*PHASE 1 SEWAGE DISPOSAL CERTIFICATION

Connecticut Department of Public Health
Keeping Connecticut Healthy

---

* Presented by:

Connecticut Department of Public Health
Environmental Engineering Program
410 Capitol Avenue- MS# 51-SEW
P. O. Box 340480
Hartford CT, 06134

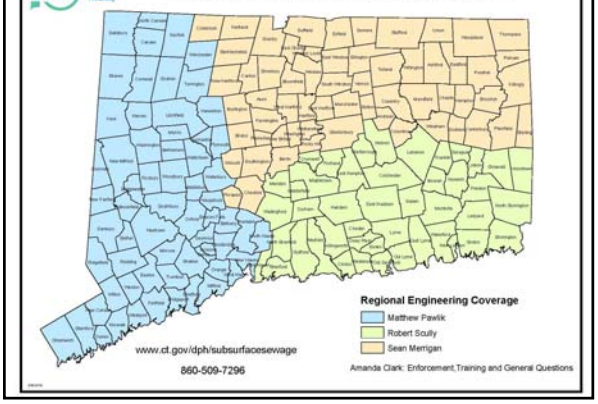
Phone: (860) 509-7296
Fax: (860) 509-7295

Environmental Engineering Program

- *Environmental Engineering Program
  - *3 Engineers and 1 Environmental Analyst
- *On-site Sewage Disposal
- *Dead Body Structures

Introduction 3

Environmental Engineering Program



Website Information

- *www.ct.gov/dph/subsurfacesewage
- *Training Section
  - *Download Phase 1 presentations, class work, homework and handouts.
- *Information on Operation and Maintenance, Regulations and Technical Standards, Design Manual, Circular Letters and more.

---

*Purpose / Scope

- *Phase 1 sewage disposal certification training
  - *Overview of regulations
  - *Installer plan review
  - *Investigation
  - *Inspection
  - *Design practices pertaining to subsurface sewage disposal system
  - *Soils information
- *Phase 1 required for local health agent certification by a director of health

Introduction 6

*Required Training

- *Commissioner of Public Health must certify agents of the Director of Health to:
  - *Investigate
  - *Inspect
  - *Approve installers plans
  - *Approve engineered plans (Phase 2)
    - *Regulations and Technical Standards
    - *Design Guide

Introduction 7

*Phase 1 Training

- *Pass Exam (70 or better)
  - *Site investigation
  - *Inspect
  - *Approve installers plans

Introduction 8

*Required Reading

- *Regulations and Technical Standards for Subsurface Sewage Disposal Systems
  - *Review regulations by next class
- *Design Manual Chapters 1-17 and 26-32
  - *Read chapters 1-11 by next class
  - *Read chapters 26-32 by day 3
  - *Read chapters 12-17 by day 4

Introduction 9

*Technical Standards

- *Latest revision January 1, 2015
- *Code Advisory Committee
  - *COWRA
  - *CEHA
  - *CADH
  - *Home Builders
  - *DEP
  - *Soil Scientist
  - *DPH
  - *Professional Engineers

10

CONNECTICUT PUBLIC HEALTH CODE

On-site Sewage Disposal Regulations, and Technical

Standards for Subsurface Sewage Disposal Systems

PHC Section 19-13-B100a (e.g., Building Conversions, Changes in Use, Building Additions)

Effective August 3, 1998

PHC Section 19-13-B103 (Design Flows 5,000 Gallons per Day or Less)

Effective August 16, 1982

Technical Standards for Subsurface Sewage Disposal Systems

Effective August 16, 1982

Former revisions: 1986, 1989, 1992, 1994, 1997, 2000, 2004, 2007, 2009, 2011

Revised January 1, 2015

PHC Section 19-13-B104 (Design Flows Greater than 5,000 Gallons per Day)

Effective August 16, 1982

State of Connecticut
Department of Public Health
Environmental Engineering Program
410 Capitol Avenue - MS #51SEW
P.O. Box 340308
Hartford, Connecticut 06134
(860) 509-7296

www.ct.gov/dph/subsurfacesewage

January 2015

*Regulations

- *19-13-B100a Building Conversions, Change in use, Additions (effective August 3, 1998
- *19-13-B103 Discharges 5000 Gallons Per Day or less (effective August 16, 1982)

