

A Green Approach to Campground Wastewater Improvements

AMC Noble View Camp

- Jeremy Cigal, Tighe & Bond
- Joe Ducharme, Clivus New England



Design Parameters

- Non-conforming Systems (Remedial Use Approvals)
- Less than 4' of Naturally Occurring Pervious
- ESHGW 2.5' Deep
- 50 Campers = 1,750 GPD Design Flow
- Sandy Loamy (Class II Soil)
- Perc Rate 8 MPI
- Large SAS Footprint (100' x 100' Area)
- Conservation Restriction Limited Development (20 acres)

248 CMR 10.10 5(f)
Alternative Technology Toilet Systems

January 31, 2012

Is it legal, can it be permitted? Yes and this is how it is ----

1. Areas subject to 310 CMR 15.000 or where sewers are unavailable innovative alternative technology toilets may be installed in place of a liquid sealed toilet. These are considered plumbing fixtures under 248 CMR 10.00 and therefore the permit requirements must be satisfied.

2. The alternative technology toilet system shall be manufactured to NSF-41 standards and shall be installed in compliance with the manufacture's instructions.

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The composting system is located within the building, unlike traditional waste treatment systems, so it falls under the MA plumbing code and DEP title 5 regulations

Product Approval List

Clivax Multrum, Inc.

- AF-106 Waterless Urinal (P3-0209-320)
- AF-202 Waterless Toilet Fixture (P3-0209-320)
- AF-203 Waterless Toilet Fixture (P3-0209-320)
- AF-208 Waterless Toilet Fixture (P3-0209-320)
- AF-208B Waterless Toilet Fixture (P3-0209-320)
- AF-209 Waterless Toilet Fixture (P3-0209-320)
- M-12M Composting System (P3-0209-320)
- M-12U Composting System (P3-0209-320)
- M-15 Composting System (P3-0209-320)
- M-18 Composting System (P3-0209-320)
- M-22 Composting System (P3-0209-320)
- M-25 Composting System (P3-0209-320)
- M-28 Composting System (P3-0209-320)
- M-32 Composting System (P3-0209-320)
- M-35 Composting System (P3-0209-320)
- M-10 Composting System (P3-0208-238)

Clivax New England, Inc.

- STW-30 Nepon Foam Flush Toilet (P3-0309-370)
- 2000 Recycling Greywater System (P3-0309-370)

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Example

Natural Process

15.289 Humus/Composting Toilets

- Certified for General use
 - Liquid by-product must be properly discharged or removed by a licensed septage hauler
 - It is possible to use an existing cesspool as a leaching pit
 - Must be pumped and cleaned
 - Bottom cannot extend below high groundwater elevation
 - Meets design criteria of 310 CMR 15.253
 - Complies with 310 CMR 15.242 Loading rates
 - System designed to store compostable solids for a minimum of two years
 - Burial on site or in another manner and location approved by the local Approving Authority, covered with a minimum of 6" of clean compacted earth
 - Hauled off by a licensed septic hauler

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Large scale composting systems not box dehydrators Massachusetts plumbing board approved Two year retention NSF requirement No need for individual DEP product approvals However must have NSF and a Mass plumbing board approval

What is Blackwater?

- Toilets
- Urinals

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Important Information

- All Toilet and Urinal fixtures must have a State approval number
- The alternative system must have a State approval number
- All Systems must be manufactured in accordance to NSF 41 standards
- No other power vents in restrooms/bathrooms
- ABS or PVC for all venting and Liquid removal lines
- Nepon foam-flush toilet waste line must be at a 45-deg. or vertical
- Moistening system feeds require backflow
- No traditional flushing toilet fixtures
- Must have local board of health approval
- System certification by Clivus New England, Inc.

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What is Greywater

A Form of Wastewater

- Lavatories
- Showers
- Kitchen Sinks
- Dishwashers
- Janitorial Sinks
- Drinking fountains
- Clothes Washers
- Bathtubs

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Not all states allow kitchen sinks and dishwashers to be categorized as greywater. All of the New England states do allow this classification.

$$G = RF + HQE$$

Greywater = reduced flow + higher quality effluent
for reuse

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What comes out of a sink is of a much higher quality than what comes from a toilet which gives us more options. Use your own imagination of what is possible

15.262: Greywater Systems

- Commercial & Public Facilities
 - Site specific design flow
 - Loading rate of 770 GPD/Acre
 - Minimum of two feet of separation to high groundwater
 - Backfill of at least 9"
 - No discharge of Blackwater when using the 770-Loading
 - No Garbage grinders
 - Greywater filter can replace the septic tank
 - Do not need to demonstrate that a traditional system in full compliance can be installed

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Greywater regulations

Site specific design flows allows to use historical data from similar sites to assist in determining design flows because the traditional design flows don't take into account the elimination of the toilet waste effluent 9" below the surface unless combined with an alternative technology that allows for less depth like drip dispersal All NE states have there own requirements which vary slightly

Clivus New England, Inc.

Providing Economic Solutions Through Recycling

Joseph A. Ducharme

Clivus New England, Inc.
P.O. Box 127
North Andover, MA 01845

Phone: (978) 794-9400
Fax: (978) 794-9444
E-Mail: JDucharme@clivusne.com

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Joe Ducharme, General Manager
Clivus New England, Inc.

