Rhode Island Department of Environmental Management
Soil Evaluator (Class IV License) Examination Study Guide
Revised 2017

Contents

Purpose

The purpose of this study guide is to provide information on soil evaluator exam format, general content of the exam and equipment required for the field component; it is not intended to provide the technical foundation necessary to pass the exam.

You are expected to have an understanding of the general configuration and function of septic systems. This guide includes some fundamental information relating to these topics. If these topics are new to you or are unclear, you should refer to the reference list provided at the end of this compilation.

The test incorporates content from the OWTS Rules applicable to the work performed by a soil evaluator. The OWTS Rules are available on the DEM website: from DEM home at **http://www.dem.ri.gov**,

Click on the vertically-oriented tab on the right, labelled "**Permits & Licenses**",

Then select "**ISDS/OWTS (Septic) Systems Permits**",

Then "**+ (About) Regulations**",

Select "**OWTS Rules**".

Rule 15 covers soil evaluation, Rule 16, additional site testing. Since soil evaluation is performed to evaluate the suitability of a site for onsite wastewater treatment, the testing is performed in the area of the proposed leachfield. Therefore, familiarity with setbacks is necessary (Rule 22).

In addition to studying the OWTS Rules, you should review the **Soil Evaluation Guidance Document.** This is available from the DEM website: at http://www.dem.ri.gov,

Click on the vertically-oriented tab labelled "**Permits & Licenses**",

Then "**ISDS/OWTS (Septic) Systems Permits**",

From beneath "**Permitting Information**" select "**Soil Evaluations**".

Responsibilities of a Licensed Soil Evaluator

A licensed soil evaluator has responsibilities beyond conducting the soil evaluation service for clientele.

Regulatory Permitting Requirements
It is the responsibility of the licensee to follow the regulations concerning submission of applications for permitting-related activity and data to the OWTS Permitting Program.

Renewal of License
The soil evaluator license is a distinct license under the DEM OWTS designer licensing program and renewal must be requested independent of other licenses you may possess. Renewal requires submission to the Department of a completed renewal application form, with the renewal application fee (and late fee as applicable) as directed on the renewal application form and documentation of required continuing education.

Continuing Education
"Continuing education units" (CEUs) required for renewal is 4 CEUs multiplied by the number of years since the license was issued or renewed. Continuing education must be obtained after the license is issued; events attended prior to obtaining the license may not be considered "continuing education".

The New England Onsite Wastewater Training Center (NEOWTC) at URI posts to their website a schedule of classes every year; many of these classes may be attended for Class IV License CEUs. The OWTS licensing section of the DEM website provides a link to the NEOWTC:

At DEM home (http://www.dem.ri.gov/),

Select from the right side of the screen, the vertically-oriented tab labelled "**Permits & Licenses**", then "**ISDS/OWTS (Septic) Licenses**",

From the center of the screen beneath "**Exams and Workshops**:" click on "**Continuing Education Opportunities**",

Beneath "**OWTS Professional Licensing Continuing Education Opportunities**", click on "**New England Onsite Wastewater Training Program at URI- Schedule**".

Be certain that CEUs have been assigned for Class IV (Cl-IV) Licenses if your primary interest in the class is to obtain CEUs for renewal of your Class IV License.

Beneath the link to the NEOWTC, there is a list of events that have been assigned CEUs for OWTS licenses, each listing identifies the license classes for which the CEUs apply – not all of the events listed here, or available at the NEOWTC are applicable to the work performed by Soil Evaluators – read events' descriptions carefully and be certain that CEUs have been assigned for Class IV (Cl-IV) Licenses if your primary interest in the event is to obtain CEUs for renewal of your Cl-IV License.

Licensees may request review of courses, seminars or workshops for possible CEUs. To request review for continuing education credit value, as much specific information about the content of the event as possible should be provided to the OWTS program for evaluation.

Examination Logistics

Location and Time

Specific instructions concerning location of the exam and the time by which you must arrive will be provided to applicants after the exam application deadline.

Weather

Arrive on time even if it rains; the rain date decision may be made the day of the exam, so you must arrive at the location specified in the exam-specific instructions as scheduled, *unless other instructions are provided to you*.