Introduction 12

- Design Manual
  - Subsurface Sewage Disposal Systems for Households and Small Commercial Buildings. July, 1998

Guidelines- acceptable practices in CT

Introduction

13

Scope and Purpose

- Guidance for engineers, installers and local health officials in the design and construction of subsurface sewage disposal systems for households and small business
- Design considerations and practical solutions for overcoming specific installation problems

Introduction

14

Introduction : Onsite Sewage Disposal Systems and Design

Connecticut Department of Public Health
Keeping Connecticut Healthy

Wastewater

Domestic Sewage

Connecticut Department of Public Health
Keeping Connecticut Healthy

Domestic Sewage

Domestic Sewage

- Water and human excretions
  - Toilets
  - Bathing water
  - Cooking and cleaning
  - Laundry
- Waste from restaurants and commercial buildings

Introduction

18

*How we dispose sewage?

*Where does it go?

Introduction 19

Methods of Sewage Disposal

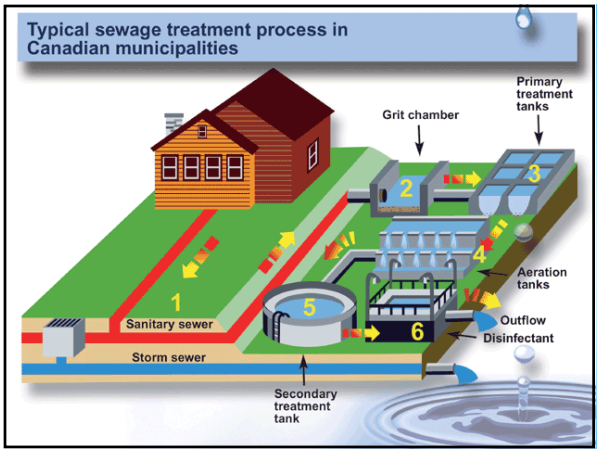
*Public Sewers
*Conventional "Septic Systems"
*Alternative or Advanced Treatment Systems

Introduction 20

*Public Sewers

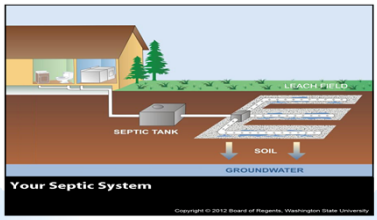
*Serves approximately 60 percent of the CT population
*Predominantly in urban areas and areas of high density development

Introduction 21



Conventional Septic Systems

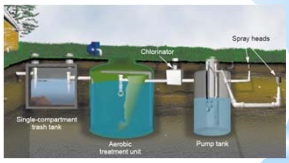
*Serve approximately 1 million people in CT
*Defined as Subsurface Sewage Disposal Systems in CT regulations
* Soil based treatment and dispersal



Introduction 24

*AT Systems

- *Requires DEEP permit
- *Alternative or Advanced Treatment Systems
- *Wastewater Management District Legislation may allow for broader use.



