, Industrial Wastes, Waste Oil Pumping, and Cleaning and Transportation.

### **SD 2.14 Construction in Area Served by Private Wells**

Before an approval can be granted to construct an individual sewage disposal system for a building being served by a private well, sufficient additional area must be available for the replacement of the disposal field, in case of failure. This area must be on the property of the individual seeking approval and meet all the minimum distance requirements set forth in these regulations.

### **SD 2.15 Location of Wells**

No person shall locate or cause to be located, any part of an individual sewage disposal system within 100 feet of a private well or within 400 feet of a public well, consistent with SD 3.05.

### **SD 2.16 Individual Sewage Disposal System Application Involving Freshwater Wetlands**

(a) Approval for individual sewage disposal systems that are located within fifty (50) feet of a marsh, swamp, bog or pond, or within one hundred (100) feet of a river of less than ten (10) feet in width during normal flow, or within two hundred (200) feet of a river of ten (10) feet or more in width during normal flow, or within a flood plain or other freshwater wetland as defined in the Rhode Island General Laws Section 2-1-20, will not be issued until the Freshwater Wetlands Section of the Department of Environmental Management issues a wetlands permit or determines that the Wetlands Act does not apply to the proposed new construction or new installation.

**\*\* NOTE:** If there is any question concerning the location of freshwater wetlands or applicability of the proposed individual sewage disposal system and related building or site improvements to the Freshwater Wetlands Act, the Department strongly recommends that application for wetlands determination be made to the Wetlands Section prior to approval to avoid delays in individual sewage disposal system permit review. If freshwater wetlands are located in the vicinity of the proposed individual sewage disposal system, related improvements that are not limited to: 1) Construction or alteration of a building served by the individual sewage disposal system. 2) Earth removal, filling or grading associated with proposed site improvements, building construction or individual sewage disposal system improvements. 3) Alteration of groundwater or surface water flow resulting in discharge of flow in or near a wetland.

(b) If the Individual Sewage Disposal System Section determines that there is a reasonable doubt as to the location of a freshwater wetlands boundary or applicability of the Wetlands Act to the proposed new construction or new installation of an individual sewage disposal system, the Individual Sewage Disposal System Section shall require that the applicant request a preliminary applicability determination from the Wetlands Section in which case the individual sewage disposal system approval shall not be granted without submittal of either a determination that the Wetlands Act does not apply or an approved wetlands permit, and a copy of the current, approved plans, stamped by the Wetlands Section.

### **SD 2.17 Individual Sewage Disposal System Application Involving Shoreline Features**

The Coastal Resources Management Council has authority over any construction proposed in the coastal region of the state. The coastal region includes: All salt water beaches, barrier beaches and all land within two hundred (200) feet of tidal waters, salt water ponds, salt water marshes, salt water wetlands or on other land subject to Coastal Resources Management Council jurisdiction. After receiving a permit for an individual sewage disposal

system from the Director, the applicant should consult with the Coastal Resources Management Council before undertaking any construction on the property. The applicant shall have the responsibility to obtain a Coastal Resources Management Council permit if necessary.

### **SD 2.18 Laundromat Wastes**

Commercial laundromat(s) shall not be permitted to discharge to an ISDS.

### **SD 2.19 Suspensions and Revocations**

(a) The Director may suspend or revoke any approval granted under these regulations in the event that subsequent examination reveals any of the data included in any application form, submittal, plan or sketch to be incorrect or not in compliance with these regulations, or any conditions at the site are such that the approved design is no longer in accordance with the these regulations.

(b) Notice - The applicant shall be given written notice by certified mail, return receipt requested, of such action by the Director. Such notice shall be in conformance with the Administrative Procedures Act, R.I. General Laws Sections 42-35-9(b) and 42-35-14, as amended.

(c) Request for Hearing - An applicant may request a hearing on the suspension or revocation with the Department of Environmental Management, Administrative Adjudication Division, within ten (10) days of the date of receipt of such notice. Pursuant to R.I. General Laws Section 42-17.1-2, as amended, and the Rules of Practice and Procedures for the Administrative Adjudication Division for Environmental Matters, a request for hearing must be received by the Administrative Adjudication Division within ten (10) days in order to be timely filed.

(d) Cessation of Work - Upon issuance of a suspension or revocation of any permit from the Individual Sewage Disposal Systems Program, no construction activity may be performed or continue to be performed on the property until such time as the suspension or revocation is rescinded or released by the Director. Where the applicant requests a hearing in accordance with SD 2.19(b) above, the suspension or revocation shall be stayed. However, any and all work performed on the property shall be at the applicant's own risk.

(e) Investigations - The Director shall conduct investigations of any signed, written complaint received from any person, regarding applications for individual sewage disposal systems. The complaint shall specify the nature of the problems and include all appropriate information to allow the Director to evaluate the complaint.

(f) Misrepresented Data - Submissions of data and/or test results by a Registered Professional Engineer or a Registered Land Surveyor that are found to contain substantive misrepresentations or inaccuracies will be subject to referral of such evidence to the State Board of Registration for Professional Engineers and/or the State Board of Registration for Professional Land Surveyors (the "Boards") as provided under R.I. General Laws Chapters 5-8 and 5-8.1, respectively.

(g) Fees Charged to Verify Inaccurate Data - Should the information which the Department has in its possession indicate that false or misleading information has been provided in any application to the Individual Sewage Disposal Systems Program, the Director, in his/her discretion, may charge a fee to the applicant to cover costs to field check any or all data submitted by the Registered Professional Engineer or Registered Professional Land Surveyor in question.

## STANDARDS FOR CONSTRUCTION AND DESIGN

### SD 3.00 Standards of Flow and Minimum Distances

#### SD 3.01 - Determination of Sewage Flow

A sewage disposal system must be designed to dispose of the estimated maximum days' flow from the building it serves. The maximum days' flow is estimated by multiplying flow (according to the following table) by the maximum design capacity of the building. Consideration will be given to maximum sewage flow estimates derived from actual records of water consumption kept at comparable establishments.

#### MINIMUM DESIGN REQUIREMENTS FOR SEWAGE FLOW

TYPE OF ESTABLISHMENT	GALS. PER PERSON PER DAY
Single residence (2 persons per bedroom)	75
Multiple family dwelling units (2 persons per bedroom)	75
Multiple family dwelling units (Elderly housing) (2 persons per bedroom)	60
Rooming house	40
Hotel or boarding house	50
Nursing home	100
Rest home	75
School without cafeteria, gymnasium or showers	10
School with cafeteria, but no gymnasium or showers	15
School with cafeteria, gymnasium and showers	20
Boarding school or college	80
Motel	40
Motel - efficiency units	50
Public institution other than a hospital	100
Public picnic park - toilet wastes only	5
Public park with bathhouse, showers and flush toilets	15
Swimming pools or other bathing place	15
Marina (per boat)	25

(CONTINUED)

(CONTINUED)

<b>TYPE OF ESTABLISHMENT</b>	<b>GALS. PER PERON PER DAY</b>
Camp (day) - toilets (add 3 gallons per capita per meal if any served)	15
Camp (overnight)	35
Restaurant, single services (per table seat or counter seat)	35
Restaurant (per table seat or counter seat)	70
Restaurant, banquet hall, toilet and kitchen wastes (per patron)	10
Restaurant, throughway service area ( per table seat or counterseat)	350
Factory or industrial plant without cafeteria (per person)	15
Factory or industrial plan with cafeteria (per person)	10
Office building	15
Drive-in-theater - (per stall)	5
Theater - (per person)	3
Auditorium or hall - (per person)	3
Gymnasium (per spectator)	3
Gymnasium (per participant)	15
Service station (with public restrooms)	500
Cocktail lounge, bar (per seat)	20
Bowling alley - (per alley)	200
Hospital (per bed)	200
Country club - (per person at maximum use) (Exclusive of food service and bar)	25
Fellowship Hall (per seat)	6
Barber Shop (per chair)	100
Beauty Parlor (per booth)	200
Dental Office (minimum 3 persons per chair)	500
Mobile Home (exceeding 8 feet wide and 32 feet long) (using individual toilets) (minimum 450)	75
Trailers (not exceeding 8 feet wide and 32 feet long) (recreational vehicles using individual toilets) (per day per space)	200
Central Service Building (Toilet-Shower-Lavatories) Serving recreational vehicles/trailers (per day per space)	140
Dumping Station (for recreational vehicle/trailer park without individual water and sewer connections) (per day per space)	50
Laundromat	Discharge to ISDS prohibited

**SD 3.02 Separate Systems** - Where separate treatment systems are to be installed, the following proportions should be used unless there is definite data available as to the exact distribution of flow. Toilet and bath facilities and kitchen wastes 80 percent of total flow. Laundry wastes 20 percent of total flow for single family residences.

**SD 3.03 Type of System Required** - Except as provided in Section SD 14.00 an individual sewage disposal system shall consist of a septic tank followed by a subsurface seepage system or other sewage disposal method approved by the director. In the case of laundry waste, a subsurface seepage system may be used without the installation of a septic tank.

**SD 3.04 Surface Water Drainage** - Provision shall be made to prevent the flow of surface water from the surrounding area onto the area of the seepage system.

**SD 3.05 Location** - The horizontal distances between the parts of an individual sewage disposal system and the items listed in the following table shall not be less than those shown.

MINIMUM DISTANCES

	Distribution Box Dosing Tank Septic Tank (ft)	Disposal Trench, Bed or Chambers (ft)	Seepage Pit (ft)	Building Sewer (ft)	Privy (f)
1. Private well (f)	75(i)	100(h)	200(h)	50(a)	50
2. Water Supply Line (pressure) (b)	10	25	25	10	25
3. Water Supply Line (Suction)	30	40	40	25	40
4. Property Line	10	10	10	10	30
5. Dwelling	5	15(c)	20	3	30
6. Surface drinking water supplies or tributaries including storm and sub- surface drains, that discharges thereto	200	200	200	200	200
7. Watercourse (e)	50	50	50	25	50
8. Subsurface drains, foundation drains, storm drains	25	25	50	25(a)	25
9. Edge of any land at a level lower than the invert of the distribution line (d)	10	25	25	25	10(d)
10. Public Drinking Water Supply Well	400	400	400	400	400

(a) Distance may be reduced when the building sewer consists of extra heavy case iron pipe or equal with tight joints.

(b) Disposal facilities shall be installed as far away possible from water supply lines. Where sewer lines must cross water supply lines, they should be constructed of durable, corrosion - resistant material with water-tight joints and either the sewer line or the water line shall be sleeved for a distance of at least twenty five feet in either direction, and whenever possible sewer lines should be laid below water supply lines at crossings. Pressurized sewer lines are not allowed to cross water supply lines.

(c) Distance may be reduced to 8 feet with a foundation slab, or in cases where the invert of the seepage system is lower than any portion of the cellar.

(d) Where fill is required and where it is necessary to fill beyond the boundary of the subject property to meet the requirements of these regulations, no approval will be granted unless the adjoining property owner(s) have given a permanent legal release (easement, etc.) filed in the land evidence records of the municipality granting such right to the owner of the applicant property. A copy of such right of access and use shall be attached to the application. Where filling is not possible, the distance may be reduced to 15 feet by the variance procedure outlined in SD 20.00, where a lined, reinforced concrete solid retaining wall is provided on no more than 2 sides. Such retaining wall shall have a proper footing, be reinforced with rods and have a plastic lining at least 6 ml thick. Designs for retaining walls must demonstrate that the wall will not alter the groundwater flow in such a way as to cause a system failure.

(e) In case of nontidal waters, the distance shall be measured from the yearly high water mark. In case of tidal waters, the distance shall be measured from the maximum water elevation during a solstice (moon) tide. Current data for the determination of solstice (moon) tide elevations has been compiled and is available upon request. Where an individual sewage disposal system will be located in the proximity of the active ocean on sites subject to erosion caused by coastal storm, the minimum setback requirement from the solstice moon tide elevation to the edge of the system shall not be less than 150 feet.

(f) Distances may be increased at the discretion of the director for the disposal of sewage for any system serving other than an individual dwelling.

(g) Any variance from the specified distances may be made after consultation between the Department of Environmental Management and the Department of Health.

(h) Any chamber deeper than 2 feet from the invert or any depth of stone greater than 2 feet below the invert shall be prohibited for commercial sewage disposal where wells are used for drinking water, unless permitted by the Underground Injection Control (UIC) Program of the Office of Water Resources.

**SD 3.06 Subsurface Drains** The effectiveness of subsurface drains used to lower the water table to meet the limitations of these regulations must be demonstrated through one complete wet season, January 1 through April 30, before consideration can be given to an application for an individual sewage disposal system permit unless it can be demonstrated to the Department's satisfaction to be effective. (NOTE: The need to subdrain may indicate the presence of wetlands.)

A drain shall consist of not less than 6 inches of washed stone 1/2 inch to 2 inches in diameter, over which is laid a perforated or open-jointed pipe. The stone shall extend above the pipe to within 2 feet of the ground surface, and then be covered with at least a 2 inch layer of washed pea stone or a 2 inch layer of straw or hay, or by a layer of untreated building paper. The size of the pipe shall be at least 6 inches in diameter.

## **SD 4.00 Building Sewers**

SD 4.01 Size - The building sewer shall be designed with a capacity, when running full, of not less than twice the peak rate of flow with the connected fixtures. In no case shall the building sewer be less than three (3") in diameter.

SD 4.02 Material - The building sewer shall be constructed of cast iron, concrete, PVC pipe or other material acceptable to the director, provided, however, that all pipe shall be schedule SDR 35 or equivalent.

SD 4.03 Joints - All pipe joints for the building sewer shall be made water-tight and protected against damage by roots. Poured type joints shall be properly wiped on the inside to prevent obstruction of flow.

SD 4.04 Slope or Grade - The building sewer shall be designed to provide a minimum velocity of sewage flow of 2 feet per second when flowing full. This requirement is met when a 4 inch building sewer is laid with a slope of not less than 1/8 inch per foot. Slopes greater than three percent shall be prohibited.

SD 4.05 Alignment - The building sewer should be laid as nearly as possible in a straight line. Horizontal bends, where unavoidable, shall not be greater than 45 degrees. Any greater bend requires a manhole at the change in alignment.

SD 4.06 Manholes - A manhole with a removable cover of concrete, cast iron, or other durable material shall be provided at the junction of two or more pipes, at all sharp changes in direction or grade of pipes, and at intervals not greater than 300 feet.

SD 4.07 Ventilation - The building sewer shall be vented through the stack or main vent of the building it serves. No trap shall be installed in the building sewer.

## **SD 5.00 Grease Traps**

SD 5.01 Installation - Grease traps should be installed at installations such as restaurants, nursing homes, schools, hospitals, or other installations from which large quantities of grease can be expected to be discharged.

SD 5.02 Location - Grease traps should be installed on a separate building sewer serving that part of the plumbing system into which the grease shall be discharged. The discharge from the grease trap must flow to a properly designed septic tank.

SD 5.03 Capacities - Grease traps shall have a minimum depth of 4 feet and a minimum capacity of 1,000 gallons, and shall have sufficient capacity to provide at least a 24 hour detention period for the kitchen flow.

SD 5.04 Construction - Grease traps shall be water-tight and constructed of sound and durable materials not subject to excessive corrosion, decay, or frost damage, or to cracking or buckling due to settlement or backfilling. Tanks and covers shall be designed and constructed so as to withstand normal structural loading. A tank installed in groundwater shall be weighted to prevent the tank from floating when it is emptied.

SD 5.05 Depth of Tees - The inlet tee shall extend to the mid depth of the tank. The outlet tee shall extend to within 12 inches of the bottom of the tank. Tees shall be cast iron or Schedule 40 PVC and properly supported by a hanger, strap or other device.

SD 5.06 Baffles - Baffles may be provided as necessary to maximize the separation of grease from the sewage.



SD 5.07 Base - Grease traps shall be installed on a level stable base that will not settle.

SD 5.08 Materials - Grease traps may be constructed of poured reinforced concrete, precast reinforced concrete, or prefabricated material acceptable to the Director.

SD 5.09 Access Manholes - Grease traps shall be provided with a minimum 24 inch diameter manhole frame and a cover to grade over the inlet and outlet.

5.10 Accessibility - Grease traps shall be located on the lot so as to be accessible for servicing and cleaning.

SD 5.11 Invert Elevation - The invert elevation of the inlet of a grease trap shall be at least 2 inches above the invert elevation of the outlet. Inlet and outlet shall be located at opposite ends of the tank to maximize separation, and at least 12 inches above the maximum groundwater elevation.

SD 5.12 Backfill - Backfill around the grease trap shall be placed in such a manner as to prevent damage to the tank.

## **SD 6.00 Septic Tanks**

SD 6.01 Capacity - For individual dwellings, the required capacity of a septic tank, below the flow line, shall be at least that shown in the following table:

<u>Number of Bedrooms</u>	<u>Capacity below flow line (in gallons)</u>
3 (or less)	1,000
4	1,250

(1) For each additional bedroom, add 250 gallons. For other than individual dwellings, the capacity of the septic tank for sewage flows up to 500 gallons per day shall be at least 1,000 gallons. For flows between 500 and 1,500 gallons per day, the capacity of the tank shall be equal to at least two (2) times the days' flow. For flows greater than 1,500 gallons per day, the capacity of the tank shall equal 1,500 gallons plus 100 percent of the maximum daily flow.

SD 6.02 Length - In rectangular tanks, the distance between the inlet and outlet should be at least equal to the liquid depth of the tank and at least one and one-half times the width.

SD 6.03 Diameter of Circular Tanks - Circular tanks shall have a diameter of at least 52 inches.

SD 6.04 Depth - The depth of the tank below the flow line should be not less 4 feet or more than 8 feet.

SD 6.05 Multiple Compartments - Multiple compartment tanks, including two individual septic tanks placed in series, will be approved, provided the total capacity (below the flow line) is not less than 5,000 gallons and the capacity of the first compartment or tank is at least one-half of the capacity required.

SD 6.06 Construction - Septic tanks shall be water-tight. They shall be constructed of sound and durable materials not subject to excessive corrosion, decay or frost damage or to cracking or buckling due to settlement or soil pressures. Tanks and covers shall be constructed so as to withstand any load that may expected to be placed upon them.

#### SD 6.07 Inlet and Outlet

(a) Septic tanks shall be provided with inlet tees or inlet baffles, and outlet tees. The tops of the tees or baffles shall extend a minimum of 6 inches above the flow line. Tops of the tees or baffles shall be left open to provide ventilation. There shall be an air space of at least 3 inches between the tops of the tees or baffles and the top interior of the tank.

(b) Inlet - The inlet shall be provided with a tee or baffle which must extend downward at least 1 foot below the flow line but not below the outlet tee.

(c) The outlet shall be provided with a tee either precast or installed of material acceptable to the director. The outlet tee shall extend downward one-third of the depth below the flow line. Multiple outlets shall be provided on tanks wider than 7 feet.

SD 6.08 Inlet and Outlet Elevations - The invert elevation of the outlet shall be at least 2 inches below the invert elevation of the inlet, and at least one foot above the maximum elevation of the ground water table, unless special construction approved by the director is provided.

SD 6.09 Foundation - The septic tank shall be installed on a level, stable base that will not settle.

SD 6.10 Materials - Septic tanks may be constructed of poured in place reinforced concrete, pre-cast reinforced concrete, coated steel or other material approved by the director. Steel tanks designed in accordance with the provisions of these regulations shall meet Commercial Standard 177 of the U.S. Department of Commerce.

SD 6.11 Access Manholes - At least one manhole with a removable cover of concrete, iron or other durable material shall be provided for each septic tank compartment. Inlets and outlets shall be made accessible for cleaning by placing manholes or clean-out plugs over the tees or baffles. Manholes on tanks shall be brought up to finished grade. All manholes should be provided with a safe and solid cover and should be set to divert surface water away from the manhole.

SD 6.12 Accessibility - Septic tanks shall be so located on the lot as to be accessible for servicing and cleaning. They should be placed between the building and the street wherever practicable, to facilitate connection to a public sanitary sewer if it becomes available.

SD 6.13 Backfill - Backfill shall be placed around the septic tank in such a manner as to avoid damage to it. All backfill placed around the septic tank shall be free of large stones, stumps, waste, construction material and rubbish.

SD 6.14 Holding Tanks - Holding tanks are not acceptable as a means of an individual sewage disposal system for new installations, consistent with department policy. However, the use of holding tanks at marinas, for the purpose of boat pump-out may be considered as a means of water pollution abatement.

SD 6.15 Pumping to Septic Tanks Prohibited - Sewage shall not be pumped into septic tanks unless approved by the director.

SD 6.16 Floatation - Where a septic tank is installed in the ground water table, provisions shall be made to prevent floatation.

## **SD 7.00 Dosing Tank and Siphons**

SD 7.01 General - A dosing tank equipped with a siphon or two alternating pumps shall be provided where the total length of the distribution lines exceeds 500 feet. The dosing tank shall be provided with at least two alternating siphons or two alternating pumps delivering to separate seepage systems if the total length of the distribution lines exceeds 1,000 feet.

SD 7.02 Capacity - Dosing tanks shall discharge a volume of sewage which is between 60 and 75 percent of the interior capacity of the distribution lines of the disposal trenches to be dosed, and not more than the full capacity of the distribution lines in the case of a disposal bed.

SD 7.03 Construction - Dosing tanks shall be water tight. They shall be constructed of sound, durable materials not subject to excessive corrosion or decay and be able to withstand any load which may be placed upon them.

SD 7.04 Foundation - Dosing tanks shall be constructed on a level base that will not settle.

SD 7.05 Ventilation - Dosing tanks shall be constructed in a manner that will permit venting through the building sewer or other suitable outlet.

SD 7.06 Inlet - The invert elevation of the inlet pipe to the dosing tank shall be located above the maximum water elevation in the dosing tank, and at least one foot above the maximum elevation of the groundwater table, unless special construction, approved by the director is provided.

SD 7.07 Access - Each dosing tank or compartment thereof shall be provided with an access located so as to facilitate repair or adjustment of the siphons or pumps.

SD 7.08 Floataion - Where a dosing tank is installed in the ground water table, provisions shall be made to prevent floatation.

## **SD 8.00 Pumps**

SD 8.01 General - Pumps shall be located following septic tank unless otherwise approved by the director. In the case of single family residence system, one pump may be installed. In all other cases, dual alternating pumps shall be required.

SD 8.02 Size - Pump must be sized to accommodate the installation based upon system head curves. The system head curves shall be submitted with the design. The pumps must be capable of passing 2 inch diameter solids unless the pumps, approved by the director, are specifically designed to grind solids.

SD 8.03 Installation - Pumps shall be installed in strict conformance with the manufacturer's specifications; provisions should be made to easily remove the pumps for servicing.

SD 8.04 Controls - Pump controls shall be moisture proof if located above the liquid level; water-tight control shall be used when the contents are submerged.

SD 8.05 Piping - When alternating pumps are provided, discharging to separate fields, the pump discharge lines shall be inter-connected and provisions made to permit dosage of both fields with one pump when the other is being serviced. The pump discharge shall be at least 2 inch diameter for systems designed to dispose of under 1,000 gallons per day, and at least 3 inch diameter for systems designed to dispose of 1,000 gallons per day or over.

SD 8.06 Alarms - All pumps shall be equipped with a high water level visible and audible alarm powered by a circuit separate from the pump power. The alarm shall be located in a normally occupied area of the facility.

SD 8.07 Standby Power - Where pumps are used, it is recommended that standby power be provided at apartment houses, condominiums, elderly housing and all other multiple family premises which are not vacated during power failure. An empty emergency overflow tank with 24 hour storage capacity may be substituted where such tank can be placed completely above ground water.

SD 8.08 Power Supply - All junction boxes on the power supply shall be moisture proof and located above areas subject to flooding.

### **SD 9.00 Distribution Box**

SD 9.01 General - A distribution box shall be installed immediately preceding the seepage system unless otherwise approved by the director.

SD 9.02 Inlet - The distribution box shall be provided with an inlet tee or a suitable baffle. The invert elevation of the inlet pipe shall be not less than 2 inches above the invert elevation of the outlet pipe.

SD 9.03 Outlet Elevations - The invert elevation of all the outlet pipes shall be a minimum of 4 inches above the floor of the distribution box. All outlet inverts shall be at the same elevation.

SD 9.04 Distribution Pipes - All distribution pipes for a minimum of 2 feet from the distribution box to the first section in the laterals shall be schedule SDR35, level, unperforated and shall be laid with tight joints. Any sections of such pipe laid with tight joints shall not be considered in determining the leaching area. Jointing of the distribution piping with a distribution box shall be made with non-shrinking gasket materials.

SD 9.05 Construction - The distribution box shall be constructed of water-tight concrete or other durable material; and shall be capable of withstanding H-20 wheel loads. It shall be designed to accommodate the necessary distribution lines. Minimum bottom area shall be 3 square feet.

SD 9.06 Number of Outlets - If there is no dosing tank, there shall be a separate outlet for each distribution line. When a dosing tank or pump chamber is installed, there should be either a separate outlet for each distribution line, or a separate outlet of at least six (6) inches in diameter for every two distribution lines. In all cases following a dosing tank or pump chamber, the outlet shall be of sufficient size to accept the sewage flow at the rate sewage is delivered to the distribution box.

SD 9.07 Foundation - The distribution box shall be installed on a level stable base that will not settle.

SD 9.08 Manholes - The distribution box shall be provided with readily removable covers of durable material. When manholes to grades are not provided, it is recommended that a marker over the cover be provided to grade. Systems designed over 2,000 gallons per day should have a minimum 18 inch manhole over each distribution box with extra heavy duty metal frames and covers to finished grade.

**SD 10.00 Sewage Seepage Systems - General**

SD 10.01 Minimum Leaching Area - The minimum leaching area of a disposal system will be dictated by the number of bedrooms in the case of individual dwellings, or the maximum daily sewage flow for places other than individual dwellings, and the results of percolation tests performed in accordance with Section SD 16.00 or a soil evaluation done in accordance with SD 26.01. In the case of individual dwellings all systems shall be designed to serve a minimum of three bedrooms, unless evidence is submitted that a sworn affidavit substantiating less than three bedrooms has been filed with the land evidence office of the municipality.

SD 10.02 Groundwater - The vertical separation distance from the bottom of the stone underlying the seepage system shall be at least 3 feet above the maximum elevation of the groundwater table.

SD 10.03 Impervious Material - The vertical separation distance from the bottom of the stone underlying the seepage system shall be at least 5 feet above impervious formations. The horizontal separation shall be twenty five feet from the side wall of the seepage system. Excavating into impervious material is prohibited unless otherwise approved by the director.

SD 10.04 Excavation - The excavation for the seepage system may be made by mechanical means, however, if such means are used, care must be taken to assure that the soil at the bottom of the excavation is not compacted or smeared. The bottom of the excavation shall be level and scarified.

SD 10.05 Location - The minimum distance the sewage seepage system must be from items it might affect is found in Section SD 3.05.

SD 10.06 Effective Leaching Area - The effective leaching area of individual sewage disposal systems shall be determined in accordance with Section SD 11.01 for bed or trench type systems; Section SD 12.02 for seepage pit type systems; and Section SD 13.02 for leaching chamber type systems.

SD 10.07 Minimum Leaching Area - The minimum leaching area shall be determined from the following table:

Percolation Rate (minutes per inch)	A		B	
	Disposal Trenches and Seepage Pits		Disposal Beds (see SD10.08 for restrictions)	
	Leaching area max. rate of application Gals/SF/Day (1)(3)(5)	Sq ft/ bedroom (1)(3)	Leaching area max rate of application Gals/SF/Day (2)(3)(4)	Sq ft/bedroom (2)(3)(4)
2 to 5	1.20	125	0.59	255
10	0.91	165	0.50	300
15	0.79	190	0.43	350
20	0.68	220	0.38	400
25	0.63	240		
30	0.60	250		
40	0.52	290		

Rates greater than five minutes/inch may be interpolated from this table to reflect actual readings.

- (1) Soil with a percolation rate of over 40 minutes per inch is unsuitable for disposal of sewage by any means of subsurface leaching.
- (2) Soil with a percolation rate of over 20 minutes per inch or where the maximum daily sewage flow is 2,000 gallons or more is unsuitable for these means of subsurface leaching.
- (3) To determine effective leaching area, see Sections SD 11.01, 12.02 and 13.02.
- (4) The use of disposal beds will not be permitted where an alternate type of seepage system can be utilized (i.e. trenches, chambers, pits, etc.) The system designer must demonstrate that the alternates to a bed are not feasible.
- (5) The fastest percolation rate allowed for applications for new systems submitted after May 10, 2001 shall be 10 minutes per inch.