Lunch

If you are taking both components of the exam, you should consider bringing water to drink and your lunch unless you are informed there will be time to get lunch between the two components. The exam-day schedule is highly structured and is not flexible. *If you leave for lunch and are late returning, there will be no special accommodation made to provide you with extra time to complete your afternoon component.*

An **example** exam day schedule is included in this guide so you will know what to expect the day of the exam.

Examination Specifics

Two Components: Written Examination and Field Examination

Each section will be graded separately. Both must be passed, but they do not have to be passed concurrently. If more than 3 years elapse between passing both components, the component originally passed must be retaken. Examinees will be notified of results in writing within 60 days after the examination date.

Examination Content *

- Principles of on-site sewage treatment and disposal;
- Understanding of the applicable state regulations;
- Geology and soils of Rhode Island;
- Soil textural analysis and profile descriptions;
- Estimating mean seasonal high groundwater elevations using soil morphology; and
- Soil moisture and drainage characteristics of soils.

*Information from OWTS Rule 10.3.4

Written Examination Format

- Closed-book
- Multiple choice
- Fill-in the blank
- True/false
- 2 hours to complete (No talking will be allowed. When finished and your exam is turned in, you may leave the room.)

Field Examination Format

- Three soil pits will be evaluated
- Complete a Field Card (provided the day of the exam) for each of the three pits (a sample of the card used is provided later in this material).
- Guidance materials are permitted for the field examination

At the pits (50 minutes per pit, 10 minutes transit to the next pit)

- 6 examinees (maximum), each group's DEM guide and pit monitor will be present at each pit

Sequence:

Group A (3 examinees)	Group B (3 examinees)
10 minutes in	10 minutes out
20 minutes out	20 minutes in
15 minutes in	15 minutes out
5 minutes out	5 minutes in
(cards collected at end of 5 minute interval)	(cards collected on way out of pit)
Depart for the next pit.	**Depart for the next pit.**

Example Exam Day *SAMPLE* Schedule

Rhode Island Department of Environmental Management
Class IV Soil Evaluator Examination

Sample SCHEDULE

Groups 1, 2, 3		Groups 4, 5, 6	
8:30 – 8:45	Registration	8:30 – 8:45	Registration
8:45 – 9:00	Distribution of exams/instructions	8:45	Depart Parking Area for assigned soil pits
9:00 – 11:00	Written exam	8:50 – 9:40	Each group's first pit
11:00 – 12:00	Lunch		Group 4 – Pit 1
12:30	Depart Parking Area for assigned soil pits		Group 5 – Pit 2
12:40 – 1:30	Each group's first pit		Group 6 – Pit 3
	Group 1 – Pit 1	9:40 - 9:50	Transit to next pit
	Group 2 – Pit 2	9:50 – 10:40	Each group's second pit
	Group 3 – Pit 3		Group 4 – Pit 2
1:30 - 1:40	Transit to next pit		Group 5 – Pit 3
1:40 – 2:30	Each group's second pit		Group 6 – Pit 1
	Group 1 – Pit 2	10:40 -10:50	Transit to next pit
	Group 2 – Pit 3	10:50 – 11:40	Each group's third pit
	Group 3 – Pit 1		Group 4 – Pit 3
2:30 - 2:40	Transit to next pit		Group 5 – Pit 1
2:40 – 3:30	Each group's third pit		Group 6 – Pit 2
	Group 1 – Pit 3	11:40 - 11:50	Transit to Parking Area
	Group 2 – Pit 1	11:50 – 12:50	Lunch
	Group 3 – Pit 2	1:05 – 1:15	Distribution of exams/instructions
3:30 - 3:40	Transit to Parking Area	1:20 – 3:40	Written Exam

Field Examination

Required equipment for the field component

- **Soil Color Book**
- **Clip board**
- **Pencils & Erasers**
- **Water bottle**
- **Towel**
- **Soil knife**
- **Any guide materials you would use in the field for soil evaluation**
- **Plastic bag or other method to shield your recording sheet from inclement weather**
- **Back pack, bucket or a bag for toting clothing and equipment**
- **Specimen tin to hold soil samples (disposable muffin pans work well)**
- **"Sharpie" marker for labeling tin**
- **Masking tape on which to label specimen tin**

