

# RI DEM Class II & III OWTS Designer Exam

## Study Guide



This material has been compiled to assist you in your preparation for the Rhode Island Department of Environmental Management Class I OWTS Designers' Examination. This document is intended to be utilized in conjunction with the OWTS Rules, which are available at the RIDEM website at:

<http://www.dem.ri.gov/pubs/regs/regs/water/owts12.pdf>

## Table of Contents

Part 1 – Introduction

Part 2 – Sample Exam Questions

Part 3 – Design Guidance

Part 4 – OWTS Forms

# RI DEM Class II & III OWTS Designer Examination

## Study Guide

### Part 1 - Introduction



This material has been compiled to assist preparation for the Rhode Island Department of Environmental Management Class II & III OWTS Designers' Examinations. This document is intended to be utilized in conjunction with the OWTS Rules, which are available at the RIDEM website at:

<http://www.dem.ri.gov/pubs/regs/regs/water/owts12.pdf>

#### Table of Contents

DEM ISDS/OWTS Licensing Program Background .....	2
TITLE 5 Businesses and Professions.....	3
CHAPTER 5-56 Installers of Individual Sewage Disposal Systems.....	3
TITLE 5 Businesses and Professions.....	4
CHAPTER 5-56.1 Designers of Individual Sewage Disposal Systems .....	4
Directions to DEM .....	6
Map of DEM Location.....	7
Preparation for and What to Bring to the CI-II & III OWTS Designer Exams .....	8
SELECTED REFERENCES .....	9

# DEM ISDS/OWTS Licensing Program Background

## Governor's Committee

In 1995, a committee was appointed by the Governor to study the Freshwater Wetlands and ISDS Programs. The Designer statute which mandates the DEM designer licensing program was drafted by this committee to facilitate the following:

- Streamline Permitting
- Lessen deficiencies, omissions and delays in design and construction
- Increase Accountability
- Focus on failing systems, upgrades, non-point impacts, alternative technologies, large systems

## Designer Statute - RIGL 5-56.1

- Classification
- Qualifications/Examinations
- Training & Renewal of Licenses
- Inspections
- Oversight

<u>Class</u>	<u>Qualifications</u>	<u>Authorized Tasks</u>
I	OWTS Installer	Residential system repairs <=900gpd conventional systems and certain alternative technologies
II	PE or PLS	<= 2000 gpd residential <= 900 gpd commercial all Class I + alteration apps + new building apps without critical variances
III	PE	All system designs
IV	Min 9 semester Hours soil science And 2 – 4 years experience	Site/soil evaluations (req'd for all new systems)

<u>Task</u>	<u>Past Practices</u>	<u>Current Practice</u>
Site Suitability	-Wet/dry season WT -DEM verification req'd -No field approval	-Year round WT -Soil Evaluation by specialist -Field verification optional -Field approval allowed
Design	Private Practitioner (PE or PLS)	OWTS licensed designer
Design Review	Detailed review of each application	Level of review based on designer or special conditions
Installation compliance checks	DEM	-OWTS licensed designer -DEM spot checks or case-by-case basis
Certification	ISDS installer	OWTS licensed designer
Conformance	DEM	DEM

### Benefits from Licensing

- Lessen seasonal backlog in application processing
- OWTS designs improved
- OWTS performance improved
- Increased accountability on private professional
- Improved public health & environmental protection
- Recognizes specialty of OWTS and facilitates advancement of technology and practice

### Activities in Licensing

- Application to take exam
- Exam
- License registration & fee
- License issued - maximum 3 year period
- Continuing education - 4 "Continuing education units" CEU per year
- Renewal of Licenses

### Responsibilities of Class I Designers

- Obtain required site/system data
- Design of sewage disposal system repair
- Submittal of complete and accurate application and plan (see Rule 18)
  - Notify DEM of construction date; at least 24 hrs. notice
  - Minimum inspection requirements
  - Record and maintain a file (photos, material receipts, etc)
- Submit Certificate of Construction
- Inform owner of conventional system O & M

### Compliance Oversight Process

- Complaints/performance problems
  - Preliminary review
  - Warning letter
- Review Panel
- Notice of Intent to Suspend or Revoke
- Preliminary hearing
- Notice of Suspension or Revocation
  - Appeal/Formal hearing
- Public censure

**TITLE 5**  
**Businesses and Professions**  
**CHAPTER 5-56**

**Installers of Individual Sewage Disposal Systems**

**5-56-1 License required. –**

(a) It shall be unlawful for any person to install, construct, alter, or repair or cause to be installed, constructed, altered, or repaired any individual sewage disposal system unless he or she has a valid annual license issued by the director of environmental management.

(b) This section does not apply to a property owner installing, constructing, altering, or repairing an individual sewage disposal system to serve a building he or she occupies or will occupy as his or her intended permanent domicile, provided that he or she has obtained written permission for that work, and that he or she has obtained the necessary written approval of the director of the plans and specifications for that work prior to the start of any construction.

**5-56-2 Conditions for obtaining an installer's license. –**

(a) An application for an installer's license filled out in its entirety, along with a fee of twenty-five dollars (\$25.00), must be submitted to the director.

(b) The applicant installer must have demonstrated to the director that he or she is capable of installing individual sewage disposal systems in accordance with approved plans and specifications.

(c) The applicant installer must obtain a passing grade on a written examination given by the director, intended to demonstrate his or her understanding of the rules and regulations, and his or her ability to read and interpret approved plans and specifications for individual sewage disposal systems.

(d) The applicant installer must demonstrate possession of and ability to properly use a level or transit.

**5-56-3 [Obsolete.] – Reenactments.** The 1987 reenactment (P.L. 1987 ch. 78, § 1) deemed this section obsolete.

**5-56-4 License not transferable or assignable. –** Installer's licenses are not transferable or assignable and shall automatically become invalid upon a change of ownership or upon suspension or revocation.

**5-56-5 Denial, suspension and revocation of licenses. –**

(a) An application for a license may be denied, or a license may be suspended or revoked when the director has determined that the operation is not being and/or will not be conducted in manner as prescribed in these regulations.

(b) When an application for a license has been denied or when a license has been suspended or revoked, a hearing shall be granted if a hearing is requested in writing by the aggrieved applicant within ten (10) days of the denial, suspension or revocation.

**5-56-6 Expiration and renewal of licenses. –**

(a) Licenses shall be in effect for a period not to exceed three (3) years following the date of issuance.

(b) A license shall be renewed upon payment of a renewal fee and the satisfactory completion of any continuing education required by the director.

**5-56-7 Responsibilities, performance and conduct. –** A duly licensed installer shall adhere to the following:

(1) To perform all work in compliance with approved plans and specifications only.

(2) To report any discrepancies on an approved plan which he or she may note during construction to the director.

(3) To utilize only quality grade construction materials approved by the director.

(4) To use only the best construction techniques to provide for the best possible installations.

(5) To work only under valid plans approved by the director with the approval stamp clearly indicated, and to commence work only after completely reviewing the entire approval including the application, the layout plans, all typical specification sheets, and other attachments.

(6) To adhere to each and every term of approval as stipulated by the director in his or her approval of the particular plan.

**5-56-8 Penalties. –**

(a) The penalties for noncompliance with any section of this chapter are as set forth in § 42-17.1-2, as amended, as follows:

(b) Any person who shall knowingly and wilfully violate any rule or regulation adopted pursuant to authority granted to the director shall upon conviction be punished by a fine of not more than five hundred dollars (\$500) or by imprisonment for not more than thirty (30) days or both, for each offense or violation, and each day's failure to comply with any rule or regulation shall constitute a separate offense.

**TITLE 5**  
**Businesses and Professions**  
**CHAPTER 5-56.1**

**Designers of Individual Sewage Disposal Systems**

**5-56.1-1 Declaration of intent and purpose. –**

(a) Whereas sewage entering individual sewage disposal systems contains bacteria, viruses, other pathogens and nutrients; and whereas the sewage may also contain hazardous materials, including, but not limited to, cleaning fluids, paints, hobby supplies and other hazardous household chemicals; and whereas improperly designed or defectively installed and failing individual sewage disposal systems may degrade wetlands, groundwater, or surface waters, including drinking water sources; and whereas the public health, the public welfare, and the environment require protection from pollutants emanating from individual sewage disposal systems; the general assembly establishes licensing requirements and responsibilities for persons involved in certain design and installation activities relating to individual sewage disposal systems.

(b) The purpose of this chapter is to establish provisions, qualifications and procedures for licensing persons engaged in the preparation of applications, plans, certifications and specifications for individual sewage disposal systems, also referred to as "ISDSs", for submittal to the department of environmental management.

**5-56.1-2 License required. –** Beginning one year after issuance of the first designer's license, all plans, applications, evaluations and certifications for the siting, location, design, installation or repair of any individual sewage disposal system submitted to the department of environmental management are prepared by a person possessing an appropriate designer's license issued by the director of the department of environmental management in accordance with rules and regulations promulgated under § 5-56.1-3. The department of environmental management may exempt the repair of individual sewage disposal system from this requirement.

**5-56.1-3 Licensing authority. –** The department of environmental management, acting through its director and referred to as "the licensing authority", carries out the functions and duties conferred upon it by this chapter. The licensing authority adopts standards, rules and regulations, pursuant to chapter 35 of title 42, for the administration of the licensing program established under this chapter and related activities.

**5-56.1-4 Conditions for obtaining a designer's license. –** A designer's license is issued to any person who satisfies all the requirements stated below:

(1) A completed application for a designer's license along with a reasonable fee is submitted to the licensing authority; all fees are deposited as general revenues and the amounts appropriated are used for the purpose of administering the water and air protection program.

(2) The applicant for a designer's license is required to pass a written examination, which may include a field component, administered or sanctioned by the licensing authority for the applicable class of license. The test assesses the competency and knowledge of the applicant regarding pertinent subject matter and the application of ISDS regulations.

(3) The licensing authority establishes, through regulations, classes of licenses appropriate to the expertise required for each activity performed by licensed individuals. The licensing authority establishes minimum qualifications, education and experience requirements for each class of license and eligibility requirements for testing. The licensing authority may waive the requirement of a written examination or any portion of it in the case of a person licensed by a federal agency or another state having licensing requirements substantially equivalent to those in Rhode Island.

(4) No person may be granted an exemption to any of the conditions for obtaining a license as provided for in this section on the basis of past experience or "grandfather" rights.

(5) The licensing authority holds an examination at least once per year.

**5-56.1-5 License not transferable or assignable. –** Designers' licenses are issued to natural persons only and are not transferable or assignable.

**5-56.1-6 Expiration and renewal of licenses. –**

(a) A designers' license is in effect for a period not to exceed three (3) years following the date of issuance.

(b) A license is renewed upon payment of a renewal fee and upon satisfactory completion of any continuing education required by the licensing authority.

**5-56.1-7 Responsibilities – Performance and conduct. –**

(a) A licensed designer performs all studies, measurements, evaluations, investigations, data gathering and other work within his or her licensed area of responsibility required to prepare the applicable submittal for individual sewage disposal systems; non-licensed employees or subordinates of a person possessing a designer's license may assist in the work provided the work is done under the direct supervision of the licensed designer who is responsible for the work and signs any and all required applications, submittals and certifications.

(b) A licensed designer witnesses and inspects the installation of any individual sewage disposal system which he or she designed. The licensing authority may, in accordance with regulation, waive this requirement for good cause, including the designer's death or incapacity.

(c) A licensed designer certifies to the licensing authority that the individual sewage disposal system was installed in conformance with the approved application, plans, specifications, applicable statutes and regulations and that he or she has witnessed and inspected the installation. Upon the certification, the licensed designer is responsible for the installation. The certification is not construed to release the installer from liability. The licensed designer is not responsible for any negligent act or omission of a user of an ISDS which causes damage to the ISDS, including altering of site conditions after certification of installation, failing to properly maintain the ISDS or failing to protect the ISDS from physical disturbance causing damage.

**5-56.1-8 Denial, suspension and revocation of licenses – Censure. –**

(a) The licensing authority may deny, suspend or revoke a designer's license if the person or licensed designer fails to comply with the requirements prescribed in this chapter or any regulation promulgated under this chapter or where the person or licensed designer:

(1) Provided incorrect, incomplete or misleading information in obtaining a designer's license; or

(2) Demonstrated gross or repeated negligence, incompetence or misconduct in the representation of site conditions in an application to the department of environmental management, design of an ISDS, or inspection or certification of an installation of an ISDS; or

(3) Committed a felony involving moral turpitude; or

(4) Failed or neglected to comply with continuing education requirements established by the licensing authority.

(b) An action to suspend or revoke a designer's license pursuant to subsection (a) of this section may not be taken until after the licensed designer has an opportunity to have a hearing before the licensing authority. This hearing is held within thirty (30) days of written notice of intent to suspend or revoke the license.

(c) The licensing authority appoints a review panel consisting of five (5) members at least three (3) of whom are licensed designers not employed by the licensing authority, for the purpose of reviewing and hearing disciplinary actions contemplated under subsection (b) of this section. The review board makes recommendations to the licensing authority to suspend or revoke licenses. All final decisions are made by the licensing authority.

(d) Any person aggrieved by the denial of an application for a license pursuant to § 5-56.1-4 or a denial, suspension or revocation of a license pursuant to this section may request a formal hearing pursuant to § 42-17.1-2(u) which is granted, if requested, in writing by the aggrieved applicant or licensee within ten (10) days of the denial, suspension or revocation.

(e) The licensing authority may publicly censure any licensed designer whose license was suspended or revoked.

**5-56.1-9 Penalties. –** The penalties for noncompliance with any section of this chapter are the same as stated in §§ 42-17.1-2(v) and 42-17.6-1 et seq., as amended.

## How to Get to DEM's Foundry Offices

235 Promenade Street  
Providence, RI 02908-5767

### From the South

- Follow Interstate 95 North toward Providence
- Take Exit 22C - Providence Place
- Follow to end of ramp and take a right onto Kinsley/Providence Place
- Go to end, and make a U-shaped turn onto Promenade Street, crossing over river and under Rte. 95
- Take first right onto Holden Street
- Take first right onto Beach Street (between buildings)
- Look for visitor parking spaces

### From the North

- Follow Route 146 South and/or Interstate 95 South toward Providence
- Take Exit 22C off of 95 South - Providence Place
- At end of ramp go right onto Kinsley Street
- Take left in front of mall garage
- Take immediate left onto Promenade Street
- Take first right onto Holden Street
- Take first right onto Beach Street (between buildings)
- Look for visitor parking spaces

### From the West

- Follow Route 6 toward Providence
- Take the Dean Street/Atwells Avenue Exit.
- Turn left at the traffic light at the top of the ramp onto Dean Street
- Go to bottom of the hill and turn right onto Kinsley Avenue/Providence Place
- Go to end, and make a U-shaped turn onto Promenade Street, crossing over river and under Rte. 95
- Take first right onto Holden Street
- Take first right onto Beach Street (between buildings)
- Look for visitor parking spaces

235 Promenade Street is the first building on the right. Visitor parking is in the lot in the next block on the right and off Beach St. (see map for location)