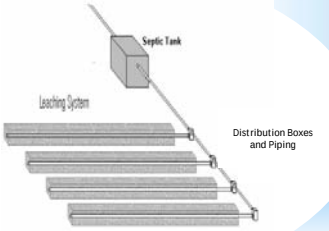
Aerobic Treatment

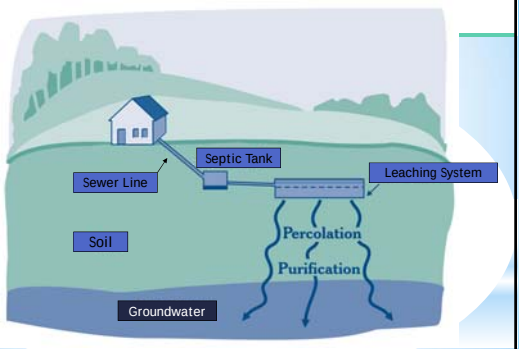
*Septic Systems

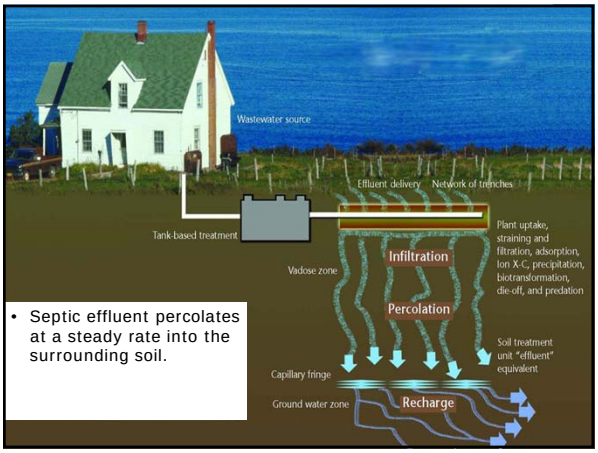
For many communities On-site Sewage Disposal via a Subsurface Sewage Disposal System a.k.a. septic system, is the only option for sewage treatment and disposal.

*What is a Septic System?

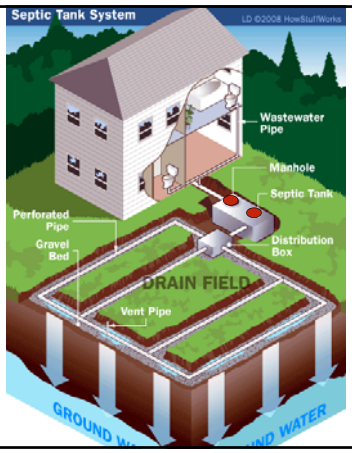
- *Building Sewer
- *Septic Tank
- *Distribution Piping
- *Leaching System
- *Necessary pumps, grease traps and groundwater control systems







- Septic effluent percolates at a steady rate into the surrounding soil.



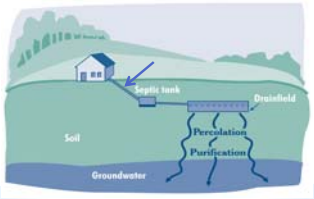
Introduction
32

How Does a Septic System Work?

http://www.gbra.org/septic.swf

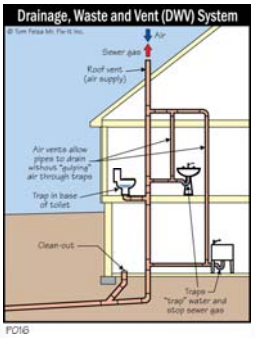
Building or House Sewer

- Refers to the pipe located between the building served connecting to the septic tank.



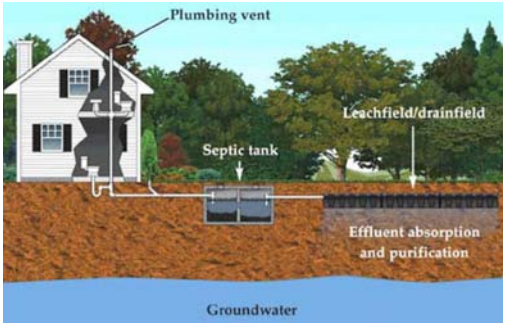
Introduction
34

Sewer Ventilation



FO16

Introduction
35



*Getting to know your Septic System

*https://www.youtube.com/watch?v=HQJXEog1VXk

*Septic Tank

*Provides the primary treatment: separates, settles and digests

*Septic Tank

*Concrete or plastic

*Provides the primary treatment: separates, settles and digests

*Tanks must be approved by CT DPH

*All new tanks require an effluent filter and are two compartments

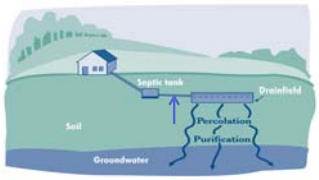
*Septic Tank

*Concrete Septic Tank

*Septic Tank Effluent Filter

*Distribution Piping

*Consists of the piping leading from the septic tank to the leaching system.

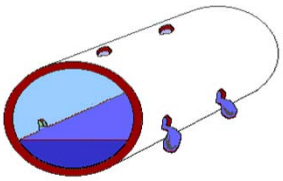


*Distribution Piping

*Distribution Box

*Perforated Piping

Perforated Piping



4" Diameter Distribution Piping

*Distribution Piping

*Distribution Box

*Distribution Box Installed

*Leaching System

*Properly functioning leaching system should treat and disperse effluent (liquid from the septic tank) into the surrounding soils without breaking out onto the ground surface or polluting the groundwater.