SD 10.08 Disposal Bed Restrictions - A disposal bed is unsuitable when the maximum daily sewage flow is 2,000 gallons or more; see Section SD 10.07, column A for design.

### **SD 11.00 Specifications for Disposal Trenches and Disposal Beds**

#### **SD 11.01 Effective Leaching Area**

- (a) Disposal Beds - The effective leaching area of disposal beds shall be the entire bottom area.
- (b) Disposal Trenches - The effective leaching area of standard disposal trenches containing 0.5 feet of stone below the pipe invert shall be the total bottom area.

Credit will be allowed for added sidewall absorption area gained by increasing the depth of stone in trenches. Such credit shall be determined in accordance with the following table which gives the square footage allowed per lineal foot of trench as the depth of stone increases.

<b>Depth of Stone Below Invert (feet)</b>	<b>Area allowed per Lineal Foot of Trench (Sq ft/ft)</b>		
	<b>24" wide trench</b>	<b>30" wide trench</b>	<b>36" wide trench</b>
0.5	2.0	2.5	3.0
1.0	2.7	3.2	3.7
1.5	3.2	3.7	4.2
2.0	3.7	4.2	4.7
2.5	4.2	4.7	5.2
3.0	4.7	5.2	5.7
3.5 (max. allowable)	5.2	5.7	6.2

Example: If a 5 minute per inch percolation rate is being used to size a trench type system for a 3 bedroom dwelling, 375 square feet of effective leaching area would be the minimum required. If a trench system with 0.5 foot of stone below the invert is used, 125 lineal feet of 3 foot wide trench would be required. If the stone depth is increased to 3.5 feet below the invert, then 60.5 lineal feet of 3 foot wide trench would be required.

SD 11.02 Construction of Disposal Trenches and Beds - Disposal trenches and beds shall follow the construction details listed in the table below:

Minimum lines per field or bed	2
Maximum length per line without dosing tank	75 feet
Maximum length per line with dosing tank	100 feet
Minimum diameter of distribution lines	4 inches
Grade of distribution lines (no gradient needed if dosed by siphon or pumps)	2-4 inches per 100 feet
Maximum width of disposal trench bottom	3 feet
Minimum distance between walls of adjacent trenches	5 feet*
Minimum cover over invert of distribution lines	1.5 feet
Maximum cover over invert of distribution lines	3.5 feet**
Maximum distance between distribution lines in disposal beds	6 feet
Minimum distance between adjacent beds	10 feet
Maximum distance between distribution lines and edge of bed	3 feet
Termination of distribution lines from end of trench	2 feet

\* Greater distances are recommended.

\*\* System should be designed as shallow as practical but invert of distribution lines shall not be less than 1.5 feet below grade.

SD 11.03 Distribution Lines - The distribution lines must consist of schedule 35 perforated PVC pipe, or an equivalent pipe approved by the director. The size, location, and number of perforations shall be acceptable to the director. The ends of all distribution lines shall be inter-connected unless otherwise approved by the director.

SD 11.04 Stone - The stone used in the leaching system to surround the distribution lines shall consist of washed stone ranging from not less than 1/2 inch to not more than 2 inches in size and free from iron, fines, soils, dust or debris. It shall cover the full width of the trench or bed and shall be placed to a depth not less than 6 inches below the bottom of the distribution lines in a disposal trench and not less than 12 inches below the bottom of the distribution lines in a disposal bed. The stone shall extend at least 2 inches above the top of the distribution pipes. The stone shall be covered with at least a 2 inch layer of straw or hay, or by a layer of untreated building paper or by a layer of synthetic filter fabric which allows evaporation.

SD 11.05 Gravel Base - Any gravel base material used under the stone layer shall consist of clean, coarse sand, or bank run gravel containing little or no fines, or organic material and containing little to no large fragments with no stones greater than 6 inches in diameter. Not more than 10% of the gravel can be made up of stones between 2 inches and 6 inches in diameter. The remaining gravel cannot exceed 2 inches in diameter.

The gravel base material shall be placed in shallow lifts and compacted. The gravel base after placement and compaction shall have a percolation rate equal to or better than 5 minutes per inch. The director may require that a percolation test be run in the presence of his agent in the gravel base after placement and compaction. Whenever a sewage leaching field will be located in fine textured soils containing fine sands, silts or clays, a minimum six (6) inch depth gravel base must be placed beneath the entire leaching field.

SD 11.06 Excavation Preparation

(a) Leach field strip requirements.

(1) The leach field and five (5) feet into the leach field perimeter shall be stripped if the groundwater elevation is less than four (4) feet or ledge is less than six (6) feet from the original ground surface. The leach field and extending five (5) feet into the leach field perimeter from the trench side walls must be stripped of trees, brush, topsoil, subsoil, undesirable material and soil containing fines.

(2) The five (5) foot leach field perimeter strip shall not be required if the groundwater elevation is at least four (4) feet or greater and ledge is at least six (6) feet or greater from the original ground surface. The leach field however, shall be stripped of trees, brush, topsoil, subsoil, undesirable material and soil containing fines.

(3) Excavations referred to in SD 11.06(a)(1) and (2) shall be backfilled with gravel base as specified in SD 11.05.

(b) All trees and brush within ten (10) feet of the leach field shall be removed.

(c) The designer may specify additional soil where conditions warrant.

(d) Gravel backfill must be brought up around the bed or trench to at least 2 inches above the top of the distribution pipes in the leaching system.

(e) The leaching system shall not be constructed when the original soil was stripped to or into, the groundwater table unless approved by the director.

SD 11.07 Backfill - All backfill placed within the leach field area shall be free of boulders and stones greater than six (6) inches in diameter, frozen clumps of earth, rubbish, masonry, stumps or waste construction materials. Backfill shall be placed carefully over disposal trenches or beds so as to avoid displacement and damage to piping. Heavy machinery shall not be permitted to pass over the leach field area.

SD 11.08 Parking Area Location - The area of the leaching system shall not be paved or used for vehicular parking or vehicular traffic except as allowed under SD 12.06 and SD 13.09. Systems serving other than individual dwellings shall be adequately curbed or fenced so as to exclude vehicular traffic. Parking areas adjacent to leaching system shall be graded or curbed to divert runoff from the leaching area.

SD 11.09 Finished Grade - The surface area over the subsurface disposal system shall be grassed.

## **SD 12.00 Seepage Pits**

SD 12.01 Acceptability - A seepage pit may be constructed in lieu of a disposal field, and must be preceded by a septic tank.

SD 12.02 Effective Leaching Area - The effective leaching area of a seepage pit shall be determined in accordance with provisions of Column A of Section SD 10.07. The sidewall area below the invert of the inlet and the bottom of excavation, not to exceed 2 feet around and below the liner, shall be used to determine the effective leaching area. Sidewall and bottom area having a percolation rate exceeding the design percolation rate shall not be used to determine the effective leaching area.

SD 12.03 Spacing - When more than one seepage pit is installed, a distance at least 20 feet between sidewalls shall separate the pits.



SD 12.04 Access - The top of a seepage pit shall be provided with an access manhole with a removable cover of concrete, iron or other durable material. The top of the manhole should be brought up to within 12 inches of the finished grade and properly marked.

SD 12.05 Construction - The lining of a seepage pit shall be of precast perforated concrete, stone, brick or cement block, laid dry with open joints. The space between the excavation and the lining shall be backfilled with washed stone, 1/2 inch to 2 inches in size, for a distance of at least 12 inches from the lining. Washed stone 1/2 inch to 2 inches in a size shall be placed on the bottom of the pit to a depth of at least 12 inches.

SD 12.06 Location Under Unpaved Traffic Areas - Where any portion of the seepage system is installed under an unpaved parking area, or subject to vehicular traffic, the structure must be capable of withstanding H-20 wheel loads. All access manholes under paved areas shall be brought to grade with covers and frames capable of withstanding H-20 wheel loads. Such systems must be vented with vents, located in a protected area, and screened. Paving over a system is limited to 25% of the total area without specific authorization of the director.

**SD 13.00 Leaching Chambers**

SD 13.01 Acceptability - A leaching chamber system may be constructed in lieu of a disposal field. It must be preceded by a septic tank.

**SD 13.02 Effective Leaching Area**

(a) Shallow Leaching Chambers - Shallow leaching chambers (also called flow diffusers) are significantly wider than they are deep. The effective leaching area shall be the total bottom area extending to 12 inches on each side of the chamber, provided the excavation below and on each side of the chamber is filled with stone meeting the size and quality requirements of SD 11.04. Shallow chambers may be installed in a trench configuration if the overall width of the trench does not exceed 6 feet. Shallow chambers installed in a trench configuration may include sidewall areas beginning at the base of the chamber and extending to the depth of stone beneath the chamber not to exceed 24 inches. Shallow leaching chambers shall not be permitted in areas where the groundwater table is less than four (4) feet.

(b) Deep Leaching Chambers - Deep leaching chambers (also called galleys) are approximately equal in width and depth. The effective leaching area shall be the total bottom area extending to a maximum of 24 inches on each side of the chamber in addition to the total pervious side-wall area beginning at the invert of the inlet to the chamber and extending to a maximum of 24 inches below the base of the chamber provided the excavation below and outside the chamber is filled with stone meeting the size and quality requirements of SD 11.04. Deep chambers must be installed in a trench configuration. Deep chamber shall not be permitted in areas where the groundwater table is less than eight (8) feet.

EFFECTIVE AREA OF CHAMBERS IN TRENCH CONFIGURATION			
TYPE OF CHAMBER			
	W/12 inches of stone sides and under	W/24 inches of stone sides and under	W/12 inches of stone sides and under
	DEEP (4 FT. CUBE)		SHALLOW (4 FT. WIDE)
Each End Unit (Sq.Ft./Unit)	98	153	78
Each Interior Unit (Sq.Ft./Unit)	58	74	64

SD 13.03 Required Minimum Leaching Area - The required minimum leaching area shall be determined in accordance with Column A of Section SD 10.07 provided that the configuration of the units is that of trench-type system. If the chambers are installed in a bed-type configuration, the required minimum leaching area shall be determined in accordance with Column B of Section SD 10.07.

SD 13.04 Construction - The leaching chamber walls shall be of precast perforated concrete, stone, brick, or cement block, laid dry with open joints. The chambers shall be constructed to allow the liquid to pass easily through openings to the surrounding stone. The cover shall be constructed of reinforced concrete or other approved material. The space between the excavation and the lining shall be backfilled with washed stone, one-half inch to two inches in size for a distance of at least 12 inches from the lining. The stone outside the chamber shall extend to within two inches of the top of the chamber and be covered with a two inch layer of washed stone pea or a two inch layer of straw or hay, or by a layer of untreated building paper. Washed stone one-half inch to two inches in size shall be placed on the bottom of the excavation to a depth of at least 12 inches.

SD 13.05 Access - The top of the chamber shall be provided with an access manhole at intervals not greater than 50 feet with a removable cover of concrete, iron or other durable material. The top of the manhole should be brought to within 12 inches of the finished grade and properly marked for systems designed to dispose of up to 2,000 gallons per day or to grade for systems designed to dispose of greater than 2,000 gallons per day (except as provided under SD 13.09). All manholes brought up to grade should be provided with a safe and solid cover and should be set to divert surface water away from the manhole.

SD 13.06 Spacing - If a trench type configuration is installed, the minimum distance between walls of adjacent trenches shall be at least 6 feet. However, it is recommended that the spacing be increased up to 12 feet where possible.

SD 13.07 Distribution - Effluent shall be applied to the leaching area in a uniform manner. If the leaching chambers are installed in a trench type configuration, the effluent shall be applied at least every 25 feet, and the leaching chambers shall be interconnected unless otherwise approved by the director. If the leaching chambers are installed in a bed-type configuration, the effluent must be applied in such a manner to insure equal distribution. The bottom of the excavation shall be level and scarified.

SD 13.08 Depth of Cover - The top of the leaching chambers shall be installed at an elevation to provide a minimum cover of 1.5 feet to a maximum cover of 3.5 feet over the invert of distribution lines.

SD 13.09 Location Under Unpaved Traffic Areas - Where any portion of the leaching chamber is installed under an unpaved parking area, or subject to vehicular traffic, the structure must be capable of withstanding H-20 wheel loads. All access manholes under paved areas shall be brought to grade with covers and frames capable of withstanding H-20 wheel loads. Such systems must be vented with vents, located in a protected area, and screened. Paving over a system is limited to 25% of the total area without specific authorization of the director.

#### **SD 14.00 Privies, Chemical Toilets, Humus Toilets, Incinerator Type, and Other Alternative Methods**

SD 14.01 Acceptability - The installation of a privy or chemical type toilet will be approved only for special use (i.e. where a conventional individual sewage disposal system is neither practical nor feasible) when a septic tank and leaching system cannot be installed. A humus or incinerator type toilet may be approved for any use where a septic tank and leaching system can be installed.

SD 14.02 Location - The location of a privy shall meet the requirements of Section SD 3.05.

SD 14.03 Construction - A privy shall have a self-closing seat cover, and a fly-tight valve and superstructures. A screened vent shall extend from the vault to the atmosphere.

SD 14.04 Maintenance - When a privy vault becomes filled to within two feet of the surface of the ground, it shall be cleaned and the contents disposed of in a sanitary manner, or it shall be covered with clean compacted earth to a depth not less than two feet.

SD 14.05 Humus Toilets - Humus toilets used for the carriage of excreta shall meet the following requirements for construction, location and use, unless otherwise approved by the director. Separate subsurface sewage disposal facilities shall be provided for the disposal of any liquid wastes from sinks, tubs, showers and laundry facilities and designed on 80 percent of the normal daily average flow. Sufficient land area shall be provided to expand the subsurface leaching area to accommodate 100 percent of the normal daily design flow.

(a) Large Capacity Composting Toilets

(1) Large capacity composting toilets shall have separate receiving, composting and storage compartments, arranged so that the contents are moved from one compartment to another without spillage, or escape of odors within the dwelling. No large capacity composting toilets shall have an interior volume of less than 64 cubic feet. All toilet waste shall be deposited in the receiving chamber, which shall be furnished with a tight self-closing toilet lid. Food waste or other materials necessary to the composting action shall be deposited in the composting compartment through a separate opening with a tight fitting lid. The final composting material shall be removed from the storage compartment through a cleanout opening fitted with a tight door or lid. The cleanout shall not be located in a food storage or preparation area. The receiving and composting compartments shall be connected to the outside atmosphere by a screened vent. The vent shall be a minimum of six inches in diameter and shall extend at least twenty feet above the openings in the receiving and composting compartments, unless mechanical ventilation is provided. Air inlets shall be connected to the storage compartment only, and shall be screened.

(2) The director may approve the use of a large capacity composting toilet for any single family residential building where application is made by the owner, and the soil and groundwater table on the lot on which the building will be located is tested by a registered professional engineer or registered land surveyor and found suitable by the director for a subsurface sewage disposal system.

(3) All waste removed from large capacity composting toilets shall be disposed of by burial or other means approved by the director.

(b) Heat Assisted Composting Toilets

(1) Heat assisted composting toilets shall have a single compartment furnished with a tight self-closing toilet lid. The compartment shall be connected to the outside atmosphere by a screened vent. There shall be a mechanical ventilation fan arranged to control the humidity in the compartment and provide positive venting of odors to the outside atmosphere at all times. A heating unit shall be provided to maintain temperature in the optimum range for composting.

(2) The director may approve the use of heat assisted composting toilets for any single family residential building where application is made by the owner, and the soil and groundwater table on the lot on which the building will be located is tested by a registered professional engineer or registered land surveyor and found suitable by the director for a subsurface sewage disposal system.

(3) All wastes removed from heat assisted composting toilets shall be disposed of by burial or other means approved by the director.

SD 14.06 Innovative or Alternative Technology Approval Procedure - No person shall construct, alter or install any innovative or alternative technology for sewage disposal unless such Technology has been placed on the Department's approved Innovative or Alternative Technology List. In reviewing any request for approval of an innovative or alternative technology, the protection of the public health and the environment shall be given priority over all other considerations. The Director has the right to waive any of the following requirements of this section, provided that the waiver does not compromise the protection of the public health and the environment.

(a) Administrative Procedure

(1) The Department shall:

(A) Maintain a list of all the approved Innovative or Alternative Technologies and all approved guidance documents.

(B) Charge fees to cover the cost of administering, reviewing, monitoring and tracking the performance of systems under the innovative or alternative approval procedure.

(C) Have the authority to remove any approved innovative or alternative technology from the Department's approved list whenever the applicant fails to submit reports or monitoring data; fails to perform required maintenance; or fails to fulfill any other required tasks stated within these regulations, the approval letter or the approved guidance document.

(b) Application Procedure for Placement on the Department Approved Innovative or Alternative Technology List.

The applicant shall submit a complete application package. This includes a proper application, all required submittals, performance data and a draft guidance document that details all design, installation, operation and maintenance, and other requirements.

(1) For purposes of submittal under the Innovative or Alternative Technology procedures, the applicant shall state whether the innovative or alternative technology proposed is: an Alternative System or Technology Class One or Class Two; System Component Class One or Class Two; or an Experimental System.

(2) The Director shall review the application and respond as follows:

(A) Approve or deny the application as submitted; or

(B) Recommend resubmission of the application with modifications as proposed by the Director; or

(C) Recommend resubmission and reclassification under subsections SD 14.06(c); or

(D) Recommend both resubmission of the application with modifications and reclassification.

(c) Evaluation Criteria - The Director shall evaluate all innovative or alternative technologies submitted under SD 14.06. At the request of the Director, the ISDS Technical Review Committee, in accordance with SD 14.06(e), may review the application and submit recommendations on the proposed Alternative System and Technology, System Component or Experimental System. Recommendations from the ISDS Technical Review Committee shall be submitted to the Director within ninety (90) days from the application date.

(1) Alternative System or Technology - The Director may approve an alternative system or technology if it meets the following criteria:

(A) Class One:

(i) The applicant provides at least five consecutive years of performance data which demonstrates that standards are met; and

(ii) The applicant demonstrates that the system has been approved for at least five consecutive years in Rhode Island or at least three other jurisdictions.

(B) Class Two:

(i) The applicant provides at least two consecutive years of performance data; and

(ii) The applicant demonstrates a theory or applied research; and

(iii) The applicant demonstrates that the system has been approved for at least two consecutive years in Rhode Island or another jurisdiction.

(C) Only those alternative systems which have been approved and are on the approved Innovative or Alternative Technology List shall be permitted by the Director.

(2) System Component - The Director may approve a system component if it meets the following criteria:

(A) Class One:

(i) The applicant provides at least two consecutive years of performance data which demonstrates standards are met; and

(ii) The applicant demonstrates that the components have been approved for at least two consecutive years in Rhode Island or at least three other jurisdictions.

(B) Class Two:

(i) The applicant provides one to two consecutive years of performance data;

(ii) The applicant demonstrates a theory or applied research; and

(iii) The applicant demonstrates that the system component has been approved for use in at least one other jurisdiction and has performed successfully for a minimum of one year.

(C) Only those system components that have been approved and are on the approved Innovative or Alternative Technology List shall be permitted by the Director.

(3) Experimental System or Technology.

(A) Persons submitting an Experimental System or Technology shall submit a written proposal to the Department for review and approval. This proposal shall follow the format outlined in the Department's Application for Innovative or Alternative Technology Approval Procedure - Experimental System or Technology.

(B) Experimental System or Technology applicants shall propose at least three (3) sites and no more than ten (10) sites where the technology will be applied. The Director reserves the right to waive this requirement for multi-family or commercial systems.

(C) The Director may approve an experimental system if it meets the following criteria:

(i) The applicant shall demonstrate that the system will work in practice and in theory;

(ii) Each location shall provide a suitable area for the installation of a conventional system or a system on the Department's approved Alternative System or Technology Class One.

(iii) The applicant proposing the experimental system, the property owner and subsequent purchasers shall submit a signed statement to the Director agreeing to abandon the experimental system and install a conventional or a Department approved Alternative System Class One if the experimental system(s) fails to perform as designed.

(iv) The applicant submits documentation securing a bond or other form of financial security acceptable to the Director, to replace the entire system in the event it fails to perform as designed.

(4) The Director may require the following:

(A) Monitoring or sampling of any system or system component; or

(B) Submittal of evaluation reports when a system or system component's performance is evaluated; or

(C) An annual report of all system or component installations and failures.

(d) Approval

(1) The Department shall maintain the approved Innovative or Alternative Technology List and maintain all appropriate guidance documents for the following:

(A) Innovative or Alternative Systems or Technologies that are approved by the Director; and

(B) System Components that are approved by the Director.

(2) The process by which an Innovative or Alternative Technology shall be placed on the lists referred to in SD 14.06(d)(1)(A) and (B) above shall be as follows:

(A) The proponent of such Innovative or Alternative Technology shall submit an application on the form required by the Department (Application for Innovative or Alternative Technology Approval Procedure) and with all data as required in SD 14.06 to the Division of Groundwater and ISDS for approval of the Innovative or Alternative Technology.

(B) If the Innovative or Alternative Technology is approved by the Director, the applicant shall submit a finalized guidance document to the Director detailing all design, installation, operation and maintenance requirements. Once the guidance document has been approved, the Innovative or Alternative Technology shall be placed on the Department's list.

(3) The Director may establish special conditions as necessary to ensure adequate protection of the public health and the environment in its approval of Innovative or Alternative Technologies. Such conditions may include without limitations: special qualification requirements for designers and installers; specification of site characteristics; or monitoring, testing and reporting requirements.

(4) Once an innovative or alternative technology application is approved, individual applications to design, construct, alter, or install a Department approved innovative or alternative technology may be submitted to the Division of Groundwater and ISDS, ISDS Section.

(A) All owners obtaining an ISDS application approval for a Department approved innovative or alternative technology requiring special operation and maintenance procedures or an experimental system shall:

(i) File a copy of the approved permit for the innovative or alternative technology, the requirements for the system's operation and maintenance, and monitoring schedules, with the land evidence records of the municipality in which the ISDS is located; and

(ii) Submit to the Department a certified copy of the recorded permit setting forth the date of the recordation and the book and page where the permit is located in the records of the municipal land evidence office.

(B) The Department shall not issue a conformance until the permit is recorded with the municipality and a certified copy of the recorded permit is submitted to the Department.

(5) Persons desiring to alter an approved innovative or alternative technology currently on the approved list shall make the request in writing and submit the following to the Department:

(A) Documentation demonstrating the applicant's compliance with the terms or conditions of the original approval of the innovative or alternative technology; and

(B) Required fees, in accordance with section SD 23.00(j)(1)(2)or(3) for innovative or alternative technology.

(6) In order to remain on the Department's approved list, the applicant shall submit:

(A) An annual report that includes installations (to include name, address, application number, system installed), failures, reasons for failures, monitoring data when required, and any other information deemed necessary by the Director; and

(B) Required renewal fees. (**NOTE:** Applicants obtaining an Innovative or Alternative Technology Class One Departmental Approval shall not be required to submit an annual renewal fee in accordance with SD 23.00(j).

(e) Individual Sewage Disposal System Technical Review Committee (ISDS TRC) - The Department shall:

- (1) Establish a committee consisting of individuals with technical or scientific knowledge applicable to ISDS whose purpose is to provide technical advice to the Director; and
- (2) Select members for the ISDS Technical Review Committee from one or more of the following organizations:
  - (A) Department of Environmental Management;
  - (B) CRMC or other state agencies;
  - (C) University/college academic communities;
  - (D) ISDS Design and Installation firms;
  - (E) Environmental organizations;
  - (F) Public utilities;
  - (G) Sewage system or related product manufacturers;
  - (H) Local municipalities; and
  - (I) Other parties.

SD 14.07 Commercial and Industrial Wastes - Where an individual sewage disposal system is approved for disposal of sanitary wastewater from commercial or industrial uses, the director may require the applicant to obtain an approval from the UIC Program if in the opinion of the director, there is a reasonable risk that materials used in commercial or industrial processing may be discharged to the system.

## **SOIL STUDIES AND PERCOLATION TESTING**

### **SD 15.00 Subsoil Exploration**

SD 15.01 General - The suitability of the soil for disposal of sewage by leaching shall be determined through the consideration of the type of soil, the results of percolation tests, the maximum groundwater table elevation, the occurrence of impervious formations, and any other relevant data. The Director may waive the requirement of percolation tests and groundwater table determinations on lots in subdivisions or parts thereof which have been reviewed and the soil found suitable for the installation of individual sewage disposal systems and in areas where available information makes such tests unnecessary.

### SD 15.02 Site Suitability

(a) The installation of an individual sewage disposal system is prohibited in any area where the groundwater table is within 4 feet of the original ground surface, or where an impervious layer is within 6 feet of the original ground surface, except under the following conditions:



(b) Areas Not Meeting (a) Above - Approval may be granted in areas where the groundwater table is within 2 to 4 feet of the original ground surface or where an impervious layer is within 4 to 6 feet of original ground surface if the following additional requirements are met:

- (1) Only disposal trenches shall be constructed on such property and the minimum sidewall to sidewall trench spacing shall be 10 feet with no credit allowed for sidewall area.
- (2) The trench design percolation rate shall be based on percolation tests run in the original ground; however, in no case shall the design percolation rate be faster than 10 minutes/inch.
- (3) At least two soil exploration holes shall be dug over the area of the proposed disposal system. The soil exploration holes shall assess the soil and ground water table conditions on both the uphill and downhill sides of the proposed system.
- (4) All applicable tests may be witnessed by the Director.
- (5) The excavation preparation procedures given in SD 11.06 shall be followed.
- (6) The design shall consider the need for diversion of surface water runoff so as not to increase stormwater runoff to adjacent properties.
- (7) Where excavation into the groundwater table is a potential problem the excavation work shall not be permitted, unless otherwise authorized by the director.
- (8) Use of the Dry Season determination of SD 17.02 may not be allowed in areas not meeting the requirements of SD 15.02(a).
- (9) The system design must be stamped by a registered professional engineer or registered land surveyor and the system installation must be supervised and certified by the designer.

SD 15.03 Percolation Test – Unless a site evaluation as specified in SD 2.01(b) is required, at least one percolation test, carried out in accordance with the procedure outlined in Section SD 16.00 shall be made. Additional testing may be required if the soil is highly variable or if a large disposal system (greater than 2,000 gallons per day) is required.

SD 15.04 Test Holes - Test holes shall be excavated within the proposed leach field area. All test holes except fill test holes shall be excavated to at least five feet below the bottom elevation of the proposed leach field. Test holes shall be excavated, if possible, to a minimum depth of ten (10) feet from original ground surface. If impervious material is encountered or the test hole becomes unstable due to lack of soil cohesion and/or the presence of groundwater, the test hole may be terminated at a depth of less than ten (10) feet. Sites with test holes which have been terminated at less than ten (10) feet may require additional testing as determined by the Director.

- (a) Dry Season Test Hole - Dry Season test holes shall be performed in accordance with SD 17.02 Dry Season Determination. Dry season test holes may be used to predict the maximum groundwater table elevation. Dry season test holes shall be witnessed by an agent of the Director unless the Director waives this requirement in writing. A wet season test hole shall be required when a dry season test hole fails to establish the maximum groundwater table elevation.

(b) Wet Season Test Hole - Wet Season test holes shall be performed in accordance with SD 17.01 Wet Season Determination. If, for any reason, a test hole or the measurement to soil or limiting layer on the inside of the groundwater test pipe is found to measure less than eight (8) feet below the original ground surface, ledge test holes shall be required. Wet season test holes shall also be required when a dry season test hole fails to establish the groundwater table.

(c) Alteration Test Hole - Alteration test holes shall be excavated to a depth of at least eight (8) feet to obtain field data when determining site suitability for a proposed system alteration. The alteration test hole shall demonstrate that the site is capable of accepting and treating effluent from the individual sewage disposal system in soil other than unconsolidated sand and gravel outwash. A percolation test as outlined in Section SD 16.00 shall be required for every alteration test hole. Alteration test holes and the percolation tests shall be witnessed by an agent of the Director unless the Director waives such a requirement in writing.