### Walking directions from the Providence Amtrak Station

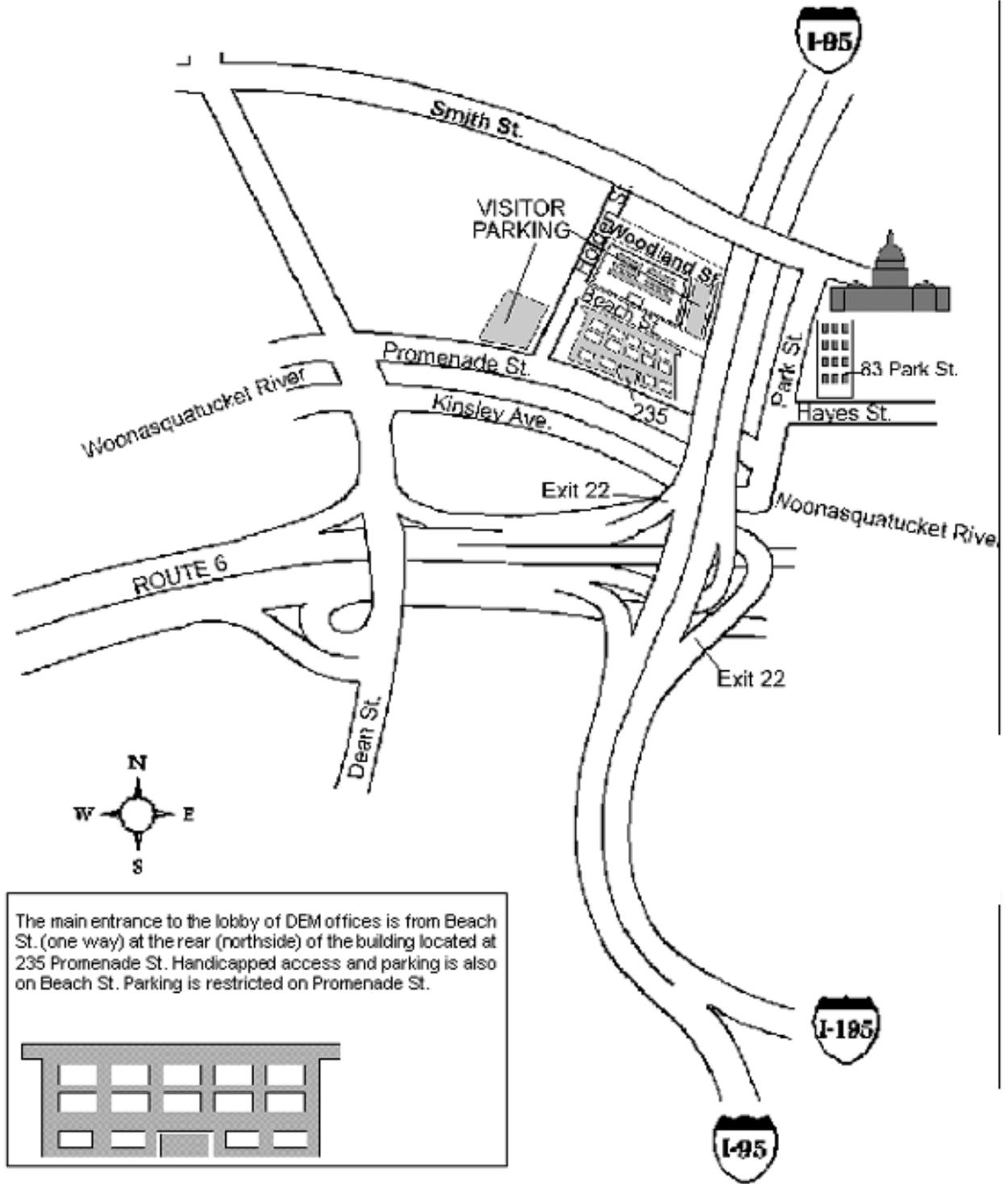
DEM's Foundry Offices are located with walking distance of the Providence Station. The station is served by Amtrak trains and MBTA commuter trains.

- Exit out the back (southeast side) of the station (signs for taxis)
- Take a right and walk to the street named American Express Plaza
- Walk up American Express Plaza toward the Providence Place Mall
- Cross Francis Street and follow the walkway under the Providence Place Mall
- The walkway connects directly to Promenade Street
- Continue on Promenade Street
- Walk under Route I-95 and enter 235 Promenade Street on the right

Call the [Rhode Island Public Transit Authority \(RIPTA\)](http://www.ripta.net) at 781-9400 for bus routes connecting to DEM's Foundry Offices.



# Map of DEM Location



# Preparation for and What to Bring to the Class II and III OWTS Designer Exams

## Exam format & required materials

The Class II and III exams are open-book. The format includes multiple choice as well as calculations and one or more design exercises. Materials you **must** bring to the exam:

- Pencils
- Calculator (consider a replacement battery)
- Copy of your OWTS Rules
- Scale

## Optional materials you may find helpful

- This study guide
- Reference texts – a general sanitary engineering text that addresses septic systems and a basic hydrology text would likely be the most useful, however the exam may be successfully completed by a knowledgeable applicant without such materials.

## Preparation

In preparing, it is appropriate to do the following as applies to the exam for which you are preparing.

- Review Rules 10, 11 and 12 which describe:
  - Authority associated with each license class,
  - Eligibility for each of the exams,
  - Content of each of the exams,
  - Expiration, Renewal and Reinstatement of Licenses, and
  - Disciplinary Action
- Familiarize yourself with all aspects of the OWTS regulations
- Review and understand basic principles of onsite wastewater treatment
  - Wastewater chemistry (fate and transport of constituents of sanitary sewage)
  - Microbiology (general understanding of organisms present in wastewater and soil)
  - Soils-related concepts (treatment potential)
  - Hydrology
  - Soil physics
- Concepts associated with system failure (identification of failure, types of failure and causes of failure)
- System design
- Components and their function
- Sizing
- Leachfield options
- Horizontal setbacks
- Vertical separation distances
- Pump design
- Site suitability issues

### **Innovative & Alternative Technologies**

The exam will not require memorization of manufacturer specifications for various technologies. Questions will focus on the general principles of advanced treatment technology and applicability to certain site conditions.

## Responsibility of Designer Beyond Design and Application

Licensure by the OWTS program includes responsibility beyond preparation and submission of applications to the Department. You are strongly urged to read and understand the “designer statute” Title 5 Chapter 56.1 – 9, included in this study guide and Rules 43 and 44 which relate to installation and documentation of installation to RIDEM.

# SELECTED REFERENCES

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

## Conventional and Alternative Design of On-site Systems

1. Burks, Bennette D. and Mary M. Minnis. *Onsite Wastewater Treatment Systems*, Madison, Wisconsin: Hognath House, Limited, 1994.
2. Collins, Eldridge. "On-site Wastewater Treatment", *Individual and Small Community Sewage Systems: Proceedings of the Seventh International Symposium in Atlanta, Georgia, November 11-13, 1994*, by The Society for Engineering in Agricultural, Food, and Biological Systems. St. Joseph, Michigan: American Society of Agricultural Engineers, 1994.
3. Laak, Rein. *Wastewater Engineering Design for Unsewered Areas, 2<sup>nd</sup> Ed.* Lancaster, Pennsylvania: Technomic Publishing Company, Inc. 1986.
4. Perkins, Richard J. *Onsite Wastewater Disposal*. National Environmental Health Association, Lewis Publishers, 1990.
5. United States Environmental Protection Agency. *Design Manual: Onsite Wastewater Treatment and Disposal Systems*. Washington, D.C.: U.S. Government Printing Office, 1980.
6. United States Environmental Protection Agency. *Onsite Wastewater Treatment Systems Manual*. Washington, D.C.: U.S. Government Printing Office, 2002.

This document is available online, as is ordering information, via a link for the DEM website. To access the link from DEM home (<http://www.dem.ri.gov/>), select "Permits", then "ISDS/OWTS (Septic) Systems Permits", then from the left side of the screen, select "Maintaining Your OWTS", and then select the link titled "2002 EPA Design Manual".

## Wastewater Engineering

7. Crites, Ron and George Tchobanglous. *Small and Decentralized Wastewater Management Systems*. The McGraw Hill Companies, Inc. 1998.
8. Salvato, Joseph A. *Environmental Engineering and Sanitation, 4<sup>th</sup> Edition*. New York: A Wiley-Interscience Publication. 1992.

## Groundwater

9. Freeze, Allen R. and John A. Cherry. *Groundwater*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc. 1979.
10. Matthes, Georg. *The Properties of Groundwater*. New York: A Wiley-Interscience Publication. 1982.

# RI DEM Class II & III OWTS Designer Exam

## Study Guide

### Part 2 – Sample Exam Questions



This material has been compiled to assist you in your preparation for the Rhode Island Department of Environmental Management Class II and III OWTS Designers' Examinations. This document is intended to be utilized in conjunction with the OWTS Rules, which are available at:

<http://www.dem.ri.gov/pubs/regs/regs/water/owts12.pdf>

#### Table of Contents

Section II - Principles of Onsite Sewage Treatment and Disposal .....	4
Section III – Analysis of Failure.....	4
Section IV – Design and Construction of New OWTS Including Constraints to Design Imposed by Soils.....	5
Example: Design a Trench System.....	5
Sample Pump Calculations .....	7
Dose Volume .....	12
Sample Site for Which OWTS is to be Designed.....	20
Sample Site Plan With all Necessary Features Depicted.....	21
Sample Construction Notes and Invert Schedule.....	22
Sample Construction Notes with Required Dimensions and Elevations Provided.....	23
Section V – Advanced Wastewater Treatment Technologies.....	24
Section VI – Groundwater Hydrology.....	24
Example Site Plan of System Requiring Repair .....	25
Example Site Plan With Repair Design.....	26
Exam Tips.....	27

**CLASS II – OWTS Designer Licensing Exam**  
**(Part 1 of the Class III Exam)**

Point Distribution

20 points	<b>SECTION I – <u>OWTS Regulations</u></b> 40 questions – 1/2 point each
25 points	<b>SECTION II – <u>Principles of Design of On-Site Sewage Systems</u></b> 25 questions – 1 point each
15 points	<b>SECTION III – <u>Analysis of OWTS Failure</u></b> 15 questions – 1 point each
40 points	<b>SECTION IV – <u>Design and Construction of an OWTS, with consideration to soil types and related constraints.</u></b>  PART A      10 points – Pump design  PART B      5 Points – Complete OWTS Application 25 points – OWTS Design

A passing grade for this part of the exam is 70%.

**Class III OWTS Designer Licensing Exam**  
**(Part 2 of the Class III Exam)**

20 points	<b>SECTION V – <u>Advanced Wastewater Treatment Technologies</u></b> 10 questions - 2 points each
30 points	<b>SECTION VI – <u>Groundwater Hydrology &amp; Resource Protection</u></b> 10 questions - 3 points each
50 points	<b>SECTION VII – <u>Understanding of Additional Applicable State Regulations, Advanced Treatment Technologies and Commercial Wastewater Treatment</u></b> 50 points total; 25 points for commercial design, and 25 points for variance design.

A passing grade for this part of the exam is 70%.

# Sample Exam Questions

## Section I - OWTS Regulations

A leach field must be at least \_\_\_\_\_ feet from a subsurface drain.

- a) 15
- b) 20
- c) 25
- d) 30

*See Table 22.1 Minimum Setback Distances – General*

A client has a cesspool for an OWTS. He/she states that a second floor addition will contain an additional 2 bedrooms. What type of application would this be considered?

- a) Alteration
- b) Repair
- c) New Building Construction
- d) Other

*See Rule 17.5.1*

Can a Class II designer submit a Subdivision Suitability Determination?

- a) Yes
- b) No

*See Rule 20.2*

A Class I, II and III designer is required to do the following:

- a) Inspect and make measurements of the exposed bottom of the excavation for the leachfield.
- b) Record and list all materials used, their source, and the dates delivered to the site.
- c) Notify the Department during hours of operation at least 24 hours prior to the installation of any ISDS.
- d) All of the above.
- e) a & b only.

*See Rule 43*

## Sample Questions Continued

### Section II - Principles of Onsite Sewage Treatment and Disposal

The clogging layer is formed at the \_\_\_\_\_.

- a) Edge of the perforated pipe and stone.
- b) Top of the trench and or chamber.
- c) Point of infiltration into the soil.
- d) None of the above.

Briefly define both of the following terms.

Anaerobic conditions \_\_\_\_\_

Aerobic conditions \_\_\_\_\_

### Section III – Analysis of Failure

Leachfield failure may be caused by \_\_\_\_\_.

- a) Scouring of solids from the septic tank.
- b) Overuse and excessive hydraulic loading.
- c) Smearing of the bottom area of the leachfield.
- d) All of the above.

## Section IV – Design and Construction of New OWTS Including Constraints to Design Imposed by Soils

### EXAMPLE: DESIGN A TRENCH SYSTEM

#### Given:

- Soil Category 5
- 3 Bedroom

Design a trench system

---

- 1) Establish “design flow” - From Table 21.1 “Wastewater Design Flows” sewage flow for a Single family residence: 2 persons per bedroom at 115 gallons per day per bedroom  
  
3 bedrooms X 115 G/BR = 345 Gallons per day maximum daily flow for the residence (design flow (G/d))
- 2) From Table 32.2.2 “Loading Rates Determined by Soil Category”:  
Soil Category 5 is assigned a loading rate of 0.52 (G/sf/day).
- 3) Minimum leachfield area necessary for dispersal trench (and concrete chamber leachfields) is determined by dividing the maximum daily wastewater flow (“design flow” from step 1), by the loading rate (from step 2) for applications without a soil evaluation or by the loading rate established in Rule 32.2.2 for applications with a soil evaluation. (Applications without soil evaluations are those applications that have valid field data that pre-dates the soil evaluation requirements of these Rules.)

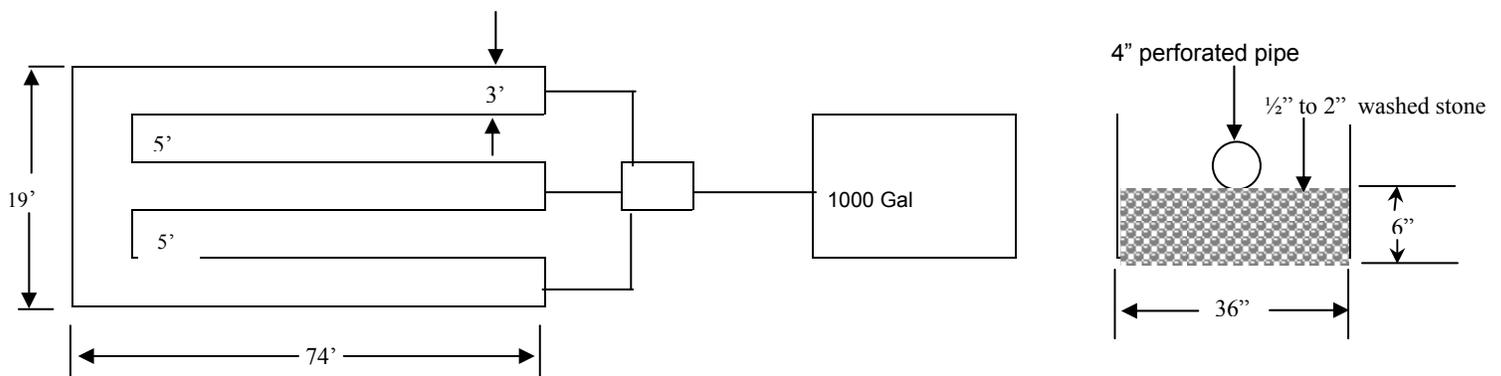
(Design flow of 345 G/d) ÷ (0.52 G/sf/d) = 663.5 sf of leaching area, round up and use 664 sf

- 4) Effective Leaching area - From Rule 33 for trench: 6 inches of stone beneath the pipe invert, 36' in. wide trench, leaching area allowed per lineal foot of trench is 3.0 sq ft/ft

664 sf leaching area ÷ 3 sf/ft = 221.3 linear feet of trench, round up and use 222 feet

Assume 3 trenches

222 ft ÷ 3 = 74 ft (3 trenches of 74 ft)



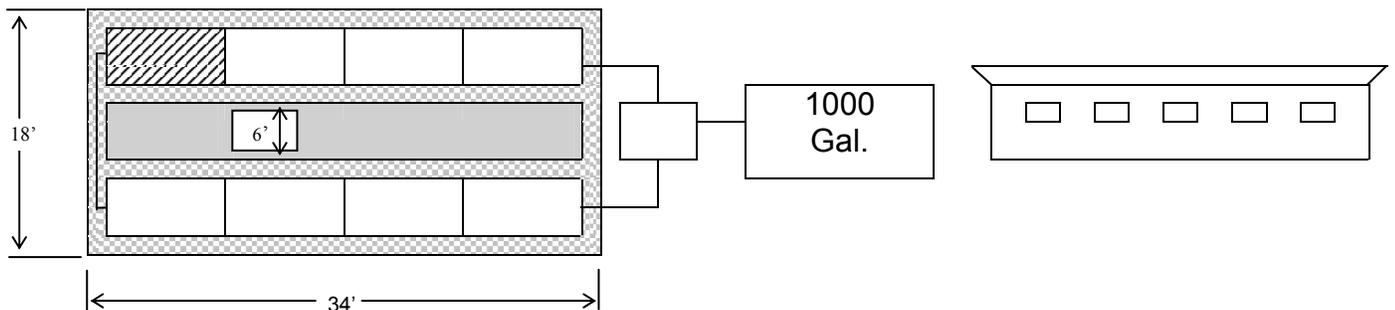
# EXAMPLE: DESIGN A FLOW DIFFUSOR SYSTEM

Given:

- Soil Category 3
- 3 Bedroom

Design a septic system with flow diffusers.