You will be in the field for 3 hours, the following are suggested:

- **Wear appropriate field attire (boots and jeans)**
- **Bring "layers" of clothing, consider a hat**
- **Be prepared for rain**
- **Consider an extra pair of shoes**
- **Insect repellant is recommended**
- **Sun screen may be desired**

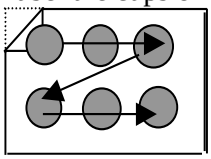
DEM will supply for use at the field component:

- **Clinometers**
- **Cards on which to record field exam information**

Recording Information at the Soil Pits

Pit Control Section

- The control section is a section of the pit wall of approximately two to three feet in width. The boundaries of the control section will be marked with ribbon.
- **The control section is the part of the soil profile you must describe.**
- **You will collect soil samples from outside the boundaries of the control section for evaluation of required properties**.
- At the pit, time is scheduled in and out of the pit. It is recommended that you use muffin pans (or any other method you may devise) to collect your soil samples in the pit for texturing and coloring during your rotation out of the pit.
  A recyclable aluminum muffin pan with one corner folded in can be keyed to a sketch you draw on your field card, so that you do not have to label the cups on the pan. **Example:**

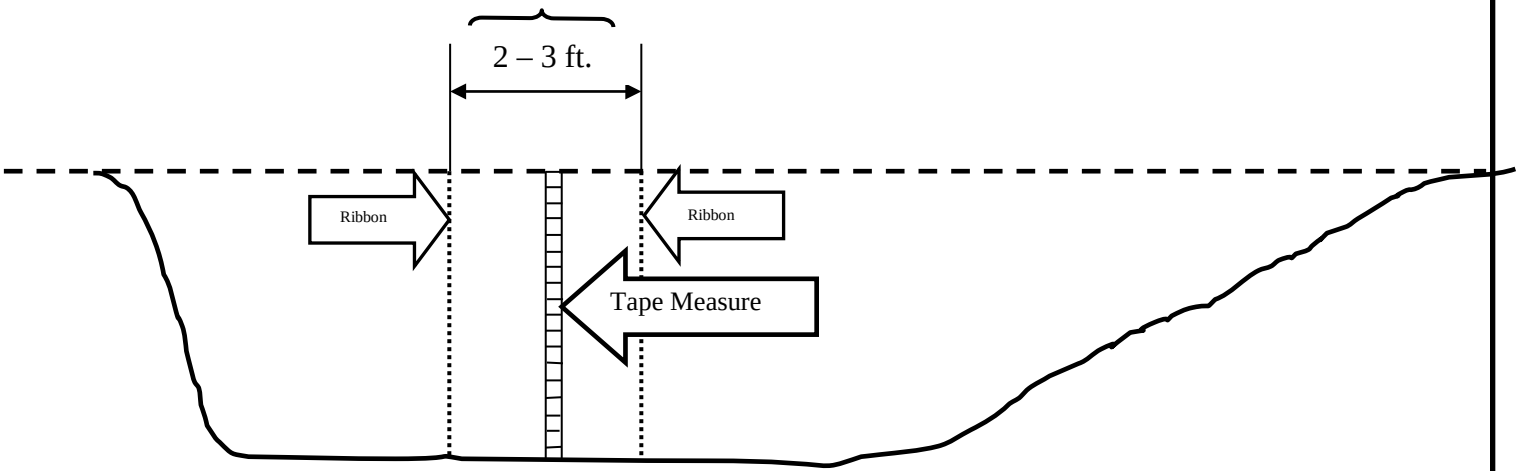


Cross Section of Pit Showing Control Section

"Control Section"

Do Not Disturb the Control Section!

Take samples from outside the control section, but describe the profile within it.



Recording Information at the Soil Pits

An example of the card on which you will record your observations is depicted on the next page. The card used for the field component of the Soil Evaluator Exam is different from the DEM Site Evaluation Report Form on which the soil evaluation is recorded.