(d) Ledge Test Hole - Ledge test holes shall be excavated in the center and four corners of the proposed leach field. When ledge is encountered, additional test holes and/or probe tests shall be required in the proposed leach field perimeter. Ledge depth shall be determined both up gradient and down gradient of the proposed leach field area. Testing shall demonstrate that ledge is at least five (5) feet below the bottom elevation of the leach field in the proposed leach field area. The five (5) foot vertical separation requirement may be waived on the up gradient side as long as ledge is no higher than the bottom of system elevation within the twenty-five (25) foot leach field perimeter (Figure 1). If ledge outcrop is visible beyond the leach field area on the down gradient side, then additional testing shall be required to provide evidence that the leach field is not surrounded by ledge. A ledge test hole shall be witnessed by an agent of the Director unless the Director waives this requirement in writing. All data concerning depths to groundwater and impervious material observed from ledge test holes and probe tests shall be submitted to the ISDS Section for review.

If during the ledge exploration work the Director determines that additional ledge test holes or probes tests are not warranted, then the agent of the Director may waive such additional testing as contained in the above paragraph.

(e) Fill Test Hole - Fill test holes shall be excavated to a sufficient depth to determine any site limitations, and the depth to original ground surface. Limitations such as depth to groundwater table and ledge shall be measured from the original ground surface. The Director may require that fill existing in the proposed leach field be removed prior to septic system installation. Fill test holes shall be witnessed by an agent of the Director unless the Director waives this requirement in writing.

#### SD 15.05 Persons Qualified to Test

(a) Percolation tests, ground water table elevation determinations, and the gathering and submission of other essential information shall be carried out by a Department licensed designer, or other persons allowed by statute, at the expense of the owner or developer.

(b) The Director may require that all soil examinations be performed in the presence of one of his agents.

(c) Class IV Soil Evaluator – Percolation tests and determination of the depth to the ground water table may be carried out by a licensed Class IV Soil Evaluator. A soil evaluation done as part of a site evaluation, as required by SD 2.01(b) for applications for new systems, shall be carried out by a Class IV Soil Evaluator at the expense of the owner or developer.

SD 15.06 Recording Results - The results of percolation tests, ground water table determinations, the description of soil, and the location of impervious formations in the area shall be recorded on forms provided by, or approved by the director. Any person making and/or witnessing the determination shall certify to the accuracy of the technical data recorded.

### **SD 16.00 Percolation Test Procedure**

SD 16.01 –

(a) Dig two or more test holes within the area of the proposed seepage system, not less than 10 feet apart. One of the holes should be at the depth of the bottom elevation of the proposed seepage system, and the second hole should be at a depth of about 18 inches below the bottom elevation of the proposed seepage system. This is to evaluate the consistency with depth of the seepage qualities of the soil. The size of the seepage system must be based on the slowest percolation rate obtained. The holes shall not be less than 6 inches in diameter or 6 inches square, nor should they be greater than 8 inches in diameter or 8 inches square.

(b) Scarify the bottom and sides of the test holes and remove all loose material. Place about 2 inches of coarse sand or fine gravel in the holes to prevent bottom scouring.

(c) Fill the holes with clear water to a minimum depth of 12 inches above the coarse sand or fine gravel. Keep water in each hole for at least four hours and preferably overnight by refilling. If necessary to maintain water in each hole for this period, provide a reservoir of water and an automatic siphon to deliver it to the holes intermittently, or the percolation test holes should be soaked and maintained full for not less than four hours before the percolation test is made. In uncompacted sandy soils containing no clay or silt, the above saturation procedure is not necessary, the test can be made as soon as the water from one filling has seeped away.

(d) The percolation test should be made following the saturation process. When the saturation process is complete, the water depth should be adjusted to 6 inches over the coarse sand or fine gravel before the test is begun. The drop in water level should be measured from a fixed reference place, such as a board laid across the hole, over 30 minute intervals, refilling the holes to a depth of 6 inches as necessary.

(e) When three consecutive readings at 30 minute intervals read the same rate, the test may be considered complete. If no stability is reached between three 30 minute readings, not less than four hours of readings must be followed. The drop in water level which occurs during the final 30 minute period is used to calculate the percolation rate. This rate is expressed in minutes per inch.

(f) Soils in which the first 6 inches of water seeps away in less than 30 minutes, after the saturation period, the time interval between measurements should be reduced to 10 minutes and the test run over a period of one hour. The drop in water level which occurs during the final 10 minute period is used to calculate the percolation rate. This rate is expressed in minutes per inch.

SD 16.02 - If an unanticipated cut in topography is made, the results of any percolation test made prior to the cut is invalid. A new percolation test shall be made under the changed conditions.

SD 16.03 - In no case shall a percolation test be made in filled or frozen ground. If a seepage system is to be located in filled ground, a percolation test must be made in the original ground.

## **SD 17.00 Procedures for Ground Water Table Elevation Determinations**

### **SD 17.01 Wet Season Determinations**

The ground water table elevation determination shall be made when the water table is highest; this occurs usually during the months of January through April. (Specific dates may be determined on a yearly basis by the director). In making this determination it is necessary to bore or dig an adequate number of holes of convenient size in the proposed leaching area to a depth of at least five (5) feet below the lowest point of the proposed subsurface seepage system. An open perforated pipe at least 4 inches in diameter shall be installed. Such pipe should remain in place until a permit has been issued by the director. This pipe shall be capped at the top and mounded to prevent the collection of surface water. All water table observations should be made during the wet season no sooner than 48 hours after excavation and shall be witnessed by an agent of the director unless otherwise waived. It is recommended that multiple water table observations be made.

### **SD 17.02 Dry Season Determinations**

Although the groundwater table is more accurately measured in the wet season, data may be available or developed throughout the year to predict the maximum groundwater table elevation during the wet season. To make a dry season determination, the applicant shall dig a ten (10) foot test hole in the location of the proposed leach field area. Each test hole shall be witnessed by an agent of the Director. In addition, the applicant shall submit data and comply with the procedures set forth in either (a) or (b) below whichever is applicable.

(a) In cases where the soil consists of: unconsolidated sand or gravel outwash to a depth of at least ten (10) feet; has a percolation rate not greater than five (5) minutes per inch; and groundwater or ledge is not encountered within ten (10) feet of original ground surface, an adjustment factor may be applied to the observed groundwater table in order to correct to the Maximum Groundwater Table Elevation. This adjustment factor is to be determined by the Director. If the corrected groundwater table depth is less than four (4) feet, or if ledge and soil other than unconsolidated sand and gravel outwash is encountered less than ten (10) feet below the original ground surface, the groundwater table must be determined in the wet season or in accordance with 17.02(b) below. A test hole shall be witnessed by an agent of the Director, and the Director or his/her agent shall make the final determination as to all factual matters.

(b) Where soil conditions are other than those described in SD 17.02(a) above, the designer shall collect, evaluate and provide to the ISDS Section all pertinent information relative to accurate groundwater table elevation determination in conjunction with the designer's specific professional conclusions and sworn affidavit as to groundwater table elevations. Such "pertinent information" to be provided to the ISDS Section shall be as follows:

- (1) Groundwater table data from an approved lot in the immediate area;
- (2) Seasonal water elevations in nearby wells and/or surface water bodies;
- (3) USDA Soil Conservation Service maps;
- (4) Any other data deemed necessary by the ISDS Section.

The Director may require that the above data be verified by one of his/her agents, and shall make the final determination as to all factual matters involved.

(c) The above procedures for dry season determinations set forth in SD 17.02(b) above may **not** be available to determine the groundwater table where;

- (1) The groundwater table is estimated to be within four (4) feet of the original ground surface; or
- (2) an impervious layer is within six (6) feet of the original ground surface; or
- (3) sewage flows from the proposed system are anticipated to meet or exceed 2,000 gallons per day; or
- (4) a variance is requested for projects not meeting procedures in SD 17.02(a); or
- (5) the existing soil is a dark silt loam such as, a Mansfield, Newport, Pittstown and/or Stissing soil series as defined by the United States Department of Agriculture Soil Survey of Rhode Island.

(d) Until such time that a site evaluation is required pursuant to SD 2.01(b)(1), the Department may allow a dry season determination under conditions that do not meet the requirements of 17.02(a)-(c) if the determination is conducted by a licensed Class IV soil evaluator done in accordance with the soil evaluation procedures in 26.01.

### **SD 18.00 Subdivisions**

SD 18.01 Subdivisions - Individual Sewage Disposal Systems - No person shall begin construction in any subdivision located in areas where sewage will have to be disposed of by means of individual sewage disposal systems until he has obtained certification from the director that the subsoil is suitable for disposal of sewage by individual sewage disposal systems. Application for such certification shall be made on forms provided by the director and accompanied by data described in SD 18.02 through SD 18.06.

SD 18.02 Topographic Map - A topographic map of the entire area under consideration shall be prepared to an appropriate engineering scale and submitted with the application. For the entire site it should show: (a) proposed house locations; (b) individual and public water supplies and sewage disposal systems; (c) rights of way or easements; (d) natural waters or water courses, swamps and marshes, wetlands, drainageways, detention basins and other depressions; (e) rock out-crops and wooded areas; (f) stone walls. The map shall also show the location of proposed water supplies and sewage disposal systems on lots within the subdivision conforming with requirements of SD 3.05. There shall also be shown, designated or reported for lands immediately adjacent - (a) natural waters or water courses within 200 feet from the property; (b) private wells within 200 feet from the parcel being considered; (c) the location of any watershed of an existing or proposed public water supply source or critical area with respect to the property; (d) the location of any existing individual sewage disposal system or drain within 100 feet of the property.

The topographic map shall show ground elevations on the tract as follows: (a) for land that slopes less than approximately 2 percent show spot elevations at all breaks in grade, along all drainage channels or swales, and at selected points not more than 100 feet apart in all directions.; (b) for land that slopes more than approximately 2 percent show broken line contours with an interval of not more than 2 feet. The datum on which the elevations or contours are based shall be reported including a permanent reference bench mark. Where cut and/or fill or more than 1 foot can be anticipated and estimated, it should be indicated by solid line contours showing approximate finished grade. Plan and profile showing existing and proposed finished grades of proposed roads must be provided.

SD 18.03 Location Map - A location map or sketch showing existing highways, streets and/or other identifiable landmarks or distances thereto, shall be furnished to facilitate an inspection of the site. This may be incorporated on the topographic map.

SD 18.04 Percolation Tests - An adequate number of percolation tests not less than one to an acre, with a minimum of two tests in small areas shall be made, to indicate clearly the soil conditions throughout the property. These tests shall be made in accordance with the procedure outlined in Section SD 15.00 and SD 16.00. Unfavorable or variable soil conditions will require more tests, up to one per lot at the proposed site of each subsurface absorption unit. The results of each percolation test and pertinent information shall be recorded in the tabulation provided on the application and the location of the percolation tests shall be marked on the topographical map and indexed by the corresponding number used in the tabulation of results.

SD 18.05 Ground Water Table - An adequate number of borings, excavations or observations shall be made by the developer to clearly establish the elevation of the ground water table in accordance with the procedure outlined in Sections SD 15.00 and SD 17.00. The ground water table determination should be made when the ground water table is at its highest level. The results of each observation and pertinent information shall be recorded in the tabulation of the application. The location of the ground water table observations shall be indicated on the topographical map and labeled in the field together with the index letter used in the tabulation of the results together with the existing ground elevations at the test hole and the maximum ground water elevations.

SD 18.06 Certification - The engineer, surveyor, soil scientist or sanitarian shall execute the certificate relating to the accuracy of the technical data on each sheet on which such technical data is recorded.

SD 18.07 Revised Plot Plans - If the lot numbers on the plot plan are revised after review, the revised plan shall be submitted for revised suitability determination.

SD 18.08 Freshwater and Coastal Wetlands

(a) Where in the opinion of the director, a substantial question exists regarding the cumulative impact of the operation of sewage disposal systems on individual lots within the subdivisions on the water quality of a unique or valuable body of ground water or surface water, the Director may require an assessment of such potential cumulative impacts, including appropriate studies, to be submitted by the applicant. Such an assessment may include a determination of the following potential impacts:

- (1) Whether the operation of such systems will result in a loss of a use assigned to that class of water quality as designated by the Department.
- (2) Whether the operation of such systems will result in a reduction in the ability of the wetland to support indigenous animal and plant life.

(b) Subdivisions which may affect coastal or freshwater wetlands are subject to the provisions of SD 2.16 and SD 2.17.

SD 18.09 - Nothing in Sections SD 18.01 through 18.08 shall prevent the director from requesting any or all of the procedures established in these regulations for a single lot if in his opinion the protection of the public health and environment so requires.

SD 18.10 Soil Survey - A copy of the page or pages of the latest Soil Survey published by the Soil Conservation Service of the U.S. Department of Agriculture illustrating the location of the subdivision.

SD 18.11 Easement Filing - Where subdivision lots will require filling over lot lines to maintain fill perimeters an easement for that fill must be submitted with the application for the individual lots.

## **PROPOSED STANDARDS FOR SITING AND DESIGN OF INDIVIDUAL SEWAGE DISPOSAL SYSTEMS IN CRITICAL RESOURCE AREAS**

### **SD 19.00 Critical Resources**

(a) Certain areas have been identified as critical resources which are deemed to be particularly sensitive to the detrimental effects of nutrients, pathogenic organisms, organic chemicals and other substances that may be present in effluent from sewage disposal systems and which are in need of special protection from such effects due to the unique and irreplaceable value of the resource as a public water supply, fisheries habitat and/or public recreation area.

(b) Standards for siting and design of individual sewage disposal systems of this section are established to enhance the wastewater treatment capability of individual sewage disposal systems and thereby reduce the potential for adverse effects to critical resources. In areas designated as critical resources, the standards of this section shall supersede minimum standards wherever applicable.

(c) Areas designated as critical resources include: (See Appendix for figures.)

(1) The South Shore Coastal Ponds of Charlestown, South Kingstown and Westerly, with their associated groundwater recharge zone as determined by the Coastal Resources Management Council SAM plan or more accurate survey of surface or groundwater flow from the disposal area, as shown in Figure 2 and listed below:

Trustom Pond	Cards Pond
Potter Pond	Ninigret Pond
Quonochontaug Pond	Winnapaug Pond
Green Hill Pond	Maschaug Pond

(2) The Scituate Reservoir and its Watershed as determined by the Providence Water Supply Board, as shown in Figure 3.

(3) The Narrow River and its watershed, as shown in Figure 4.

(d) The applicant shall be required to certify the location of a disposal area with respect to any critical area. If the Department determines that an individual sewage disposal system may be wholly or partially located within a critical resource area, the applicant shall be required to provide evidence of the location with respect to the critical resource.

### **SD 19.01 Alterations in Critical Areas**

No alteration of a building served by an individual sewage disposal system shall be approved in a Critical Area which will result in an increase in flow or change in type of wastewater discharged unless after such improvements to the building the lot satisfies, to the maximum extent possible, all design and siting requirements of the regulations in effect at the time of permit application. If the lot does not satisfy all current requirements, the alteration may only be approved if it adds no more than the equivalent of 1 bedroom beyond the number of rooms existing at the time the individual sewage disposal system was installed and does not reduce the area of the lot available for the individual sewage disposal system.

## **SD 19.02 Special Requirements for ISDS in the Coastal Pond and Narrow River Critical Resource Areas**

### **SD 19.02.1 Large Systems**

(a) Definition - A large system shall be considered any individual sewage disposal system designed, installed or operated as a single unit to treat more than 2,000 gallons per day or any combination of systems owned or controlled by a common owner and having a total design capacity of 2,000 gallons per day or more in a critical area.

#### **(b) Siting and Design**

(1) Large systems shall not be permitted where the ground water is within 5 feet of the original ground surface or where an impervious layer is within 7 feet of the original ground surface.

(2) Large systems shall not be permitted in highly permeable soils (perc rate faster than 3 minutes per inch) except where the site evaluation and impact assessment has demonstrated that ground water and surface water quality will be protected.

(3) Horizontal separation distances from large systems to wells and surface waters shall be three (3) times the minimum distances required of SD 3.05 and SD 19.02.4.

(4) Both the proposed disposal area and the alternate area shall be evaluated by soil test pits, groundwater elevation and percolation tests.

#### **(c) Environmental Impact Assessment**

(1) Determination of site suitability for large systems shall be conducted by a professional engineer registered in the State of Rhode Island.

(2) Applicants for large systems shall be required to demonstrate the capability of the proposed disposal site to accept and transmit effluent at the proposed application rate without failure or adverse effect to ground/surface water. Such analysis shall include the following:

(A) Complete site evaluation, including results of soil morphological analysis, of percolation tests, record of ground water monitoring, and location of any water course, wetlands, and any existing or proposed private well or drain within 500 feet and any existing or proposed public well within 3000 feet of the proposed disposal system; and

(B) Hydrogeologic assessment of the disposal area considering potential of pollutant loading to groundwater below the system.

#### **(d) Preliminary and Final Reports**

(1) Prior to or concurrent with preparation of detailed plans and specifications for new construction, repair or alteration of a large system, a preliminary report, describing the suitability of the site, and nature and scope of the project shall be submitted in addition to the data requirements of SD 2.02. The preliminary report shall include:

(A) Site evaluation;



- (B) Description of the system with preliminary plans and specifications;
  - (C) Volume and rate of sewage flow;
  - (D) Biological and chemical wastewater characteristics;
  - (E) Construction materials; and
  - (F) Schedule for phase development.
- (2) Complete plans and specifications shall be submitted following approval of preliminary plans to include:
- (A) Detailed plans and specifications;
  - (B) Plan of Construction; and
  - (C) Plan for operation and maintenance of the system including qualifications of those responsible for maintenance and long-term agreements for maintenance. Such plan shall fully describe the treatment and disposal system; specify frequency of monitoring and inspection of system performance; and include routine maintenance logs needed for proper operation of the system.

SD 19.02.2 Subdivisions - Assessment of impact to groundwater, freshwater and coastal wetlands in critical resource areas.

(a) An assessment of the impact of the operation of sewage disposal systems on individual lots within the subdivision shall be required where the total combined flow from each system is 2,700 gallons per day or greater. Such assessment shall include:

An evaluation of the effect of estimated pollutant loadings from the sewage disposal system to use of ground and surface waters including ability of wetlands to support indigenous animal and plant life.

(b) Analysis of the hydraulic characteristics of the site may be required for subdivisions where the total combined flow is 2,700 gallons per day or greater and where, in the opinion of the director, the density of development and/or limiting conditions limit the ability of the soil to accept and transmit effluent.

SD 19.02.3 Coordination With The Groundwater Section

(a) Application for Large System (SD 19.02.1) and subdivisions (SD 19.02.2) shall be subject to a review by the Department of Environmental Management Groundwater Section.

(b) Application for approval of plans where required, site suitability, for large systems and subdivisions shall be filed with the Individual Sewage Disposal System Section, accompanied by all required information, including a geohydrologic analysis of the site and assessment of impact to ground and/or surface waters.

(c) The Individual Sewage Disposal System Section shall forward a complete application with all required plans and information to the Groundwater Section for a determination of conformance with groundwater quality standards.

(d) The Groundwater Section shall make their findings to the Individual Sewage Disposal System Section, with a recommendation for denial or approval of the application, specifying any stipulations to be placed upon the permit.

(e) The Individual Sewage Disposal System Section shall complete review of the application and, considering the findings of the Groundwater Section, issue or deny the permit.

SD 19.02.4 Location - General - The horizontal distances between the parts of any individual sewage disposal system and the feature requiring a setback shall not be less than those shown in Table 19.1. Where a minimum distance is not specified, the requirements of SD 3.05 shall apply.

SD 19.02.5 Site Suitability - General

(a) The installation of an individual sewage disposal system is prohibited in any area where the ground water table is within five (5) feet of the original ground surface, or where an impervious layer is within seven (7) feet of the original ground surface except under the following conditions:

(b) Areas With Limiting Conditions - Unless specifically prohibited above, approval may be granted in areas where the ground water table is within 2 to 5 feet of the original ground surface, or where an impervious layer is within 4 to 7 feet of the original ground surface if the requirements of SD 15.02(b) and the following are met:

(1) The minimum distances of Tables 3.1 and 19.1 shall be maintained. In addition, a 25 foot distance shall be maintained from the disposal trench, bed or flow diffuser to any area where the ground water table is less than two (2) feet to the original ground surface, or where ledge rock is less than four (4) feet to the original ground, or any floodplain.

(2) Large systems and seepage pits shall not be permitted in areas with limiting conditions.

SD 19.02.6 Sewage Seepage Systems - General

(a) Groundwater - The bottom of the seepage system shall be at least 4 feet above the maximum elevation of the ground water table.

(b) Impervious Material - The bottom of the seepage system shall be at least six (6) feet above impervious formations. Excavating into impervious material is prohibited unless otherwise approved by the director.

**SD 19.03 Scituate Reservoir Watershed**

No system within the Scituate Reservoir Watershed shall be permitted in locations where the groundwater table is within 2 feet from the original ground surface. Subdrains to lower the water table are not permitted. All systems designed in this watershed must maintain a separation of at least 4 feet from the bottom of the system to the groundwater table as determined in SD 17.01.

**TABLE 19.1  
MINIMUM DISTANCES FOR CRITICAL AREAS  
INCLUDING SURFACE WATER RESERVOIRS**

<b>FEATURES REQUIRING SETBACK (FT)</b>	<b>DISTANCE FROM ANY SYSTEM COMPONENT</b>
Coastal Pond and Narrow River shoreline features and tributaries including storm and subsurface drains directly discharging thereto	150
Other watercourse not directly connected	100
Subsurface drains designed, or having the potential, to lower the groundwater in the vicinity of the leachfield:	
(a) Upgradient of leachfield	25*
(b) Downgradient of leachfield	75*
Private well where individual sewage disposal system is located in permeable soil (faster than 3 minutes per inch perc rate)	150
All watersheds to surface water reservoirs including perennial streams discharging there to and any storm or subsurface drains directly discharging thereto	200

\*NOTE: Applies to disposal trench, bed or flow diffusers only. Also, a minimum separation of 50 feet shall be maintained from the point of drainage discharge to any watercourse.

**GUIDELINES FOR REVIEW OF APPLICATION FOR  
INDIVIDUAL SEWAGE DISPOSAL SYSTEM VARIANCE**

**SD 20.00 Requests for Variances**

- (a) Applications for the approval of plans and specifications for an individual sewage disposal system may include a request for a variance from the provisions of the Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction, and Maintenance of Individual Sewage Disposal Systems.
- (b) Requests for variances shall be on forms provided by the Director and attested to by a Registered Professional Engineer or Registered Professional Land Surveyor.
- (c) Contents of Variance Request - The information supporting the applicant's variance request shall, at a minimum, specifically identify how the proposed system will affect:
  - (1) Public health;
  - (2) Any drinking water supply or tributary thereto, including, but not limited to, the cumulative impacts of the system to the surrounding area as described in SD 20.01(g);
  - (3) Any body of water including, but not limited to, impacts on groundwater and/or surface water quality and to the ability of the waterbody to support and/or maintain plant and wildlife as well as other designated water uses;
  - (4) Public use and enjoyment of any recreational resource; and

(5) Surrounding persons or property as a potential cause of any public or private nuisance.

(d) Nothing herein shall prevent the Director or his/her designee from requesting additional information that he/she may deem appropriate. Upon review of all evidence relating to the variance, the Director or his/her designee shall issue a written decision stating his/her findings and the bases for his/her approval or denial of the variance.

(e) Each application for an individual sewage disposal system with variance(s) shall be accompanied by a list identifying the names and addresses of the local building official and all property owners within 200 feet of any component of the proposed system for which variance(s) have been requested.

(f) Prior to submitting any variance request to the variance review process, the application's plans and/or specifications shall be reviewed by the Individual Sewage Disposal System Program Staff for compliance with all regulatory requirements. Upon review, should the Individual Sewage Disposal System Program find that the application fails to meet any regulatory requirement other than those for which the applicant has properly requested variances, the application shall be returned to the applicant.

(g) Once the applicant's plans and/or specifications have been reviewed for regulatory compliance, the applicant shall notify the local municipal building official and all property owners within 200 feet of any component of the proposed system of the pending application for an individual sewage disposal system with variance(s). Also, if a variance is requested from the minimum setback requirement to a public water supply well, public water supply distribution facility, private water line and/or a surface water reservoir including perennial streams or subsurface drains directly discharging thereto, then the applicant shall also notify the applicable public water system entity or agency. Each notice shall include:

(1) A copy of the Variance Request Form(s) submitted to the Individual Sewage Disposal Systems Program; and

(2) A cover letter conforming to a form to be provided by the Director, which shall include at least the following information:

(A) The application number;

(B) A statement of the purpose of the notification;

(C) A certificate of service;

(D) A statement advising the recipient that he/she may, within twenty (20) days of the date specified in the certificate of service, provide the Chief of the Division of Groundwater and Individual Sewage Disposal Systems or his/her designee with written comments or information bearing upon the subject application.

(3) Site plans identical to those submitted to the RIDEM ISDS Section shall be forwarded to all individuals notified for comments on the variance request.

(h) All notices shall be forwarded by certified mail, return receipt requested. The applicant shall clearly mark each return receipt with the application number and the words "Variance Request."

- (i) When all certified receipts have been returned to the applicant, copies of each cover letter, accompanied by the appropriate certified receipt, shall be filed with the Individual Sewage Disposal System Program along with a letter requesting that the application be submitted to the variance review process for final review and determination.
- (j) If a correctly addressed, certified notice is returned to the applicant, the applicant may submit the returned envelope and certified receipt, unopened, along with the other return receipts as proof of the applicant's good faith attempt to serve the notice.
- (k) All timely submitted comments and information relating to the intent and purpose of these regulations shall be considered during the variance review process.

#### **SD 20.01 Variance Review Process**

(a) Preliminary Review and Recommendation - All requests for variance(s) shall be reviewed by the ISDS Program's Staff Engineers for the purpose of determining whether such variance(s) would be contrary to the public health, the public interest or the environment. As part of their review of any request for variance(s), the Staff Engineers shall consider:

- (1) All evidence submitted by the applicant, the local building official and the notified property owners bearing upon the subject application;
- (2) Any limiting conditions of the site, including, but not limited to: the sensitivity and use of the ground/surface waters to be protected; the amount and type of wastewater discharged; the ability of the site to accept, transmit and renovate effluent; the intensity of the use of the surrounding area and other site suitability factors;
- (3) The number and extent of the limiting conditions at the site and surrounding area; and
- (4) Whether the site characteristics are less than optimum for wastewater disposal.

(b) Consultation with Experts - In conducting their review of the applicant's variance requests, the ISDS Program Staff Engineers may also consult with other experts, whether employed by the Department or not.

(c) Recommended Determination - Upon completion of their review, the ISDS Section Staff shall prepare a written recommendation of approval or denial of the variance request. The review shall identify the factors considered in the review process, specify the bases for their recommendation, and identify any suggested conditions for approval.

(d) Final Determination - Upon his/her review of the recommendation submitted in accordance with SD 20.01, above, the Director or his/her designee shall render a final decision approving or denying the requested variance(s). In arriving at his/her final decision, the Director or his/her designee may:

- (1) Adopt the recommendation, with or without additional written comments or conditions; or
- (2) Reject the recommendation and render his/her own decision; in which case the Director or his/her designee shall render a written decision specifying the bases for the rejection; or
- (3) Remand the matter back to the ISDS Program Section Staff for further review and consideration of certain specified factors.

(e) Further Evaluation - Where the Director or his/her designee has reason to believe that groundwater and/or surface water quality at the site or surrounding area is a concern, or that the variance(s) requested will impact groundwater and/or surface water quality, he/she may require the applicant to submit a detailed engineering evaluation discussing the impacts of the requested variance(s) on groundwater and/or surface water quality. Such evaluations may include, but not be limited to, geohydrologic evaluations and water quality impact analyses of the site and surrounding area.

(f) Cumulative Impact Assessment - Any application for an ISDS proposed to be installed on a lot less than 10,000 square feet in area which requires more than one variance and which will be located within 100 feet of any public or private well will not be approved unless a "Cumulative Impact Assessment" of the variances is conducted by the applicant and submitted to the Department along with the request for variance. The Cumulative Impact Assessment shall include, but not be limited to; a description of all abutting properties identifying the location of all individual sewage disposal systems, alternate disposal areas, surface waters, wetlands, and private or public wells; a concise description of all variances granted in the permitting of these abutting individual sewage disposal systems; and any additional information which the Director, in his/her discretion, may deem appropriate.