*Leaching types

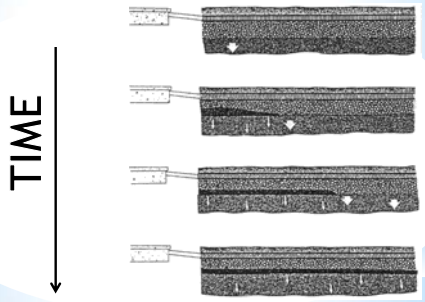
- *Trench
- *Pits
- *Galleries
- *Proprietary products
  - *Plastic chamber
  - *Mats
  - *Forms
  - *Cardboard

How does a leaching system work?

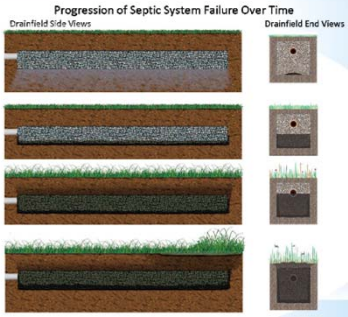
- *Effluent from the septic tank is directed to the leaching system by the distribution piping
- *A layer of biological slime is formed on the interface between the soil and the leaching system surface (BIOMAT)
- *The growth of the slime layer reduces the rate at which sewage passes into the soil.

Formation of a Biomat

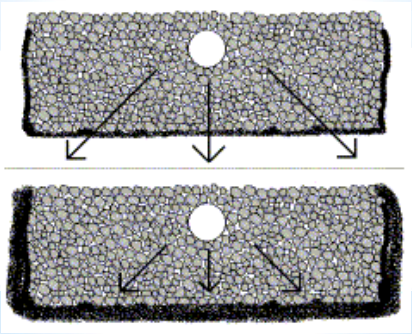
Gravity Distribution



*Biomat Formation



Biomat Growth



*Stone Trenches

Introduction

58

*Leaching Pit or Dry Well

Introduction

60

*Galleries - 12-inch high

Introduction 61

*Galleries - 27-inch Teepees

Introduction 62

*Galleries - 4' x 4'

Introduction 63

*Filter fabric over gallery rows

Introduction 64

*Plastic Chambers-Infiltrators

Introduction 65

*Cultec

Introduction

68

*Form Cell: Living Filter

Introduction

69

*Living Filter

Introduction

70

*GreenLeach Filter

GeoMat Flat

Lay distribution pipe over system per design

Set form in trench

GeoMat Edge

Place lids on top of GeoMat slots

GeoMat Edge

GST Leaching System

Prepare site

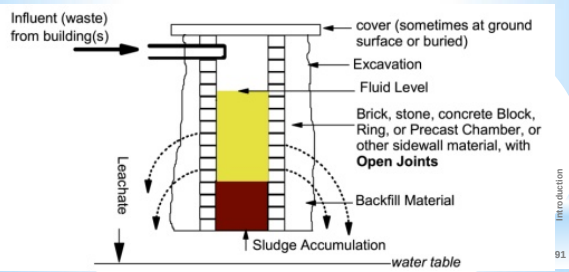
S-Box

*Perc-Rite

*Perc-Rite

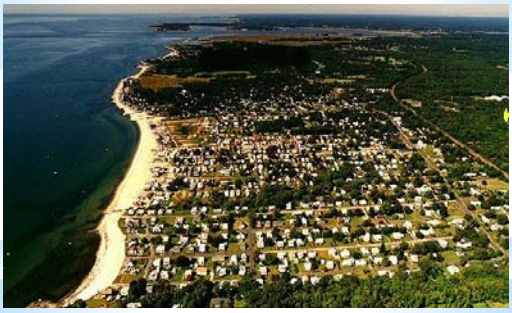
*Perc-Rite

*Cesspools - Not Allowed



Introduction 91

*System Failure



Introduction 92

*Septic System Repair

Introduction 93

*How is a system sized?