Field Exam Reporting Card - Side 1

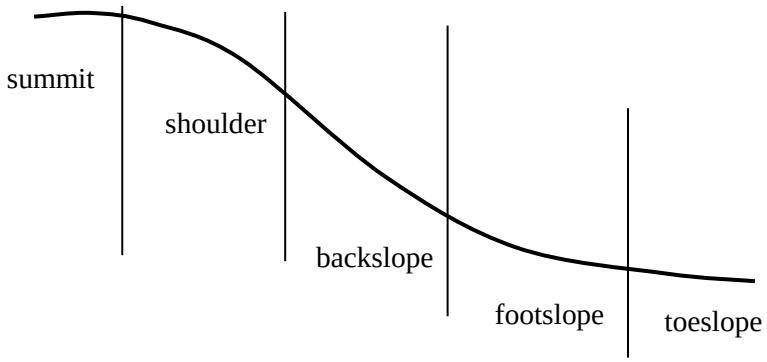
On side 1 of the field exam reporting form, each element of soil description is presented in a distinct column; this requires that each element of the description be considered individually during the exam, as one is describing each element of a soil horizon.

If you do not observe a characteristic, draw a line through the box indicating that you have considered that element, but that it was not observed. If a box is left blank, without such a mark, it will be assumed that you were not able to make a determination, which will negatively influence your score.

Depth must be recorded in **inches**.

Field Exam Reporting Card - Side 2

Landform and Landscape position - On side 2 of the field exam reporting form, you are required to identify the type of landform in which the test pit is located as well as the landscape position (hillslope profile position) of the pit. Landforms are discussed later in this study guide. Below is a simple diagram of landscape position.



Slope - You will be required to record the slope of the land where the pit has been excavated. A clinometer will be available at each pit for determination of slope.

Parent Material(s) - Note that if 2 parent materials are observed both must be recorded.

RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
CLASS IV SOIL EVALUATION EXAMINATION

20__ __

RECORD ALL DEPTHS IN INCHES

NAME: _____ **PIT #:** _____

HORIZONATION					BOUNDARY		TEXTURE		COLOR			STRUCTURE			MOIST CONSIST.	REDOX FEATURES			
Prefix	Master	Suff.	No.	Depth (in)	Distinct.	Topo	Coarse Fragment Modifier	Class	Hue	Value	Chroma	Grade	Shape (Type)	Size		Depletions		Concentrations	
																Abundance	Contrast	Abundance	Contrast

Format of card used for the field component of the Class IV Exam.

Side 1

Nomenclature is described in the **Soil Evaluation Guidance Document**. You may access the Soil Evaluation Guidance Document online. At http://www.dem.ri.gov, select the vertically oriented tab labelled "**Permits & Licenses**", then "**ISDS/OWTS (Septic) Systems Permits**", then scroll down and from the table in the center of the screen, select "**Soil Evaluations**".

On the Field Card:

- Record depths in ***inches***
- If you do not observe a characteristic, draw a line through the box indicating that you have considered that element, but that it was not observed. Boxes which are left blank without such a mark, will be assumed to indicate that you were not able to make a determination, which will negatively influence your score.

Depth to limiting layer (inches): _____

Depth to groundwater or seepage (inches): _____

Depth to seasonal high watertable (inches): _____
(if below soil profile, so indicate)

SITE INTERPRETATION

NOTE:
If two parent materials are present, record both of them

Landform

_____ **Floodplain**
_____ **Stream Terrace**
_____ **Coastal Dune**
_____ **Depression**
_____ **Moraine (Recessional/Terminal)**
_____ **Drumlin**
_____ **Till Ridge**
_____ **Outwash Plain**
_____ **Esker, Kame or Kettle**
_____ **Other Upland Area**

Hillslope-Profile

_____ **Summit**
_____ **Shoulder**
_____ **Backslope**
_____ **Foot slope**
_____ **Toe slope**
_____ **None**

Slope

_____ **1 – 3%**
_____ **3 – 8%**
_____ **8 – 15%**
_____ **15 – 25%**
_____ **25 – 35%**
_____ **> 35%**

Parent Material (s)

_____ **Eolian Deposits**
_____ **Glacial Ice Contact**
_____ **Proglacial Outwash**
_____ **Dense Glacial Till**
_____ **Loose Glacial Till**
_____ **Dune**
_____ **Alluvial**
_____ **HTM**
_____ **Other (organic soils)**

Format of card used for the field component of the Class IV Exam.