- 1) From Table 21.1 “Wastewater Design Flows” sewage flow for a Single family residence 2 persons per bedroom at 115 gallons per bedroom per day  
3 bedrooms X 115 G/BR = 345 gallons per day
- 2) From Table 32.2.2 “Loading Rates Determined by Soil Category”:  
Soil Category 3 is assigned a loading rate of 0.70 (G/sf/day).
- 3) Minimum leachfield area necessary for concrete chamber leachfields is determined by dividing the maximum daily wastewater flow (“design flow” from step 1), by the loading rate (from step 2) for applications without a soil evaluation or by the loading rate established in Rule 32.2.2 for applications with a soil evaluation. (Applications without soil evaluations are those applications that have valid field data that pre-dates the soil evaluation requirements of these Rules.)  
 $(\text{Design flow of } 345 \text{ G/d}) \div (0.70 \text{ G/sf/d}) = 492.85 \text{ sf of leaching area, round up and use } 493 \text{ sf}$
- 4) Leaching area: From Table 34.3, with 12 inches of stone on sides and under:  
Each end unit effective leaching area = 78 sf./Unit  
Each interior unit effective leaching area = 64 sf./Unit
- 5) Assume 2 “trenches” or rows of chambers  
493 sf. – 312 sf. (leaching area for 4 end units) = 181 sf. of leaching area to be provided by interior units  
 $181 \text{ Sq. Ft.} \div 64 \text{ sf./ Interior Unit} = 2.83 \text{ interior units}$  Round up to 3, therefore, use two trenches or rows, one with three chambers (one of which is an interior unit) and one with four chambers (two of which are interior units), or use two trenches or rows of four chambers each.



Legend	
	Stone
	Soil
	Optional unit

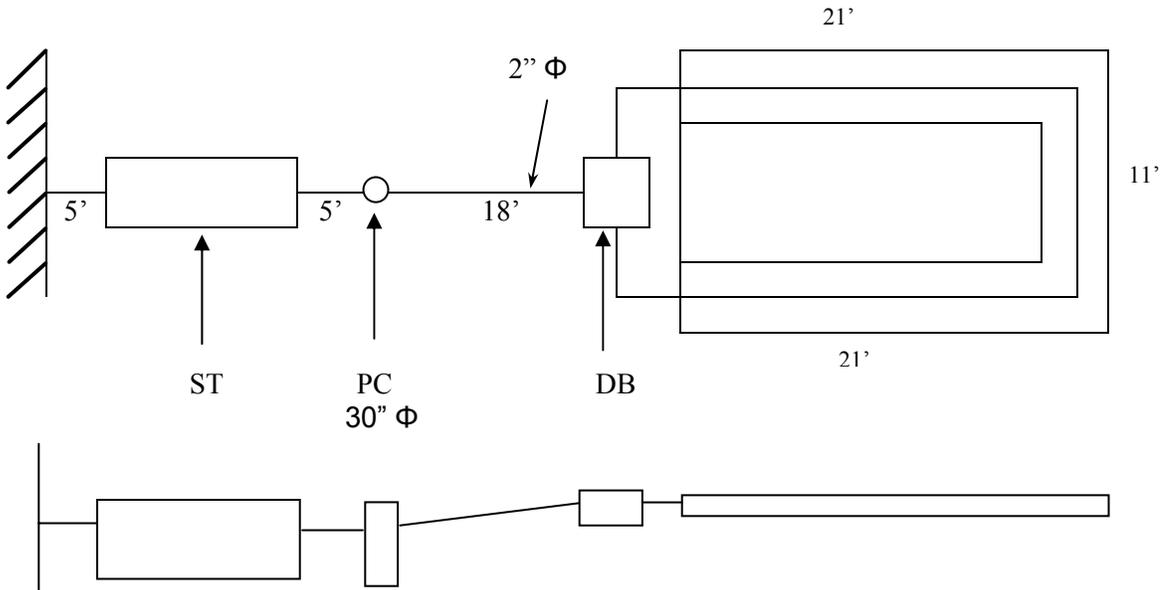
# Sample Pump Calculations

NOTE: The following courses on pump design are available at the New England Onsite Wastewater Training Center:

- OWT 145 (Pumps and Control Panels),
- OWT 150 (AutoCALCS - Automated Support Materials for Pump Timers, Tanks, Chambers, BSF Sizing, & Buoyancy Calculations)
- OWT 180 (Design of Conventional Onsite Wastewater Treatment Systems).

Schedule and registration information are available at: <http://www.uri.edu/ce/wq/OWT/Courses/index>

Given the following information complete the pump calculation for a 3 bedroom dwelling



- Assume 1 90° elbow in pump chamber assembly
- Assume pump is 2" off the bottom of the pump chamber and use the bottom of the pump as the pump "off" elevation and for static head calculations.

Inverts:	House	23.10
	ST "in"	23.05
	ST "out"	22.80
	PC "in"	22.75
	PC bottom	19.50
	PC "out"	23.00
	DB "in"	27.50
	DB "out"	27.33
	Field	27.33
	Pump off	19.67

**Required tables are on following pages**

**A. Find leachfield volume**

4" pipe →  $r = 2"$      $L = (2 \times 21) + 5 = 47'$

$$V = \Pi r^2 L$$

$$V = \Pi (2/12)^2 (47) = 4.1\text{ft}^3$$

**Dose 60% to 75% of leachfield volume**

$0.60 \times 4.1 = 2.46 \text{ ft}^3$

**or**

$0.75 \times 4.1 = 3.08 \text{ ft}^3$

**Use 2.46 ft<sup>3</sup>**

$2.46 \text{ ft}^3 \times (7.481 \text{ GAL}/1.0 \text{ ft}^3) = \mathbf{18.40 \text{ Gal}}$

**B. Find required draw in pump chamber**

Draw = (dose volume / pump chamber area)

$2.46 \text{ ft}^3 / (\pi (15/12)^2) = 0.501 \text{ ft} \times (12 \text{ in} / 1 \text{ ft}) = \mathbf{6 \text{ in}}$

**C. Static Head Loss**

D-box "in" = 27.50

Pump "off" =  $\frac{19.67}{7.83 \text{ ft}}$

**D. Find Equivalent Pipe Length**

Actual length + Fittings (from Source 1, use 90° elbow)

Actual Length = 18 ft

Fittings (source1)

90° elbow =  $\frac{5 \text{ ft}}{23 \text{ ft}}$

**E. System Curve**

Q GPM	Pipe Length	X	Head Loss (per 100 ft) from Source 2	=	Dynamic Loss	+	Static Loss	=	Total Head Loss (ft)
60	23		4.83 / 100		1.11		7.83		8.94
70	23		6.43 / 100		1.48		7.83		9.31
75	23		7.30 / 100		1.68		7.83		9.51
80	23		8.23 / 100		1.89		7.83		9.72

**Plot Q vs Head Loss (chart on following page)**

**F. Pump Capacity**

At 9.0 ft of head the pump capacity is 65 GPM

Pump runs for:

Leachfield volume / pump capacity

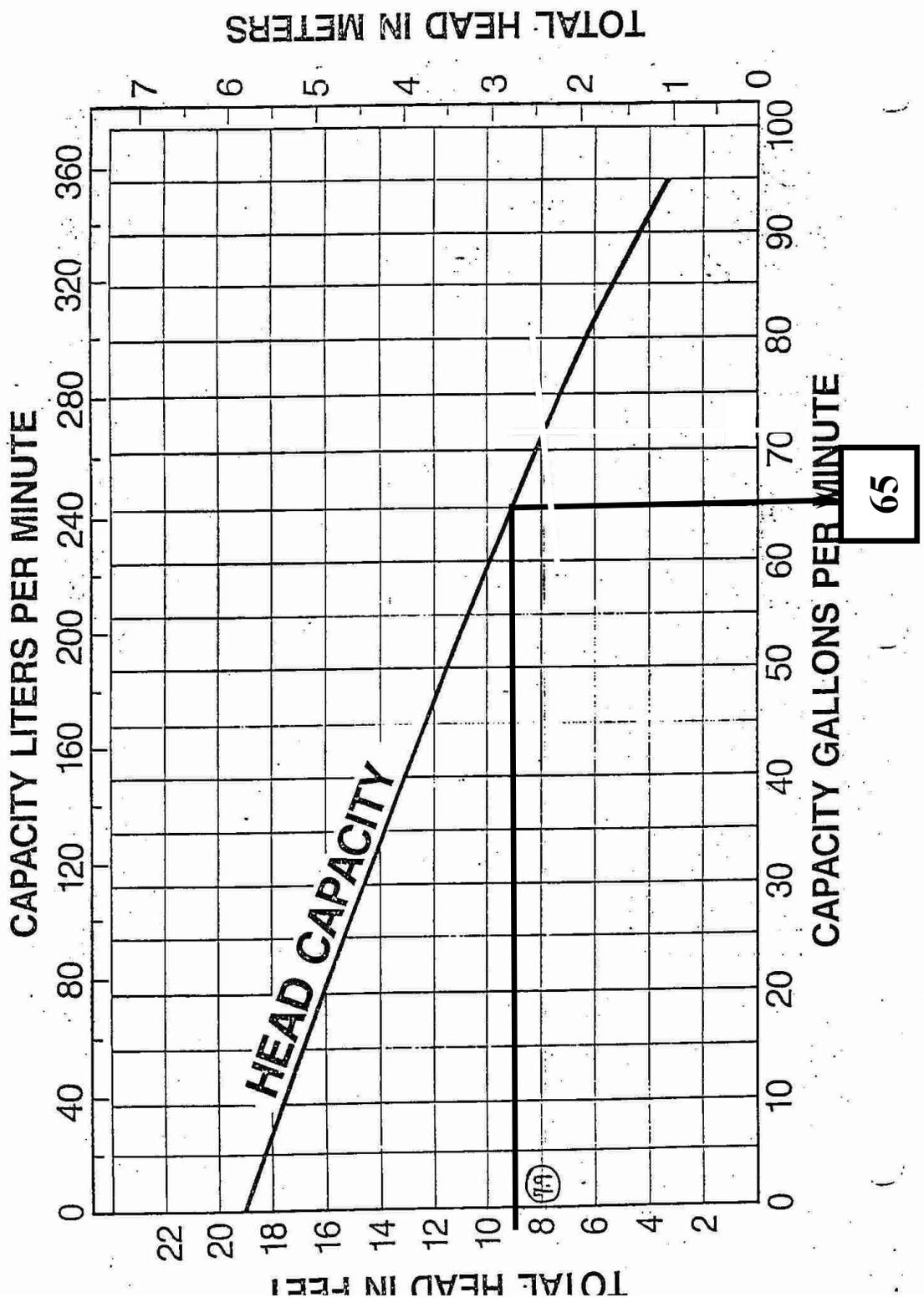
$18.4 \text{ Gal} / 65 \text{ Gal}/\text{min} = 0.283 \text{ min} = 16.98 \text{ sec}, \mathbf{\text{use } 17 \text{ sec}}$

**G. Pump Setting**

Pump off = 19.67

Pump on = 20.17 (using 6" draw down)

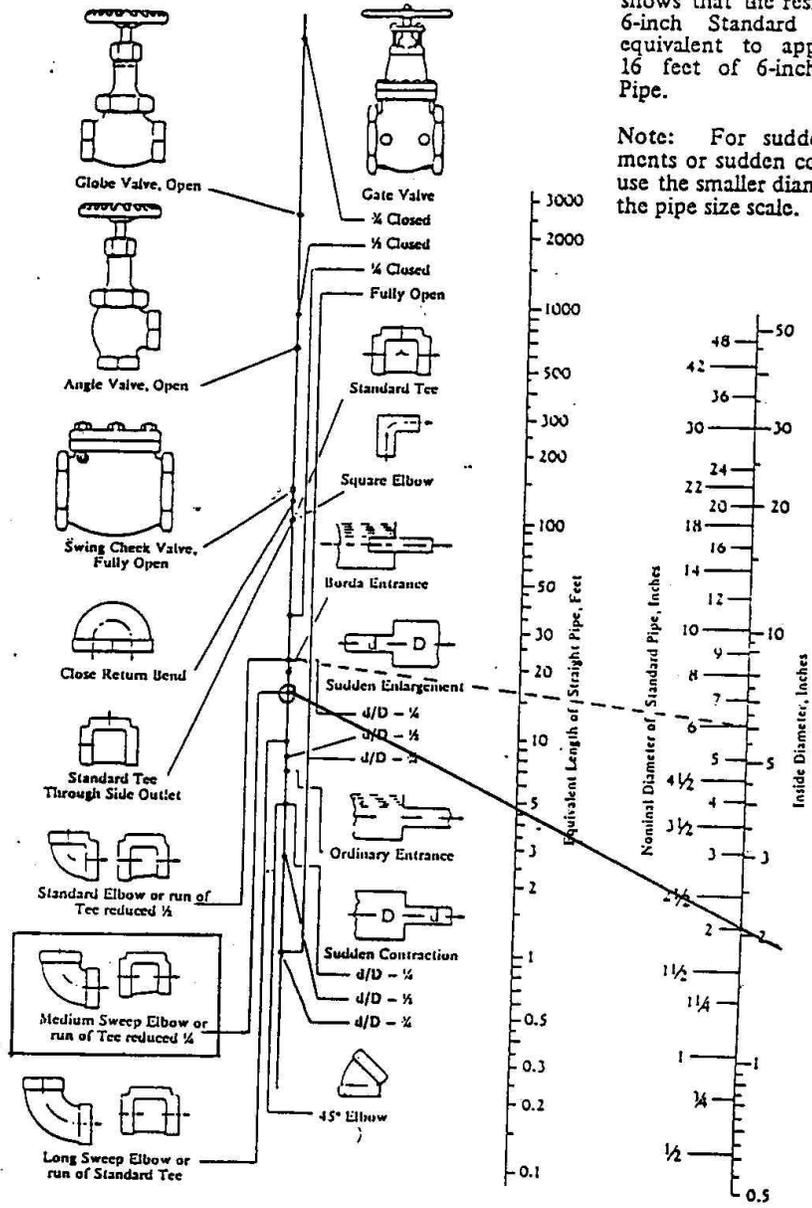
### MYERS SRM4 SUBMERSIBLE SEWAGE PUMP



65

FIGURE 37 – RESISTANCE OF VALVES AND FITTINGS TO FLOW OF FLUIDS

Note: Head loss through check valves varies with types manufactured.  
Consult manufacturer for correct values.



Example: The dotted line shows that the resistance of a 6-inch Standard Elbow is equivalent to approximately 16 feet of 6-inch Standard Pipe.

Note: For sudden enlargements or sudden contractions, use the smaller diameter, d, on the pipe size scale.