(g) Five Year Life of Date - No requests for a variance from the requirement that soil and water table data must have been determined within the past 5 years shall be considered.

(h) Lots Under 10,000 Square Feet - No requests for variances will be considered for new lots under 10,000 square feet platted or otherwise created after June 18, 1992.

#### **SD 20.02 Variance Review Standards**

(a) Approval - A request for variance from the minimum standards set forth in these regulations shall be approved if it is determined that such a variance(s) will not be contrary to the public health, the public interest, or environmental quality.

(b) Denial - A request for variance from the minimum standards set forth in these regulations shall be denied when:

(1) The evidence fails to demonstrate that the same degree of environmental protection provided under these regulations can be achieved without strict application of the provision for which the variance has been requested;

(2) The evidence demonstrates that the individual sewage disposal system will not function as proposed in the application; or

(3) The evidence indicates that the approval of the system would otherwise be contrary to the public health, the public interest, or environmental quality.

(c) Terms and Conditions - The variance decision may contain such terms and conditions as it deems necessary to protect the public interest and the public health.

**TABLE 20.1  
GUIDELINES FOR REVIEW OF VARIANCE REQUESTS RELATING TO RESIDENTIAL USES  
DISCHARGING 450 GALLONS PER DAY OR LESS\***

ITEM	MINIMUM STANDARD ALLOWABLE AFTER VARIANCE
Distance from private well	80'
Distance from watercourse, marsh, swamp, bog or pond	35'
Distance from surface drinking water supply and tributaries directly discharging thereto	NO VARIANCE ALLOWED
Distance from critical resource area:	
-Coastal ponds and tributaries directly discharging thereto	100'
Depth to Water Table:	
-Water table less than 2 feet from original ground surface	NO VARIANCES ALLOWED
-Water table between 2 and 4 feet from original ground surface or filled system under SD1.00; <u>and</u> system not in conformance with SD15.02(b) or distances to wells and watercourses under SD3.05	
Depth to Impervious Layer:	
-Impervious layer less than 4 feet from bottom of system	NO VARIANCES ALLOWED
-Impervious layer 4 to 6 feet from original ground surface and system not in conformance with SD15.02(b) or distances to wells and watercourses under SD3.05	
Fill perimeter (SD3.05)	15' (upgradient side only)
Side wall distance to impervious layer:	
-System in critical resource area <u>or</u> where public water is not available <u>or</u> where impervious layer located downgradient from system	NO VARIANCE ALLOWED
-Other areas	10' (upgradient only)
Percolation Rate:	
-System in critical resource area or where public water is not available	Not faster than 1 min/inch
-Other areas	Not slower than 60 min/inch

\* **NOTE:** These guidelines establish baselines below which it is highly unlikely that variances will be granted except in the most unique of circumstances. The minimum standards allowable after variance listed above, represent variances which may be granted under optimum conditions and are in no way intended to establish new minimum standards or to in any way guarantee the award of any particular variance request. These guidelines are made public for the sole purpose of informing ISDS designers and installers and the general public of the limits of the variance review process.

## **SD 21.00 Right to Appeal**

Any person whose permit application is denied may appeal to the Director for review of the decision on which the denial is based by filing an appeal with the Administrative Adjudication Division.

### **SD 21.01 Appeal Procedure**

(a) Filing of Appeal - All appeals shall be in writing and shall be filed with and received by the Department's Administrative Adjudication Division within thirty (30) days after the effective date of the denial of the subject application.

(b) Contents of Appeal - Every appeal shall contain:

- (1) A detailed basis upon which the appeal is taken;
- (2) A plat plan of the area of the subject application;
- (3) A list of the names and addresses of:
  - (A) The applicant;
  - (B) The municipality in which the property is located;
  - (C) The owner of any surface water supply as identified by SD 2.02(e), if applicable; and
  - (D) The owners of record of real property within a 200 foot radius of any component of the applicant's proposed individual sewage disposal system; and
- (4) A certified check, bank draft or money order in the amount of one thousand five hundred (\$1,500) dollars in accordance with SD 23.04.

(c) Notice of Administrative Hearing - Upon the filing of an appeal with the Administrative Adjudication Division, and once the hearing schedule allows, the Administrative Adjudication Division shall notify the following, by first class mail, of the date, time and place of the adjudicatory hearing, in conformance with R.I. General Laws Section 42-35-9, as amended: the applicant; the municipality in which the property is located; the owner of any surface water supply as identified by SD 2.02(e), if applicable; and the owners of record of real property within a 200 feet of any component of the applicant's proposed individual sewage disposal system.

(d) Conduct of Hearing - The notice and conduct of the hearing by the Department of Environmental Management, Administrative Adjudication Division, shall comply in all respects with the provisions of the Administrative Procedures Act, R.I. General Laws Chapter 42-35, and the Rules of Practice and Procedure for the Administrative Adjudication Division for Environmental Matters.

### **SD 21.02 Burden of Proof and Standard of Review**

(a) At the adjudicatory hearing, the applicant shall have the burden of proof to demonstrate through clear and convincing evidence that:

- (1) A literal enforcement of the regulations will result in unnecessary hardship;



(2) That the system will function as proposed in the application; and

(3) That the issuance of a permit will not be contrary to the public interest, public health and the environment.

(b) In order to demonstrate that the proposed Individual Sewage Disposal System will not be contrary to the public interest, public health and the environment, the applicant must introduce clear and convincing evidence to the satisfaction of the Director that:

(1) The waste from the proposed system will not be a danger to public health;

(2) The disposal system to be installed will be located, operated and maintained so as to prevent the contamination of any drinking water supply or tributary thereto;

(3) The waste from the proposed system will not pollute any body of water or wetland;

(4) The waste from the proposed system will not interfere with the public use and enjoyment of any recreational resource; and

(5) The waste from the proposed system will not create a public or private nuisance.

(c) The Director, or his/her designee, may approve a permit or grant a variance from any provision of these rules and regulations where he/she finds that:

(1) A literal enforcement of such provisions will result in unnecessary hardship to the applicant;

(2) That the system will function as proposed in the application; and

(3) That the permit or variance sought will not be contrary to the public interest, public health and the environment.

(d) The decision of the Director, or his/her designee, may contain such terms and conditions as he/she deems necessary to protect the public interest, public health and the environment.

### **SD 22.00 Applicability**

SD 22.01 - The above-stated rules and regulations shall be applicable to any and all application filed with the director pursuant to SD 2.00 on or after the effective data of these rules.

SD 22.02 - A request for a variance pursuant to SD 20.01 may be filed with the director where an application was filed with the director on or before the effective data of these rules, provided that:

1. No action has been taken by the director denying or approving such application, or

2. Action has been taken by the director denying such application but an appeal has been requested pursuant to SD 21.01 et seq. of these rules.

SD 22.03 - Severability

If any section or provision of these rules and regulations is held invalid by a court of competent jurisdiction, the remaining sections or provisions of these rules and regulations shall not be affected thereby.

SD 22.04 - New Products/System Design Conditional Approval

Based upon submission of engineering research and testing data indicating that certain products, design and performance are equal to or greater than these standards, the Director may grant conditional approval for the use of systems, products or procedures differing from these standards.

**SD 23.00 Fee Schedules**

All persons, except for state and local governmental entities, shall be liable for the payment of fees to the Department of Environmental Management as set forth below:

DESCRIPTION	FEE
(a) Water Table Verification for Individual Lots:	
1) Wet Season Test Holes	\$50.00 per system
2) Dry Season, Ledge, Fill and Alteration Test Holes	\$100.00 per system per site
(b) Water Table Verification for Subdivisions (per test hole submitted, with a maximum charge per submittal of one test hole per ISDS as per local zoning)	\$35.00
(c) Soil Evaluations for Individual Lots	\$100.00
(d) Soil Evaluations for Subdivisions (per evaluation submitted, with a maximum charge per submittal of one evaluation per ISDS as per local zoning)	\$50.00
(e) Reinspection (beyond 3 site visits)	\$50.00
(f) Application Fees for New Systems and Alterations of Existing Systems (per application):	
(1) Single Family Residences:	
(A) Single Family Residence	\$150.00
(B) Transfer	\$30.00
(2) Commercial Systems:	
(A) Less than 2,000 gpd	\$200.00
(B) 2, 000 gpd to 4, 999 gpd	\$500.00
(C) 5, 000 gpd to 9, 999 gpd	\$1,000.00
(D) 10,000 gpd or More	\$2,000.00
(E) Transfer	\$30.00
(3) Subdivision Review	
(A) 1 to 9 Lots	\$100.00 per lot
(B) 10 Lots or More	\$1,000.00 plus \$50.00 per lot for each lot over 10
(4) Component Relocation or Addition Only, Excluding the Leachfield	\$50.00

DESCRIPTION	FEE
(g) Application for Repair of Existing System:	
(1) Single Family Residence	\$100.00
(2) Commercial Systems	
(A) Less than 2,000 gpd	\$150.00
(B) 2,000 gpd to 4,999 gpd	\$300.00
(C) 5,000 gpd to 9,999 gpd	\$600.00
(D) 10,000 gpd or More	\$1,000.00
(3) Component Replacement Only, Excluding the Leachfield	\$50.00
(h) Application for System Suitability Determination	\$55.00
(i) Variance Request for New Systems: Residential and Commercial (fee is in addition to application fee in 23.00(f))	\$300.00
(j) Where an application for a new system, alteration or variance is determined to be deficient, the Department may assess a resubmission fee that is equal to 50% of the original fee if the application had previously been reviewed by the Department and one or more deficiencies had not been properly addressed. In no case shall this resubmission fee exceed \$300.00.	
(k) Installer's Licenses:	
(1) New License Application	\$55.00
(2) License Renewal	\$30.00 per annum
(l) Innovative or Alternative Technology:	
(1) Alternative System or Technology:	
(A) Class One	\$500.00
(B) Class Two	\$1,000.00
(2) System Component:	
(A) Class One	\$200.00
(B) Class Two	\$300.00
(3) Experimental System or Technology	\$2,000.00
(4) Renewal of Innovative or Alternative Technology Application:	
(A) Alternative System or Technology Class Two	\$500.00
(B) System Component Class Two	\$150.00
(C) Experimental System or Technology	\$1,000.00
(m) Class I, II, III, and IV Licenses:	
(1) Examination Application	\$50.00
(2) License Fee (maximum of 2 years)	\$100.00
(3) License Renewal (2 year period)	\$100.00

#### SD 23.01 Modification Costs

If a person modifies the initial submittal, renewal or other request made to the Department for any reason, he/she shall be liable for payment of an additional fee. The cost per modification, shall never exceed the fees for a new submission set forth in SD 23.00 above. These additional fees shall be collected prior to the Department's review of the modification(s) under consideration. No final approval or denial shall be issued by the Director until such time as these additional fees have been received.

<b>DESCRIPTION</b>	<b>FEE</b>
Designers Affidavit Continuing Validity - per lot	\$30.00
Designers Affidavit – Subdivisions	\$100.00
Revision to Subdivision (1 to 9 lots) per lot	\$30.00
Revision to Subdivision (10 or more lots)	\$300.00
As Built - Requested or Submitted	\$30.00
Redesign - Single Family	\$80.00
Redesign - Commercial - less than 2,000 gpd	\$105.00
Redesign - Commercial - more than 2,000 gpd	\$205.00

#### SD 23.02 Reinspection Fees

Reinspection fees will be assessed after the third site visit for each approved application and shall be paid prior to the next inspection. Fees for witnessing soil examinations may be assessed at any time prior to issuing a conformance when, in the opinion of the Director, there is cause to believe soil data and/or percolation data is inaccurate.

#### SD 23.03 Payment of Fees

All fees shall be due at the time the initial form and/or request is submitted to DEM requesting that it undertake one of the activities specified in SD 23.00 above. The Department will not undertake any such activity until payment has been received.

#### SD 23.04 Costs of Appeal

Any person who requests an appeal pursuant to SD 21.01 shall also be liable for fees to cover costs incurred in the holding of the hearing. The fee shall be sufficient to defray the costs incurred by the Administrative Adjudication Division for, but not limited to: all investigations; the appearance of a stenographer and the original transcript; renting a room, when necessary; and the costs associated with the appearance of the hearing officer. The applicant must pay the Director the sum of \$1,500.00 as a deposit against the actual costs of a hearing before a hearing will be scheduled.

#### SD 23.05 Deposit of Fees Collected

All monies collected pursuant to SD 23.00 through SD 23.03, above, shall be paid into the "Water and Air Protection Program" account, established pursuant to R.I. General Laws § 42-17.1-2(z), as amended. All monies collected pursuant to SD 23.04 shall be paid into a restricted account established within the Administrative Adjudication Division.

#### SD 23.06 Water Table Verification

(a) All water table levels certified by a registered professional engineer or registered professional land surveyor shall be subject to on-site verification by the Department on a random basis, or when such certification is suspected to be incorrect, or when the site is located in certain sensitive land areas in the State.

(b) In the event that said certification is determined by the Department to be incorrect following an on-site verification, the Department may reject the application and require resubmittal thereof with a new water table level certification and the payment of an additional filing fee to be determined by the Director.

(c) The fees prescribed in SD 23.00(b), above, shall not be charged for any test hole that the Department shall require the applicant to install in addition to the one-per-system maximum unless the data gathered from the additional test hole indicates that the original data was false or misleading. See SD 2.19(e) and (f).

#### **SD 23.07 Commercial Systems**

For the purpose of assessing fees, all duplex and multi-family residential individual sewage disposal systems shall be considered commercial systems.

#### **SD 23.08 Specially Engineered Systems**

For the purposes of assessing variance request fees, the term "Specially Engineered System" shall mean any ISDS for which the applicant proposes to use a pre-engineered design not otherwise contained in or approved by these regulations or DEM, or proposes to demonstrate by means of a detailed engineering evaluation and study report that the proposed system will function adequately.

#### **SD 24.00 Consistency**

No provision of these regulations nor approval granted hereunder shall be construed to prevent enforcement of any other state, federal or local laws and regulations duly adopted for the purpose of protecting the public health and/or environmental quality.

#### **SD 25.00 Licenses**

##### **SD 25.01 License Required**

(a) Beginning one year after the issuance of the first Class I, II, or III Designer's License, no person shall prepare plans, applications, certifications and specifications for the design of an ISDS that is to be submitted to the Department pursuant to these regulations, unless such person has a valid license in accordance with the provisions of this section to conduct such activity.

(b) Beginning one year after the issuance of the first Class IV Soil Evaluator's License, no person shall submit a site evaluation report required by these regulations unless the soil evaluation component of the site evaluation is completed by a person holding a valid license in accordance with the provisions of this section.

##### **SD 25.02 Licenses**

(a) Class I Designer's License -- A Class I license authorizes the design of a repair to an existing ISDS, or any component thereof, provided that the repaired system meets one of the criteria below:

- (1) Conventional ISDS for residential use with a design flow of less than or equal to 900 gallons per day; or
- (2) Alternative system for residential use designated by the Director as suitable for a Class I designer with a design flow of less than or equal to 900 gallons per day.

(b) Class II Designer's License -- A Class II license authorizes the design of the following:

- (1) The design of a repair or alteration for an existing system, provided that the repaired or altered system meets one of the criteria below:
  - (A) Conventional ISDS for residential use with a design flow of less than or equal to 2000 gallons per day;
  - (B) Alternative system for residential use designated by the Director as suitable for a Class II designer with a design flow of less than or equal to 2000 gallons per day;
  - (C) Conventional ISDS for commercial use with a design flow of less than or equal to 900 gallons per day; or
  - (D) Alternative system for commercial use designated by the Director as suitable for a Class II designer with a design flow of less than or equal to 900 gallons per day.

(2) The design of a new system, provided that the system meets one of the criteria above in (b)(1)(A)-(D) and the system is on a lot that does not require a variance from any of the following provisions of the regulations:

- (A) SD 15.02 -- in regards to the prohibition of system installation in areas where there is a shallow depth to the groundwater table or to an impervious layer from the original ground surface;
- (B) SD 3.05(6) and 3.05(10); or
- (C) In critical resource areas, as defined in SD 19.00, setbacks established in Table 19.1 and SD 3.05(1).

(c) Class III Designer's License -- A Class III license authorizes the design of any ISDS provided for under these regulations.

(d) Class IV Soil Evaluator's License -- A Class IV license authorizes the performance of soil evaluations described in SD 26.00. Persons holding a Class IV license will be referred to herein as soil evaluators.

**SD 25.03 Obtaining a License**

(a) Any person seeking a license under these regulations will be required to pass the appropriate examination administered by the Department. Each applicant for an examination shall submit a completed application to the Director, which shall include the non-refundable examination application fee of \$50. In the event that a person fails an examination given pursuant to these regulations, there shall be a \$50 fee for each subsequent time an examination is taken.

(b) In order to qualify for an examination, the applicant must demonstrate to the Department with appropriate documentation that the minimum qualifications below are met for the respective examination:

- (1) Class I -- A valid license authorizing the installation of ISDSs pursuant to RI General Laws Chapter 5-56, or registration as a Professional Land Surveyor with the Rhode Island State Board of Registration for Professional Land Surveyors, or Registration as a Professional Engineer with the Rhode Island State Board of Registration for Professional Engineers. Professional Engineers registered in Rhode Island after December 31, 1994 must be registered as a Civil Engineer or Environmental Engineer.

(2) Class II -- Registration as a Professional Land Surveyor with the Rhode Island State Board of Registration for Professional Land Surveyors or Registration as a Professional Engineer with the Rhode Island State Board of Registration for Professional Engineers. Professional Engineers registered in Rhode Island after December 31, 1994 must be registered as a Civil Engineer or Environmental Engineer.

(3) Class III -- Registration as a Professional Engineer with the Rhode Island State Board of Registration for Professional Engineers. Professional Engineers registered in Rhode Island after December 31, 1994 must be registered as a Civil Engineer or Environmental Engineer.

(4) Class IV

(A) The minimum qualifications for the Class IV exam shall be satisfied by meeting any one of the following:

(i) Registration as a professional soil scientist by the Society of Soil Scientists of Southern New England or the American Registry of Certified Professionals in Agronomy, Crops and Soils; or

(ii) 4 years professional experience in soil studies and percolation testing for septic system design in Rhode Island or in soil classification, mapping, interpretation or a combination thereof; and successful completion of 9 semester hours in soil science from an accredited college or university; or

(iii) 2 years professional experience in soil studies and percolation testing for septic system design in Rhode Island or in soil classification, mapping, interpretation or a combination thereof; and a bachelor's degree or graduate degree from an accredited college or university in soil science, geology, engineering or similar discipline with successful completion of 9 semester hours in soil science;

(B) The Director reserves the right to determine which courses are acceptable in meeting the requirement for 9 semester hours in soil science in (A)(ii) and (iii) above. The Director may determine that certain courses or training other than those from an accredited college or university are an equivalent and acceptable alternative to all or part of the requirement in (A)(ii) and (iii) above for 9 semester hours in soil science.

(c) An examination shall be given for each class at least once per year, once the first examination in that class has been given. Minimum passing score for an examination shall be a 70 percent correct response for all questions comprising the examination.

(d) Examination Description:

(1) The examination for a Class I designer's license shall be a written examination that, at minimum, addresses the following:

(A) Principles of on-site sewage treatment and disposal;

(B) Understanding of the applicable state regulations;

(C) Analysis of ISDS failures; and

(D) Design and construction of ISDS repairs, with consideration given to soil types and related constraints.

(2) The examination for a Class II designer's license shall be a two part written examination that, at minimum, addresses the following:

(A) Part One shall consist of the test given for a Class I license; and

(B) Part Two shall, at minimum, address the following:

(i) Advanced principles of on-site sewage treatment and disposal;

(ii) Understanding of the applicable state regulations; and

(iii) Design and construction of new ISDSs, including constraints to design imposed by soils.

(3) The examination for a Class III designer's license shall be a two part written examination:

(A) Part One shall consist of the test given for a Class II license; and

(B) Part Two shall, at minimum, address the following:

(i) Understanding of additional applicable state regulations;

(ii) Groundwater hydrology;

(iii) Commercial wastewater treatment;

(iv) Advanced wastewater treatment technologies; and

(v) Operation of electrical and mechanical components of wastewater treatment systems.

(4) The examination for a Class IV soil evaluator's license shall have a written and field component, each of which shall be graded separately. The written and field examinations for Class IV do not have to be passed concurrently. However, if more than 2 years elapses between the applicant passing the written and field components of the examination, the applicant must retake that portion of the examination originally passed more than 2 years earlier. The soil evaluator's examination shall at minimum address the following:

(A) Principles of on-site sewage treatment and disposal;

(B) Understanding of the applicable state regulations;

(C) Geology and soils of Rhode Island;

(D) Soil textural analysis and profile descriptions;

(E) Estimating mean seasonal high groundwater elevations using soil morphology; and

(F) Soil moisture and drainage characteristics of soils.



(e) Completed applications for examinations, fees and evidence that the applicant meets the minimum qualifications specified in SD 25.03(b) shall be received by the DEM at least 45 days prior to the date of the applicable examination.

(f) Within 30 days of receipt of an application for an examination, the applicant shall be notified as to whether the minimum qualifications in SD 25.03(b) have been met, if more information is needed, or if the applicant is eligible for the examination. If the applicant is determined ineligible, the Department shall provide the applicant with reasons for the determination. The applicant may appeal the Director's decision of ineligibility with the Administrative Adjudication Division.

(g) Applicants who meet the minimum qualifications in SD 25.03(b) and hold a license from another state or federal agency having licensing requirements substantially equivalent to those in Rhode Island may petition the Director to waive the portion of the examination requirements concerning technical competency within the respective class of license. All applicants will, at minimum, be required to take that portion of the exam regarding the applicable Rhode Island regulations.

(h) The Department shall notify the applicant of examination results no later than 60 days after the examination date. For those applicants that pass the examination, the notification will include a license registration form to be submitted to the Department along with the license fee.

(i) A license fee of \$100 shall be received by the Department prior to the Department issuing the license. Initial licenses issued pursuant to this Rule shall be in effect for a maximum of 2 years.

(j) The license shall be issued to natural persons only and is not transferable or assignable.

#### **SD 25.04 Expiration, Renewal and Reinstatement of License**

(a) Once a license issued pursuant to this Rule has expired, the person that held such license is prohibited to practice as a licensed designer or soil evaluator.

(b) A license issued pursuant to this Rule may be renewed provided that:

(1) The application for renewal is received at least 30 days prior to the license's expiration date;

(2) The applicant pays the renewal fee of \$100 for the two year renewal period;

(3) The applicant certifies that he/she continues to hold the professional license(s) required as a minimum qualification to obtain the designer's license in SD 25.03(b)(1)-(3); and

(4) The applicant demonstrates satisfactory completion of a minimum of eight classroom hours of appropriate continuing education since the applicant's license was last issued. The Director shall develop and maintain a list of approved training courses, which shall be distributed annually to licensees.

(c) If a license has expired for less than one year, the license may be reinstated in accordance with SD25.04(b)(2)-(4) above. If the license has expired for greater than one year, the license may be reinstated provided the request is made within three years of the license expiration, the applicant pays a reinstatement fee equal to the number of years the license has expired multiplied by \$100, and the applicant demonstrates compliance with SD 25.04(b)(3) and (4) above. If the license is not reinstated within the 3 year period after expiration, the applicant must reapply for the license and take the appropriate examination.

### **SD 25.05 Disciplinary Action**

(a) The Director shall establish a means to monitor licensed designers' and soil evaluators' compliance with the provisions of these regulations. Where the Director has identified negligence, incompetence or misconduct on the part of a licensee in fulfilling the requirements of these regulations, the Director may issue a notification letter to the licensee documenting the transgression. A copy of the notification shall be placed in the licensee's file, and a copy shall be provided to the Review Panel established pursuant to SD 25.05(d) below.

(b) The Director may deny, suspend or revoke a license if the person has failed to comply with the requirements in these regulations or where the person:

- (1) Provided incorrect, incomplete or misleading information in obtaining the license;
- (2) Demonstrated gross or repeated negligence, incompetence or misconduct in representation of site conditions in an application to the Director, design of an ISDS, or inspection or certification of an installation of an ISDS;
- (3) Committed a felony involving moral turpitude; or
- (4) Has a professional license that is a minimum qualification to obtain the designer's license in SD 25.03(b)(1)-(3) which has expired, is suspended or is revoked.

(c) The Director may deny the renewal of a license if the person has failed to comply with the requirements in these regulations or where the person:

- (1) Provided incorrect, incomplete or misleading information in obtaining the license;
- (2) Demonstrated gross or repeated negligence, incompetence or misconduct in representation of site conditions in an application to the Director, design of an ISDS, or inspection or certification of an installation of an ISDS;
- (3) Committed a felony involving moral turpitude;
- (4) Failed or neglected to comply with the continuing education requirements; or
- (5) Has a professional license that is a minimum qualification to obtain the designer's license in SD 25.03(b)(1)-(3) which has expired, is suspended or is revoked.

(d) The Director shall appoint a Review Panel which shall consist of 5 members, at least 3 of whom shall be licensed under this Rule and not be employed by the Director. The Review Panel shall conduct regular meetings as needed, but shall meet not less than once every 6 months. The Review Panel shall have the authority to:

- (1) Review complaints against licensed designers and soil evaluators, including requesting information to aid such review;
- (2) Recommend to the Director to suspend or revoke a license, including recommendations on the time period for the suspension or revocation which would depend on the severity of the actions involved.

(e) The Director shall be responsible for all final decisions regarding denial, suspension and revocation of licenses issued pursuant to these regulations as well as any other disciplinary actions to be brought against a licensee. Nothing herein shall prevent or restrict the Director from initiating any disciplinary action regarding denial, suspension or revocation of a license without the recommendation of the Review Panel.

(f) The procedure for Departmental review of complaints is described below. At any time during the review of the complaint, the Director may request an informal meeting with the licensee to discuss the complaint.

(1) Upon receipt of a written complaint regarding a licensed designer or soil evaluator, the Director shall contact the licensee and all relevant parties to the complaint as part of the Director's preliminary review.

(2) If as a result of the preliminary review, the Director concludes that the complaint lacks merit or is not within the Department's jurisdiction under these regulations, the Director shall dismiss the complaint and no record of the complaint shall be placed in the licensee's file.

(3) If as a result of the preliminary review, the Director concludes that the complaint may have merit, the Director shall forward the complaint and a report of any findings to the Review Panel.

(4) The Review Panel shall review the complaint and make recommendations appropriate to its authority to the Director.

(g) Before the Director suspends or revokes a license, the Director will issue a Notice of Intent to Revoke/Suspend a license to the licensee notifying the licensee of the Director's intention to revoke or suspend the license and the reasons why the Director intends to take such action. The licensee receiving the Notice of Intent to Revoke/Suspend may request a preliminary hearing before the Director or his or her designee to show cause why the Director should not revoke or suspend the license. Such hearing shall be held within 30 days of receipt of a written request for such preliminary hearing. If the licensee fails to request a preliminary hearing within 10 days of receipt of the Notice of Intent to Revoke/Suspend, or fails to show cause to the Director or his or her designee why the Director should not revoke or suspend the license, the Director may revoke or suspend the license in accordance with these regulations.

(h) The licensee may request a hearing on the denial, suspension, or revocation of a license with the Department of Environmental Management, Administrative Adjudication Division within 30 days of the date of receipt of such notice. Pursuant to Rhode Island General Laws section 42-17.1-2, as amended, and the Rules of Practice and Procedures for the Administrative Adjudication Division for Environmental Matters, a request for hearing must be received by the Administrative Adjudication Division within 30 days in order to be timely filed.

(i) The Director may publicly censure any licensed designer or soil evaluator whose license has been suspended or revoked.

(j) Any person with a suspended license is prohibited from renewing the license or applying for a new license for the period of the suspension.

(k) Any person who has a license revoked pursuant to this Rule shall not petition the Director for reinstatement for a period of time to be determined by the Director.

## **SD 26.00 Site Evaluation**

(a) Site evaluations required by the Department in accordance with SD 2.01 shall be done in a manner described in this section. The site evaluation shall provide information that will determine the acceptable types of ISDSs for a site. The site evaluation report shall:

- (1) Describe and interpret soil morphology in regards to the proper functioning of ISDSs utilizing the soil as part of the treatment process;
- (2) Characterize the lithologic and hydrologic limiting layers affecting the siting and functioning of ISDSs; and
- (3) Document site limitations for the placement of ISDSs.