Side 2

Landforms, soil characteristics and parent material are discussed in the **Soil Evaluation Guidance Document,** at http://www.dem.ri.gov, select the vertically oriented tab labelled "**Permits & Licenses**", then "**ISDS/OWTS (Septic) Systems Permits**", then scroll down and from the table in the center of the screen, select "**Soil Evaluations**".

STATE OF RHODE ISLAND AND PROVIDENCE PLANTATIONS
Department of Environmental Management
Office of Water Resources
Onsite Wastewater Treatment System Program

Site Evaluation Form
Part A – Soil Profile Description **Application Number** _____

Property Owner: _____
Property Location: _____
Date of Test Hole: _____
Soil Evaluator: _____ License Number: _____
Weather: _____ Shaded: Yes ☐ No ☐ Time: _____

TH____ Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				

Sample form used for
DEM OWTS *Soil Evaluation (NOT for the test)*

Part A (Side 1)

To be completed by a Soil Evaluator (Class IV License)

TH____ Horizon	Depth	Horizon Boundaries		Soil Colors		Re-Dox			Texture	Structure	Consistence	Soil Category
		Dist	Topo	Matrix	Re-Dox Features	Ab.	S.	Contr.				

TH _____ Soil Class _____ Total Depth _____ Impervious/Limiting Layer Depth _____(og) GW Seepage Depth _____ SHWT _____(og)

TH _____ Soil Class _____ Total Depth _____ Impervious/Limiting Layer Depth _____(og) GW Seepage Depth _____ SHWT _____(og)

Comments: _____

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Part B

Site Evaluation – to be completed by Soil Evaluator or Class II or III Designer

Please use the area below to locate:

1. Test holes and bedrock test holes,
2. Approximate direction of due north,
3. Offsets from all test holes to fixed points such as street, utility pole, or other permanent, marked object.*
   *OFFSETS MUST BE SHOWN

Key:
- Approximate location of test holes
- Approximate location of bedrock test holes
- x% Estimated gradient and direction of slope
- N Approximate direction of due north

Sample form used for DEM OWTS *Soil Evaluation (NOT for the test)*

Part B (Side 2)

To be completed by a Soil Evaluator (Class IV License), or a Class II or III OWTS Designer

Bedrock THs	
TH	Depth

1. Relief and Slope: _____
2. Presence of any watercourse, wetlands or surface water bodies, within 200 feet of test holes? If yes, locate on above sketch. NO ☐ YES ☐
3. Restrictive Layer or Bedrock within 4' below original ground within 25 feet of test hole? Provide all test hole locations & depths above. NO ☐ YES ☐
4. Presence of existing or proposed private drinking water wells within 200 feet of test holes? If yes, locate on above sketch. NO ☐ YES ☐
5. Public drinking water wells within 500 feet of test holes? If yes, locate on above sketch. NO ☐ YES ☐
6. Is site within the watershed of a public drinking water reservoir or other critical area defined in Rule 38? NO ☐ YES ☐
7. Has soil been excavated from or fill deposited on site? If yes, locate on above sketch. NO ☐ YES ☐
8. Site's potential for flooding or ponding: NONE ☐ SLIGHT ☐ MODERATE ☐ SEVERE ☐
9. Landscape position: _____
10. Vegetation: _____
11. Indicate approximate location of property lines and roadways.
12. Additional comments, site constraints or additional information regarding site: _____

Certification

The undersigned hereby certifies that all information on this application and accompanying forms, submittals and sketches are true and accurate and that I have been authorized by the owner(s) to conduct these necessary field investigations and submit this request.