- *Residential buildings
  - *Number of bedrooms
- *Commercial and non-residential buildings
  - *Actual flow times a factor of safety
  - *Design flow table

Introduction 94

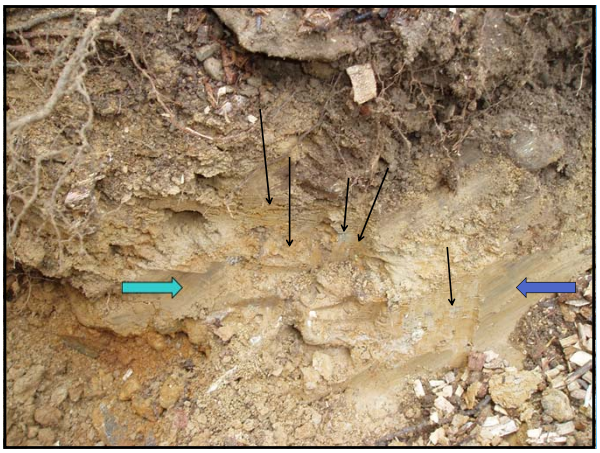
*Siting and design

Connecticut Department of Public Health
Keeping Connecticut Healthy

*Vertical Placement

- *Utilize soil-based identification of redoximorphic features (redox- discoloration of the soil indicative to seasonal high groundwater) to identify groundwater
- *Redox features form by the biogeochemical processes of reduction, movement, and oxidation of iron and manganese.

https://www.youtube.com/watch?v=olNAI0gmCos

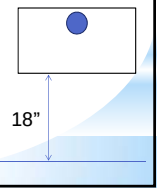


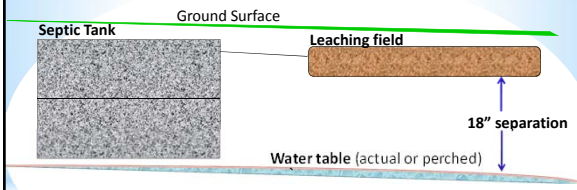
*Site Hydraulics

- *Important factor when designing a septic system
- *The naturally occurring soil surrounding leaching systems should be capable of hydraulically dispersing the entire volume of sewage effluent discharged into it on a continuous basis

Vertical Separation Distances

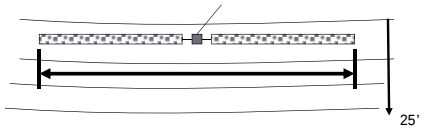
- *Bottom of the Leaching
  - *18" above water, redox or compact layer (restrictive layer)
    - *24" if a large system over 2000 GPD or located in a tidally impacted groundwater table
  - *4' over ledge rock, 24" of which is natural

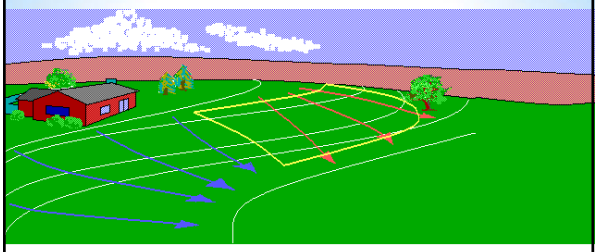


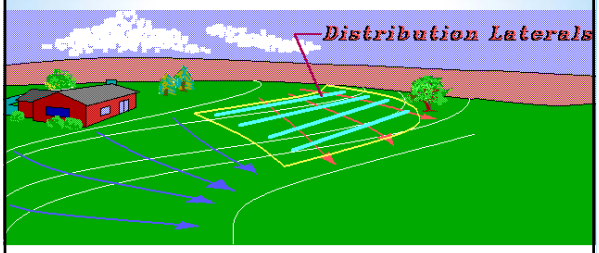


Minimum Leaching System Spread

Down gradient soil must be taken into account when siting a system.