SOURCE 1

TABLE 42 – FLOW FRICTION LOSS, ASTM D2241 PVC PIPE

. 1½" IPS (ASTM D2241)

SDR 26				SDR 21		
Flow Gals./Min.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.
2	0.27	0.024	0.010	0.28	0.027	0.012
5	0.68	0.13	0.057	0.71	0.15	0.063
7	0.95	0.25	0.11	0.99	0.27	0.12
10	1.36	0.48	0.21	1.41	0.52	0.23
15	2.04	1.01	0.44	2.12	1.11	0.48
20	2.72	1.72	0.74	2.83	1.89	0.82
25	3.40	2.59	1.12	3.53	2.86	1.24
30	4.08	3.64	1.58	4.24	4.01	1.74
35	4.76	4.84	2.10	4.95	5.33	2.31
40	5.43	6.20	2.69	5.65	6.82	2.96
45	6.11	7.71	3.34	6.36	8.49	3.68
50	6.79	9.37	4.06	7.07	10.31	4.47
60	8.15	13.13	5.69	8.48	14.46	6.27
70	9.51	17.46	7.57	9.89	19.23	8.34
75	10.19	19.84	8.60	10.60	21.85	9.47

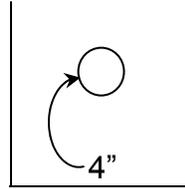
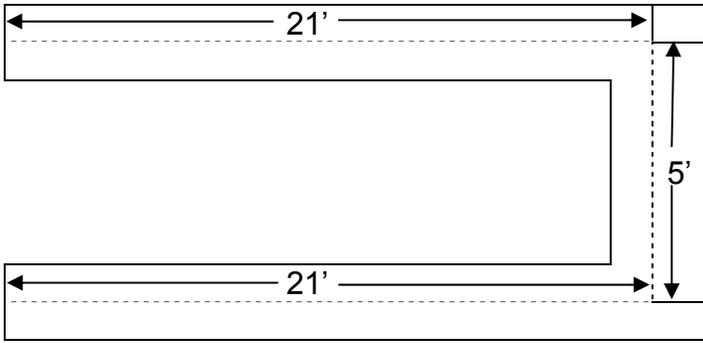
2" IPS (ASTM D2241)

SDR 26				SDR 21		
Flow Gals./Min.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.	Velocity Ft./Sec.	Loss of Head Ft./100 Ft.	Press. Drop PSI/100 Ft.
2	0.17	0.0080	0.0035	0.18	0.0089	0.0039
5	0.43	0.044	0.019	0.45	0.048	0.021
7	0.61	0.082	0.035	0.63	0.090	0.039
10	0.87	0.16	0.069	0.90	0.18	0.076
15	1.30	0.34	0.15	1.35	0.37	0.16
20	1.73	0.57	0.25	1.80	0.63	0.27
25	2.16	0.86	0.37	2.25	0.96	0.41
30	2.60	1.21	0.53	2.70	1.34	0.58
35	3.03	1.61	0.70	3.15	1.78	0.77
40	3.46	2.06	0.89	3.61	2.28	0.99
45	3.89	2.57	1.11	4.06	2.84	1.23
50	4.33	3.12	1.35	4.51	3.45	1.49
60	5.19	4.37	1.90	5.41	4.83	2.09
70	6.06	5.82	2.52	6.31	6.43	2.79
75	6.49	6.61	2.87	6.76	7.30	3.17
80	6.92	7.45	3.23	7.21	8.23	3.57
90	7.79	9.27	4.02	8.11	10.24	4.44
100	8.65	11.26	4.88	9.01	12.44	5.39

NOTE: Table is based on Hazen-Williams Equations 80, 81, 82 and 82. C = 150

# Dose Volume

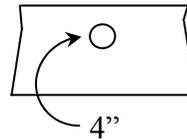
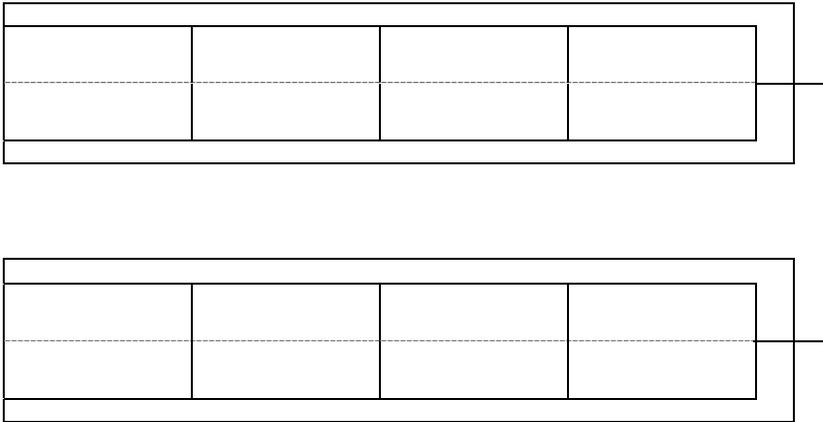
## Trenches



Pipe Length =  $(2 \times 21) + 5 = 47$  ft.  
 Pipe radius = 2"  
 $V = \pi r^2 L$   
 $V = \pi (2/12)^2 (47) = 4.102 \text{ ft}^3$  **or**  
 $4.102 \text{ ft}^3 \times 7.48 \text{ Gal/ft}^3 = 30.68 \text{ Gal}$

60% = 18.4 Gal  
 75% = 23 Gal

## Flow Diffusors



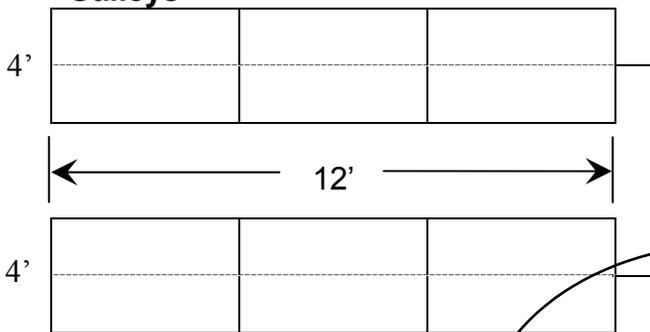
Pipe Length = 8 feet for each flow diffuser  
 $8 \times 8 = 64$  ft

Pipe radius = 2"  
 $V = \pi r^2 L$

$V = \pi (2/12)^2 (64) = 5.585 \text{ ft}^3$  **or**  
 $5.585 \text{ ft}^3 \times 7.481 \text{ Gal/ft}^3 = 41.78 \text{ Gal}$

60% = 25.07 Gal  
 75% = 31.34 Gal

## Galleys



No Pipe! Must use bottom area of galleys

Bottom area =  $12 \times 4 = 48$   
 $+ 12 \times 4 = \underline{48}$   
 96 SF

Dose to a one inch depth

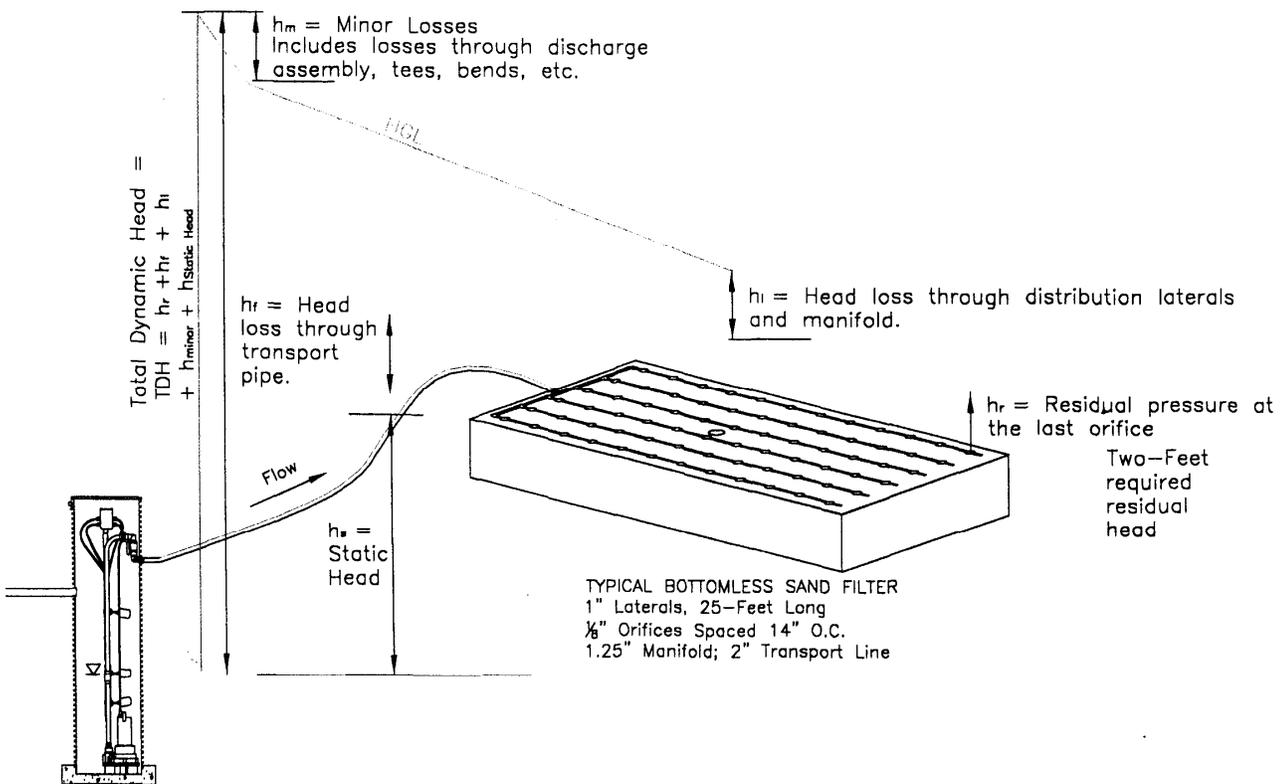
$V = (1/12)(96) = 8.00 \text{ FT}^3$   
**or**  
 $8 \times 7.481 = 59.85 \text{ Gallons}$

60% = 35.91 Gallons  
 70% = 44.89 Gallons

# Bottomless Sand Filters

## Determining hydraulic head, pumping considerations and pump selection

### DETERMINATION OF HYDRAULIC HEAD



## Step 1: Determine Total Flow Rate

A. Set the discharge rate for each orifice. Use the orifice equation or the limit in the state guidelines.

$$Q_o = 12.4d^2h^{0.5}$$

where:

$Q_o$  = gpm / orifice

$d$  = size of orifice (inches)

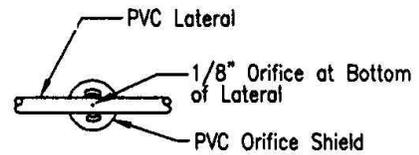
$h$  = required residual head (ft)

Example

$$d = \frac{1}{8}''$$

$$h = 2'$$

$$Q_o = 12.4d^2h^{0.5} = 0.27 \text{ gpm / orifice}$$



B. Estimate total flow by multiplying the flow for each orifice by the number of orifices.

$$Q_t = (\# \text{ orifices / lateral}) \times (\# \text{ laterals}) \times Q_o$$

where:

$Q_o$  = gpm / orifice

Example

4 Laterals

25 Feet Long

15" Spacing

$$25' / 1.25' = 20 \text{ orifices / lateral}$$

$$20 \times 4 = 80 \text{ orifices total}$$

$$Q_o = 0.27 \text{ gpm / orifice} \times 80 \text{ orifices} = 21.6 \text{ gpm}$$

## Step 2: Use the Total Flow Rate Determined in Step 1 to Determine Total Dynamic Head Losses

A. Determine the Static Head =  $h_s$  = Difference in elevation between the manifold and liquid level in the pump chamber

Example

Elevation of water level = 95.0

Elevation of manifold = 100.0

$$h_s = 100.0 - 95.0 = 5'$$

B. Determine Head Loss through Transport Pipe =  $h_f$  = Friction losses which can be calculated using Hazen-Williams Formula.

$$h_f = \frac{(4.27 L) (Q/C)^{1.85}}{D^{4.87}}$$

where:

$h_f$  = Friction Loss

C = Hazen-William Coefficient

D = Pipe Diameter

L = Pipe Length

where:

Q = 21.8 gpm

C = 150 for 2" PVC

D = 1.25"

L = 40'

$$h_f = \frac{(4.27 * 40) (21.8 / 150)^{1.85}}{1.25^{4.87}} = 1.6 \text{ feet}$$

C. Determine residual head which is required by state to ensure scouring and proper pressure distribution.

Example: Bottomless Sand Filter = 2.0 Feet

## Step 2: Use the Total Flow Rate Determined in Step 1 to Determine Total Dynamic Head Losses

D. Determine Losses Through the Laterals =  $h_l$  = Use a pump calculation program or follow the procedure on the following page which outlines an iterative process for calculating loss through consecutive lateral orifices.

Example: 0.5 Feet

E. Determine Minor Losses: Use manufacture's determined values for equivalent length for distribution assemblies or through certain fittings.

Typical Equivalent Lengths of Schedule 40 Straight Pipe for Standard Steel Fittings and Valves

For any fluid in turbulent flow

Fitting Type	Equivalent Length, ft		
	1"	2"	4"
Regular 90° Elbow	5.0	8.0	12.0
Long Radius 90° Elbow	3.0	3.8	4.8
Regular 45° Elbow	1.5	1.7	2.0
Teel Tee Through-Line Joint	3.0	3.7	17.0
Teel Tee Through-Port	8.0	10.0	21.0
180° Return Elbow	5.0	8.0	12.0
Gate Valve	19.0	54.0	150.0
Globe Valve	34	1.5	2.0
Angle Valve	17.0	18.0	18.0
Swing Check Valve	15.0	18.0	28.0
Coupling or Union	—	4.8	—

HYDROTEK CORPORATION HYDROTEK PROGRAM: PD Series, San Ramon, CA 94583

$$H_f = \frac{(4.27 L) (Q/C)^{1.85}}{D^{4.87}}$$

where:

$H_f$  = Friction Loss

$C$  = Hazen-William Coefficient

$D$  = Pipe Diameter

$L$  = Equivalent Length

where:

$L = 8.5'$  for 90° Elbow

$Q = 21.6$  gpm

$C = 150$  for 2" PVC

$D = 2"$

$L = 8.5'$

$$h_f = \frac{(4.27 * 8.5) (21.8 / 150)^{1.85}}{2^{4.87}} = 0.03 \text{ feet}$$

From table

F. Add Each Component of Head to Determine the Total Dynamic Head

$$5' + 1.3' + 2.0' + 0.5' + 0.03' = 8.85 \text{ Feet of Head}$$

# METHOD FOR DETERMINING TOTAL HEADLOSS IN A PRESSURE LATERAL

(A) First calculate the discharge rate at orifice no. 1 using the following orifice equation:

$$Q_o = 12.38d^2\sqrt{h}$$

Where;  $Q_o$  = GPM  
 $d$  = diameter of orifice in inches  
 $h$  = feet of pressure head at the orifice

(B) Next, calculate the actual headloss in each segment, in succession, from the end orifice (orifice no. 1) to the final orifice (orifice no. 16) using the following headloss equation. The segment headloss is then added to the preceding pressure head ( i.e.  $h_2 = h_1 + hf_1$ ... etc).