(b) The site evaluation report shall be prepared on forms approved by the Director. The site evaluation report shall contain a site sketch and identification of specific site conditions and limitations relative to the proposed disposal area. The report shall include, but not be limited to, the information below. The information in (1) and (2) below, which shall be referred to as the soil evaluation, shall be completed by a Class IV soil evaluator, and may be required to be witnessed by the Director in accordance with SD 26.00(c) and (d). The soil evaluation shall be done in accordance with SD 26.01. The information in items (3)-(11) shall be completed by a Class II or III designer or Class IV soil evaluator.

- (1) Comprehensive soil profile description and textural analysis identifying the characteristics and using the terminology in Appendix 1;
- (2) Identification of seasonal high water table;
- (3) Assessment of depth to bedrock done in accordance with SD 15.04(d);
- (4) General description of slope;
- (5) Presence of any watercourse, wetlands, surface water bodies, existing and proposed private drinking water wells within 200 feet;
- (6) Presence of any public drinking water wells within 500 feet;
- (7) Determination if the site is within the watershed of a public drinking water reservoir or other critical area defined in SD 19.00;
- (8) Areas on the site where soil has been excavated and where fill has been deposited determined in accordance with SD 15.04(e);
- (9) The site's potential for flooding;
- (10) Approximate location of property lines; and
- (11) Any other relevant information about the site.

(c) The Director shall determine if the soil evaluation component (SD 26.00(b)(1) and (2)) of the site evaluation must be witnessed by the Department. An application to schedule the soil evaluation shall be submitted to the Director prior to conducting the soil evaluation field work on the site. Such application will be on forms approved by the Director and will require at minimum a locus map and photocopy of the relevant page or section thereof from the USDA Soil Survey with the site location marked. The Director shall notify the applicant within 10 business days of receipt of the application as to whether or not the soil evaluation must be witnessed by the Department.

(d) Soil evaluation to be witnessed by the Department

(1) At the time of the notification in SD 26.00(c) above, an appointment will be scheduled for the Department to witness the soil evaluation. This time shall be within 15 business days of the Director's notification in SD 26.00(c) above.

(2) Requests for cancellation of the soil evaluation appointment will be accepted by the Director up to 24 hours in advance of the scheduled appointment, and if requested, will be rescheduled for the next available date. All other cancellations, including instances where the Director is on-site and the licensed designer or soil evaluator is not present, will require reapplication to the Director. If the Director is not on-site for the scheduled appointment, the completed site evaluation report shall be submitted to the Director prior to the submission of the application for an individual sewage disposal system permit.

(3) The soil evaluator shall complete the soil evaluation form prior to the arrival of the Director on-site for the scheduled appointment with the Department. While in the field, the Director shall determine which of the following apply:

(A) The Director concurs with the soil evaluation. An application for an individual sewage disposal system permit may be submitted to the Director along with the submission of the complete site evaluation report; or

(B) The Director does not concur with the soil evaluation, in which case the complete site evaluation shall be submitted to the Director in accordance with SD 26.00(f) prior to the submission of the application for an individual sewage disposal system permit.

(e) Soil evaluation not to be witnessed by the Department – If the Director determines that the Department need not witness the soil evaluation, the licensed designer or soil evaluator shall notify the Department during normal business hours by telephone of the date and time of the soil evaluation at least 24 hours prior to conducting the soil evaluation. The Department, at its discretion, may make unannounced inspections of any soil evaluation. The complete site evaluation report shall be submitted to the Director prior to the submission of the application for an individual sewage disposal system permit.

(f) The site evaluation report shall be submitted to the Director within 90 days of the date of the soil evaluation, unless wet season monitoring is necessary in accordance with 26.01(c)(4) to determine the seasonal high water table, in which case the site evaluation shall be submitted to the Director with the wet season monitoring data. After review of the site evaluation report, the Director shall either:

(1) Approve of the site evaluation;

(2) Determine that the site evaluation is not in compliance with these regulations or that more information must be collected, in which case a revised site evaluation report must be submitted to the Director; or

(3) Disclaim the determinations of the site evaluation, and provide an explanation for not accepting it.

(g) The site evaluation report shall be accompanied by a certification, on a form approved by the Director, that the site evaluation was conducted in a manner consistent with these regulations and that it is an accurate portrayal of site conditions on the day and time they were conducted. If more than one person licensed under these regulations participated in the development of the site evaluation report, the report must specify who prepared which part and include a certification from each licensee.

(h) Approval of a site evaluation indicates only that the site evaluation was conducted in compliance with these regulations. It is not an indication of the correctness or quality of the site evaluation.

### **SD 26.01 Soil Evaluation—For Persons Licensed as a Class IV Soil Evaluator in Accordance with Section 25.00**

(a) Soil Observation Pits - A minimum of two soil observation pits shall be excavated within the area of the proposed leachfield, with one pit on the uphill side and one on the down hill side of the proposed leachfield. The Director may waive the requirement for a second soil observation pit where the conditions indicate that such pit is not necessary.

(1) The observation pits shall be excavated to a depth of 5 feet, unless site conditions prevent doing so, in order to allow detailed examination by the soil evaluator. The soil evaluator shall complete the soil evaluation form provided by the Director using the terminology in Appendix 1.

(2) From 5 feet to a minimum of 10 feet, to the extent possible, the soil evaluator shall provide the information requested on the soil evaluation form from material removed from the observation pit without entering the pit. This information shall include at minimum the soil texture, structure and consistence for each soil horizon observed. This can be done in an additional soil observation pit, or in the pit used to complete work for 26.01(a)(1) after such work has been witnessed by the Department, if required.

(3) If impervious material is encountered or the observation pit becomes unstable due to lack of soil cohesion and/or the presence of groundwater, the observation pit may be terminated at a depth of less than 10 feet. Sites with observation pits which have been terminated at less than 10 feet may require additional testing as determined by the Director.

(4) It is recommended that persons performing the soil evaluation not enter into portions of a soil observation pit which have been excavated to depths greater than five feet below the surrounding ground surface. It is the responsibility of persons performing or witnessing the soil evaluation to comply with all applicable federal, state and local laws and regulations governing occupational safety.

(b) Soil Profile Analysis – On forms approved by the Director, the soil evaluator shall evaluate each soil horizon for depth, color, presence of redoximorphic features, texture, structure and consistence using the terminology in Appendix 1. The information collected shall be used to assign the soil to one of the soil classes below, except for Class G soils in which case the soil class for the substratum shall also be indicated. (Additional information about each soil class is located in Appendix 2.)

(1) Class A - Glacial Lodgement Till: Silt loam to loamy sand texture. Lower profiles tend to have a platy structure and are dense to very dense. Excavation is difficult. High probability of hydraulically restrictive lower layers. Angular rock fragments and occasional cobbles and stones.

(2) Class B - Glacial Ablation Till: Silt loam to loamy sand throughout the profile. Lower horizons tend to be more sandy. These soils tend to be looser than lodgement tills and typically do not have hydraulically restrictive layers. Lower horizons may be firm. Angular rock fragments and occasional cobbles and stones.

(3) Class C - Proglacial Outwash Deposit: Also referred to as stratified drift, soil textures range from silt loam to loamy sand (in the upper horizons) to a sandy/gravelly substratum. Stratified layers of water sorted materials may be present. Entire profile tends to be loose and easy to dig except saturated horizons may be firm or cemented or both. Horizons of rounded rock fragments are common. A silty eolian mantle may also be present.

(4) Class D - Glacial Ice Contact Deposit: Outwash deposits of well to poorly sorted sands and gravel. Texture can be highly variable over short distances and may include pockets or lenses of silt or silt loam. Stratification may be irregular or absent. Sub-rounded to rounded stones and cobbles are possible.

(5) Class E - Coastal Dune Deposit: Fine to coarse sands, well sorted, often finely stratified. Little or no silt and clay. Typically no sediment larger than coarse sand. Deposited by wind action or storm overwash.

(6) Class F - Alluvial Deposits: Material transported and deposited by streams and rivers. Typically well sorted, stratified, fine textured sediment that may have dark layers in the substratum which were at one time surface layers. Subject to seasonal flooding.

(7) Class G - Eolian Deposits: Wind blown silts deposited after the retreat of the Wisconsin glaciation. Typically brown to dark brown silt ranging in thickness of several inches to several feet. Underlain by outwash, ablation till, or lodgement till.

(c) Determination of Seasonal High Water Table

(1) The soil evaluator shall use the depth to, type, location and abundance of hydromorphic features and other characteristics to determine the depth to the seasonal high water table. The criteria to use in evaluating hydromorphic features include, but are not limited to the following:

(A) Redox depletions and/or redox concentrations occupy 2% or more of the exposed horizon surface;

(B) Soil matrix and redox concentrations/depletions vary 2 or more units in chroma; or

(C) Presence of a reduced soil matrix, which is often indicated by a color chroma less than or equal to 2.

(2) In cases where the soil is class C or D as determined in 26.01(b) and there are no observable hydromorphic features to use to make a determination in accordance with (1) above, an adjustment factor may be applied to the observed water table in order to correct to the seasonal high water table. This adjustment factor shall be determined by the Director. When groundwater is not encountered in a soil observation pit at least 10 feet deep, the adjustment factor may be applied as measured from the bottom of the pit.

(3) A perforated pipe at least 4 inches in diameter shall be installed to the full depth of the excavation in each soil observation pit at the conclusion of the soil evaluation, unless such requirement is waived by the Director. The pipe shall be capped at the top and mounded to prevent the accumulation of surface water.

(4) The soil evaluator has the option to determine the seasonal high water table during the wet season in accordance with SD 17.01. The seasonal high water table shall be determined during the wet season in accordance with SD 17.01 when either of the following occurs:

(A) The soil evaluator and the representative of the Department disagree on the determination of the seasonal high water table during a witnessed soil evaluation; or

(B) The soil is determined to be one of the following soil series as described in the United States Department of Agriculture Soil Survey of Rhode Island: Mansfield, Newport, Pittstown or Stissing.

(d) Assigned Percolation Rates Using Soil Physical Properties -- For applications with a site evaluation, the percolation rate used to determine the minimum leaching area in SD 10.07 shall be determined from the table below. The percolation rate applied shall be that assigned to the soil category with the slowest percolation rate obtained in the manner described below:

(1) If the bottom of the stone in the system is above the original grade, use the horizon with the slowest percolation rate within 3 feet of the original ground surface;

(2) If the bottom of the stone in the system is below the original grade, use the horizon with the slowest percolation rate within 3 feet below the bottom of the stone; or

(3) If no natural soil will remain within the 3 feet referenced in 26.01(d)(1) and (2) above, use the percolation rate of the first naturally occurring soil horizon below that depth.



<b>SOIL CATEGORY</b>	<b>SOIL TEXTURE*</b>	<b>SOIL STRUCTURE</b>	<b>SOIL CONSISTENCE</b>	<b>RELATIVE OCCURRENCE IN RI **</b>	<b>ASSIGNED PERCOLATION RATE (min/inch)</b>
1	cos, s, lcos, ls, cosl	structureless- single grain	loose	very common	10
2	vfs, fs	structureless- single grain structureless- massive	loose very friable	not common	10
3	lfs, ls, fsl, sl, l	granular, subangular blocky	very friable to friable	common	10
4	lvfs, vfsl, sil	granular, subangular blocky	very friable to friable	fairly common	15
5	lcos, ls, cosl	subangular blocky	friable	rare	10
6	lfs, ls, sl, l	structureless-massive	friable	common	10
7	fsl, vfsl, sil, si	structureless- massive	very friable or friable	common in southern RI	20
8	lcos, ls, cosl	structureless-massive	firm to very firm	quite rare	30
9	fs, sl, l, fsl, vfsl, sil, sicl	platy, structureless- massive	firm to very firm	very common	40
10	all textures	structureless- massive	extremely firm	fairly common	not allowed (impervious)

\* Soil texture shall be determined with no consideration of coarse fragment modifiers.

\*\* "Relative Occurrence in RI" is a general indicator of abundance, and it may not apply equally to every soil texture in a particular soil category.

## **SD 27.00 Responsibilities of Class I, II and III Licensed Designers**

- (a) Class I, II and III licensed designers shall design an ISDS for a site that is provided for in these regulations. The design shall be based on the information provided in the site evaluation report. This design shall be submitted to the Director in accordance with SD 2.01 and SD 2.02.
- (b) If at any time the Class I, II, or III designer encounters conditions in the field that are not consistent with the information in the site evaluation report, and these conditions would have an impact on the siting, design, or operation of an ISDS, the Class I, II, or III designer shall stop work on the design or construction of the system and notify the Director.
- (c) The licensed designer shall be responsible for witnessing and inspecting the installation of any ISDS which he/she has designed. In no case shall the person witnessing and inspecting the installation of the ISDS be the licensed installer who installs the system, except for the repair of an existing ISDS. Any person assisting a licensed designer in witnessing and inspecting the installation of an ISDS must be an employee of the same business entity as the licensed designer, and such person must work under the licensed designer's direct supervision in respect to witnessing and inspecting the installation of the ISDS.
- (d) A property owner may apply to the Director for approval to have a licensed designer, other than the one that designed the ISDS, be responsible for witnessing and inspecting the installation under the conditions specified in (1) or (2) below. The Director may grant the approval provided the replacement designer has a license issued in accordance with section 25.00 that authorizes the designer to design the type of system in question, and the replacement licensed designer signs an affidavit assuming full responsibility for installation of the system in accordance with the DEM issued permit. A property owner may apply to the Director for a replacement designer in either of the following circumstances:
- (1) The designer of the system is incapable of witnessing and inspecting the system; or
  - (2) The property owner contracted with a business entity for design services and the designer who prepared the ISDS design is no longer employed by that business entity.
- (e) An applicant may choose to select a replacement licensed designer for reasons other than those in (d) above, in which case the applicant must submit a redesign prepared by the replacement designer. Any variance previously approved by the Department shall remain valid, provided that the Department agrees that the circumstances and facts regarding the variance are the same as the facts under which the original variance was granted or that the variance in the redesign represents less of a deviation from the regulations than the original variance.
- (f) Prior to installation of an ISDS in areas served by private wells, the designer shall verify that conditions on site and adjacent to the site are the same as at the time of design approval, or have not changed in a manner that would affect the original design. If conditions have changed in a manner that would affect the original design, the designer shall notify the Department prior to installation of the system.
- (g) The designer shall notify the Department during normal business hours at least 24 hours prior to the installation of any ISDS. The Department, at its discretion, may inspect any aspect of the installation.
- (h) The designer shall, at minimum, inspect and make measurements, where appropriate, of the following components and steps in the installation of the ISDS:

- (1) The exposed bottom of the excavation for the leachfield;
  - (2) The size and condition of all structures such as the septic tank, D-box, galleys, flow diffusers, etc.;
  - (3) The elevations of all pipe inverts;
  - (4) All sand media and aggregate is in accordance with specifications and is placed in accordance with the design plan;
  - (5) Completed installation prior to covering;
  - (6) The type of backfill and that the backfill is properly placed and compacted;
  - (7) Final soil cover including the 25 ft perimeter; and
  - (8) All horizontal set-backs, including from the building and any wells on-site or on abutting lots.
- (i) If conditions are encountered during construction which indicate that the system cannot be installed or is not installed in accordance with the permit, or any terms and conditions contained therein, the designer shall notify the Director as soon as possible, but no later than 24 hours after discovery. The Department shall issue written guidance on specifications for construction tolerances as well as conditions under which as-built plans and redesigned plans are required. The designer shall stop construction if conditions are such that a redesign is required. Notification is not required if all design elements are within the tolerances established by the Department through written guidance. In response to the designer's notification, the Director shall either:
- (1) Authorize the designer to proceed with the work on-site and to provide appropriate documentation to the Department as may be required by the Director;
  - (2) Require the designer to submit as-built plans within 10 business days after the ISDS is installed to record changes that are **in compliance** with the standards in these regulations, but which need to be documented; or
  - (3) Require the designer to submit redesigned plans and specifications to the Director for approval showing changes from the original approved application, plan and specifications.
- (j) The designer shall collect the information below that can be used to verify that the installation of the ISDS was performed as specified:
- (1) Daily inspection report (weather conditions, persons on-site, work accomplished, and other information customarily included in inspection reports);
  - (2) A minimum of two photographs of the system being installed;
  - (3) List of all materials used, their source, and the dates delivered to the site; and
  - (4) Product specification sheets, if different from those specified in the approved design.
- (k) The designer shall keep the information required above in SD 27.00(j) on file for a minimum of 10 years from the date of the certificate of construction in SD 27.00(l) below. At the Department's request, the designer shall make this information available for review.

(l) Certificate of Construction

(1) The designer that is responsible for the system installation in accordance with SD 27.00(c) shall complete a certificate of construction that certifies that the ISDS was installed in conformance with the approved application, plans, specifications, applicable statutes and regulations and that he or she is responsible for having witnessed and inspected the installation. The certificate of construction shall be on forms provided by the Director.

(2) The certificate of construction shall be submitted to the Director within five business days after the ISDS, building foundation, drinking water well, and other appurtenances, as may be specified in written Department guidance, have been constructed in accordance with the design plan. The designer shall provide a copy of the certificate of construction to the property owner.

(3) In addition to the certification in SD 27.00(1)(1) above, the certificate of construction shall include, but not be limited to, the following:

(A) Name and license number of the designer;

(B) Name and license number of the installer;

(C) Distances from two building foundation corners to the septic tank manhole, to the distribution box, and to the leachfield corners.

(m) Once the designer has certified that the ISDS has been properly installed, the designer shall provide information and recommendations to the owner of the ISDS on system specific operation and maintenance practices to prevent against premature system failure and pollution of the waters of the state.

(n) The designer is not responsible for any negligent act or omission of a user of an ISDS, including but not limited to, failure to properly use and maintain the system, which causes damage to the ISDS.

## **FIGURES**

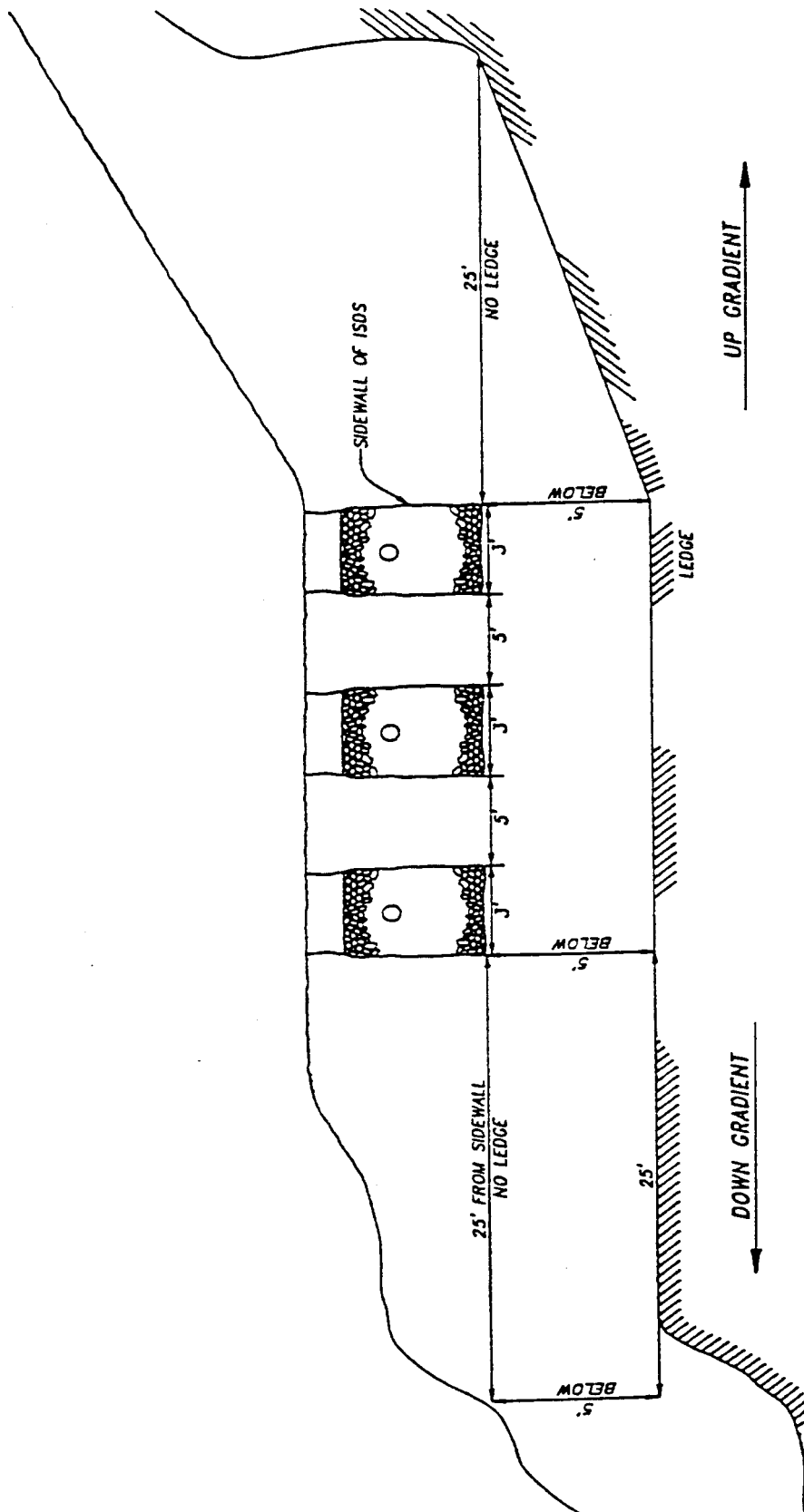
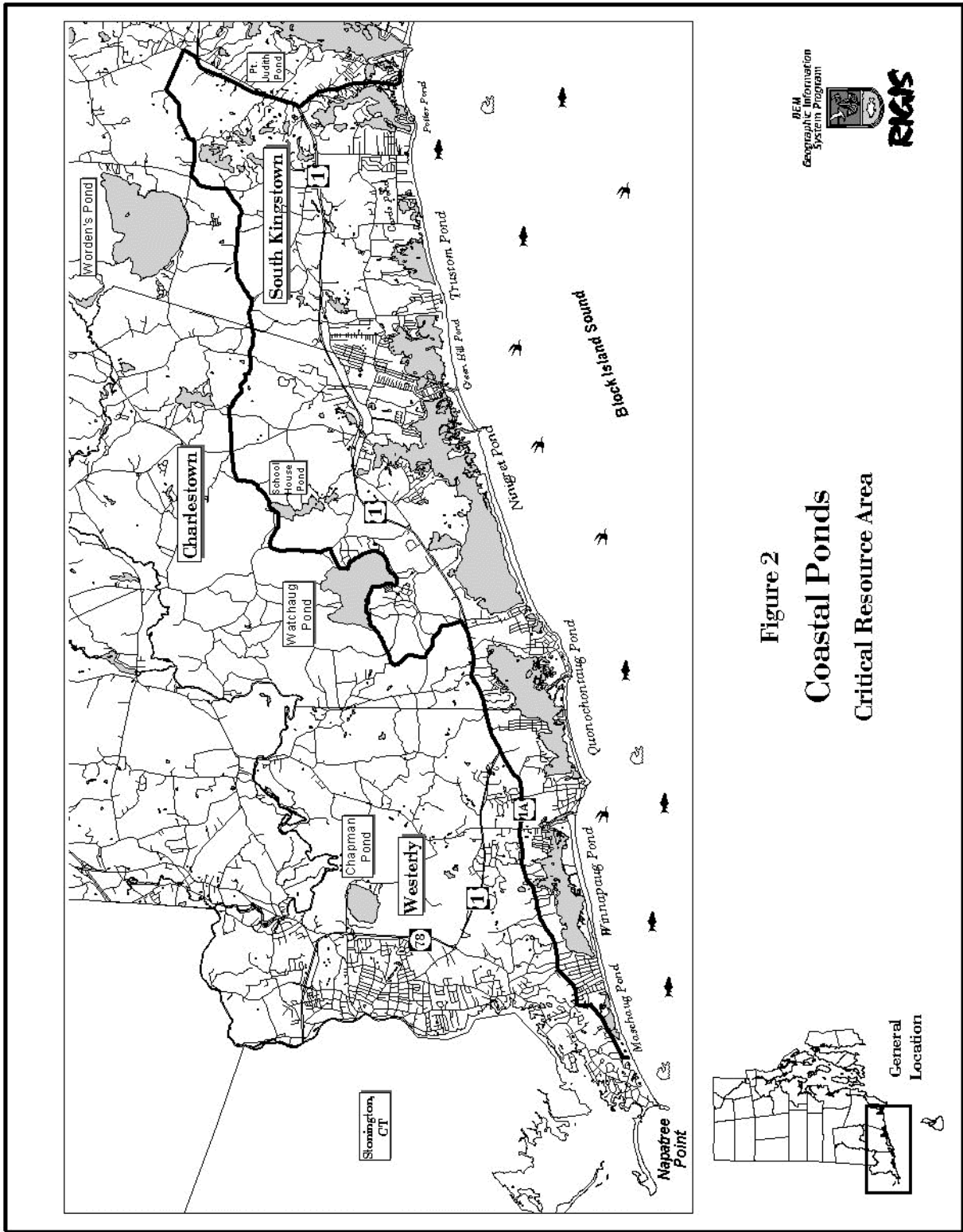


Figure 1. Ledge Within the 25 Foot Leachfield Perimeter

Figure 2. Coastal Pond Critical Resource Area

For administrative purposes, the boundaries of the Coastal Pond Critical Resource Area follow the roadways that most closely correspond to the watershed boundaries of the salt ponds. The region is bounded to the east by Succotash Road in South Kingstown, to the west by Manatuck Avenue in Westerly, and to the south by Block Island Sound. The northern boundary runs from Route 1 in Narragansett, along Tuckertown Road and Narragansett Trail in South Kingstown to the town hall in Charlestown; thence following the Burlingame State Park Boundary to Watchaug Pond; thence following the southern shore of Watchaug Pond to Healy Brook and thence to Cookestown Road in Charlestown; thence following Route 1 west to Scenic Route 1A; thence to Ocean View Highway. The boundaries described above have been delineated on the following map.