Joe Ducharme has been with the Clivus companies for over 26 years. Throughout this time he has designed and installed composting and greywater systems that have efficiently and economically provided waste treatment on environmentally sensitive sites and for US Green Building Council projects. He also was a member of the 1994/1995 Title-5 review committee for Composting and Greywater systems regulations that are now in use.

Systems range in size from residential applications to public and commercial facilities which receive thousands of visitors daily, and are demographically diverse throughout North America. His wide-ranging experience and "outside the box" approach have allowed him to provide solutions for difficult projects.

Composting waste treatment systems used with the Nepon 3-oz. Foam-Flush Toilet rely on natural decomposition, conserve both clean water and energy, and reduce dependency on centralized water treatment facilities.

LEED projects with Clivus systems accredited to date by Joe include

- University of Vermont - University Heights Residential Learning Center
- Vermont Law School - South Royalton, VT
- Massachusetts Audubon Society Wellfleet Wildlife Sanctuary - Cape Cod
- NH Audubon Society McLane Center at Silk Farm - Concord, NH
- Society for the Protection of New Hampshire Forests - Concord, NH
- Trustees of Reservations Doyle Conservation Center - Leominster, MA
- Green Woodlands - Dorchester, NH
- US Forest Service Administrative Complex - Campton, NH

P.O. Box 127 - North Andover - MA - 01845
tel 978-794-9400 • fax 978-794-9444
jducharme@clivusne.com

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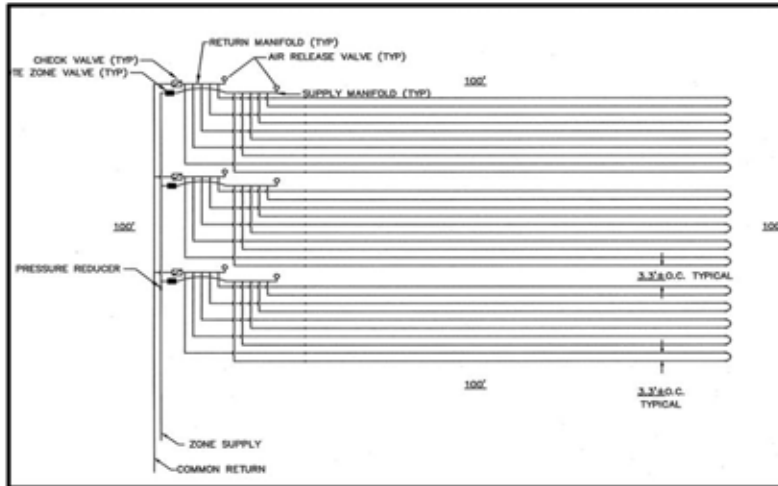
Permitting

- Required Variance for Naturally Occurring Pervious
- Greywater Allowed 2' Separation to ESHGW
- Selected Perc-Rite Drip Dispersal to Distribute Flow Over Large Available Area
- Multiple Drip Dispersal Zones Accommodated Fluctuation in Use
- August 2009 Russell Board of Health Approved
- September 2009 DEP Presumptive Approval

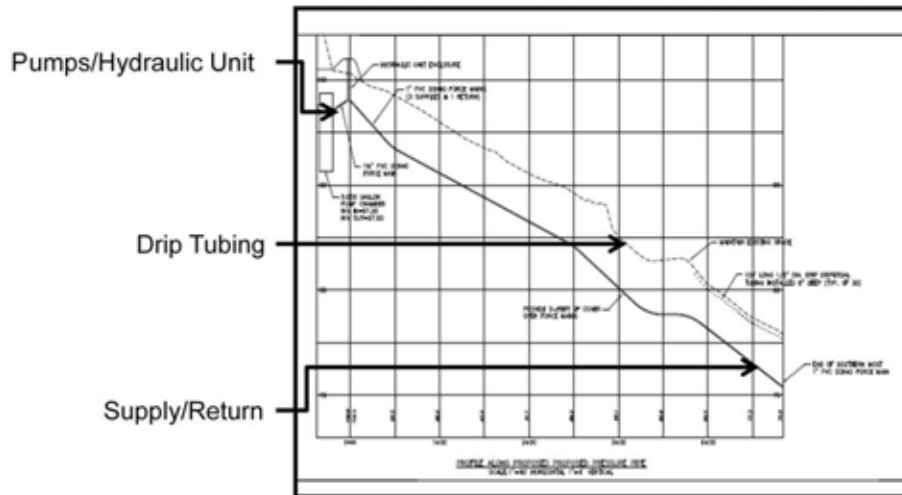
Drip System Design

- Large Area for Dispersal – 100' x 100'
- Used Three Zones to Spread Out Effluent
- Multiple Zones Allowed Flexibility of Shutting Off During Slower Use Periods
- Tubing Typical Installed 2' O.C. - Used 3.3' O.C.
- Pumped Downhill – Required Remote Zone Valves

Details of Drip Field



Profile Of Supply/Return Lines



Summary

- Bathhouse Grand Opening in 2011
- AMC is proud of the overall green design including the septic system components
- Gary Forish noted last week that the composting toilets are working great. They don't expect to replace the compost for many years
- AMC was pleased to preserve the open meadow where the drip dispersal was installed.
- Overall Project success!