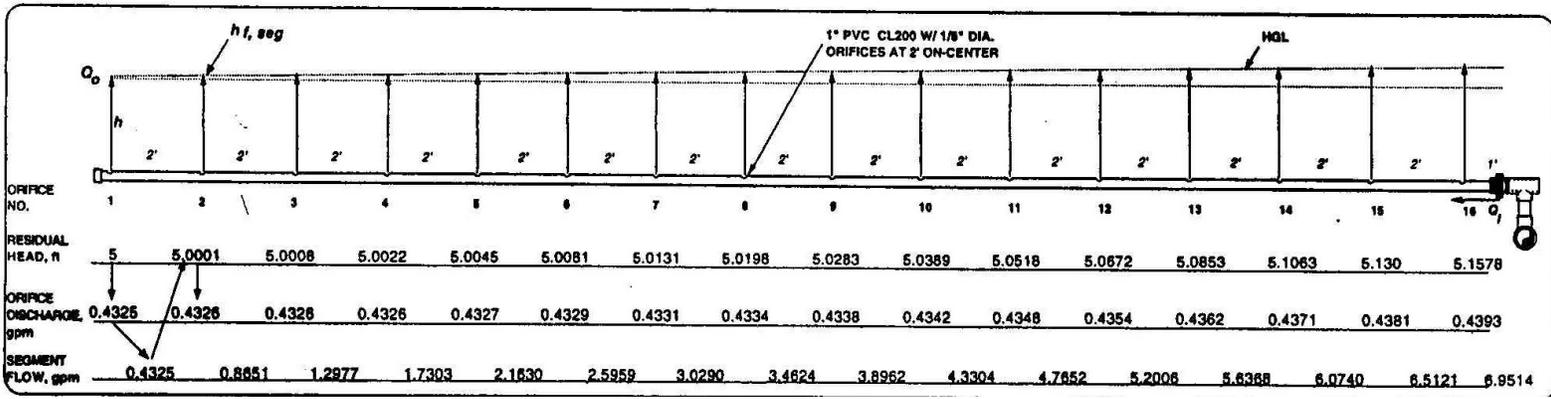
$$hf_{.seg} = \frac{4.727L_{seg}(Q_{seg})^{1.85}}{(d)^{4.87} (449C)} = 0.000995 \frac{L_{seg}}{d^{4.87}} Q^{1.85}$$

Where;  $Q_{seg}$  = the summation of orifice discharges following the segment (i.e.  $Q_{o1} + Q_{o2} + Q_{o3}$ ...etc.) in GPM  
 $L_{seg}$  = the segment length between orifices, in feet  
 $d$  = the inside diameter of the PVC line, in inches  
 $C$  = 150 (Hazen-Williams coefficient)

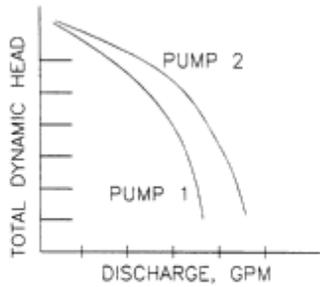
(C) Using the diagram below as an example:

- Assuming 5' of pressure at orifice #1:  
 $Q = 12.38d^2\sqrt{h} = 12.38(0.125)^2\sqrt{5} = 0.4325$  GPM  
 0.4325 GPM flows in the segment of pipe between orifice #2 and orifice #1.
- The headloss in the segment between orifice #2 and orifice #1 is given by:  
 $hf_{.seg} = 0.00085(Q_{seg})^{1.85} = 0.00085(0.4325)^{1.85} = 0.00018'$
- The pressure at orifice #2 is  $5 + 0.00018 = 5.00018'$  and the flow is 0.4326.
- The flow from orifice #3 to orifice #2 is  $0.4325 + 0.4326 = 0.8651$  GPM. The headloss in the segment between orifices #3 and #2 is  
 $hf_{.seg} = 0.00085(0.8651)^{1.85} = 0.00066'$
- The pressure at orifice #3 is  $5.00018 + 0.00066 = 5.00084'$  etc..

(D) When the flow in an upstream orifice exceeds flow in orifice #1 by 10%, the maximum length of lateral has been reached.

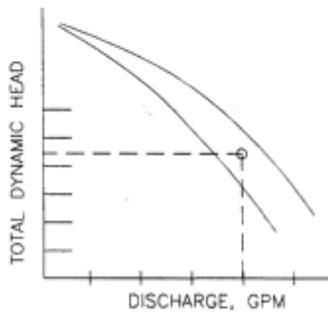


### Step 3: Select a Pump Using Manufacturers Discharge-Head Curves



Plot:  
Estimated Required Discharge from Step 1  
Total Dynamic Head from Step 2 (F)

8.85 Feet of Head  
21.8 gpm Flow Rate



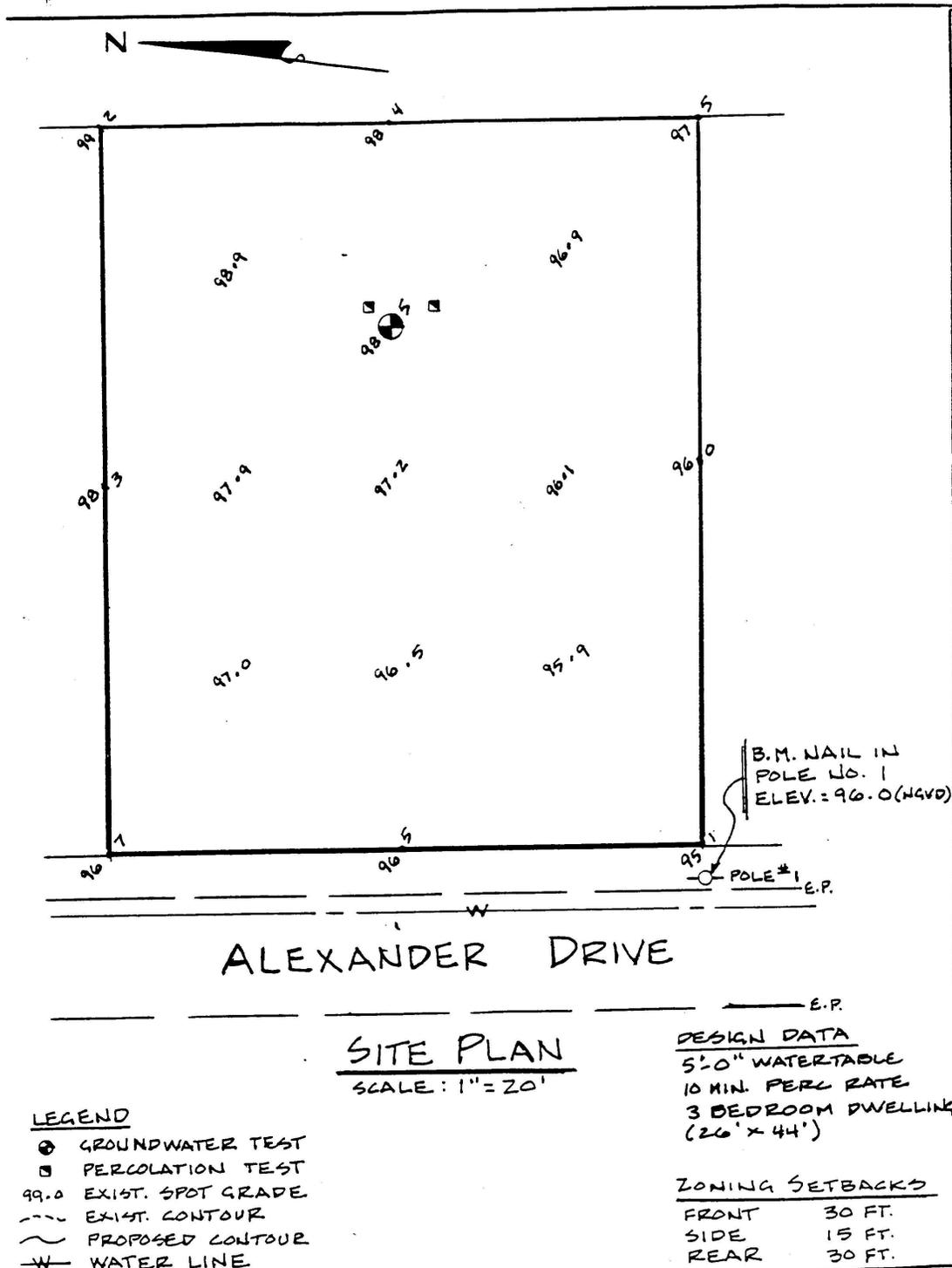
Select Pump 2

## General Pump Considerations

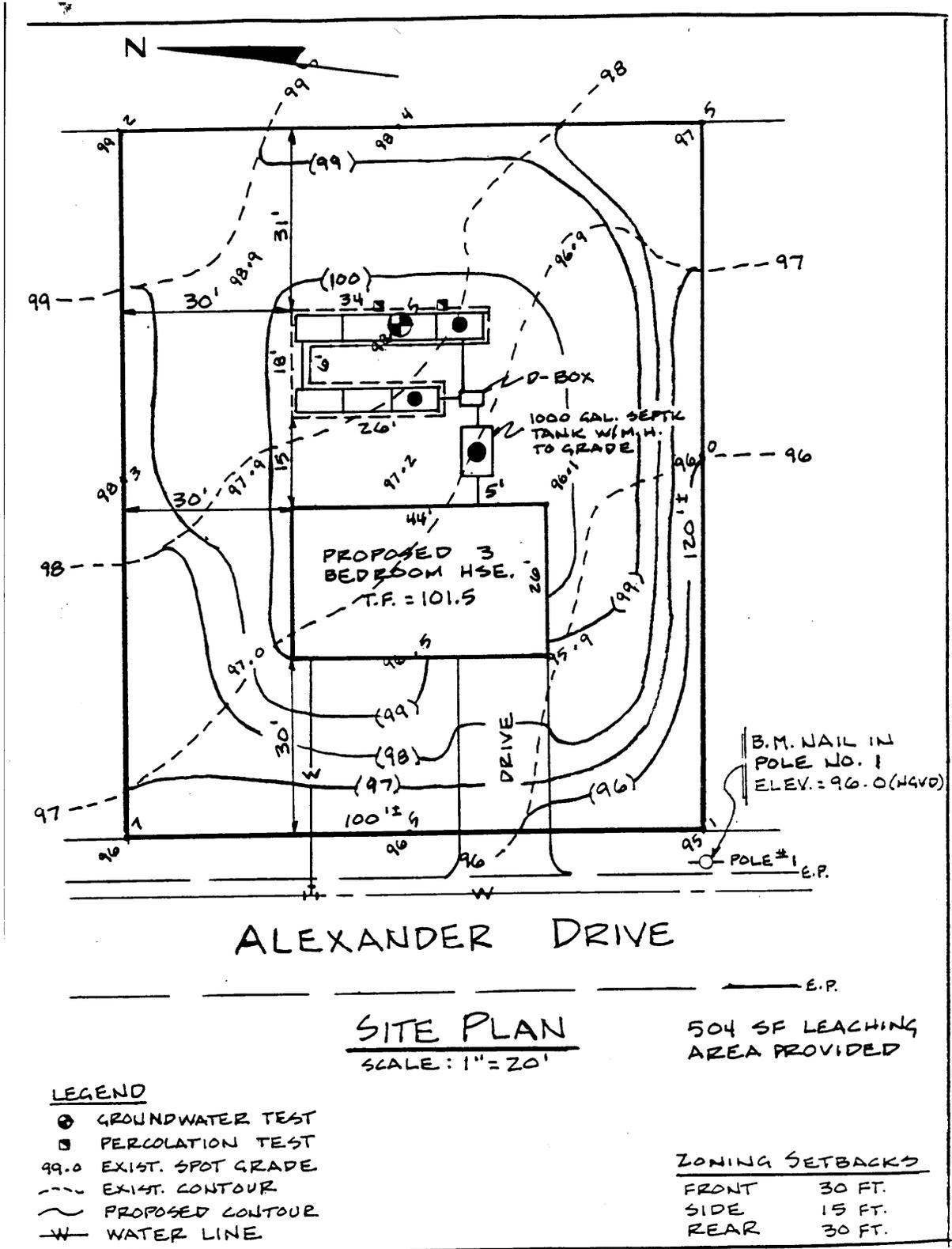
- Free Drainback to Either the Pump Basin or Field Should Be Provided To Prevent Freezing of Water in the Transport Line. Check Valves Shall Not Be Used If Drainback Is Directed Towards the Basin.
- Check Valves Shall Be Used If Flow Back Through the Discharge Must Be Prevented (i.e. When Using Duplex Pumps With a Common Assembly).
- An Anti-Siphon Device Shall Be Used When Pumping Downhill.
- Weep hole with Check Valve + Drainback

# Sample Site for Which OWTS is to be Designed

See next page for sample site plan with all necessary features depicted.



# Sample Site Plan With all Necessary Features Depicted

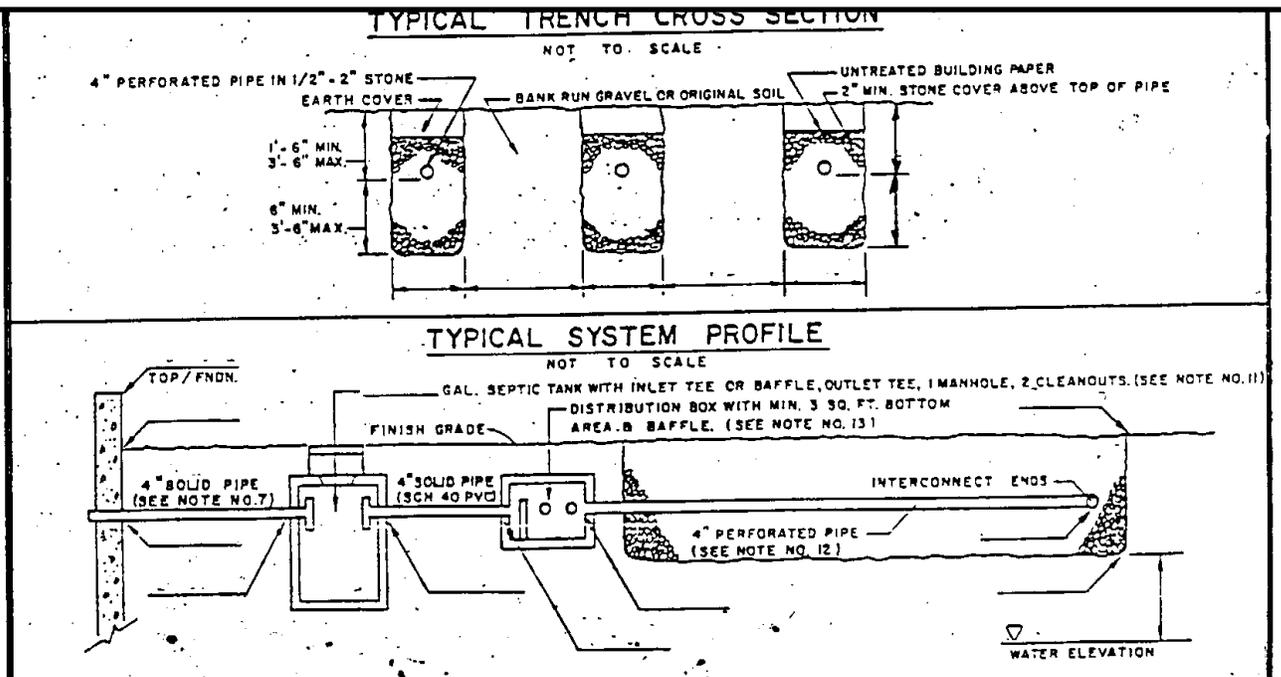


## Sample Construction Notes and Invert Schedule

See next page for this form with all required dimensions and elevations provided.

### CONSTRUCTION NOTES

1. Maintain invert elevation \_\_\_\_\_ for 10' and 3:1 slope.
2. No existing or proposed wells within 200 ft. of system other than specified on plan.
3. No existing or proposed OWTs within 100 ft of proposed well.
4. Proposed well to be installed 100 ft minimum from any leaching field.
5. Install schedule 40 PVC pipe, as required.
6. Proposed top of foundation elevation is directly related to proper installation and functioning of leachfield and should not be changed without first consulting engineer.
7. All design, construction, and maintenance requirements to be in conformance with the Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems (OWTS Rules), as amended.
8. No subsurface drain to be installed within 50 feet of the down- and side-gradient side of the OWTS or within 25 feet of the upgradient side if the OWTS.
9. Manhole on the septic tank to be brought to finish grade.
10. Distribution pipes shall be schedule 35 or equal (4" min.)
11. No existing or proposed public wells within 500 ft of OWTS other than specified on plan.
12. No existing or proposed drains are located within 200 feet of OWTS unless specified on plan.



### Plan of proposed Onsite Wastewater Treatment System

Lake Shore Drive, Warwick, R.I.

A.P. 20, Lot 18

Scale: 1" = 30'

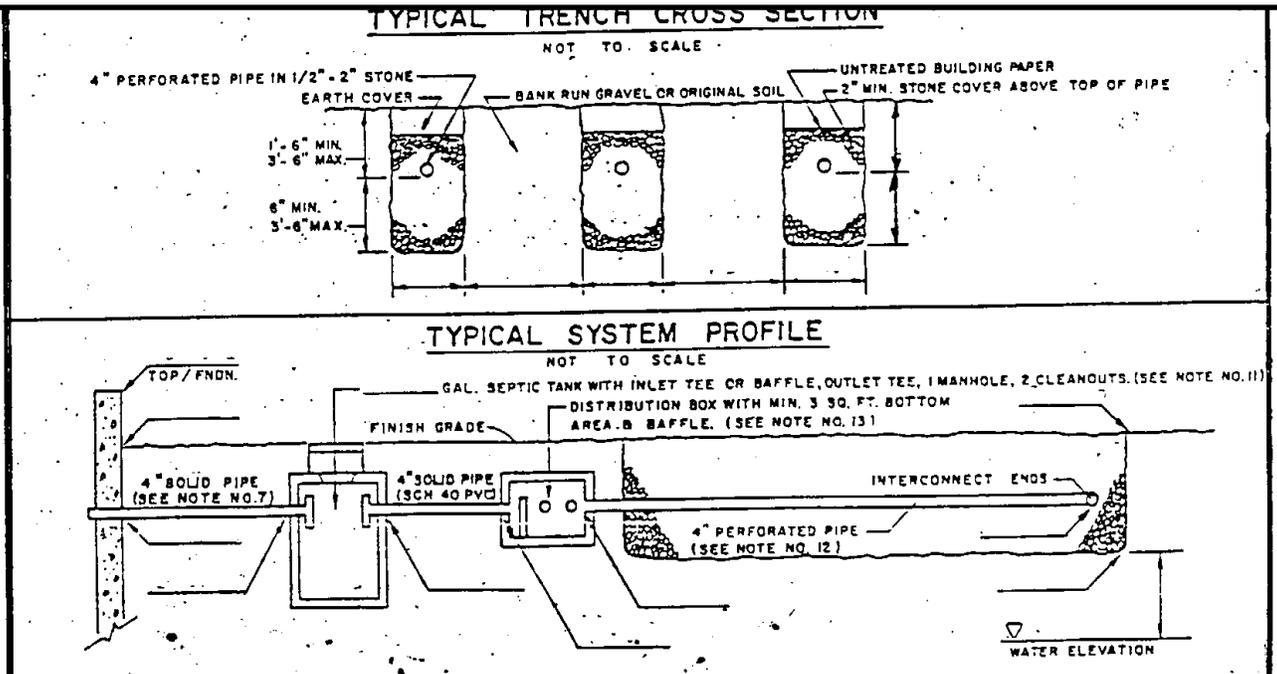
Date: November 2012

Owner: Don Mallard  
102 Lake Shore Drive, Warwick, RI 02889

# Sample Construction Notes with Required Dimensions and Elevations Provided

## CONSTRUCTION NOTES

13. Maintain invert elevation \_\_\_\_\_ for 10' and 3:1 slope.
14. No existing or proposed wells within 200 ft. of system other than specified on plan.
15. No existing or proposed OWTSs within 100 ft of proposed well.
16. Proposed well to be installed 100 ft minimum from any leaching field.
17. Install schedule 40 PVC pipe, as required.
18. Proposed top of foundation elevation is directly related to proper installation and functioning of leachfield and should not be changed without first consulting engineer.
19. All design, construction, and maintenance requirements to be in conformance with the Rules Establishing Minimum Standards Relating to Location, Design, Construction and Maintenance of Onsite Wastewater Treatment Systems (OWTS Rules), as amended.
20. No subsurface drain to be installed within 50 feet of the down- and side-gradient side of the OWTS or within 25 feet of the upgradient side if the OWTS.
21. Manhole on the septic tank to be brought to finish grade.
22. Distribution pipes shall be schedule 35 or equal (4" min.)
23. No existing or proposed public wells within 500 ft of OWTS other than specified on plan.
24. No existing or proposed drains are located within 200 feet of OWTS unless specified on plan.



### Plan of proposed Onsite Wastewater Treatment System

Lake Shore Drive, Warwick, R.I.

A.P. 20, Lot 18

Scale: 1" = 30'

Date: November 2012

Owner: Don Mallard  
102 Lake Shore Drive, Warwick, RI 02889

## **Class III Exam Sample Questions**

### **Section V – Advanced Wastewater Treatment Technologies**

The purpose and advantage of an aerobic treatment unit is the substantial removal and lowering of \_\_\_\_\_.

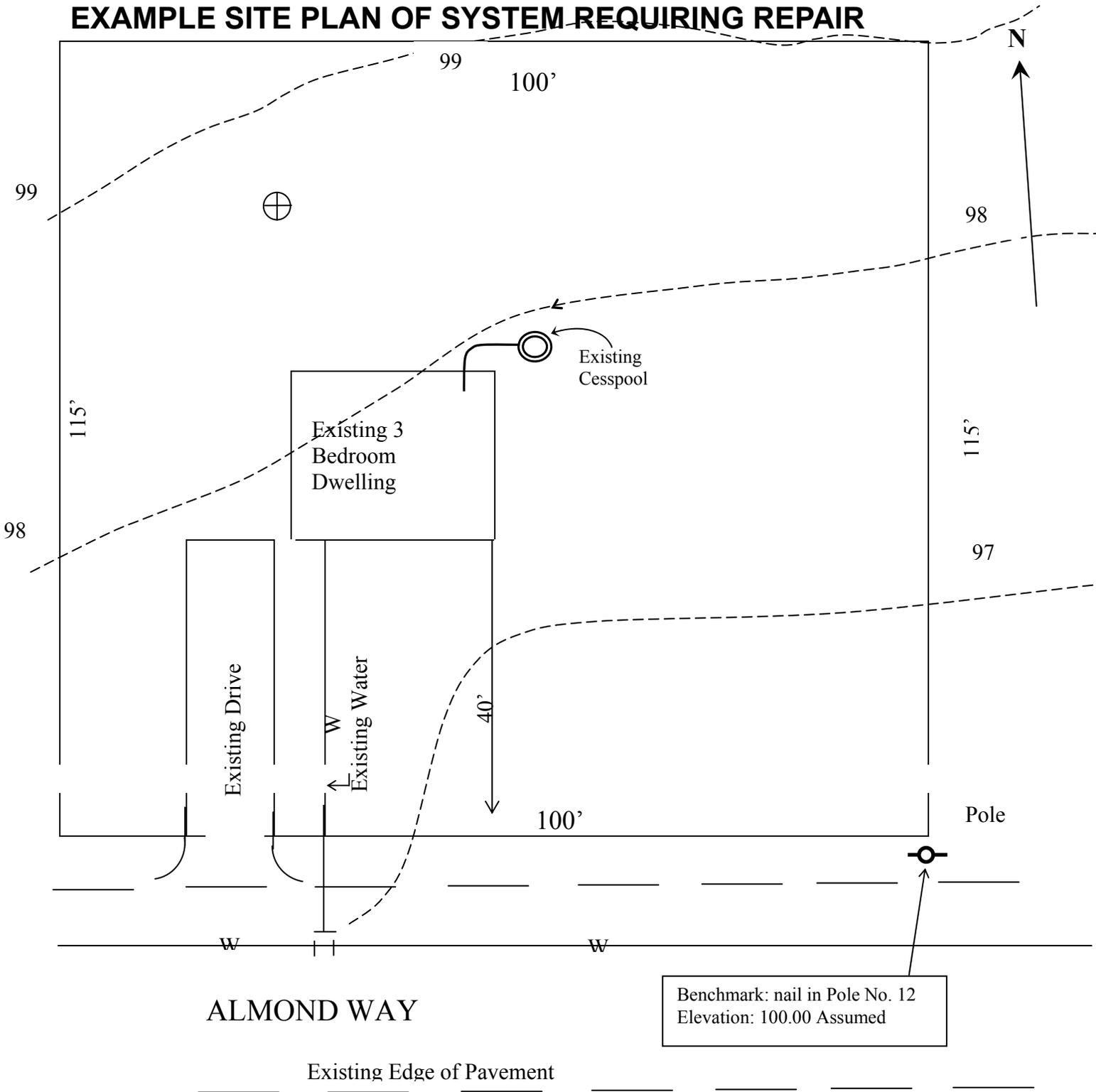
- a) BOD
- b) TSS
- c) Pathogenic organisms
- d) All of the above
- e) None of the above

### **Section VI – Groundwater Hydrology**

The ratio of voids to the volume of solid rock is referred to as \_\_\_\_\_.

- a) Specific yield
- b) Permeability
- c) Porosity
- d) None of the above

# EXAMPLE SITE PLAN OF SYSTEM REQUIRING REPAIR



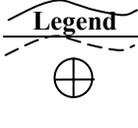
ALMOND WAY

Benchmark: nail in Pole No. 12  
Elevation: 100.00 Assumed

Existing Edge of Pavement

## Site Plan

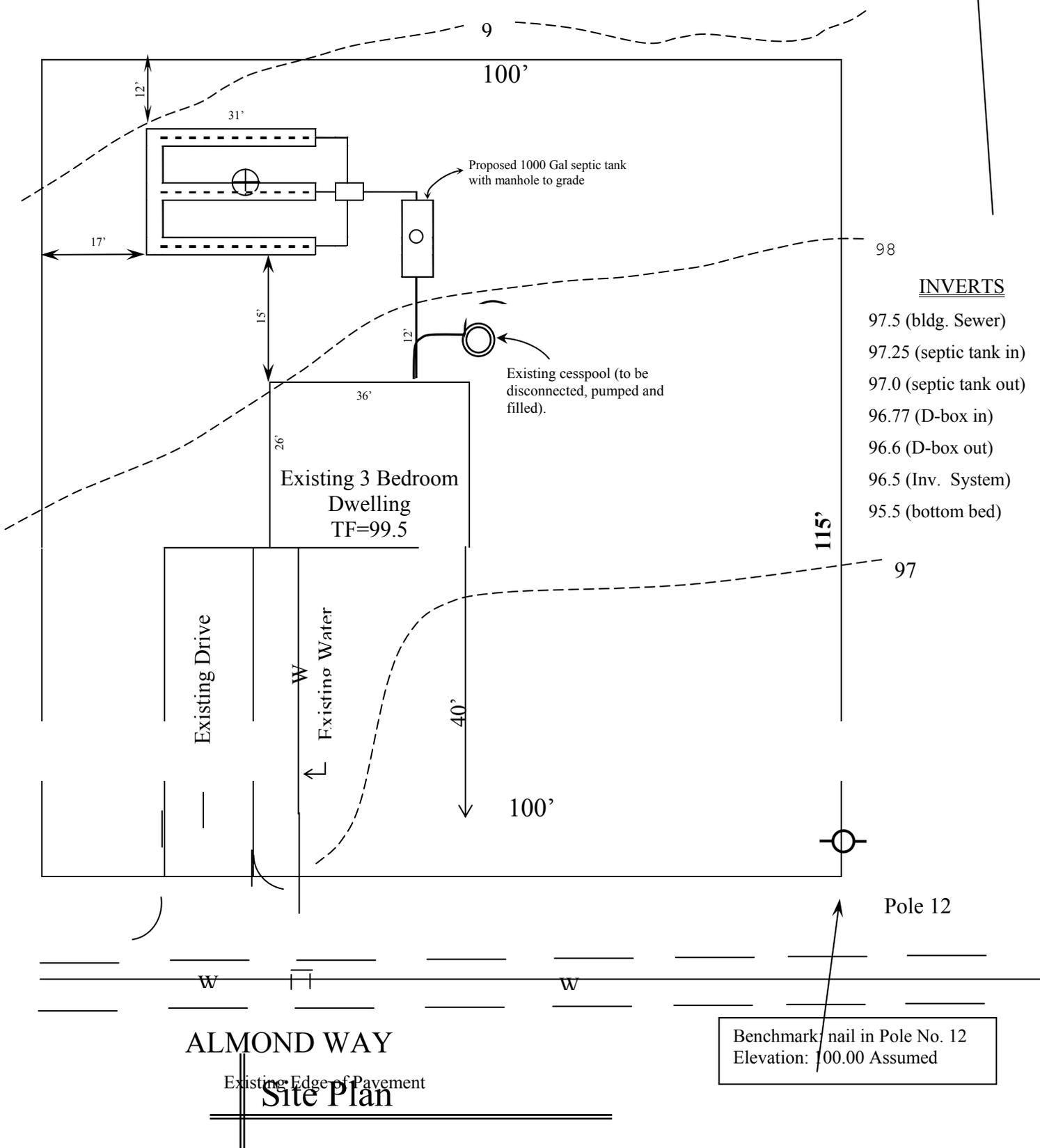
Scale: X" = X' example not drawn to scale. You will be expected to draw to scale on the exam



Exist. Contour  
Proposed Contour  
GWT

**Design Data**  
6'-0" Watertable  
10 Min Perc Rate

# EXAMPLE SITE PLAN WITH REPAIR DESIGN



INVERTS

97.5	(bldg. Sewer)
97.25	(septic tank in)
97.0	(septic tank out)
96.77	(D-box in)
96.6	(D-box out)
96.5	(Inv. System)
95.5	(bottom bed)

Scale: X" = Y' – this example is not drawn to scale. You will be expected to draw to scale for the exam.

- Legend**
- Exist. Contour**
  - Proposed Contour**
  - GWT**

**12" stone below invert = 381 SF leaching area**

# Exam Tips

Read directions thoroughly

Know the Rules

Budget your time!

Bring calculator, scale and pencils

Design the required system type

Design in the area of testing

Show proposed grading

# RI DEM Class II & III OWTS Designer Examinations

## Study Guide



### Part 3 – Design Guidance

This material has been compiled to assist you in your preparation for the Rhode Island Department of Environmental Management Class II & III OWTS Designers' Examinations. This document is intended to be utilized in conjunction with the OWTS Rules, which are available at:

<http://www.dem.ri.gov/pubs/regs/regs/water/owts12.pdf>.

#### Table of Contents

<b>Septic System Treatment Basics</b> .....	<b>2</b>
<b>Wastewater Constituents</b> .....	<b>2</b>
<b>Principles of Onsite Sewage Treatment and Disposal</b> .....	<b>2</b>
<b>OWTS Archive Resources</b> .....	<b>3</b>
<b>Table 22.1 Minimum Setback Distances – General</b> .....	<b>4</b>
<b>Table 15.11 Soil Category</b> .....	<b>5</b>
<b>Proper Design Techniques and Materials</b> .....	<b>6</b>
<b>Septic System Failure</b> .....	<b>9</b>
<b>OWTS REPAIR SUBMISSION REQUIREMENTS</b> .....	<b>11</b>
<b>Common Errors, Omissions and Problems</b> .....	<b>12</b>
<b>Inspection of Septic Systems</b> .....	<b>13</b>

## **Septic System Treatment Basics**

Collect and separate solids and grease from wastewater

Waste decomposition by physical, biological and chemical processes

Disposal of the treated water

## **Wastewater Constituents**

Microorganisms (fecal coliform and pathogens)

Nutrients (Nitrogen and phosphorus)

Organic Chemicals

Toxic Chemicals

## **Principles of Onsite Sewage Treatment and Disposal**

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

Adsorption vs. absorption

Denitrification

Function of a septic tank, d-box and leachfield

Nutrients found in septic system effluent (nitrogen and phosphorus) and their significance regarding water quality

Nitrate

Percolation test

Impervious in OWTS terms

ATUs, Sand Filters, Trickling Filters

# OWTS Archive Resources

The following resources are available for researching OWTS permitting data.

- Public Access Computer at DEM (1990 – Present)
- OWTS Application Search (1990 – Present) a service of ri.gov, is available on the internet. To access this search tool from DEM home at <http://www.dem.ri.gov/> select, from the bottom of the screen, the link titled “OWTS (ISDS) Permit Search”.
- Microfilm (1970 – 1989)
- Conformed Applications (1989 – Present)
- Expired Applications (1970 – Present)
- Water Table Cards (1987 – 1992)
- Subdivision Records (1970 – Present)

# Table 22.1 Minimum Setback Distances – General

(From OWTS Rules available at: <http://www.dem.ri.gov/pubs/regs/regs/water/owts12.pdf>)

	Building Sewer, Grease Tank, Distribution Box, Pump Tank, Septic Tank, Septic Tank Effluent Pipe (ft)		Leachfield (ft)	
Well Serving Non-potable Uses	25		50	
Water Supply Line	10 (Note 1)		25	
Property Line	10 (Note 2)		Design Flow (gpd)	(ft)
			0-3000	10
			>2000-5000 (Note 3)	50
			> 5000 (Note 4)	min. 50 (Note 5)
Foundation	5 (Not applicable to building sewer)		25 (Note 6)	
Subsurface drains, foundation drains, or storm drains (see also Tables 22.2 and 22.3):	25 (Note 7)		25 (Note 8)	
	25 (Note 7)		50 (Note 9)	
Edge of any land at a level lower than the invert of the distribution line	10		10	
Stormwater Infiltration System	25 (Note 10)		25 (Note 10)	
Swimming Pools:	In-ground:		25	
	Above ground:		10	
	Design Flow <5000 gpd	Design Flow ≥5000 gpd (Note 4)	Design Flow <5000 gpd	Design Flow ≥5000 gpd (Note 4)
Coastal Shoreline Feature (Note 11) not in a Critical Resource Area, Flowing Water (Rivers and Streams), Open Bodies of Water (Lakes and Ponds), Other Watercourses Not Mentioned Above, and Any Stormwater Management Structure That Potentially Intercepts Groundwater	25	50	50	100

### Notes:

The reductions in setback distances allowed below in Notes (1) through (5) will not be granted if the setback distances in Table 22.1 can be met.