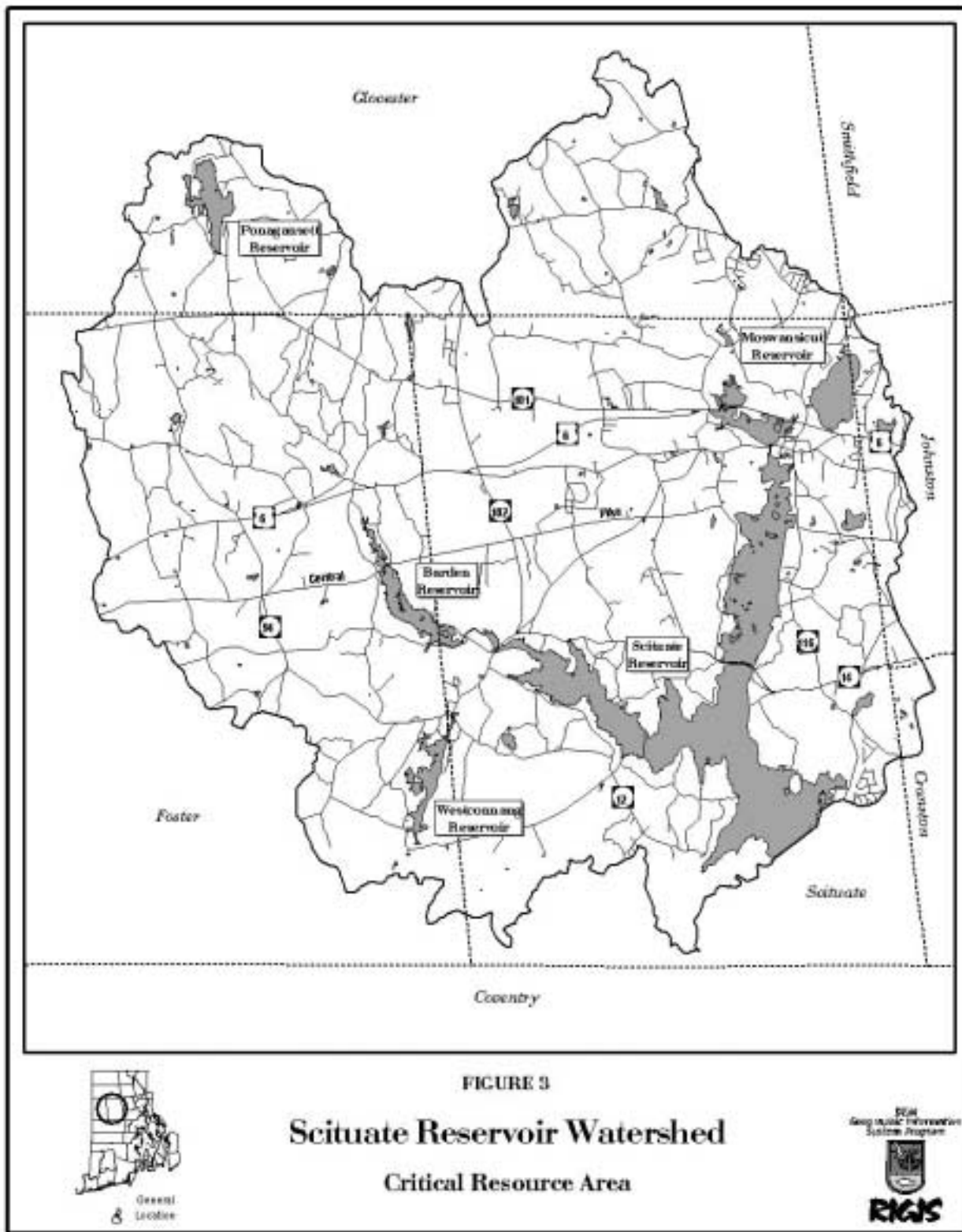


Figure 3. Scituate Reservoir Watershed Critical Resource Area

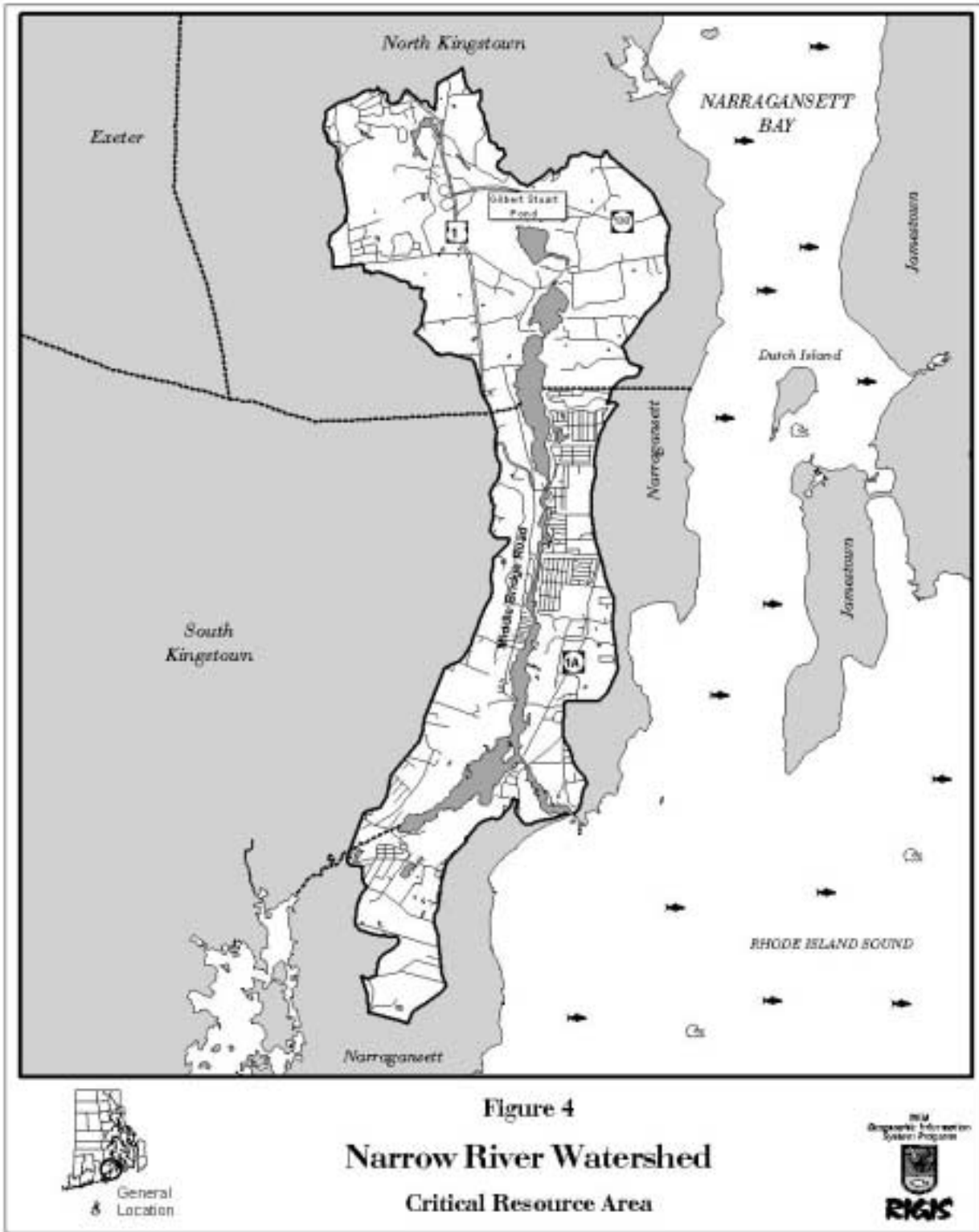


Figure 4. Narrow River Watershed Critical Resource Area

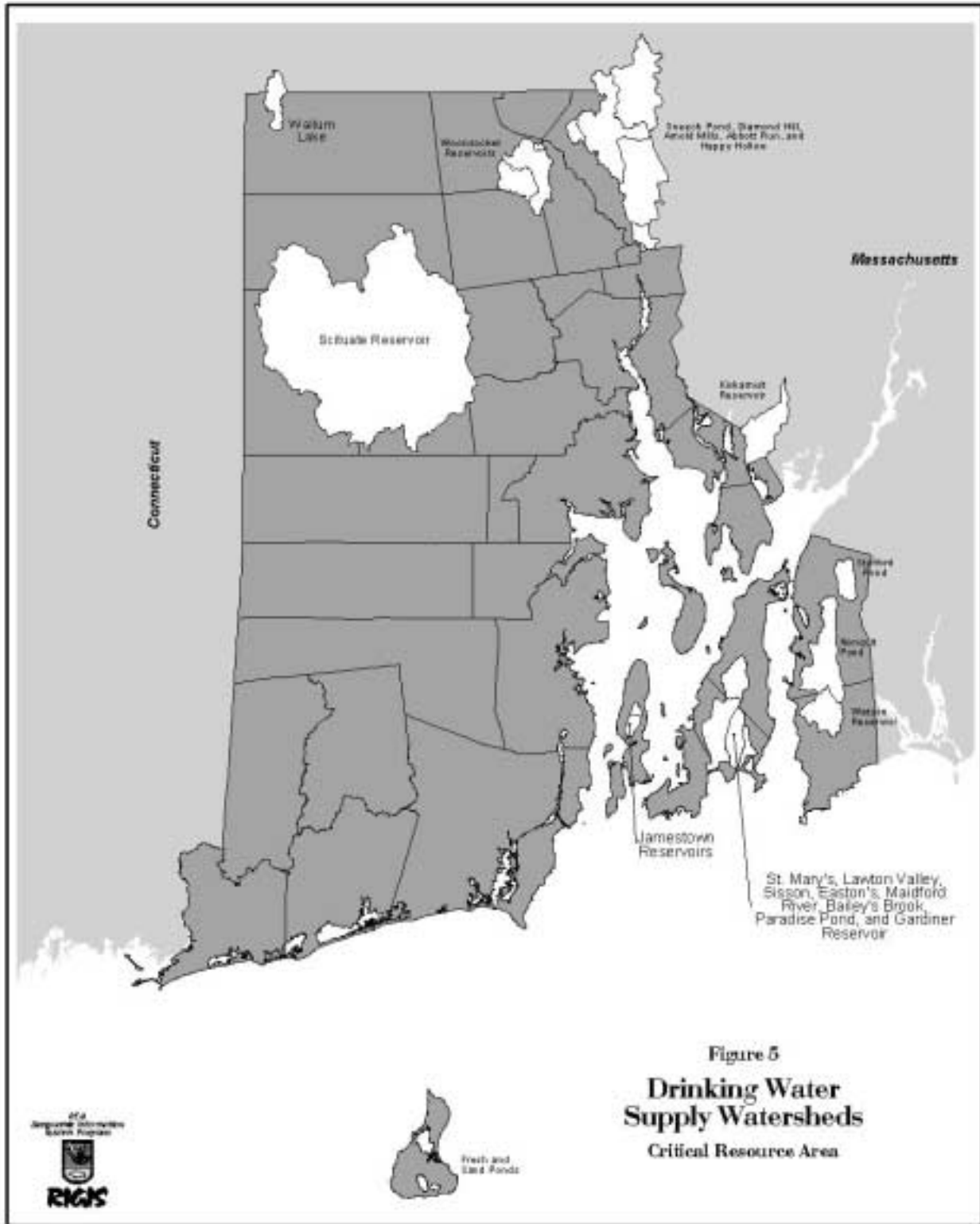


Figure 5. Watersheds of Surface Water Reservoirs in Rhode Island

# APPENDIX 1

## MASTER HORIZONS

### O Horizon

The O horizons in Figure 1 were formed from organic litter derived from plants and animals and overlies mineral surfaces. The uppermost part of this organic layer, which is called the Oi horizon, is unaltered except for some leaching of soluble constituents and discoloration. Most of the material in this horizon can be identified with the naked eye. The lower portion of the organic layer, which is called the Oa horizon, consists of decomposed plant and animal remains and is commonly referred to as humus. These organic horizons are present in the forested regions of Rhode Island, but may be destroyed by burning, erosion, pasturing, or cultivation. The horizons of organic soils are described as Oi (fibric), Oe (Hemic), or Oa (sapric), indicating whether the organic materials are undecomposed, moderately decomposed, or highly decomposed.

### A Horizon

The A horizon is commonly referred to as the top soil or surface soil. It is the uppermost layer of the mineral soil profile and contains the most organic matter of any mineral horizon. The A horizon is also the most active biologically. Plant roots, bacteria, fungi, insects, and small animals are more common in the topsoil than in any other major horizon.

Because it lies at the surface, the A horizon is affected the most by falling rain. Some of the rainwater percolates directly into the soil and may remove or leach some of the soluble bases present. This results in quite acid (low pH) surface soils; therefore, lime and fertilizer are required to maintain a soil pH and fertility conducive to optimum plant growth. This is particularly true in Rhode Island soils. Not all of the rain falling on the soil surface percolates down through the soil profile. During severe rainstorms, runoff from sloping areas can result in erosion of the top soil.

Although most of the soils in Rhode Island have developed under forest vegetation, evidence of disturbance is very common due to cultivation. If the soil is very poorly drained, the thickness of the A horizon might be eight or ten inches.

If a soil has been cultivated, the O horizon, A horizon, E horizon, and some of the B horizons may have been destroyed. This condition is referred to as a plow layer and is identified as an Ap horizon. These plow layers are evident in many forested regions of Rhode Island which indicate that they were cultivated at one time.

### E Horizon

The E horizon is commonly referred to as the zone of *eluviation* or leaching. This horizon has been leached of organic matter, iron and aluminum oxides, and other soluble constituents, and has a corresponding concentration of resistant minerals such as quartz. This lighter-colored layer, which occurs directly beneath the A horizon in some soils, is frequently destroyed by plowing and, therefore, is rarely present in Rhode Island soils.

### B Horizon

The B horizon is commonly referred to as the subsoil and usually occurs immediately below the Ap horizon in Rhode Island soils. In well-drained soils, the B horizon is commonly yellowish-brown to reddish-brown in color. These brighter colors have resulted from the accumulation of iron oxides. The B horizon is generally referred to as the zone of maximum illuviation. In addition to iron, there may also be an accumulation of such constituents as aluminum, manganese, calcium, clay and organic matter in the subsurface horizons of some soils.

The B horizons of soils classified as poorly or very poorly drained are usually gray.

The properties of the B horizon are important to agriculture and urban development because of their influence on root growth and water movement. Knowledge of the characteristics of this subsurface horizon is critical for the appropriate design of tile drain systems, sanitary landfills, on-site sewage disposal systems, and highway construction.

In soil profile descriptions, the B horizon may be subdivided with additional symbols which indicate different types of soil properties. For example, Bt, Bh, Bs, and Bk indicate subsurface accumulations of illuvial clay, humus, illuvial iron, and calcium carbonate, respectively. Most subsurface horizons in Rhode Island soils are designated as Bw, indicating that the subsoil is weakly developed and has a reddish-brown color and subangular blocky structure.

The solum is that portion of the soil profile which has undergone soil-forming processes and includes the O, A, E, and B horizons collectively.

### **C Horizon**

The C horizon is a layer of unconsolidated material underlying the solum. This horizon is outside the zone of major biological activity and has been influenced only slightly by soil-forming processes. However, sufficient physical and chemical weathering has occurred to distinguish this material from the consolidated bedrock below. The C horizon material may have accumulated by the breakdown of bedrock, or it may have been moved to its present location by the action of water, wind, or ice. If the C horizon material is similar in chemical, physical, and mineralogical properties to the material from which the A and B horizons have developed, the C horizon is commonly referred to as the parent material.

In many Rhode Island soils the C horizon consists of materials that are different from those in the solum. For example, the solum may have developed in wind-blown silt (*loess*) while the C horizon consists of stratified sand and gravel (glacial outwash). The presence of two or more different geologic materials in the same soil profile is referred to as a lithologic discontinuity. In profile descriptions these differences in geologic materials are designated by Arabic numeral prefixes such as 2C.

### **R Horizon**

The underlying consolidated bedrock, such as granite, gneiss, or shale, is designated as the R horizon. If the bedrock is unlike the overlying soil material, the R is preceded by an Arabic numeral such as 2R. Although bedrock can be observed in many areas of Rhode Island, none of the soils in the State were formed in place from this material.

### **Transitional Horizons**

Transitional horizons are layers of the soil between two master horizons. Horizons dominated by properties of one master horizon while having subordinate properties of an adjacent master horizon are designated by two master horizon capital letters. The first letter indicates the dominant master horizon characteristics and the second letter the subordinate characteristics. For example, an AB horizon indicates a transitional horizon between the A and B horizon, but more like the A horizon than the B horizon. For example, a BA horizon is a transitional horizon between the A and B master horizons but more like the B horizon than the A horizon. Other commonly designated transitional horizons include AE, EA, EB, BE, BC, CB, and AC.

A second type of transitional horizon (combination horizon) is recognized where separate components of two master horizons are recognizable in the horizon and at least one of the component materials is surrounded by the other. Such mixed transitional horizons are designated as A/B, B/A, E/B, B/E, and the like. The first symbol designates the material of greatest volume in the transitional horizon.

### Subordinate Distinctions within Master Horizons

Further characterization of the above described master horizons is facilitated by the application of subordinate distinctions, denoted as lowercase characters. Subordinate distinctions provide for noting the presence of specific properties which are present within the master horizons. The list of subordinate distinctions appears below. Subordinate distinctions of importance relative to characterization of Rhode Island soils include: a, which denotes highly decomposed organic matter; b, which denotes a buried soil horizon and d, which denotes dense unconsolidated materials, such as those which are present in glacial till.

Lower case letters are used to designate specific features within master horizons.

a -- Highly decomposed organic material: Used only with the O master horizon; rubbed fiber content less than 17% by volume (referred to as Sapric).

b -- Buried genetic horizon: This designation is used only if the buried mineral horizon contains clearly identifiable features of a genetic soil horizon. It is not used in organic soils or to identify a buried O horizon.

c -- Concretions or hard nonconcretionary nodules: This symbol is used only for iron, aluminum, manganese, or titanium cemented nodules or concretions.

d -- Dense unconsolidated sediments or materials: This symbol is used to indicate naturally occurring or man-made unconsolidated sediments with high bulk density, such as basal till, plow plans, and other mechanically compacted zones. Roots do not enter except along fracture planes.

e -- Organic material of intermediate decomposition: Use only with O horizons with rubbed fiber content between 17 and 40% by volume (referred to as Hemic).

f -- Frozen soil: This is used only for Horizons, usually C horizons, that contain permanent ice.

g -- Reduced matrix: This symbol is used to indicate low chroma color, usually 2 or less with values  $\geq 5$ , caused by *reduction* of iron in stagnant saturated conditions. The iron may or may not be present in the ferrous form. The g is used to indicate either a total reduced matrix or the presence of redox depletions in a patchwork pattern.

h -- Illuvial accumulation of organic matter: Used only in B horizons, the h indicates an accumulation of *illuvial, amorphous*, dispersible organic matter with or without A1 sesquioxide component. If the sesquioxide component contains enough iron so that color value and chroma is 3 or less, then hs, is used.

i -- Slightly decomposed organic material: Used only with the O horizon to designate that the rubbed fiber content is greater than 40% by volume (referred to as Fibric).

k -- Accumulation of carbonates: Used with B and C horizons, k indicates an accumulation of alkaline earth carbonates, usually calcium carbonate.

m -- Cementation or *induration*: Used with any master horizon, except R, where more than 90% of the horizon is cemented and roots penetrate only through cracks. The cementing material is identified by the appropriate letter, such as km = carbonate, qm = silica, sm = iron, ym = gypsum, kqm = both lime and silica, zm = salts more soluble than gypsum.

n -- Accumulation of sodium: This symbol is used on any master horizon showing morphological properties

indicative of high levels of exchangeable sodium.

o -- Residual accumulation of *sesquioxides*: This symbol is used on any master horizon having properties indicative of sesquioxide residual after intense weathering.

p -- Plowing or other cultivation disturbance: Whereas plowing is the most common method of cultivating soil, hoeing and discing and a multitude of other practices that mix a surface layer are designated by this symbol. The symbol p is only used with the master horizon A or O, if organic, even if the material mixed by the cultivation is from an E, B, or C horizon.

q -- Accumulation of silica: This symbol is used with any master horizon, except R, where secondary silica has accumulated. It is frequently used with m if the horizon is more than 90% cemented.

r -- Weathered or soft bedrock: This symbol is only used with the master C horizon. It designates material often called saprolite that is hard enough that roots only penetrate along cracks, but soft enough that it can be dug with a spade or shovel.

s -- Illuvial accumulation of sesquioxides: This symbol is only used with B horizons. It indicates the presence of illuviated iron oxides in contents sufficient to give a color of more than 3 for both value and chroma. It is often used in conjunction with h when the color is 3 or less for both value and chroma.

t -- Accumulation of silicate clay: The presence of silicate clay forming coatings on ped faces, in pores, or as bridges between sand sized mineral grains. The clay coats form by illuviation into B horizons. The symbol may also be used in C or R horizons.

v -- Plinthite: This symbol is used in B and C horizons that are humus poor and iron rich. The material usually has "reticulate mottling" of reds, yellows, and grey colors. Upon exposure as in a road cut, the material hardens irreversibly.

w -- Development of color and structure: This symbol is used for B horizons that have developed structure or color different from the A or C horizon, usually redder, but does not have apparent illuvial accumulations.

x -- Fragipan character: This symbol is used to designate genetically developed firmness, brittleness, or high bulk density in B and C horizons.

y -- Accumulation of gypsum: This symbol is used in B and C horizons to indicate genetically accumulated gypsum. Often used with m if horizon is cemented in more than 90% of its extent.

.z -- Accumulation of salts more soluble than gypsum: This symbol is used to identify soluble salt accumulations in B and C horizons.

### **Vertical Subdivisions**

Frequently a horizon or layer designated by a master, transitional, and/or subordinate symbol needs to be subdivided. In most soils this subdivision is based on differences in morphological features such as structure, color, or texture. Arabic numbers are added as suffixes to the horizon symbols to identify subdivisions within horizons. For example, successive layers in a C horizon would be designated as C1, C2, C3, etc., or a horizon sequence of A, AB, Bt1, Bt2, Bt3, BC, C would indicate three (3) subdivisions of the Bt horizon.

### **Discontinuities**

A lithologic discontinuity is a significant change in particle-size distribution and/or mineralogy in the vertical direction of a soil profile that was caused by geologic processes. For example, it is quite common for soils to exhibit a windblown silt mantle (loess) over glacial till or stratified glacial outwash deposits over glacial till. Such discontinuities are designated with Arabic numbers as prefixes to master horizons. The uppermost geologic material, which would be prefixed by a 1, is not numbered using this convention. For example, if a soil has developed in loess overlying glacial outwash, a typical profile might have the following horizon designations: A, Bw1, Bw2, BC, 2C1, 2C2, 2C3. The prefix 2 indicates that the upper part of the soil developed from a different geologic material than the C horizon.

### **Use of the prime**

Occasionally, two (2) horizons may develop in a profile and have the same horizon designation but be separated by an unlike horizon. Where the investigator interprets this to be due to genetic processes, the lower of the two (2) horizons is designated as prime ('). For example, an A-E-Bh-E-Bt profile indicates an eluviated E horizon formed in association with a Bt horizon and subsequently a Bh horizon has formed within the E horizon. Soils with such genetic scenarios are referred to as bisequal.

## **PROPERTIES OF SOILS**

An experienced pedologist (soil scientist) can read a great deal from the morphology of a soil seen in the field. Many of the soil properties, such as color, structure, consistence, and sequence of horizons, are readily observable and the soil scientist can make many interpretations based on these properties. However, some soils may look alike but may have entirely different chemical and physical properties which could cause them to react quite differently to various uses. Thus, for modern soil science, quantitative field and laboratory data on the composition of soils are needed in order to make accurate interpretations related to the response of soils to different uses.

### **Color**

Color is perhaps the most obvious and easily determined soil characteristic. This physical property has little effect on soil behavior beyond influencing the gain and loss of radiant energy; however, color is particularly useful for making a number of meaningful predictions about the soil. It is an indirect measure of such things as the intensity of mineral weathering, the amount and distribution of organic matter in the soil, and the state or degree of soil aeration.

Although color itself has little influence on the nature of soils, it is a property which soil scientists use to interpret and predict soil conditions and responses. Because soil colors reflect seasonally high water tables, they are a valuable tool in determining the suitability of soils for such uses as on-site sewage disposal systems, sanitary landfills, home sites, and other structures affected by wet soils.

The two (2) dominant coloring agents of soils are organic matter and iron oxides. The effects of organic compounds are most prevalent in surface horizons and give them their dark colors. Although organic matter is not the only coloring agent, and all organic matter is not the same color, there is generally a darkening of soils with increased organic content. The relationship between soil color and organic matter content may be somewhat obscured by the type of organic matter and its stage of decomposition. Raw peat (Oi) material is generally brown in color, whereas highly decomposed organic (Oa) materials, such as those found in muck soils, are black or nearly so. The amount of organic matter and thus the color of the soil is correlated quite well with the soil drainage class. As illustrated in Figure 2, as a soil becomes more poorly drained the A horizon becomes thicker, the organic matter content increases, and the color becomes darker.

Subsoil or B horizon colors can range from gray to yellowish brown to reddish brown to red. These



color differences can generally be attributed to the amount of iron present. Although the parent material may influence the color of some soils, particularly young soils, most subsoil colors are related to the intensity of weathering or the amount of oxidation which is controlled by drainage. Usually reddish soils are found in warm humid climates where the intensity of weathering has been high, as in the southeastern parts of the United States or in tropical areas. Some well-drained soils which have apparently undergone extensive weathering may be yellow rather than red. Laboratory analyses often reveal that these soils are just as high in iron as the red soils; but the iron occurs in a different form. A number of studies have suggested that red soils are occupied by iron oxides such as hematite, whereas the yellow soils are composed primarily of hydroxides such as goethite.

It is also important to realize that the color of a soil is influenced by its moisture content. Normally, moist soils will have lower values (darker colors) than dry soils. Unless indicated otherwise, all soil colors should be determined on moist samples.

Munsell color charts are utilized to determine a soil's color. The three (3) components used in describing soil color (Munsell Notation) are hue, value, and chroma.

- Hue:** Corresponds to the dominant spectral (rainbow) color and is related to the dominant wavelength of light. Each color chart (page) in the Munsell color book is of a different hue. The symbol for hue is the letter abbreviation for the dominant color (i.e., R - red, YR- yellow red, Y - yellow). The dominant hue is further subdivided into quarters which is identified with a numerated prefix (e.g., 2.5R, 5R, 7.5 R, and 10R).
- Value:** Refers to the lightness or darkness of color relative to gray and is a function of the intensity or amount of light reflected. The value ranges from 0 (black) to 10 (white).
- Chroma:** Refers to the relative purity or intensity of color. Chroma ranges from 0 for gray or dull colors, to 10 for bright colors.

The Munsell color notation is written as follows:

**Example:** 7.5YR 5/6  
**Hue** = 7.5YR  
**Value** = 5  
**Chroma** = 6

This soil sample would have a color of Strong Brown.

### **Redoximorphic Features**

Soils that have impeded drainage and/or have high water tables during certain periods of the year usually exhibit *redoximorphic features*. These features can be categorized as redox depletions and redox concentrations (formerly called low and high chroma mottles, respectively), and a gleyed matrix. The color of these redox features (Munsell Notation) should be given as well as a description of the pattern of redoximorphic features. Patterns to be noted are:

Abundance of Redox Depletions and/or Redox Concentrations:

**Few (f):** occupy less than 2 percent (2%) of the exposed horizon surface.

**Common (c):** occupy 2 to 20 percent (2-20%) of the exposed horizon surface.

**Many (m):** occupy greater than 20 percent (20%) of the exposed horizon surface.

A chart for estimating percentages of redox depletions or concentrations is given in Figure 3.

Size of Redox Depletions and/or Redox Concentrations:

**Fine (1):** less than 5 mm in diameter.

**Medium (2):** 5 to 15 mm in diameter.

**Coarse (3):** greater than 15 mm in diameter.

<b>SIZES:</b>		
5 mm	10 mm	15 mm

Contrast of Redox Depletions and/or Redox Concentrations

**Faint (f):** hue and chroma of matrix and redox concentration/depletion are closely related.

**Distinct (d):** Matrix and redox concentrations/depletion vary one to two (1-2) hues and several units in chroma and value.

**Prominent (p):** matrix and redox concentration/depletion vary several units in hue, value and chroma.

It is quite common for soil scientists to use shorthand or abbreviations when describing soils in the field. For example; 7.5YR 6/6 matrix and m3p 10YR 7/2 redox depletions would be written in longhand as:

Yellowish Brown (7.5YR 6/6) with many, coarse, prominent light gray (10YR 7/2) redox depletions.

Soil color is greatly influenced by the inter-relationships between water and air flow through the soil. Poor aeration results when soil pores remain filled with water for prolonged periods. When aeration is poor, iron assumes a chemically reduced form, (ferrous iron; Fe<sup>+2</sup>). Ferrous forms of iron are quite soluble in water and are readily leached from the soil leaving uncoated mineral grains that imparts grayish to bluish hues to the soil body a gleyed matrix. These colors are indicative of poorly and very poorly drained soils.

The depth to water tables fluctuates from season to season. During the winter and spring, water tables are generally quite high resulting in a reduction of iron compounds to the ferrous form which imparts a gray color to the soil. Water tables generally drop during the summer months resulting in oxidizing conditions. This alternate reducing and oxidizing environment causes a mobilization and redeposition of iron compounds resulting in the formation of redox concentration and depletion features in the soil, formerly referred to as mottles. These rust-colored redox concentrations, and grey-colored, redox depletions, are generally indicative of seasonally high water tables.

The following kinds of redoximorphic features have been identified for use in profile descriptions. Redox features are one of the components that indicate aquic conditions exists. The other two (2) components of aquic conditions are saturation of the soil and reduction of the soil.