Part A prepared by: _____ (Signature) _____ (License #) Part B prepared by: _____ (Signature) _____ (License #)

DO NOT WRITE IN THIS SPACE

Witnessed Soil Evaluation Decision: Concur ☐ Inconclusive ☐ Disclaim ☐

Unwitnessed Soil Evaluations Decision: Accept ☐ Inconclusive ☐ Disclaim ☐

Wet Season Determination required ☐ Additional Field Review Required ☐

Explanation: _____

_____

_____

_____ (Signature Authorized Agent) _____ (Date)

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Principles of on-site sewage treatment and disposal

Wastewater Constituents

Microorganisms (fecal coliform and pathogens)

Nutrients (nitrogen and phosphorus)

Organic Chemicals

Toxic Chemicals

Septic System Treatment

Collect and separate solids and grease from wastewater

Waste decomposition by physical, biological and chemical processes in the system and in the soil

Dispersal of the treated water to the soil environment

Principles of Onsite Sewage Treatment and Disposal

Function of a septic tank, d-box, drainfield

Biomat – What is it? How is it formed? Where is it formed? What does it do?

Long-term acceptance rate (LTAR)

Soil Physical Properties

Adsorption versus absorption

Aerobic versus anaerobic

Nitrification

Denitrification

Regulatory

Soil Testing Application Form (submitted to OWTS Program prior to Soil Evaluation)

Soil Evaluation and Site Evaluation ("Site Evaluation Form", may be referred to as Soil Evaluation Form)

Soil Evaluation submission requirements (Rule 15)

OWTS Rules addressing Leachfields

Restrictive layer/(impervious layer) or bedrock, groundwater

Configuration of a conventional septic system

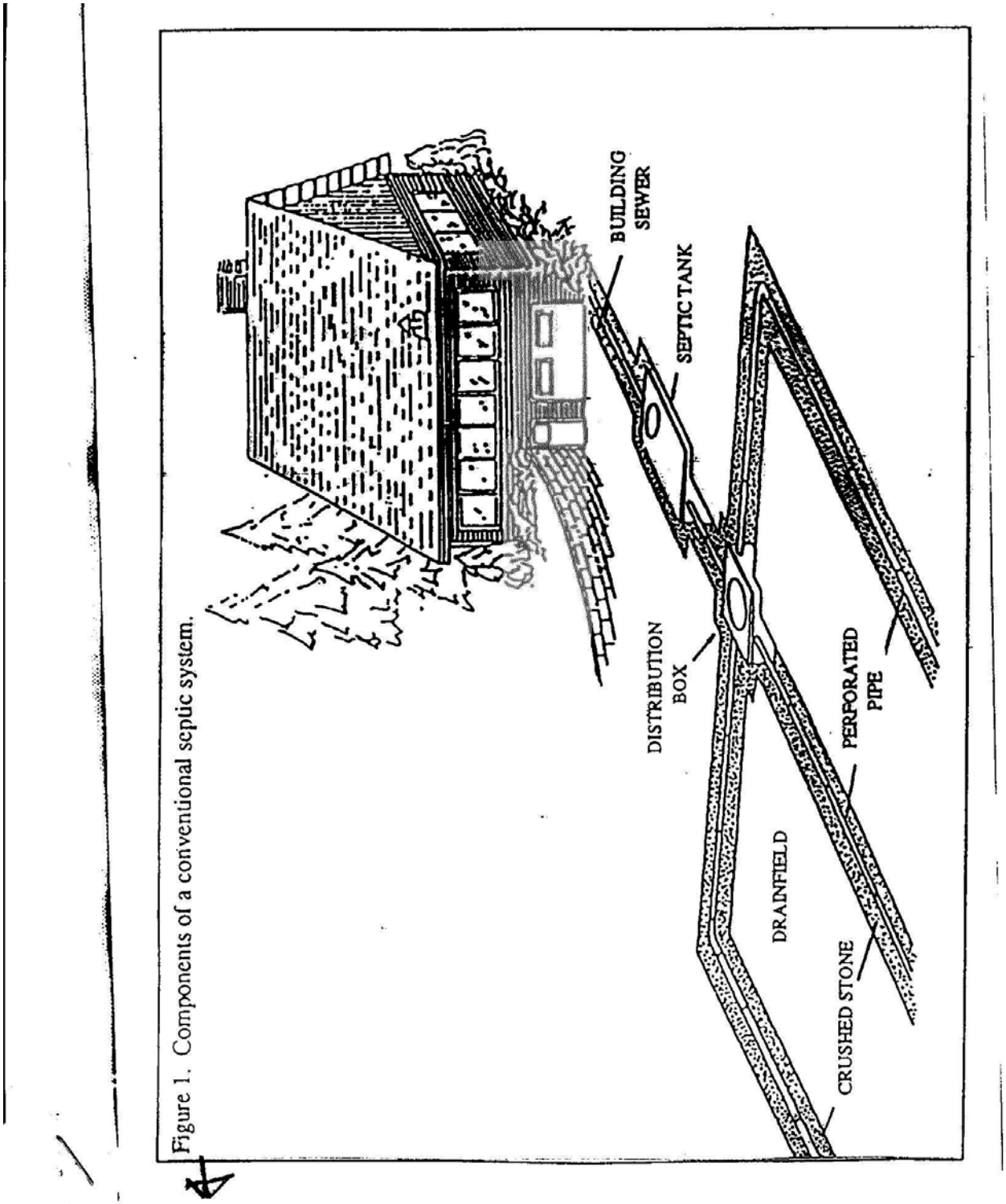

Figure 1. Components of a conventional septic system.

Advanced Treatment Options

Alternative or Experimental (A/E) systems are available for use at properties requiring better treatment than achieved by a conventional system. DEM maintains a list of Department approved technologies. This list includes proprietary systems, and system components, manufactured and marketed by a business entity as-well-as non-proprietary sand filters.

Proprietary systems which pass the approval process are issued an approval certification for a specific use, for example TSS and BOD reduction or nitrogen reduction.

Landforms and Soil Parent Materials

Parent Material	Landforms
Glacial Till (dense) Lodgement Till (basal till)	Drumlins, moraines, till ridges, ice contact
Glacial Till (loose) Ablation Till	Drumlins, moraines, ice contact
Outwash Proglacial outwash Ice-Contact Outwash (Ice contact stratified drift)	Outwash Plains, kames, kettles, eskers
Alluvial	Floodplain (FP), Stream Terrace
Eolian	Variable, outwash plains & till ridges
Organic Deposits	Depressions, low areas near streams and ponds
Coastal Dune	Coastal sites; shoreline beaches
Lacustrine	Glacial lakebed sediments
Human Transported Materials	Formerly referred to as “fill”, human-altered/transported material includes a variety of soil and geologic material deposited by human activity

Study Resources

This includes a list of typical reference books and some online resources. The listing is not all-inclusive, nor is it necessary to review these books, or websites. This is intended as guidance, as to the type of texts you may want to review prior to the exam.

Online Resources

1. The New England Onsite Wastewater Training Center has available on their website, a series of onsite wastewater fact sheets including but not limited to the following topics: conventional and advanced treatment system types, wastewater treatment and system maintenance. These fact sheets are available a links at: http://web.uri.edu/owt/onsite-wastewater-factsheets/.

2. The US Environmental Protection Agency issued two onsite manuals, one in 1980 and the second in 2002. These manuals are available at https://www.epa.gov/septic/onsite-wastewater-treatment-and-disposal-systems and are listed as number 5 and 6 below.

3. The Consortium of Institutes for Decentralized Wastewater Treatment "*Decentralized Wastewater Glossary*" is available at http://onsiteconsortium.org/Glossary2009.pdf.

4. The Soil Science Society of Southern New England website provides links to sites providing soils-related information at: http://ssssne.org/links.html.

Printed Resources

1. *Soil Survey of Rhode Island*
   United States Department of Agriculture (Soil Conservation Service) Natural Resources Conservation Service in cooperation with Rhode Island Agricultural Experimentation Station, issued July 1981.
   The RI Soil Survey is now availabel online at
   https://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm.

2. *Onsite Wastewater Treatment Systems*
   Burks, Bennette D. and Mary M. Minnis. Madison, Wisconsin: Hograth House, Limited, 1994.

3. *Wastewater Engineering Design for Unsewered Areas, 2nd Ed.*
   Laak, Rein. Lancaster, Pennsylvania: Technomic Publishing Company, Inc. 1986

4. *Onsite Wastewater Disposal*.
   Perkins, Richard J. National Environmental Health Association, Lewis Publishers, 1990.