(1) The distance between the building sewer or septic tank effluent pipe and a water supply line may be reduced and the lines may cross provided that either the building sewer or septic tank effluent pipe or water supply line is sleeved whenever the lines are within ten (10) feet of each other. The sleeve shall be seamless or schedule 40 PVC or equivalent with watertight joints and it shall have a watertight seal that is fastened to the pipes with a stainless steel retractable clamp.

Whenever possible, the building sewer and septic tank effluent pipe should be laid below water supply lines at crossings. Pressurized building sewers or pressurized septic tank effluent pipes shall be laid below water supply lines at crossings. If the setbacks to a water supply line for a public water system cannot be met, the applicant must obtain, and submit to the Department, written permission from the water supplier.

(2) Not applicable to building sewer and septic tank effluent pipe. Setback distance of 10' applies for all OWTS components not specifically listed.

(3) Any single leachfield designed to treat more than two thousand (2000) but less than five thousand (5000) gallons per day.

(4) As defined in Rule 35.1.1.

(5) Distance shown is the minimum for upgradient and side gradient directions. Downgradient separation distance will be based on nitrate modeling undertaken pursuant to Rule 35 and shall be a minimum of fifty (50) feet.

(6) Distance may be reduced to fifteen (15) feet with no foundation drain. Full foundation details must be shown on the plan. Distance may be reduced to eight (8) feet where a foundation slab elevation or the basement floor elevation is higher than the invert of the distribution lines in the leachfield.

(7) The distance between the building sewer or septic tank effluent pipe and a drain may be reduced and the building sewer or effluent pipe may cross the drain provided that the building sewer or septic tank effluent pipe is sleeved whenever they are within twenty-five (25) feet of the drain. The sleeve shall be seamless or schedule 40 PVC or equivalent with watertight joints, and it shall have a watertight seal that is fastened to the pipes with a stainless steel retractable clamp.

(8) If the slope of the original land surface over the area of the leachfield and fifty (50) feet in all directions from the edge of the leachfield is less than three (3) percent, the minimum setback distance between the leachfield and the drain must be fifty (50) feet in all directions. If the applicant conducts a groundwater flow study that conclusively demonstrates the drain is upgradient of the leachfield, the Director may allow a twenty-five (25) foot separation distance on the upgradient side.

(9) If a drain is watertight and bedded in sand or bank run gravel, or laid at an elevation above the seasonal high groundwater table, this setback distance may be reduced to twenty-five (25) feet. Applications shall include a detail drawing of the drain pipe joints and bedding material.

(10) On a residential property with both an OWTS and a stormwater infiltration system, the distance between any OWTS component and the stormwater infiltration system may be reduced to fifteen (15) feet if the stormwater infiltration system has been designed in accordance with the *Rhode Island Stormwater Design and Installation Standards Manual* or the *State of Rhode Island Stormwater Management Guidance for Individual Single-Family Residential Lot Development*.

(11) The minimum setback distance from the inland edge of the coastal shoreline feature of the ocean or Narragansett Bay is either fifty (50) feet or twenty five (25) feet plus the CRMC calculated shoreline change setback pursuant to the CRMP Section 140, whichever is greater. Shoreline change rates and maps are available on CRMC's web site. This setback distance is doubled for OWTSs with design flow greater than five thousand (5000) gallons per day.

Minimum setback distances from drinking water supply watershed features and from features in the Salt Pond and Narrow River Critical Resource Areas are described in Tables 22.2 and 22.3 respectively, in the OWTS Rules.

## Table 15.11 Soil Category

(From OWTS Rules, available at: <http://www.dem.ri.gov/pubs/regs/regs/water/owts12.pdf>)

Soil Category	Loading Rate (gals/sq ft/day) Pursuant to Rule 32.2  Starred items (*) are for soils with coarse fragment modifiers	Soil Texture	Soil Structure	Soil Consistence		Typical Soil Class
				Consistence In-Hand Using Soil Clods	Excavation Difficulty	
1	.70	cos, s, lcos, ls, cosl, fs	structureless- single grain subangular blocky	loose friable	N/A	Outwash (Class C), ice contact (Class D) and coarse ablation till (Class B) deposits
	.61*					
2	.61	vfs, lvfs	structureless- single grain	loose	N/A	Outwash (Class C) and ice contact (Class D) deposits
3	.70	ls, sl, l	granular, subangular blocky	very friable to friable	low	Lodgement Till (Class A), Ablation Till (Class B), Outwash (Class C), or Ice Contact (Class D)
4	.61	lfs, lvfs, fs, vfs	granular, subangular blocky	very friable to friable	low	Lodgement Till (Class A), Ablation Till (Class B), Outwash (Class C), or Ice Contact (Class D)
	.70*					
5	.52	sil, si, vfil	subangular blocky	very friable to friable	low	Typically Eolian deposits (Class G)
6	.61	lcos, cosl, lfs, ls, sl, l	structureless massive	very friable to friable	low	Ablation till (Class B)
	.70*					
7	.52	fil, vfil, sil, si, vfs	structureless- massive	very friable to friable	low to moderate	Ablation till (Class B)
	.61*					
8	.46	all textures	structureless-massive	firm to very firm	moderate	Lodgement till (Class A)
	.48*					
9	.40	all textures	platy, structureless-massive	firm to very firm	high	Lodgement till (Class A)
	.43*					
10	Not Allowed (Impervious)	all textures	platy, structureless-massive	extremely firm	very high to extremely high	Lodgement till (Class A)

Note 1: Refer to the DEM Soil Evaluation Guidance Document for explanation of soil texture, soil structure, soil consistence and excavation difficulty.

## **Proper Design Techniques and Materials**

- Leachfield
  - Properly located, all setbacks per regulations, as closely as possible.
  - The OWTS Rules require that the area between the trenches remain undisturbed, unless site conditions warrant the removal of all soil material. The Rules also provide for leachfield design and construction where the invert of the distribution lines is above original grade and for leachfields on sloping sites. Rule 33 addresses dispersal trenches and Rule 34 address concrete chambers.
- All invert elevations must be taken from benchmark.
- D-box must be level. Installed in undisturbed soil, if possible.
- Backfill material must be free of stones over 6” in diameter, construction debris, stumps, etc.
- No wheeled machinery should be driven over field during backfilling.



# Field Guide for OWTS Installations

October 2008

The following guidelines for field tolerances need to be used by licensed OWTS designers to determine if an OWTS is installed in compliance with approved plans. The Department recognizes that slight deviations from approved plans will not have a measurable effect on system performance. The Department recognizes that certain field changes, such as foundation footprint and final grading, are often due to the specifications of a homebuyer who is not involved in the project at inception. The purpose of this document is to set general guidelines on allowable changes in the field that differ from the original design. This document will also clarify when Department approval, as-built plans, and/or a redesign will be required. All deviations from approved plans must be noted on the Certificate of Construction (COC).

**1. TOLERANCES-** These deviations from approved plans **will not** require pre-approval of the Department:

- One (1) foot on any minimum horizontal distance shown in Tables 22.1 - 22.5.
- Well, waterline, or leachfield is moved up to five (5) feet from the original location, but it is in compliance with the minimum distances shown in Tables 22.1 - 22.5, and with the tolerances specified above.
- The invert of the distribution pipe or the bottom of the stone elevation is moved up to three (3) inches vertically.
- A ten percent (10%) deviation on all vertical and horizontal separation distances listed in Rules 32 and 33.
- The building sewer pitch is between one percent (1%) and five percent (5%).

**Note: VARIANCES** - Any critical distance approved by variance must be strictly adhered to.

If conditions are encountered during construction which indicate that the system cannot be installed or is not installed in accordance with the permit and the above tolerances, the designer shall notify the Director as soon as possible, but no later than 24 hours after discovery.

**2. AS-BUILTS** - \$50.00 fee required for as-built submittals (except for repair applications-no fee required) and three (3) copies of the as-built drawings.

As-built plans may be required when changes in the field exceed horizontal and vertical tolerance limits but still comply with the standards in the OWTS Rules. The designer shall notify the Department when changes exceed acceptable tolerances. The designer shall certify these changes on the COC and by submitting as-built plans within ten (10) business days after the OWTS is installed.

The following are instances where the Department may require submission of as-built drawings:

- The leachfield has moved up to ten (10) feet from the location on the approved plan.
- Orientation or location of the building served by the OWTS is changed so that up to twenty five (25%) of the footprint is outside the footprint on the approved plan.
- The well, waterline, or leachfield has moved up to ten (10) feet from the approved plan.

**3. REDESIGN** – Fee in accordance with Table 50.3, four (4) copies of the redesigned plans, and a new application form must be submitted.

Designers are required to submit redesigned plans when a well, foundation, wall, tank, waterline, leachfield, or other structure is placed in a location that is significantly different than indicated on the approved permit. If a redesign is required, the designer must stop construction of the OWTS and take measures to protect all work completed to date.

The following are instances where the Department may require redesigned plans:

- The leachfield is moved more than ten (10) feet horizontally from the approved plan.
- The invert of the distribution pipe or the bottom of the stone elevation has moved more than three (3) inches vertically from the approved plan.
- Orientation or location of the building served by the OWTS is changed so that more than twenty five percent (25%) of the footprint is outside the footprint on the approved plan.
- The well or waterline is moved more than ten (10) feet.

# **Septic System Failure**

## **Excerpt from OWTS Rules Definitions Section**

“Failed OWTS” means any OWTS that does not adequately treat and disperse wastewater so as to create a public or private nuisance or threat to public health or environmental quality, as evidenced by, but not limited to, one or more of the following conditions:

- (1) Failure to accept wastewater into the building sewer;
- (2) Discharge of wastewater to a basement; subsurface drain; stormwater collection, conveyance, or treatment device; or watercourse unless expressly permitted by the Department;
- (3) Wastewater rising to the surface of the ground over or near any part of OWTS or seeping from the absorption area at any change in grade, bank or road cut;
- (4) The invert of the inlet or the invert of the outlet for a septic tank, distribution box, or pump tank is submerged;
- (5) The liquid depth in a cesspool is less than six (6) inches from the inlet pipe invert;
- (6) Pumping of the cesspool or septic tank is required more than two (2) times per year;
- (7) OWTS is shown to have contaminated a drinking water well or watercourse;
- (8) If a septic tank, pump tank, distribution box, or cesspool is pumped and groundwater seeps into it;  
or
- (9) Any deterioration, damage, or malfunction relating to any OWTS that would preclude adequate treatment and dispersal of wastewater.
- (10) Excessive solids are evident in the distribution box or distribution lines.

## **Two Types of Septic System Failure**

Treatment failure - A system which is not adequately treating effluent (destruction, removal/reduction of pathogens: bacteria and viruses and reduction of nutrients: nitrogen and phosphorous).

Hydraulic failure – A system fails to accept all the wastewater being delivered to it. This may be evidenced by effluent backing-up into the home or effluent on the surface in the yard.

## **Possible Causes of System Failure:**

- leaking fixtures in the home,
- system undersized (tank and or leachfield)
- tank not watertight (water seeping into tank)
- baffle not in tact or no outlet tee (allowing solids to carry over to the leachfield)
- d-box not level (effluent not distributed evenly over entire field)
- system in groundwater
- dirty stone
- crushed pipe
- leachfield clogged

## **Signs of OWTS Failure**

- Discharge to the surface of the ground.
- Lush growth over portion of the lawn.
- Sewage backup inside the house.
- Sewage odor in house or yard.
-

## **Where to Investigate**

- Inlet, outlet hatches, if septic tank in use.
- Run water; insure flow is entering and exiting tank.
- Check for buildup of solids; is outlet tee in place?
- Water test sewer line between tank and D-box.

## **Rule 17.7 OWTS Application for Repair– excerpted from OWTS Rules**

An application for a repair of any OWTS, or any component thereof, shall be made when an OWTS or component has failed, as defined by Rule 7. An application for repair shall not propose any change of use, building renovation or any increased flow to the OWTS. The Department may allow an OWTS Application for Repair to be submitted when, after the effective date of these Rules, a fire or other catastrophic occurrence necessitates that a structure served by an OWTS be replaced. The applicant may also submit an OWTS Application for Repair when the property owner desires to upgrade or modernize the OWTS (e.g., replacement of cesspool).

17.7.1 All plans and specifications for an OWTS application for Repair shall be prepared by a licensed Class I, II or III designer in accordance with Rules 9 and 10. The applicant is not required to have a soil evaluation pursuant to Rule 15 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 licensed Class II or Class III designer.

17.7.2 Applicants shall meet the requirements of these Rules to the greatest extent possible. If necessary, certain requirements under these Rules 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 Rules, the protection of the public health and the environment shall be given priority over all other considerations.

17.7.3 Deep concrete chambers will not be permitted for OWTS Applications for Repair where an alternate type of leachfield can be utilized. The licensed designer must demonstrate that the repair alternatives to a deep concrete chamber are not feasible.

17.7.4 Exemptions for OWTS Application for Repair- Under the limited circumstances in Rule 17.7.4 (A)–(E), an OWTS Application for Repair will not be necessary prior to repairing the OWTS. Any repair or installation work done in accordance with Rule 17.7.4(A) – (E) that is found not to be in compliance with these Rules, will have to be corrected and will be considered a violation of these Rules.

(A) Septic Tank Replacement- When a crushed tank or other failure necessitates replacement to maintain wastewater handling capacity at a facility and averting a public health threat, the installer must receive verbal authorization from the Department prior to septic tank installation and the owner must submit a proper and complete repair application by the end of the next business day.

(B) Building Sewer- Replacing a crushed or otherwise repairing a faulty building sewer between the building and the septic tank does not require prior authorization of the Department or notification to the Department once the work is completed.

(C) Access openings- The following work on access openings does not require prior authorization of the Department or notification to the Department once the work is completed:

(i) Installation of access openings to finished grade; and

(ii) Compliance with the requirements to upgrade the cover of existing tanks that have access openings to finished grade in accordance with Rule 25.11 (grease tank), Rule 26.14 (septic tank), Rule 28.6 (holding tank), Rule 29.8 (pump tank), and Rule 34.6.2(D) (concrete chambers).

(D) Retrofitting for a septic tank effluent screen- Such work does not require prior authorization of the Department or notification to the Department once the work is completed.

(E) In-kind emergency replacement of a failed mechanical or electrical device does not require prior authorization of the Department or notification to the Department once the work is completed.

# OWTS REPAIR SUBMISSION REQUIREMENTS

Refer to **Rule 18** for required content of OWTS repair application submissions.

## Proper Design Techniques and Materials

- Leachfield
  - Properly located, all setbacks per regulations, as closely as possible.
  - The OWTS Rules require that the area between the trenches remain undisturbed, unless site conditions warrant the removal of all soil material. The Rules also provide for leachfield design and construction where the invert of the distribution lines is above original grade and for leachfields on sloping sites. Rule 33 addresses dispersal trenches and Rule 34 address concrete chambers.
- All invert elevations must be taken from benchmark.
- D-box must be level. Installed in undisturbed soil, if possible.
- Backfill material must be free of stones over 6” in diameter, construction debris, stumps, etc.
- No wheeled machinery should be driven over field during backfilling.

# **OWTS Design Applications and Installations Common Errors, Omissions and Problems**

## **Pre-Approval**

- Design element missing on plan (eg. septic tank)
- Missing signature
- 12.2.2 General incompetence displayed on plans that have been submitted
- Plan errors
- Field incorrectly sized
- Omission of essential data
- Some aspect of setback rule not met; variance required but not divulged
- Expired or incorrect field data
- Design not in accordance with subdivision approval
- Trench configuration or distances between trenches incorrect or not clear
- Application not completed

## **Post Approval**

- Designer not calling in 24 hour start of construction notice
- COC not submitted within 5 days or not at all
- Designers missing deficiencies during their inspections of septic systems
- Required bottom inspections not being called in.
- Cover inspections not being called in when required
- Installation records not being kept or inadequate
- Installation or design change not reported to Department

## **Installers**

- Begins construction without designer involvement
- Installer does not cooperate with designer to allow designer to do his/her part of job
- Installer not following design plan

Deficiencies discovered by our inspectors during spot inspections due to installer mistake

**Responsibilities of Licensed OWTS Designers  
Hired by a Homeowner  
in Response to Direction from  
DEM Office of Compliance & Inspection (OC&I)**

- 1) When contacted by a property owner, make sure to ask if they have received any letters from DEM.
- 2) **If the answer is yes**, make sure you read the letter so you understand what the issue is.
- 3) Call OC&I:
  - a. Advise them that the property owner has retained you to address the issue(s) in the letter, and
  - b. Provide them some idea of what you will be doing (time frame, approach, etc.).
- 4) Most of the notices require that an evaluation of the system be performed by a licensed designer and a report submitted to OC&I. The report, in addition to date, time and weather conditions, should include the following:
  - (1) What was the cause of the system failure the OC&I inspector observed and what was done to address that problem, if anything.
  - (2) Was the system functioning properly on the date of your inspection?
  - (3) If not, what is the cause of the system failure and what do you recommend to fix the problem.
  - (4) If you establish that the system is functioning properly, how did you determine this:
    - Did you do a flow through test,
    - Pull the covers of the tank, d-box, etc.,
    - What were the levels in the tank, d-box, etc.

**IMPORTANT!!!**

**You are the licensed professional, the expert; you are expected to apply your experience and knowledge to evaluate the situation and prepare a comprehensive report for submission to OC&I which supports your findings. At the time of your inspection, record for inclusion in your report, date, time, weather, all inspection activity conducted, observations and information provided by the homeowner.**

## Inspection of Septic Systems

Information on septic system function and procedures for conducting inspections of septic systems is available in the DEM publication “SEPTIC SYSTEM CHECKUP: THE RHODE ISLAND HANDBOOK FOR INSPECTION”. This document is available on the DEM website. The Universal Resource Locator (URL) for this is: <http://www.dem.ri.gov/pubs/regs/regs/water/isdsbook.pdf>

You may navigate to this document as follows: from DEM home (<http://www.dem.ri.gov>), select “Publications”, then from the links on the left side of the screen, select “Policies/Guidelines”, and from the links in the center of the screen, select “Septic System Inspection Handbook.

# RI DEM Class II & III OWTS Designer Examination

## Study Guide

### Part 4 – OWTS Forms



This material has been compiled to assist you in your preparation for the Rhode Island Department of Environmental Management Class II & III OWTS Designers' Examinations. This document is intended to be utilized in conjunction with the OWTS Rules, which are available at: <http://www.dem.ri.gov/pubs/regs/regs/water/owts12.pdf>.

#### Table of Contents

DEM OWTS Design Application .....	2
DEM OWTS Inspection Report .....	4
Designer's Certificate of Construction for ISDS .....	5
Affidavit to Replace Designer of Record .....	6

# DEM OWTS Design Application



## RHODE ISLAND DEPARTMENT OF ENVIRONMENTAL MANAGEMENT ON-SITE WASTEWATER TREATMENT SYSTEM CONSTRUCTION PERMIT



### FOR RIDEM USE ONLY

APPLICATION No. \_\_\_\_\_ DATE RECEIVED \_\_\_\_/\_\_\_\_/\_\_\_\_ AMOUNT RECEIVED \$ \_\_\_\_\_ CHECK # \_\_\_\_\_ NOTE \_\_\_\_\_

TYPE OF APPLICATION (CHECK ALL THAT APPLY)

CERTIFICATION

- NEW BUILDING CONSTRUCTION
- ALTERATION
- REPAIR
- TRANSFER
- A/E TECHNOLOGY
- TYPE OF SYSTEM \_\_\_\_\_
- VARIANCE
- REDESIGN

#### SITE INFORMATION

NO. STREET \_\_\_\_\_ CITY/TOWN \_\_\_\_\_ POLE # \_\_\_\_\_  
 PLAT NUMBER \_\_\_\_\_ LOT NUMBER \_\_\_\_\_ SUBDIVISION LOT NUMBER \_\_\_\_\_  
 LOT SIZE \_\_\_\_\_ SQUARE FEET  
 SUBDIVISION NAME \_\_\_\_\_  
 SUBDIVISION SITE SUITABILITY CERTIFICATION # \_\_\_\_\_

#### OWNER INFORMATION

LAST NAME \_\_\_\_\_ FIRST NAME \_\_\_\_\_ M.I. \_\_\_\_\_  
 NO. STREET \_\_\_\_\_ CITY/TOWN \_\_\_\_\_ ZIP CODE \_\_\_\_\_

#### RIDEM APPLICATION HISTORY

PREVIOUS SITE TESTING  YES  NO APPLICATION # \_\_\_\_\_  
 DEPTH TO APPROVED WATER TABLE \_\_\_\_\_ HOW DETERMINED \_\_\_\_\_  
 TEST HOLE # \_\_\_\_\_ DATE EXCAVATED \_\_\_\_/\_\_\_\_/\_\_\_\_ WETLANDS within 200' OF OWTS  YES  NO  
 WETLAND DETERMINATION  YES  NO RIDEM FILE # \_\_\_\_\_ DATE \_\_\_\_/\_\_\_\_/\_\_\_\_  
 LARGE SYSTEM  YES  NO

#### DESIGN INFORMATION

BUILDING USE:  Residential  Commercial \_\_\_\_\_  
 WATER SUPPLY:  public water  public well  private well \_\_\_\_\_  
 # OF DESIGN UNITS \_\_\_\_\_  
 UNIT DESIGN FLOW \_\_\_\_\_ gallons per \_\_\_\_\_ (unit) TOTAL DAILY FLOW \_\_\_\_\_ gallons  
 TANK SIZE \_\_\_\_\_ gallons DESIGN LOADING RATE \_\_\_\_\_ gpd/sf  
 MINIMUM REQUIRED LEACHFIELD AREA \_\_\_\_\_ square feet  
 LEACHFIELD TYPE \_\_\_\_\_  
 TOTAL AREA OF LEACHFIELD PROVIDED \_\_\_\_\_ square feet

I, \_\_\_\_\_ (print), the undersigned licensed OWTS designer, certify that I prepared this application and accompanying forms, submittals, plans and sketches in accordance with the RULES of the RIDEM pertaining to OWTS and that all the information provided on this application and accompanying forms, submittals, plans and sketches is true and accurate.

Signature of Designer \_\_\_\_\_

Designer License Number \_\_\_\_\_

Phone # \_\_\_\_\_

Business/Company Name \_\_\_\_\_

I certify that a) I am the owner of the property indicated under the site information on this application, b) I will hire a licensed OWTS installer to install the system proposed herein, c) the system will be installed in strict accordance with this application, d) I will hire and retain the licensed OWTS designer of record to witness and inspect the installation of the system, e) I assume all responsibility for the truth and accuracy of this application and all liability and responsibility for any improper installations of the system on this site and agree to hold the RIDEM harmless from any and all claims relating whatsoever to the system. In the case of a transfer application, I acknowledge that the permit application and plans previously approved and accompanying this application are the operative documents subject to certification.

Owner(s) Signature \_\_\_\_\_

Phone Number \_\_\_\_\_

#### PERMIT APPROVAL SECTION: DO NOT WRITE BELOW THIS LINE

Based upon the representations of the owner and the owner's agents, including the representations of the owner's OWTS designer, and the truth and accuracy of all information submitted, this application for an OWTS is hereby approved. The RIDEM assumes no responsibility or liability for the future safe operation or maintenance of the aforesaid system, or the fitness or suitability of this system to this site, nor does it assume any responsibility for the accuracy and truth of the owner's, or the owner's agent's representations. This approval is subject to future suspension or revocation in the event that subsequent examination reveals any data indicated on any application, form, submittal, plan or sketch to be incorrect, or not in compliance with the RULES or any conditions at the site are such that the approved design is not in accordance with the RULES, or in the event that the system discharges inadequately treated wastewater to waters of the State or fails to operate satisfactorily in any other manner.

#### IMPORTANT: Additional terms of approval as circled.

- A. Bottom of leaching area excavation must be inspected by the RIDEM prior to placement of any gravel or stone.
- B. System installation must be inspected by RIDEM prior to covering any component of the system with backfill.
- C. Applicant shall comply with all requirements, conditions and stipulations of variance(s) approved on \_\_\_\_\_.
- D. A/E Technology: additional specific installation, operation, or maintenance requirements may apply (see RIDEM A/E technology certification for this system type).
- E. Copy of this form and Operation/Maintenance contract must be filed in land evidence records prior to conformance.
- F. Proposed construction falls within "Coastal Zone". Contact Rhode Island Coastal Resources Management Council.
- G. Proper erosion and sedimentation controls must be installed prior to start of construction.
- H. Transfer: See original permit for all applicable conditions.
- I. Other \_\_\_\_\_

Signature of RIDEM Official \_\_\_\_\_

Date of Approval \_\_\_\_\_

Date of Expiration \_\_\_\_\_

DEM SEE INSTRUCTIONS ON REVERSE SIDE

### INSTRUCTIONS FOR COMPLETING APPLICATION

1. The owner must complete the owner's information section of the application, sign in the certification section, and furnish a telephone number.
2. The licensed OWTS designer must complete the remainder of the application except areas marked FOR RIDEM USE ONLY and PERMIT APPROVAL SECTION.
3. Check all TYPES OF APPLICATIONS that apply..
4. If an alternative or experimental technology system is proposed, the AE TECHNOLOGY box must be checked and the TYPE OF SYSTEM must be completed.
5. All site information including plat and lot, subdivision information, and lot size must be completed.
6. Any previous RIDEM application information must be shown including groundwater table verification and wetlands determination or permit.
7. Only one box should be checked for BUILDING USE. IF COMMERCIAL, provide a brief description.
8. Only one box should be checked for WATER SUPPLY.
9. Design information must accurately reflect the type and size of the septic system shown on the accompanying plans.
10. RIDEM APPLICATION HISTORY, DESIGN INFORMATION, and Signature of Designer are not needed for a transfer application.
11. **IMPORTANT:** This application is a part of a design submission that must include 4 (four) copies of the design plan, 4 (four) copies of any attachments such as calculations or details, a designer's checklist, and the appropriate fee.

**12. MAIL OR DELIVER TO:**

Rhode Island Department of Environmental Management  
Onsite Wastewater Treatment Program  
Office of Water Resources, Room 260  
235 Promenade Street  
Providence, Rhode Island 02908-5767

If you have any questions relating to this application, please call (401) 222-6820 Monday through Friday, 8:30 am to 4:00 pm.

# DEM ISDS Inspection Report



**Rhode Island Department of Environmental Management  
Individual Sewage Disposal System Section**

**INSPECTION REPORT**

APPLICATION NUMBER:	
STREET:	INSPECTOR:
CITY/TOWN:	INSPECTION DATE:
PLAT/LOT:	POLE NO.:
ISDS INSTALLER:	ARRIVAL TIME:
PHONE NO.:	WEATHER CONDITIONS:
INSPECTION NUMBER:	
TYPE OF INSPECTION:	

**FINDINGS/COMMENTS**

**RESULTS OF INSPECTION/ACTION REQUIRED**

- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Bottom Bed OK -- Construct system and call for cover inspection</li> <li><input type="checkbox"/> (RFA) Address items listed or checked and call for a re-inspection</li> <li><input type="checkbox"/> (RFA) Correct items listed</li> <li><input type="checkbox"/> (RFA) Correct items listed</li> <li><input type="checkbox"/> Cover System</li> <li><input type="checkbox"/> (COC) Submit certificate of construction</li> <li><input type="checkbox"/> (RFAD) STOP CONSTRUCTION. Contact designer. DO NOT CONTINUE. Items listed are too complex for a simple resolution</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> (ASB) Designer Must Submit As Built Plans</li> <li><input type="checkbox"/> (RPREQ) Submit Revised Plans</li> <li><input type="checkbox"/> (SOS) Designer's Supervision and Statement Required</li> <li><input type="checkbox"/> (SOS) Designer's Supervision and Statement Required</li> <li><input type="checkbox"/> (DRYVER) Dry Season Verified</li> <li><input type="checkbox"/> (DRYUNA) Dry Season Unacceptable</li> <li><input type="checkbox"/> (FEE) If this item is checked, a \$50 fee is required before re-inspection. Send copy of this inspection form with the check</li> </ul> |
|---|--|

Signature of Inspector(s) \_\_\_\_\_

**INSTALLER'S COPY**

INSPECT FORM REV. 9/86



DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF WATER RESOURCES  
PERMITTING SECTION  
INDIVIDUAL SEWAGE DISPOSAL SYSTEMS PROGRAM



DESIGNER'S CERTIFICATE OF CONSTRUCTION FOR ISDS

Permit No. \_\_\_\_\_  
I, \_\_\_\_\_, as the designer of record for the ISDS installation located at (Street) \_\_\_\_\_ in the City or Town of \_\_\_\_\_ hereby certify that the installation of the ISDS was performed by the installer named below, and to the best of my information, knowledge and belief, was witnessed and inspected in accordance with RIDEM/ISDS Rules and Regulations, and that, in my professional opinion, the installation of the ISDS conforms with the plans, specifications, applicable statutes, regulations, and construction tolerances as approved by the Director of the Rhode Island Department of Environmental Management. I further certify that I have documented the installation in accordance with RIDEM/ISDS Rules and Regulations. This certification is effective as of (date): \_\_\_\_\_

The septic tank, D-Box (if any) and leach field are located as set forth below:

[Empty box for site details]

Installer's Name \_\_\_\_\_ License No. \_\_\_\_\_

Designer License No. D- \_\_\_\_\_

Designer's Signature \_\_\_\_\_ Date Signed \_\_\_\_\_

Designer Request of Change (DROC) Approval Date(s) \_\_\_\_\_

DESIGNER: PLEASE RETAIN GREEN COPY FOR YOUR RECORDS



DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
 OFFICE OF WATER RESOURCES  
 PERMITTING SECTION  
 INDIVIDUAL SEWAGE DISPOSAL SYSTEMS PROGRAM



## AFFIDAVIT TO REPLACE DESIGNER OF RECORD

I \_\_\_\_\_ said owner(s) of property, ISDS permit number \_\_\_\_\_  
 (print name)

\_\_\_\_\_, do hereby request authorization to have the replacement designer \_\_\_\_\_ witness and inspect the installation of \_\_\_\_\_  
 (designer name and license number)

the ISDS on said property. I am petitioning the Department for this request based on the following reason(s):

**CHECK APPROPRIATE ITEM(S):**

- 1) \_\_\_\_\_ The original designer of the system is incapable of witnessing and inspecting the system because he/she is: \_\_\_\_\_ Deceased  
 \_\_\_\_\_ Physically Incapacitated  
 \_\_\_\_\_ No Longer Licensed  
 \_\_\_\_\_ Other \_\_\_\_\_
- 2) \_\_\_\_\_ I, the property owner, contracted with a certain business entity for design services. The original designer who prepared the ISDS design is no longer employed by that business entity, and the property owner is replacing the original designer with another designer employed by that business entity.

Owner(s) signature: \_\_\_\_\_ Date: \_\_\_\_\_  
 (Owner must be the same person as permittee)

I, the replacement designer, have a designer's license in the appropriate license class required by the regulations to design the system prepared by the original designer of said ISDS. I take full responsibility for the design and installation of the system in accordance with all ISDS Rules and Regulations.

Replacement designer's signature: \_\_\_\_\_ Date: \_\_\_\_\_

**FOR OFFICE USE ONLY**

DECISION Approved  Denied

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Signature of Authorized Agent \_\_\_\_\_ Date \_\_\_\_\_