103

Pollutants in Domestic Sewage

- Suspended Solids
- Bio-chemical Oxygen Demand (BOD5)
- Total Nitrogen
- Total Phosphates
- Grease and Oils
- Coliform Bacteria

Introduction

104

Bio-Chemical Oxygen Demand

- BOD
- measure of the amount of bio-degradable organic chemicals in the wastes
- High BOD = strong waste
- Low BOD = weak waste

Introduction

105

Bio-Chemical Oxygen Demand

- Properly functioning septic tank will reduce the BOD in the effluent by about 25 to 30 percent (more with a two compartment tank)
- Further reduction occurs when the effluent comes in contact with bacterial growth in the leaching system (biomat)
- Amount of reduction depends on the volume of bacterial growth in the leaching system

Introduction

106

Nitrogen

- Hazardous to infant children (methomoglobinemia or "blue baby disease")
- Septic systems remove approximately 30% of total nitrogen with the remaining 70% being discharged to the groundwater
- Separation distances to wells must be maintained

Introduction

107

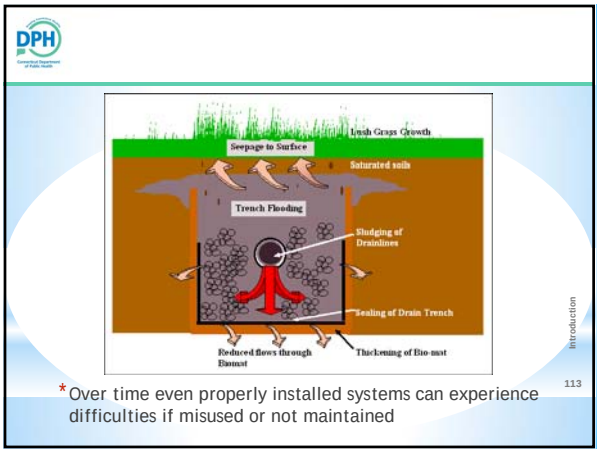
Phosphate

- Stimulates plant growth (lush green grass or algae growth in surface water)
- Algae blooms →

- Readily removed by filtration through only a foot or two of most CT soil types

Introduction

108



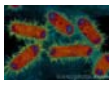
*Over time even properly installed systems can experience difficulties if misused or not maintained

*Coliform Bacteria

*indigenous to the digestive tract of humans and warm-blooded animals

- may not be harmful themselves, but indicates that pathogenic organisms and / or viruses may be present

- viruses are smaller than bacteria and not as easily filtered out



Introduction

115

Chemical Pollutants in Sewage

*Paints, solvents, refinishing agents, cleaning chemicals, chlorinated hydrocarbons, etc.

*Considered to be hazardous chemicals since they can readily pass thru a septic system and enter the groundwater

*Amount of these chemicals in domestic sewage should be extremely small

Introduction

116

*Non-Typical Domestic Sewage

*Kitchen wastes – extremely high in grease

*Wastes from garbage disposal systems contain large amounts of settleable solids and therefore the septic tank should be pumped more frequently

*Laundry wastes high in phosphates, clothing fibers, oils and bacteria shed from the body

Introduction

117

*Why A Septic System?

*Septics vs Sewers

*Low density – towns wish to remain rural

*Sewers too costly in rural areas

*The goal - avoid groundwater pollution

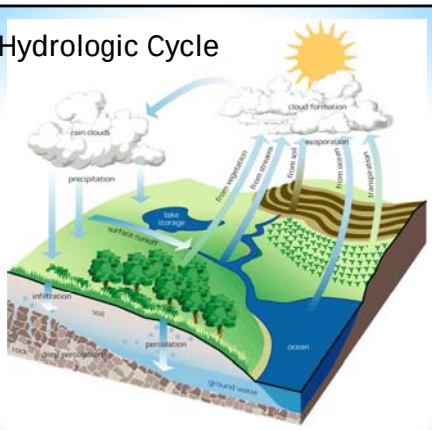
*Typically cause less pollution

*Cost effective with proper maintenance

Introduction

118

The Hydrologic Cycle



*Regulatory Jurisdiction

*Who Regulates in CT?

CT Department of Energy & Environmental Protection

Local and State Dept. of Public Health

*Local and State Health Departments

*Conventional Septic Systems with Design Flows of 5,000 Gallons Per Day (GPD) and Less

Introduction

121

*Department of Energy and Environmental Protection

*Design Flows Exceeding 5,000 GPD,
*Alternative
*Community Systems
*PHC B104 (at the end of the TS)

Introduction

122

*Additional Reading

www.ct.gov/dph/subsurfacesewage

Introduction

123