1. Redox Concentrations - Bodies of apparent accumulations of Fe and Mn oxides.
  - a. **Nodules and Concretions:** Firm to extremely firm irregularly shaped bodies with diffuse boundaries. When broken in half, concretions have concentric layers, whereas nodules have a uniform internal fabric. However, the terms "nodules" and "concretions" have been used interchangeably.
  - b. **Masses:** Soft bodies, frequently within the matrix, whose shape is variable. Masses include features that formerly would have been called "reddish mottles."
  - c. **Pore Linings:** Zones of accumulation that may be either coatings on a pore surface or impregnations of the matrix adjacent to the pore.
2. Redox Depletions - Bodies of low chroma ( $\leq 2$ ) having values of 4 or more where iron and manganese oxides alone have been stripped out or where both iron and manganese oxides and clay have been stripped out.
  - a. **Iron Depletions:** Low chroma bodies with clay contents similar to that of the adjacent matrix. These features have sometimes been called "grey mottles," "gley mottles," "albans" or "neoalbans." They may occur along macropores and also within the matrix. When the soil matrix has a color chroma of  $\leq 2$ , it can be considered an iron depleted matrix.
  - b. **Clay Depletions:** Low chroma bodies containing less Fe, Mn, and clay than an adjacent soil matrix. They have been described as "silt coatings" or "skeletons" formed along ped surfaces or lining channels. The clay eluviated from the clay depletions frequently is found coating ped surfaces in underlying horizons. Clay is not likely to be found in Rhode Island soils.
3. Reduced Matrices - Soil matrices that have a low chroma color in situ because of the presence of Fe(II), but whose color changes in hue or chroma when exposed to air as the Fe(II) is oxidized to Fe(III). The change in color usually occurs within 30 minutes or less after the sample is exposed to air. This period is variable and may have to be determined by local field studies.

**\*Note:** Several conditions must exist in order for iron or manganese to be reduced resulting in a reduced matrix. Iron (III) and Mn (III and IV) are reduced by bacteria decomposing organic matter under *anaerobic* conditions. In a soil that is moist but not saturated, bacteria consume and reduce  $O_2$  in air filled soil pores during the decomposition of organic tissue. Anaerobic soils are saturated such that most pores will be filled with water unless air has been entrapped in some pores. Bacteria in these soils consume  $O_2$  dissolved in the soil water as they decompose the organic matter. When the dissolved  $O_2$  is gone, the soil water is said to be reduced. As bacteria continues to decompose organic matter,  $NO_3^-$  (nitrate) is converted to  $N_2$  gas (*denitrification*), and reduction of minerals composed of Mn (IV) and Fe (III) oxides occurs. These chemical reactions occur in sequence, with  $O_2$  being reduced first, then  $NO_3^-$ , Mn(III or IV) oxides, and finally Fe(III) oxides. The Fe oxide minerals will not be reduced, and thus will not show a reduced matrix until after  $O_2$ ,  $NO_3^-$ , and Mn oxides that occur near the Fe oxides have been reduced. If for any reason this sequence is interrupted and Fe cannot be reduced, the matrix will not appear reduced.

4. Exceptions - there are at least two (2) cases when the features listed above cannot reliably be considered as redoximorphic features reflecting current *aquic conditions*.

- a. Low chroma matrix colors that do not indicate saturation and reduction. Several examples of these are known. Soils having a color value moist of 3 or less and found in horizons with organic matter accumulations cannot be used as indicators of redoximorphic features. Low chroma organic stains and low chroma carbonate accumulations are not considered to be redoximorphic features. Exceptions to the value limit do occur. Higher values may have to be excluded under some situations where measurements show saturation does not occur.

In addition, low chroma colors may occur in some parent materials that contained little or no oxidized iron. Iron can also be stripped from soil particles by organic compounds such as chelates, and these reactions may not require saturated conditions. Low chroma colors not formed by saturation and reduction tend to be found more often in sandy soils than in finer-textured soils (Hyde and Ford, 1989). Accordingly, it is critical that saturation and reduction be confirmed by inspection or measurements before assuming that low chroma colors found in a soil indicate that the soil is seasonally saturated and reduced. Low chroma soil colors may also occur in soils formed from inherently dark parent materials such as shale or phyllite. In relatively young soils the parent material color masks any morphology that may indicate aquic conditions. This situation occurs in Narragansett Basin soils in the East Bay area of Rhode Island.

- b. Nodules and concretions composed of Fe and Mn oxides are resistant features and may be relicts of wetter conditions many years before the present, or may have formed at other locations and were transported to the present site. Nodules and concretions with sharp boundaries usually did not form in the horizon in which they are observed, particularly if they occur in clay depletions. For this reason, nodules and concretions should not be used as redoximorphic features if they are the only features present, unless it is known by measurement of water saturation that they represent current conditions.

### **Texture**

Soils, as they occur in the field, are mixtures of mineral particles of different sizes ranging from stones and gravel to microscopic clay. While stones and gravel, when present, give certain characteristics to a soil, from a biological and nutritional standpoint, the important fraction is the fine earth material (<2 mm). Table 1 lists limits of various particle size fractions as established by the United States Department of Agriculture. Sand grains are easily seen with the naked eye and feel gritty. Silt and clay particles, however, cannot be felt individually but they do have characteristics that permit their identification. Visually, silt particles fall within the range of an ordinary microscope. They are very smooth when moist and have the consistency of face powder or flour when dry. Clays, on the other hand, are too small to be observed with an ordinary microscope and are extremely sticky and plastic when wet and form hard clods when dry.

Few soils consist of a single particle size and most contain varying proportions of sand, silt and clay. Some variation in texture can occur without causing a major change in the general character of the soil. Because of this, it is convenient to group soils into a limited number of textural classes, each representing a fairly narrow range in particle size composition and properties. Twelve textural classes are recognized in the United States and are listed by name on the textural triangle in Figure 4.

**Table 1.** U.S.D.A. Size Limits of Coarse Fragments and Soil Particles

NAME OF COMPONENT	DIAMETER	VISUAL SIZE COMPARISON OF MAXIMUM SIZE
Stones	Above 25.4 cm	
Cobbles	7.5 cm - 25.4 cm	
Gravel	2 mm - 7.5 cm	
Very Coarse Sand	1.0 - 2.0 mm	House Key Thickness
Coarse Sand	0.5 - 1.0 mm	Small Pin Head
Medium Sand	0.25 - 0.5 mm	Sugar or Salt Crystals
Fine Sand	0.1 - 0.25 mm	Thickness of Book Page
Very Fine Sand	0.05 - 0.1 mm	Invisible to the Eye
Coarse Silt	0.02 - 0.05 mm	Visible with Microscope
Fine Silt	0.002 - 0.02 mm	
Coarse Clay	0.0002 - 0.002 mm	Most Not Visible with a Microscope
Fine Clay	Below 0.0002 mm	

The textural class of a soil is determined by analyzing the particle size. Accurate measurements of particle size distributions are made in a laboratory, however, an experienced soil scientist can estimate texture fairly accurately by rubbing a small portion of moist soil between the thumb and forefinger. Soil texture classes can be determined by using the following descriptions:

- \* **Sand:** Soil consisting mostly of coarse to fine sand, and containing so little clay that is loose when dry and not sticky when wet. When rubbed it leaves no film on the fingers.
- \* **Loamy Sand:** Consisting mostly of sand, but with sufficient clay and silt to give the soil slight cohesion when very moist. Leaves a slight film of fine materials on the fingers when rubbed.
- \* **Sandy Loam:** Soil in which the sand fraction is still quite obvious, it molds readily when sufficiently moist, but in most cases does not stick appreciably to the fingers. Threads do not form easily.
- \* **Loam:** Soil in which the fractions are so blended that it molds readily when sufficiently moist, and sticks to the fingers to some extent. It can, with difficulty, be molded into threads.
- \* **Silt Loam:** Soil that is moderately plastic without being very sticky and in which the smooth, soapy feel of the silt is the most noticeable feature.
- \* **Silt:** Soil in which the smooth, soapy feel of silt is dominant.

**Sandy Clay Loam:** Soils containing sufficient clay to be distinctly sticky when moist, but in which the sand fraction is still an obvious feature.

**Clay Loam:** The soil is distinctly sticky when sufficiently moist, and the presence of sand fractions can only be detected with care.

**Silty Clay Loam:** The soil contains quite subordinate amounts of sand, but sufficient silt to confer something of a smooth, soapy feel. It is less sticky than silty clay or clay loam.

**Sandy Clay:** The soil is plastic and sticky when moistened sufficiently, but the sand fraction is still an obvious feature. Clay and sand are dominant and the intermediate grades of silt and very fine sand are less apparent.

**Silty Clay:** Soil which is composed almost entirely of very fine material, but in which the smooth, soapy feel of the silt fraction modifies to some extent the stickiness of the clay.

**Clay:** The soil is plastic and sticky when moistened sufficiently and gives a polished surface on rubbing. When moist, the soil can be rolled into threads. It is capable of being molded into any shape and takes clear fingerprints.

\*These textural classes are typical of soils in Rhode Island. Textural classes not noted with an asterisk are not generally found in Rhode Island due to a lack of clay. Refer to the soil textural triangle for additional information.

**Sand Size Modifiers**

The 12 textural classes are based solely on the percentages of sand, silt and clay in the soil sample. If the textural class is sand, loamy sand, or sandy loam, a modifier may be added to indicate the dominant size of the sand fraction. The following is a list of textural classes with acceptable sand-size modifiers:

<b>TEXTURAL CLASS</b>	<b>SAND-SIZE MODIFIERS</b>
Coarse Sand:	25 Percent or More Very Coarse or Coarse Sand
Sand:	25 Percent or More Medium Sand
Fine Sand:	50 Percent or More Fine Sand
Very Fine Sand:	50 Percent or More Very Fine Sand
Loamy Coarse Sand:	25 Percent or More Very Coarse or Coarse Sand
Loamy Sand:	25 Percent or More Medium Sand
Loamy Fine Sand:	50 Percent or More Very Fine Sand
Loamy Very Fine Sand:	50 Percent or More Very Fine Sand
Coarse Sandy Loam:	25 Percent or More Very Coarse or Coarse Sand
Sandy Loam:	25 Percent or More Medium Sand
Fine Sandy Loam:	30 Percent or More Fine Sand
Very Fine Sandy Loam:	30 Percent or More Very Fine Sand

**Coarse Fragment Modifiers**

Coarse fragments or rock fragments apply to all pieces of rock larger than 2 mm in size. A modifier of the textural class name is applied if the soil contains a "significant" percentage of coarse fragments. The modifier used is based on the volume, shape and size of the dominant coarse fragment in the soil. Table 2 will be helpful in determining the appropriate coarse fragment modifier to use.

**Table 2.** Names of Coarse Fragment Modifiers

SHAPE	SIZE AND NAME			
	0.2 - 7.6 cm	7.6 - 25 cm	25 - 60 cm	> 60 cm
Rounded	Gravelly	Cobbly	Stony	Bouldery
Flat	Channery	Flaggy	Stony	Bouldery

Adjectives are also used to indicate the estimated volume of the coarse fragments.

- |                                   |                                     |
|-----------------------------------|-------------------------------------|
| Less Than 15 Percent by Volume    | No Adjective                        |
| 15 to 35 Percent by Volume        | Name of Coarse Fragment             |
| 35 to 60 Percent by Volume        | Very Plus Coarse Fragment Name      |
| Greater Than 60 Percent by Volume | Extremely Plus Coarse Fragment Name |

For Example: A sandy loam soil that has 40 percent by volume of rounded coarse fragments, averaging 5 cm in diameter would be classified as very Gravelly Sandy Loam.

As with color and redoximorphic features, it is common practice to use textural abbreviations when making profile descriptions. Accepted textural abbreviations are as follows:

**Textural Classes**

- |                       |                              |
|-----------------------|------------------------------|
| <b>s:</b> sand        | <b>sicl:</b> silty clay loam |
| <b>ls:</b> loamy sand | <b>cl:</b> clay loam         |
| <b>sl:</b> sandy loam | <b>scl:</b> sandy clay loam  |
| <b>l:</b> loam        | <b>sc:</b> sandy clay        |
| <b>sil:</b> silt loam | <b>sic:</b> silty clay       |
| <b>si:</b> silt       | <b>c:</b> clay               |

**Coarse Fragments**

- |                     |                      |
|---------------------|----------------------|
| <b>g:</b> gravelly  | <b>ch:</b> channery  |
| <b>cb:</b> cobbly   | <b>fl:</b> flaggy    |
| <b>st:</b> stony    | <b>v:</b> very       |
| <b>bd:</b> bouldery | <b>ex:</b> extremely |

For example: A very gravelly sandy loam soil would have a field abbreviation of ...vgsl.

## Structure

Soil structure refers to the arrangement or grouping of individual soil particles into aggregates or clusters called peds. These are naturally occurring units with specific shape and size which are the result of the soil forming processes of wetting, drying, freezing and thawing, and other physical and chemical changes. These processes have created planes of weakness in the soil which form the surface of peds. Organic matter, clay, and other cementing agents, such as iron oxides, may act as forces of attraction in stabilizing structural peds.

Soil scientists describe structure in terms in their grade size and shape.

## Type

The four primary structural types are granular, platy, blocky, and prismatic (see Figure 5).

**Granular structure** is spheroidal and particles are arranged around a central point bounded by rounded or curved surfaces. This type of structure is common in most surface horizons.

**Platy structure** results when particles are arranged along a horizontal plane approximately parallel to the soil surface. This type of structure resembles thick sheets of paper and is common in E, Bx, and Cd horizons.

**Blocky structure** is composed of particles arranged around a point and bounded by flat or slightly rounded surfaces. These cube-like peds are the dominant structural units found in most subsurface B horizons. Faces can have angular or subangular surfaces.

**Prismatic structure** results when particles are arranged around a vertical line and bounded by relatively flat vertical surfaces. This type of structure, although not typical of Rhode Island soils, is common elsewhere in some subsoils, particularly Bx horizons.

## Size

Structural peds are classified according to their size. Figures 6 and 7 illustrate the various sizes for each of the primary structural types.

## Grade

Grade describes the distinctness of structure or how obvious each structural unit (ped) is to the naked eye.

<b>Structureless:</b>	No observable aggregation; distinct peds are nonexistent.
<b>Weak:</b>	Peds are barely observable in place. When gently disturbed, the soil material parts into weakly defined Structural units.
<b>Moderate:</b>	Peds are well formed and distinct structural units are evident in undisturbed soil.
<b>Strong:</b>	Peds are distinct and extremely well formed. Individual structural units are easily observed in undisturbed soils.

As with other morphological properties, an abbreviated nomenclature is used during the field description of soil structure.

Grade		Size	
0...	Structureless	vf...	Very Fine <sup>1</sup>
1...	Weak	f...	Fine <sup>1</sup>
2...	Moderate	M...	Medium
3...	Strong	C...	Coarse <sup>1</sup>
		vc...	Very Coarse <sup>1</sup>



		<b>Type</b>		
<b>gr...</b>	Granular		<b>sbk...</b>	Subangular Blocky
<b>pl...</b>	Platy		<b>pr...</b>	Prismatic
<b>abk...</b>	Angular Blocky		<b>sg...</b>	Single Grain <sup>2</sup>
			<b>m...</b>	Massive <sup>2</sup>

For Example: Weak, coarse, subangular blocky structure would be designated as lcsbk.

<sup>1</sup>For platy structure use thin or thick modifiers.

<sup>2</sup>Single grain (sandy) and massive are used only with structureless soils.

### **Consistence**

Soil consistence refers to the resistance of soil aggregates to deformation or rupture. Consistence properties are manifested by cohesion, or the attraction of soil particles to each other, and adhesion, the ability of particles to cling to other objects. Thus, the consistence of a soil is dependent upon such factors as clay, organic matter, and iron oxide content.

For any particular soil, consistence varies with the water content. For example, moistening a hard, dry clod may soften it by reducing the attraction between particles. With increasing water content, the soil will approach a plastic state and may even become sticky. For this reason, soil scientists describe consistence under three moisture conditions -- dry, moist and wet.

Terms such as loose, soft, and hard are used to describe the consistence of air-dry soil. Loose consistence applies to sandy materials. Soft suggests that the soil would crush to powder if worked in a dry condition, and cultivation of a dry soil with hard consistence would leave the surface rough and cloddy. If soils are wet, consistence is expressed in terms of plasticity and stickiness which is an indication of the amount of clay.

The consistence of most soils is determined under a field-moist condition. It is intended to represent a soil in a condition suitable for plowing. Consistence terms used at this moisture content are loose, friable, and firm. A loose consistence generally refers to non-coherent, coarse-textured soils. Friable soils are in aggregate form, but they crumble readily under gentle pressure. These soils are desirable in the preparation of a seedbed prior to planting crops. Soils described as firm when moist are usually relatively dense. This may be the result of compaction or cementation. These types of soils are generally difficult to work, and roots, air, or water may have difficulty moving through the soil. Degrees of moist consistence are determined by attempting to crush a piece of soil and are defined as:

- l...** Loose: Non-Coherent
- vfr...** Very Friable: Soil material crushes easily under gentle pressure between thumb and forefinger.
- fr...** Friable: Soil material crushes easily under moderate pressure between thumb and forefinger.
- fi...** Firm: Soil material crushes under moderate pressure but resistance is distinctly noticeable.
- vfi...** Very Firm: Soil material crushes under strong pressure; barely crushable between thumb and forefinger.
- efi..** Extremely Firm: Soil material crushes only under very strong pressure; cannot be crushed between thumb and forefinger.

It is extremely important to be aware that consistence of soil can change when removed from the soil profile. The consistence thus may be described as one consistence breaking to another (e.g., extremely firm in place and friable when removed).

## **HORIZON DEPTHS**

A description of a pedon includes the thickness and the depth limits of each horizon or layer. Depths are measured from the soil surface for all mineral soils with no organic horizon and all organic soils. For soils with an O horizon that is not saturated for prolonged periods (i.e., Oi), the soil surface is the top of the mineral horizon, with the O horizon measured up from the mineral surface. If the uppermost layer is an O horizon that is or has been saturated for prolonged periods, depths are measured from the top of either the Oe or Oa horizon, whichever is highest in the profile.

## **HORIZON BOUNDARIES**

A boundary is a surface or transitional zone, approximately parallel to the soil surface, between two adjoining horizons or layers. Boundaries are described in terms of their distinctness and topography.

**Distinctness:** Distinctness refers to the ease of determining the zone between two adjacent horizons. The distinctness of a boundary depends partly on the degree of contrast between adjacent layers and partly on the thickness of the transition zone between them. Distinctness is defined in terms of the thickness of the transition zone:

<b>abrupt (a)...</b>	less than 2 cm thick
<b>clear (c)...</b>	2 - 5 cm thick
<b>gradual (g)...</b>	5 - 15 cm thick
<b>diffuse (d)...</b>	greater than 15 cm thick

**Topography:** Topography refers to the irregularity of the boundary between adjacent layers as viewed in a soil profile:

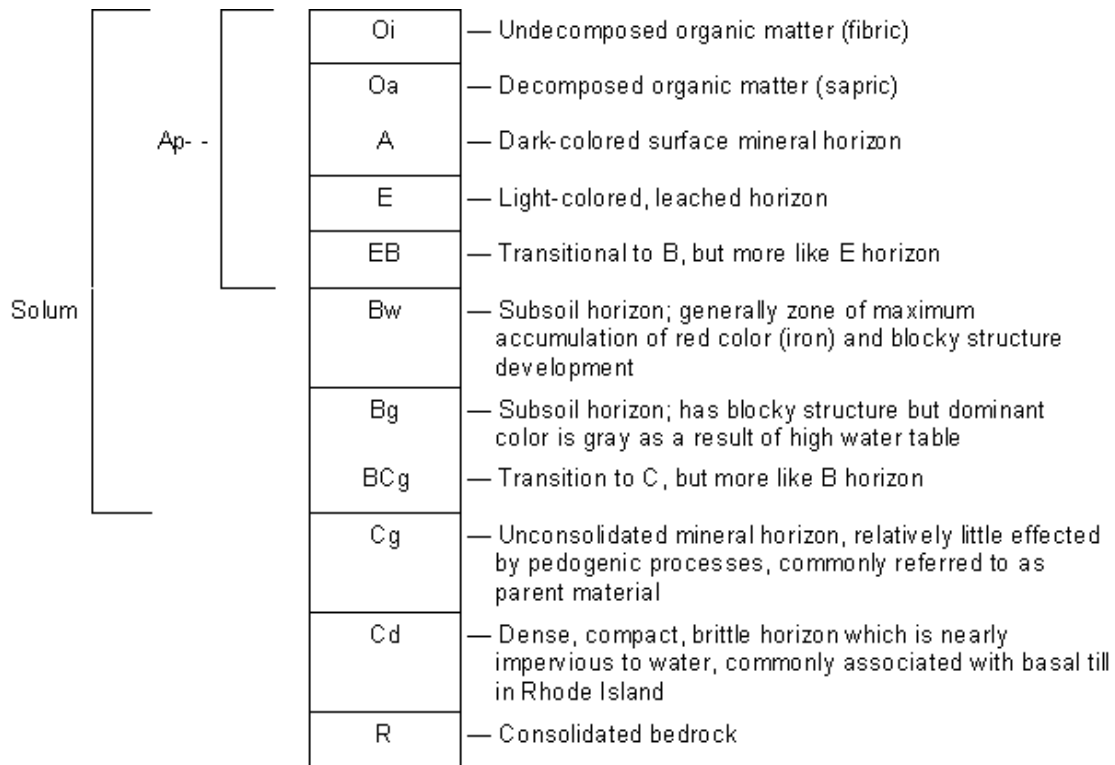
<b>smooth (s)...</b>	boundary is nearly a plane
<b>wavy (w)...</b>	boundary has undulations in which depressions are wider than their depth
<b>irregular (i)...</b>	boundary has depressions or pockets that are deeper than their width
<b>broken (b)...</b>	a discontinuous boundary

The abbreviation method used for field descriptions would use aw to designate an abrupt wavy boundary.

## **Miscellaneous**

Depending on the soil and/or the purpose of the profile description, additional soil properties may be included in the soil's description:

<b>Soil Pores:</b>	Indicates the abundance and size of pores in each horizon.
<b>Roots:</b>	Indicates the abundance, size, and whether fibrous, woody, or live roots are present in each horizon.
<b>Clay Films:</b>	Indicates the presence of clay films, clay skins, or clay coatings on the surface of peds.
<b>Reaction:</b>	Indicates whether the soil is acid, neutral or alkaline.



**Figure 1.** Hypothetical soil profile illustrating principal horizons

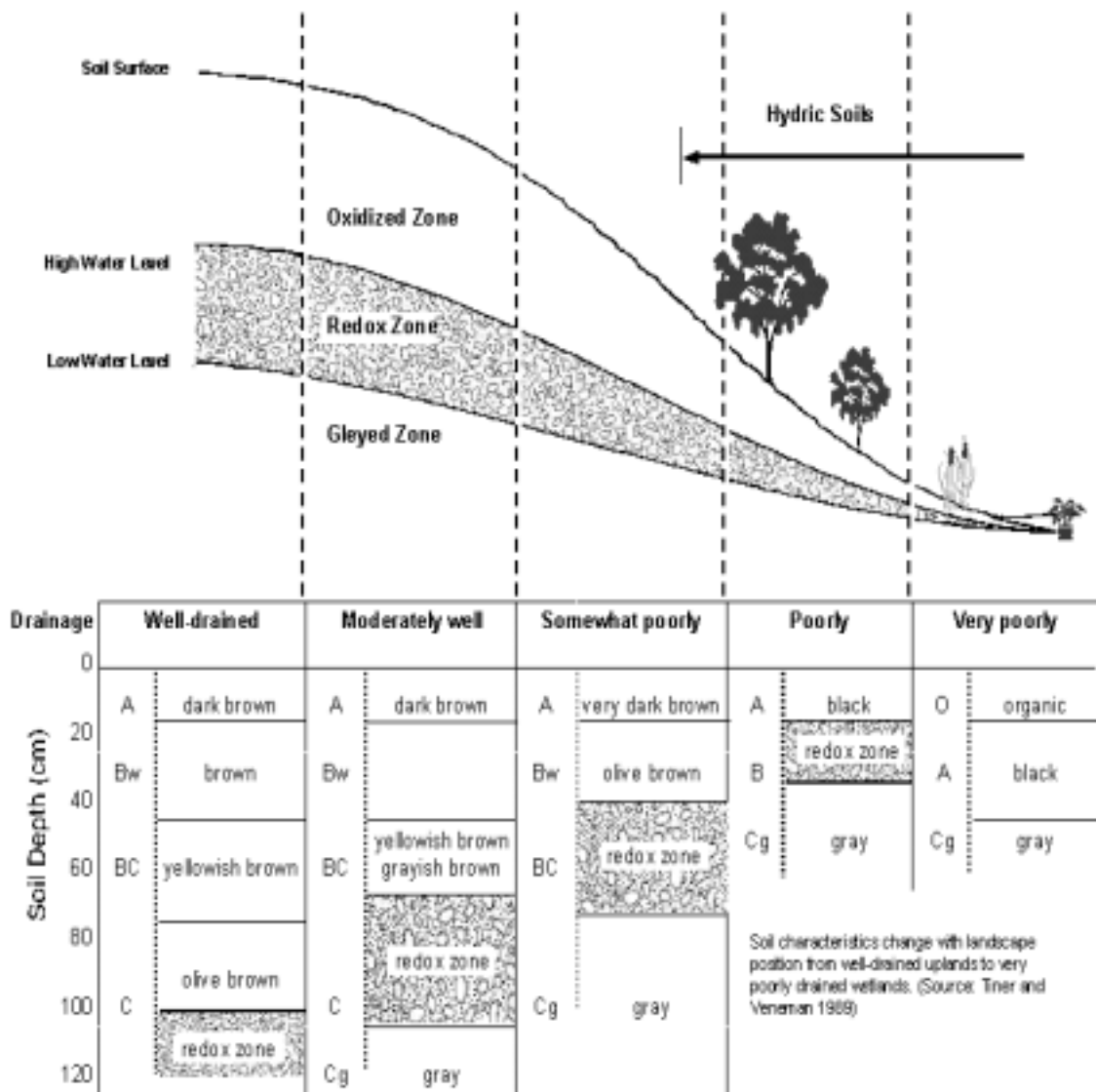
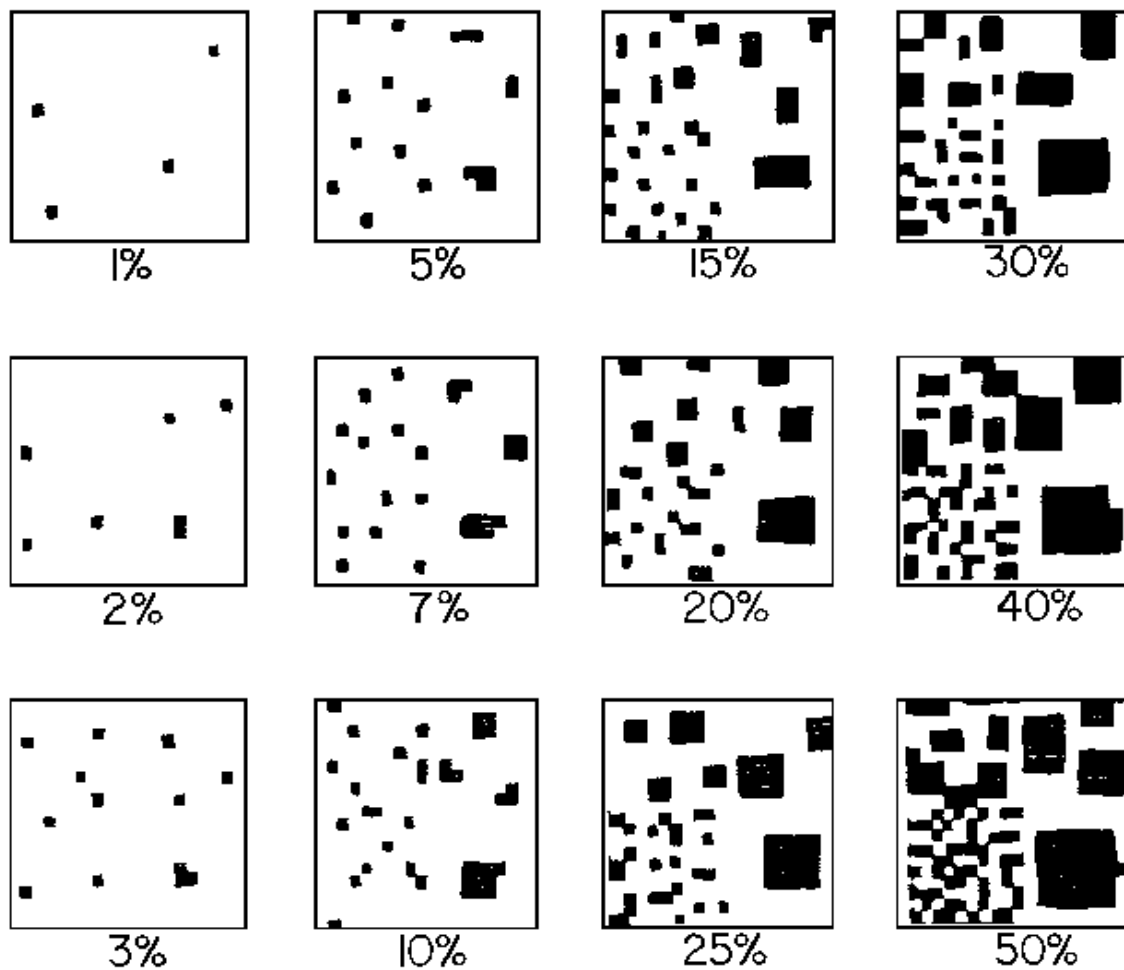


Figure 2. Soil Toposequence



**Figure 3.** Chart for estimating proportions of re-dox features and coarse fragments.

Soil texture must be determined using soil material less than 2.0 mm. in size. If approximately 20% or more of the soil material is larger than 2.0 mm., the texture term includes a modifier. Example: gravelly sandy loam.

**Example of use:**  
A soil material with 10% clay, 20% silt, and 70% sand is a sandy loam.

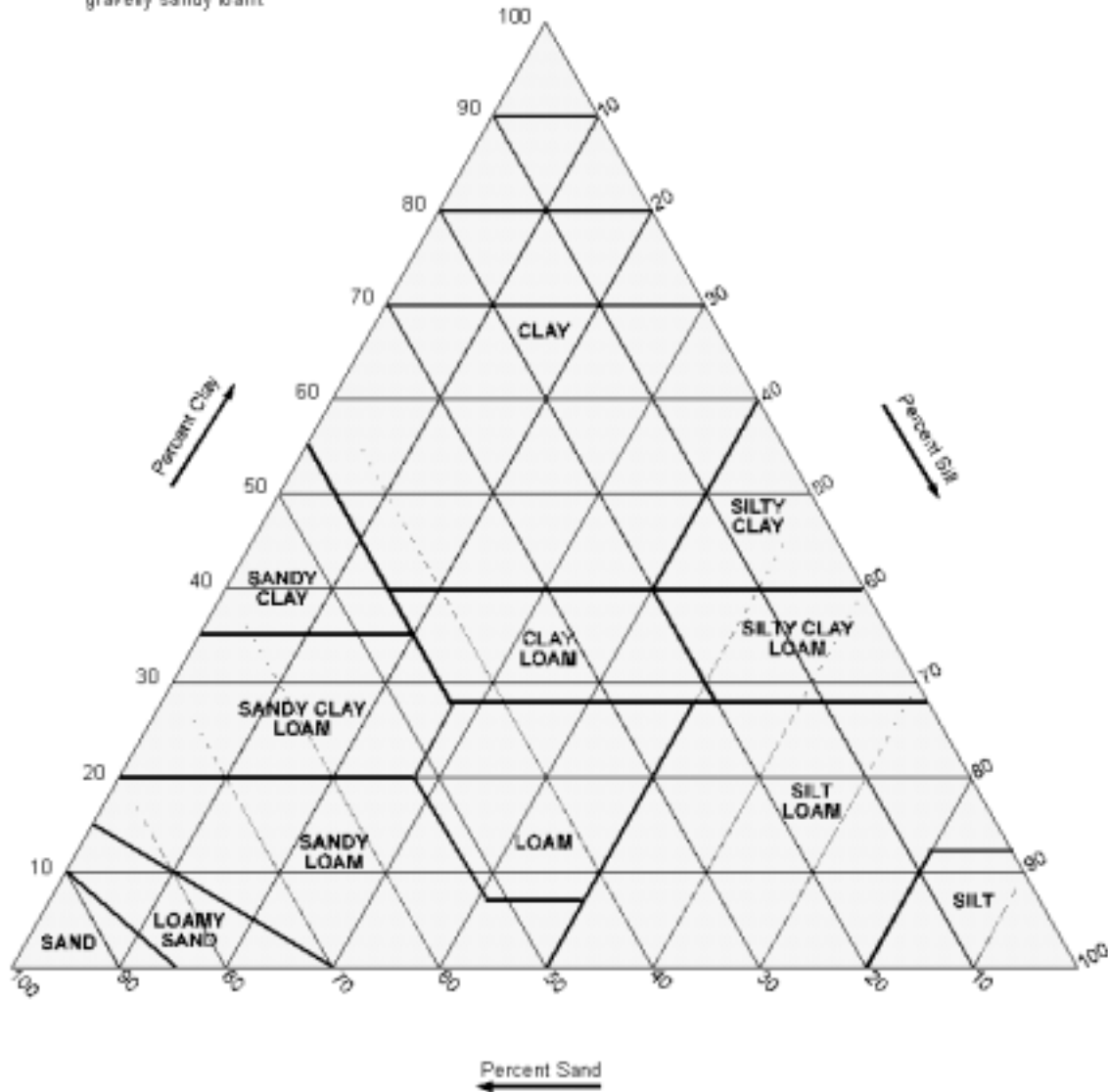
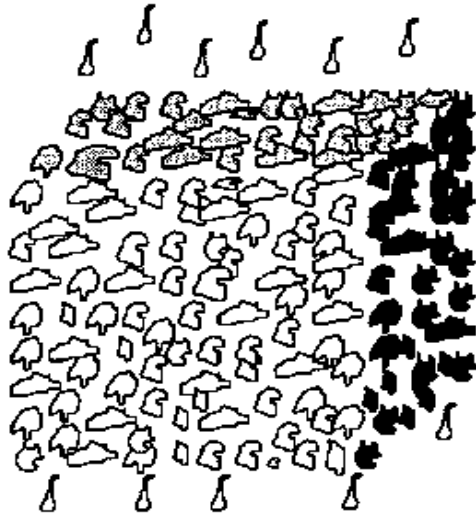
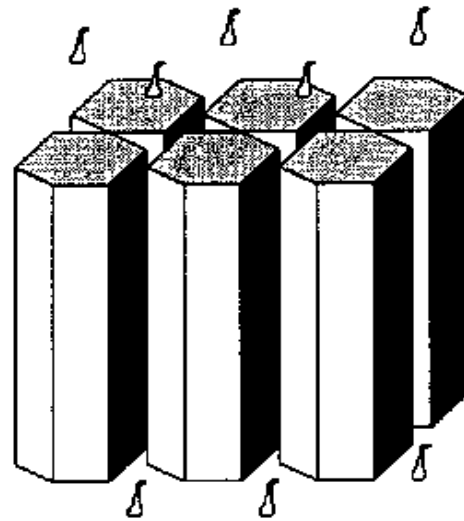


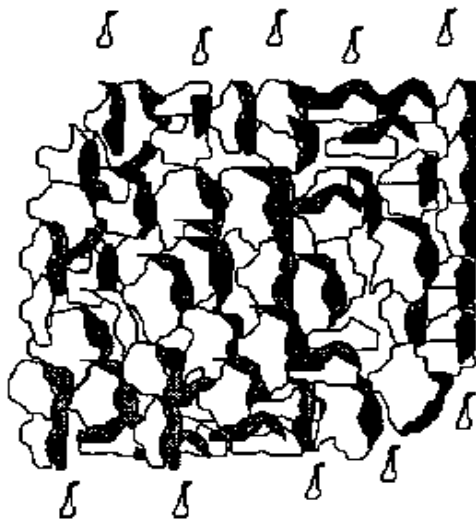
Figure 4. Soil Textural Triangle



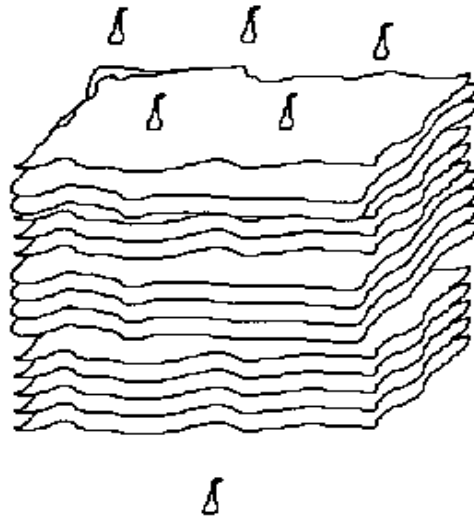
Granular Structure



Prismatic Structure



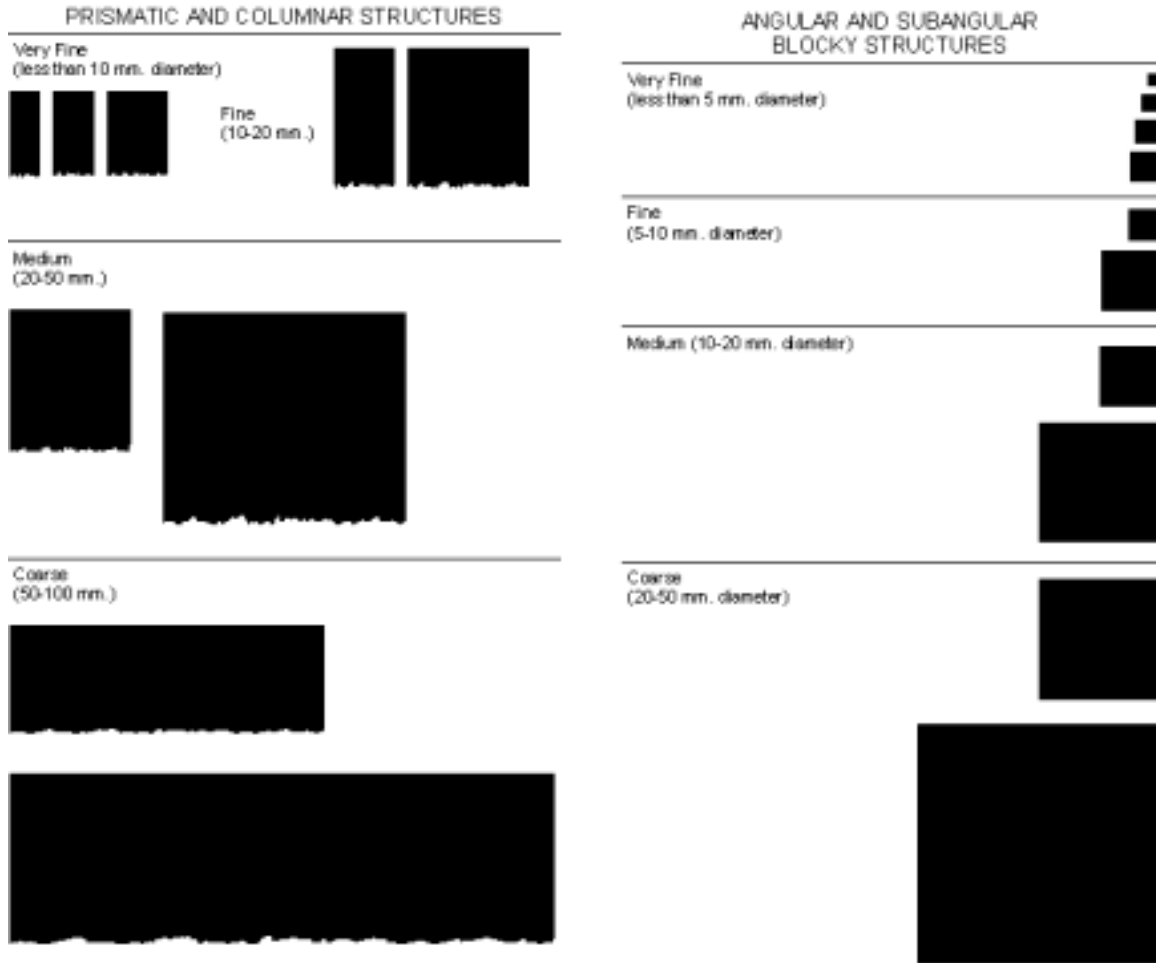
Blocky Structure



Platy Structure

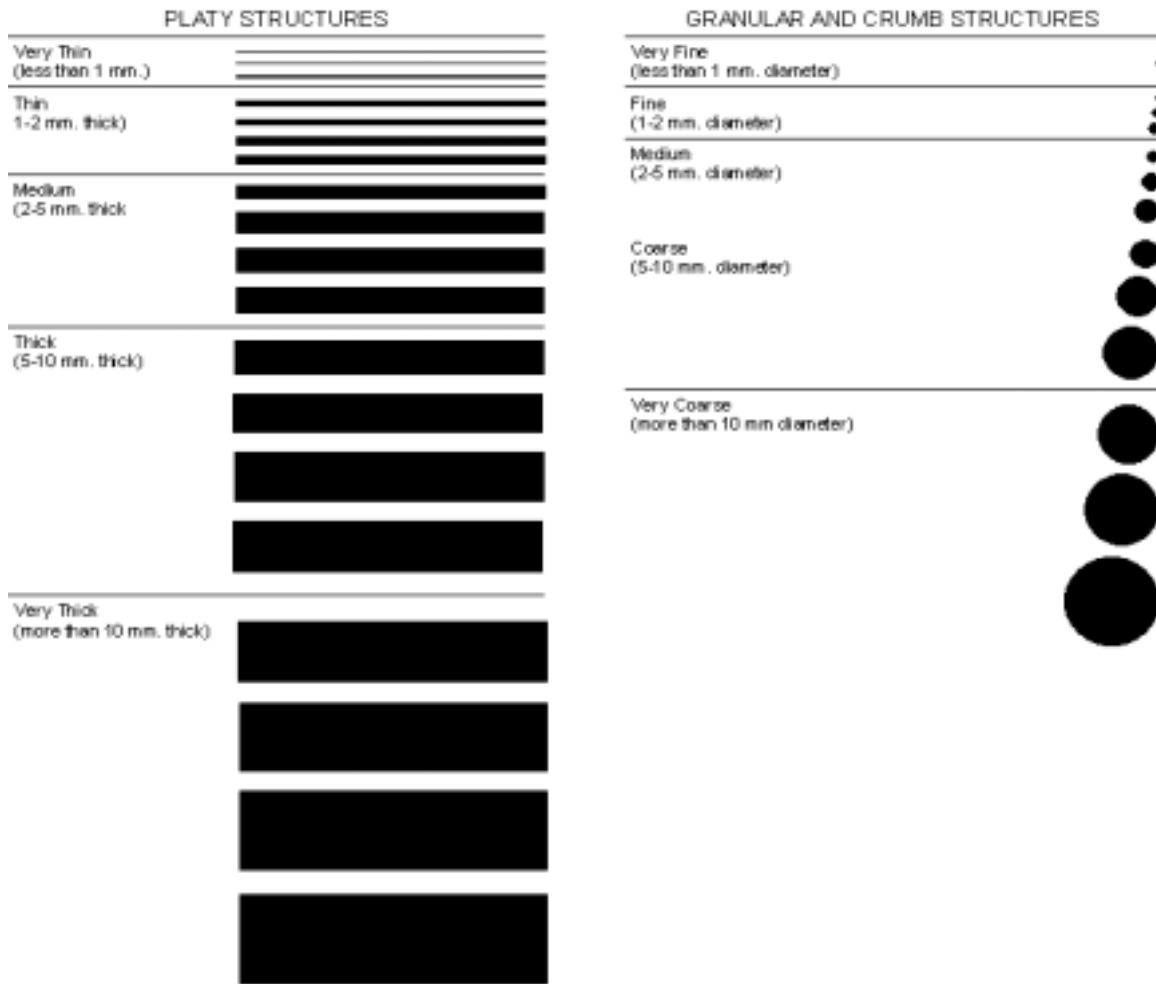
**Figure 5.** Water and wastewater movement in structured soils

Rate and volume of water/wastewater movement in structured soils.  
 Granular > prismatic = columnar > blocky > platy > massive.



**Figure 6.** Size classification of prismatic and blocky structures.





**Figure 7.** Size classification of platy and granular structures.

## APPENDIX 2: SOIL CHARACTERISTICS, ASSOCIATED LAND FORMS, AND ON-SITE CONSIDERATIONS

### 1. **GLACIAL TILL**

**Definition:** Dominantly unsorted and unstratified (not layered) sediment deposited by a glacier. Soil particle sizes associated with this type of soil are clay, silt, sand, gravel, stones and boulders. In Rhode Island, however, clay is rarely found. Glacial till can be further subdivided into two (2) categories: **LODGEMENT and ABLATION.**

#### **LODGEMENT (OR COMPACT) TILL:** (Class A)

##### **Characteristics:**

- 1) Wide particle size distribution - clay, silt, sand, gravel, cobbles, stones and boulders. Most common textures found in Rhode Island, however, are sandy loam, fine sandy loam and silt loam.
- 2) Unsorted and unstratified - heterogeneous mixture of all particle sizes showing no layering.
- 3) Angular shaped rock fragments.
- 4) Substratum is typically below 1.5 - 2.5 feet and is usually compact. Often referred to as hardpan.
- 5) Very dense, cannot be easily dug into by hand or backhoe.
- 6) Less commonly exists in western Rhode Island. Crystalline derived (lighter color) rounded/sub-rounded coarse frags.

##### **Associated Landforms:**

- 1) Till "mantle" ridge (e.g., URI main campus; Chopmist Hill, Scituate, most of Aquidneck Island).
- 2) East side of Narragansett Bay. Typically dark, coarse fraggy, monochromic carbon-based soils.
- 3) Drumlin

##### **Site Identification and Septic System Considerations:**

- 1) Identifying Lodgment Till
  - a) Note the ease of excavation by the backhoe. The bucket will often chatter across the surface of lodgment till subsoil, making shallow cuts with each pass.
  - b) Pick at the side of the test pit with a knife to feel for ease of penetration. Compact till will be difficult to penetrate or dig out.
  - c) Squeeze a clod of soil between thumb and index finger. Compact till will initially resist crushing, but with increased pressure it will rupture suddenly.
  - d) Surface stones common in many areas of till unless removed for past land uses. Stone walls may be a found on-site.
- 2) Check for presence of perched or apparent (true) water table. In cases of a perched water table which poses a depth to groundwater restriction, a curtain (subsurface) drain may be used to lower the groundwater table. Lowering the groundwater table may thereby ease the depth to groundwater restriction. Wet season (January 1 - April 1) monitoring may be required.

**Note:** In some areas subsurface drains may not be permitted, for example in the Scituate watershed.
- 3) Avoid construction when the ground is very moist or wet. Construction in moist to wet soils will cause smearing and compaction, thereby reducing the infiltrative capacity of the soil.

## **DEBRIS FLOW/ABLATION (OR LOOSE) TILL: (Class B)**

### **Characteristics:**

- 1) Typically coarser than lodgement till with a particle size distribution of sand, gravel, cobbles and stones. Common soil textures in Rhode Island are fine sandy loam, sandy loam and loamy sand. Some areas may have silt loam texture.
- 2) Much less compact than lodgement till.
- 3) Unsorted and unstratified - heterogeneous mixture of all particle sizes showing no layering.
- 4) May contain lenses or pockets of finer material.
- 5) Small amounts of silt, almost no clay.
- 6) Most extensive soil parent material on the west side of Narragansett Bay.

### **Associated Landforms:**

- 1) Moraines (Terminal and Recessional)
- 2) Ground Moraine

### **Site Identification and Septic System Considerations:**

- 1) Identifying Ablation Till
  - a) Note the ease of excavation by the backhoe. The bucket will be able to dig through ablation till easier than lodgement till making medium cuts with each pass.
  - b) Pick at the side of the test pit with a knife to feel for ease of penetration. Ablation till will be moderately difficult to penetrate or dig out.
  - c) Squeeze a clod of soil between thumb and index finger. Ablation till will crush easier than the lodgement till.
  - d) Surface stones common in many areas of till unless removed for past land uses. Stone walls may be found on-site.
- 2) Check for presence of water table. Water tables in ablation till are most likely to be apparent (true) rather than perched.
- 3) Document any restrictive layers.
- 4) Avoid construction during wet periods. Doing so will prevent smearing and compaction thereby maintaining the infiltrative capacity of the soil.

## 2. **GLACIAL OUTWASH DEPOSITS**

**Definition:** Stratified deposits of sands and gravels deposited by melt-water streams that flowed from melting glaciers. Glacial outwash is further subdivided into Proglacial and Ice-contact outwash deposits. Proglacial outwash deposits are formed in front of or just beyond the outer limits of the glacier. Ice-contact outwash deposits are formed adjacent to stagnant glacial ice, possibly collapsing after the ice has melted and leaving an irregular and often hilly terrain.

## **PROGLACIAL OUTWASH: (Class C)**

### **Characteristics:**

- 1) Stratified (layered appearance) and well sorted.
- 2) Clean sands and gravel, typically with very little silt or clay.
- 3) If present, gravel and cobble size rock fragments are sub-rounded to rounded.
- 4) Sediment is very loose, walls of test pit may slough in.
- 5) Generally, there is a lack of stones and boulders.

### **Associated Landforms:**

- 1) Outwash Plain (e.g., URI Turf Fields)

**Site Identification and Septic System Considerations:**

- 1) Proglacial outwash is characterized by stratified (layered) sands and gravel.
- 2) When digging test pits, close adherence to OSHA test pit safety methods is extremely important. Test pits can very easily slough in.
- 3) Percolation rates in these soils can be very rapid. Caution must be exercised in environmentally sensitive areas (such as coastal ponds) or in well head protection areas. Proglacial outwash areas are commonly recharge areas for aquifers.
- 4) Enhanced treatment septic systems may be necessary to reduce the nitrate and phosphate loading associated with on-site disposal of wastewater.
- 5) Galleys should not be considered in these areas because of high infiltration rates and the lack of treatment provided by this system which discharges at depths of 2+ feet.

**GLACIAL ICE CONTACT OUTWASH: (Class D)**

**Characteristics:**

- 1) Stratified (layered appearance) may be irregular or slumped.
- 2) Sediment may be well to poorly sorted.
- 3) Typically loose sandy material, but may contain pockets or lenses of silty material.
- 4) Contains significantly more silt size particles than proglacial outwash.
- 5) If present, gravel and cobble size rock fragments are sub-rounded to rounded.
- 6) May include areas of stones and boulders.
- 7) Sediment is very loose; walls of test pit may slough in.

**Associated Landforms:**

- 1) Kames
- 2) Kettles
- 3) Eskers
- 4) Kame Deltas and Terraces
- 5) End Moraines (e.g., Charlestown Moraine)

**Site Identification and Septic System Considerations:**

- 1) Ice-contact outwash may have variable stratification and sorting.
- 2) Test pits may show little consistency in their soil profiles, even on relatively small parcels. Care in ascertaining the extent of the soil conditions is necessary.
- 3) When digging test pits, close adherence to OSHA test pit safety methods is extremely important. Test pits can very easily slough in. Document any restrictive layers.
- 4) Percolation rates in these soils can vary greatly from one location to another. Caution must be exercised in environmentally sensitive areas (such as coastal ponds) or in well head protection areas. Proglacial outwash areas are commonly recharge areas for aquifers.
- 5) Enhanced treatment septic systems may be necessary to reduce the nitrate and phosphate loading associated with on-site disposal of wastewater.

3. **COASTAL DUNE DEPOSITS: (Class E)**

**Definition:** Natural mound on ridge of sand-sized sediment deposited, landward of a coastal beach, by wind action and storm overwash.

- 1) Fine to coarse sands.
- 2) Well sorted and often finely stratified.
- 3) May contain an eolian silt layer, but otherwise no silt or clay.
- 4) Typically no gravel size or coarser rock fragments.

**Associated Landforms:**

- 1) Ridges or mounds that often parallel the shoreline landward of the beach.
- 2) May be vegetated by dune grass or unvegetated loose sand. Commonly found in beach environments such as south shore of Rhode Island.

**Site Identification and Septic System Considerations:**

- 1) Ever-changing landscape that is susceptible to strong winds and wave action.
- 2) Typically found in Protected Resource Areas, careful evaluation of aerial extent is necessary. Other regulatory agencies may have jurisdiction (see: CRMC).

4. **ALLUVIAL (FLOODPLAIN) DEPOSITS:** (Class F)

**Definition:** Material transported and deposited by present day streams and rivers.

**Characteristics:**

- 1) Susceptible to seasonal flooding.
- 2) Nearly level areas adjacent to streams and rivers.
- 3) Sorted and often stratified.
- 4) Usually fine textured sediments (silts and fine sands). May be coarser depending on stream/river velocity.
- 5) May have dark buried layers in the substrata that once were surface layers.

**Associated Landforms:**

- 1) Floodplain
- 2) Stream Terrace
- 3) Oxbow
- 4) Meander Scar

**Site Identification and Septic System Considerations:**

- 1) Typical high seasonal groundwater table.
- 2) Fine textured sediments that are well sorted and stratified.
- 3) PROTECTED RESOURCE AREA - CAUTION: Careful evaluation of aerial extent is necessary. Other regulatory agencies may have jurisdiction (see: RIDEM Wetlands Division, CRMC).

5. **EOLIAN DEPOSITS:** (Class G)

**Definition:** Silt-sized sediment deposited by wind action.

**Characteristics:**

- 1) Typically silts ranging from six inches to several feet in Rhode Island.
- 2) Silt layer typically contains no rock fragments (i.e., gravel, cobble or stone).

**Associated Landforms:**

- 1) Eolian deposits are located across various landforms. Outwash plains and till ridges are the most extensive landforms with an eolian silt deposits drape.
- 2) Found in many places in Washington County and in some areas of Kent County.

**Site Identification and Septic System Considerations:**

- 1) Eolian deposits are typically silt textured soils which are powdery (like flour) when dry and smooth when wet.
- 2) Eolian deposits may retain a perched water table if underlying material is much coarser than silt.

3) Often overly glacial till and outwash soils.

**Soil Class Listing for Rhode Island Soil Series:**

<b>Soil Class “A” Lodgement Till</b>	<b>Soil Class “B” Ablation Till - Loose</b>	<b>Soil Class “C” Proglacial Outwash</b>	<b>Soil Class “D” Glacial Ice Contact</b>	
• Birchwood	Canton	Agawam	Gloucester	
• Leicester	Lippitt	• Deerfield	Hinckley	
• Mansfield	Sutton	Hinckley		
Newport	<b>Ablation Till - Compact</b>	Merrimac		
Paxton	• Charlton	• Ninigret		
• Pittstown		Quonset		
Poquonock		• Sudbury		
• Ridgebury		Windsor		
• Stissing				
• Whitman				
• Woodbridge				
<b>Soil Class “E”</b>	<b>Soil Class “F”</b>	<b>Soil Class “G”</b>	<b>Other Soils (Not Previously Listed )</b>	
<b>Coastal Dunes</b>	<b>Alluvial</b>	<b>Eolian Deposits</b>	<b>X</b> Adrian	
Udipsamments	<b>X</b> Matunuck	Bridgehampton (C)	<b>X</b> Carlisle	
	• Podunk	Broadbrook (A)	<b>X</b> Ipswich	
	<b>X</b> Rumney	Enfield (C)	<b>X</b> Scarboro	
		Narragansett (B)	<b>X</b> Walpole	
		• <b>X</b> Rainbow (A)		
		•Raypol (C)		
		•Scio (B)		
		•Tisbury (C)		
		•Wapping (B)		

**Legend:**

- Potentially problematic soils due to “perched” or “apparent” high groundwater tables
- X** Groundwater table likely to be less than 2-feet below the soil surface.
- ( ) Letters within parentheses indicate the class of the substratum

**EFFECTIVE DATE**

The foregoing “Rules and Regulations Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Individual Sewage Disposal Systems,” after due notice, are hereby adopted and filed with the Secretary of State this \_\_\_\_\_ day of January 2002 to become effective twenty (20) days thereafter, in accordance with the provisions of Chapters 5-56.1, 23-19.5, 42-35, 42-17.1, 42-17.6 of the General Laws of Rhode Island of 1956, as amended.

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Jan H. Reitsma, Director  
Department of Environmental Management

Notice Given On:                    November 7, 2001

Public Hearing Held:                December 6, 2001

Filing Date:

Effective Date: