



## PHELPS ENGINEERING, INC.

79 Court Street, P.O. Box 367  
Middlebury, VT 05753  
www.phelpseng.com

89049

August 1, 2008

Mr. Tom Mansfield  
Town of Charlotte  
P.O. Box 119  
Charlotte, VT 05445

Subject: Wastewater System and Potable Water Supply Permit Application for  
Harriet Patrick's 1812 Tavern

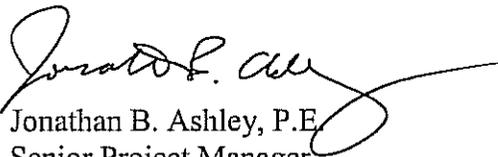
Dear Tom:

Attached is a Wastewater System and Potable Water Supply Permit application and fee for the possible future expanded use of the 1812 Tavern property located at 1355 Church Hill Road in Charlotte. The following items are attached for your use in reviewing the application:

- Test Pit Logs and Hydrogeologic Evaluation;
- Basis of Design Calculations;
- Two Full-Size Sets of Design Plans;
- One 11 x 17 Set of Design Plans; and
- One complete set of the application and attachments in PDF format.

Please call if you have any questions during your review of the project.

Sincerely,

  
Jonathan B. Ashley, P.E.  
Senior Project Manager

JA:kb

Enclosures

c: Happy Patrick

# Wastewater Management Division - Permit Application Wastewater System & Potable Water Supply



*For Office Use Only:*

Application#	PIN#	Date Complete Application Received
<input type="text"/>	<input type="text"/>	<input type="text"/>

**Authority:**

10 V.S.A. Chapter 64, the Environmental Protection Rules, Chapter 1, Wastewater System & Potable Water Supply Rules, and Chapter 21, Water Supply Rules, Appendix A. Part 11 - Small Scale Water Systems.

**General Information:**

The organization and/or content of this form may not be altered, however, the form is designed to expand to allow additional information to be entered. Changes in the organization and/or content of the form may result in an invalid application or permit.

In most cases a licensed designer will be required for your project and to help complete this application form. There are also line-by-line instructions available to assist with completing this form.

**NOTE: We strongly suggest referring to the application instructions while completing this application form.**

## Part I Applicant (Landowner) & Project Contact Information

### Section A - Applicant Details (if Landowner is an Individual or Individuals)

1 Last Name		2 First Name (and Middle Initial if appropriate)	
Patrick		Harriet S.	
3 Mailing Address Line 1		4 Mailing Address Line 2	
2952 Greenbush Road		<input type="text"/>	
5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code
Charlotte	VT	United States	05445
9 Email Address			10 Telephone
N/A			802-425-2555
<input type="button" value="Remove This Applicant"/>			

### Section B - Applicant Details (if Landowner is other than an Individual or Individuals, e.g. Corporations, Homeowner's Associations, etc.)

1 Registered Legal Entity or Organization Name		2 Telephone	
N/A - see applicant		<input type="text"/>	
3 Mailing Address Line 1		4 Mailing Address Line 2	
<input type="text"/>		<input type="text"/>	
5 Town/City	6 State/Province	7 Country	8 Zip/Postal Code
<input type="text"/>	<input type="text"/>	United States	<input type="text"/>

**Certifying Official**

The Certifying Official must be a person who has signatory authority for the legal entity or organization that is the Applicant. A copy of the document authorizing this person to act as a signatory authority must be attached to this application.

9 Certifying Official Last Name		10 Certifying Official First Name (and MI if appropriate)	
N/A - see applicant		<input type="text"/>	
11 Certifying Official Title			
<input type="text"/>			
12 Certifying Official Email Address			13 Telephone
<input type="text"/>			<input type="text"/>

<b>Section C - Primary Contact Information (if other than Applicant)</b>			
1 Last Name N/A - see applicant		2 First Name (and Middle Initial if appropriate)	
3 Mailing Address Line 1		4 Mailing Address Line 2	
5 Town/City	6 State/Province	7 Country United States	8 Zip/Postal Code
9 Email Address			10 Telephone

<b>Section D - Building/Business Owner Information</b>			
1 Last Name N/A - see applicant		2 First Name (and Middle Initial if appropriate)	
3 Mailing Address Line 1		4 Mailing Address Line 2	
5 Town/City	6 State/Province	7 Country United States	8 Zip/Postal Code
9 Email Address			10 Telephone

<b>Part II Certifying Designer(s) Information</b>			
1 Designer Last Name Ashley		2 Designer First Name (and Middle Initial if appropriate) Jonathan B.	
3 Designer License# 187350	4 Company Name Phelps Engineering, Inc.		
5 Mailing Address Line 1 P.O. Box 367		6 Mailing Address Line 2 79 Court Street	
7 Town/City Middlebury	8 State/Province VT	9 Country United States	10 Zip/Postal Code 05753
11 Email Address jashley@phelpseng.com			12 Telephone 802-388-7829
13 Designer Role(s) (check all that apply)			
<input type="checkbox"/> Water Supply Designer <input checked="" type="checkbox"/> Wastewater Disposal System Designer			
<input type="button" value="Remove This Designer"/>			

<b>Part III Property Location Information</b>			
<b>Section A - Property Parcel ID#(s) and Location(s)</b>			
1 Please provide the property location information including Town or City Parcel ID#, Town/City, and Street or Road location in the table below:			
	(a) Town/City Parcel ID#	(b) Town or City	(c) Street or Road Location
X	00007-1355	Charlotte	1355 Church Hill Road
<input type="button" value="Add Another Property"/>			

**Section B - Center of Property GPS Coordinates**

1 Enter the approximate center of property coordinates using GPS set for NAD83 or as derived from a map (map must be based on NAD83).

(a) Latitude  
(in decimal degrees to five decimal places, ex. 44.38181°)

N  °

(b) Longitude  
(in decimal degrees to five decimal places, ex. -72.31392 °)

W (-)  °

**Part IV Project Information**

**Section A - General Project Information & Questions**

1 Project Name (if applicable)  2 Total Acreage of Property

3 Business Name (if applicable)

4 Detailed Project Description

Permitting of performance-based mound systems on Lot 3 for possible future expansion of use (adding a bedroom) at the existing 1812 Tavern building on Lot 1 and the apartment on Lot 2. Additional capacity in the new mound systems reserved for possible future connections by new single family homes if Lot 3 is subdivided in the future. The project also includes a boundary line adjustment between Lots 1 and 3. No new lots will be created.

5 Were all buildings or structures, campgrounds, and their associated potable water supplies and wastewater systems substantially completed before January 1, 2007 and all improved and unimproved lots in existence before January 1, 2007? .....  Yes  No

6 Does this application include subdividing the property? .....  Yes  No

7 Has anyone from the Wastewater Management Division's Regional Office been to the property?.....  Yes  No

If Yes, enter the staff person's name and the date of the visit.

(a) Name of Staff Person  (b) Date of Visit

8 Will any construction occur within 50 feet of a wetland boundary, mapped or designated? .....  Yes  No

If Yes, contact the Wetlands Program of the Water Quality Division at (802) 241-3770.

9 Will more than one acre be disturbed during the entire course of construction, including all lots and phases? .....  Yes  No

If Yes, contact the Stormwater Program of the Water Quality Division at (802) 241-4320.

10 Will there be any stream crossings by roads, utilities, or other construction? .....  Yes  No

If Yes, contact the River Corridor Mgmt. Program of the Water Quality Division at:

Central & Northwest Vermont ..... (802) 879-5631  
 Southern Vermont ..... (802) 786-5906  
 Northeastern Vermont ..... (802) 751-0129

11 Is the project located in a special flood hazard area as designated on the flood insurance maps prepared for a municipality by the Federal Emergency Management Agency? .....  Yes  No

If Yes, show the special flood hazard area limits on the site plan.

12 Act 250: Has the Applicant (Landowner) subdivided any other lots of any size within a five mile radius of this subdivision, or within the environmental district within the last five years? .....  Yes  No

If Yes, enter the town(s) and the associated number of lots in the table below:

	(a) Town	(b) Number of Lots
X	<input type="text"/>	<input type="text"/>
	<input type="text"/>	<input type="text"/>

13 Is there any prior Act 250 jurisdiction on the tract of land?.....  Yes  No

If Yes, enter the Act 250 permit number:

(a) Act 250 Permit Number

**Section B - Project Deed Reference**

1 Please provide the Town, Book, and Page reference for the current landowner's deed(s) to this property in the table below:

	(a) Town	(b) Book	(c) Page(s)
X	Charlotte	84	418, 426, and 429

**Add Another Deed Reference**

**Section C - Project Plan Reference**

1 Please provide the following information for all water supply and wastewater disposal system plans being submitted.

	(a) Sheet#	(b) Title	(c) Plan Date	(d) Plan Revision Date
X	1	Site Plan	08-01-2008	
X	2	Site Plan	08-01-2008	
X	3	Site Plan	08-01-2008	
X	4	Site Plan	08-01-2008	
X	5	Force Main Profile	08-01-2008	
X	6	Force Main Profile	08-01-2008	
X	7	Force Main Profile	08-01-2008	
X	8	Details & Notes	08-01-2008	
X	9	Details & Notes	08-01-2008	

**Add Another Plan Reference**

**Section D - Existing Project Lot/Building Details**

Please provide the existing project details. This section is used to describe what is existing for the project. For example, if you are subdividing an undeveloped 2.1-acre parcel, you would list the existing parcel. If you are revising the boundary lines of two commercial lots in an industrial park, and constructing an addition to an existing building you would list the existing lot numbers, existing acres, existing buildings, existing uses, construction date(s), prior permits, and answer the compliance questions.

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot
1	3	9 offices and 1 bedroom apartment

4 Provide the following information for each building on the lot:

	(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with existing permits?
X	1812 Tavern	Mixed Use (Comm/Res)	1812	WW-4-0251, PB-4-0748	<input checked="" type="radio"/> Yes <input type="radio"/> No

**Add Another Building**

**Remove This Lot**

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot
2	1.26	1 bedroom apartment

4 Provide the following information for each building on the lot:

	(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with existing permits?
X	Barn Apartment	Residential	06-21-1990	WW-4-0251, PB-4-0748	<input checked="" type="radio"/> Yes <input type="radio"/> No

Add Another Building

Remove This Lot

1 Lot#	2 Lot Size (acres)	3 Existing Use of the Lot
3	24.5	Undeveloped

4 Provide the following information for each building on the lot:

	(a) Building ID	(b) Existing Use	(c) Date Construction of Building Substantially Complete	(d) Prior Permits	(e) In compliance with existing permits?
X	N/A	Undeveloped	N/A	None	<input type="radio"/> Yes <input type="radio"/> No

Add Another Building

Remove This Lot

Add Another Lot

**Section E - Proposed Project Lot/Building Details**

This section is used to describe what you are proposing to do in this project. For example, if you were going to create 4 lots for construction of single family residences, you would list each lot, proposed acreage, proposed buildings, and proposed use.

1 Lot#	2 Lot Size (acres)	3 Proposed Use of the Lot
1	5.1	Existing offices and apt., possible addition of apartment

4 Is the lot being created as part of a subdivision? .....  Yes  No

5 Are you requesting that the Blood, Marriage, or Civil Union special fee be applied to this lot? .....  Yes  No

6 If the lot is exempt, please indicate the specific exemption from the Wastewater System and Potable Water Supply Rules? .....

7 Provide the following information for each building on the lot:

	(a) Building ID	(b) If building is exempt, indicate exemption	(c) Construction or increased flow?	(d) Proposed Use
X	1812 Tavern		<input checked="" type="checkbox"/>	9 offices, 1 BR apt., possible addition of a 1 BR apartment

Add Another Building

Remove This Lot

1 Lot#	2 Lot Size (acres)	3 Proposed Use of the Lot
2	1.26	Existing 1 BR apt., possible addition of a 1 BR apartment

4 Is the lot being created as part of a subdivision? .....  Yes  No

5 Are you requesting that the Blood, Marriage, or Civil Union special fee be applied to this lot? .....  Yes  No

6 If the lot is exempt, please indicate the specific exemption from the Wastewater System and Potable Water Supply Rules? .....

7 Provide the following information for each building on the lot:

	(a) Building ID	(b) If building is exempt, indicate exemption	(c) Construction or increased flow?	(d) Proposed Use
X	Barn Apartment		<input checked="" type="checkbox"/>	1 BR apartment; possible addition of a 1 BR apartment

Add Another Building

<input type="button" value="Remove This Lot"/>		
1 Lot#	2 Lot Size (acres)	3 Proposed Use of the Lot
3	22.4	Mound systems for Lots 1, 2, and possible future subdivision
4 Is the lot being created as part of a subdivision? .....		<input type="radio"/> Yes <input checked="" type="radio"/> No
5 Are you requesting that the Blood, Marriage, or Civil Union special fee be applied to this lot? .....		<input type="radio"/> Yes <input checked="" type="radio"/> No
6 If the lot is exempt, please indicate the specific exemption from the Wastewater System and Potable Water Supply Rules? .....		<input style="width: 100%;" type="text"/>
7 Provide the following information for each building on the lot:		
(a) Building ID	(b) If building is exempt, indicate exemption	(c) Construction or increased flow?
X N/A	<input style="width: 100%;" type="text"/>	<input type="checkbox"/>
		(d) Proposed Use
		Mound systems for Lots 1, 2, and possible future subdivision
<input type="button" value="Add Another Building"/>		
<input type="button" value="Remove This Lot"/>		
<input type="button" value="Add Another Lot"/>		

<b>Part V</b>	<b>Water Supply Information</b>
<b>Section A - Water Supply Screening Questions</b>	
1 Are you proposing a new water supply for this project? .....	<input type="radio"/> Yes <input checked="" type="radio"/> No
2 Are you proposing changes to an existing water supply for this project? .....	<input type="radio"/> Yes <input checked="" type="radio"/> No
3 Is there a connection to an existing water supply for the project? .....	<input type="radio"/> Yes <input checked="" type="radio"/> No
<i>If you answered No to all three of the above questions, skip to Part VI. Otherwise, proceed with Part V.</i>	
<b>Section B - General Water Supply Questions</b>	
1 Does this project involve a failed water supply? .....	<input type="radio"/> Yes <input type="radio"/> No
2 Will any of the proposed water sources serve 25 or more people or have 15 or more service connections? .....	<input type="radio"/> Yes <input type="radio"/> No
<i>If Yes, the applicant must contact the Water Supply Division at (802) 241-3400 for source, construction and operating</i>	
3 Are any of the existing or proposed water sources located within a special flood hazard area? .....	<input type="radio"/> Yes <input type="radio"/> No
4 Are any of the existing or proposed water sources located within a floodway? .....	<input type="radio"/> Yes <input type="radio"/> No
5 Are any of the proposed water sources located within 1 mile of a hazardous waste site as designated by the Waste Management Division and identified on the Agency mapping website? .....	<input type="radio"/> Yes <input type="radio"/> No
<i>If Yes, please submit additional information on the site. The Waste Management Division can be reached at (802) 241-3888.</i>	
6 Does this project require an approval letter from the Water Supply Division for the construction of a public water system, municipal water line extension over 500 feet, or hydrants or sprinkler systems? .....	<input type="radio"/> Yes <input type="radio"/> No
<i>If Yes, please submit a copy of the approval letter from the Water Supply Division.</i>	
7 Does the proposed or existing water supply(ies) use a water treatment device to obtain compliance with the quality requirements in the Water Supply Rule? .....	<input type="radio"/> Yes <input type="radio"/> No
<i>If Yes, please submit additional information regarding the constituent(s) that exceeds the standards and plans, details, and specifications of the treatment device.</i>	
8 Is any portion of the proposed water supply located in or near a Water Source Protection Area as designated by the Water Supply Division? .....	<input type="radio"/> Yes <input type="radio"/> No
<i>If in areas of known interference issues, please contact the Water Supply Division at (802) 241-3400.</i>	
<b>Section C - Individual Water Supply Details</b>	
Please provide the following information for each of the existing and proposed water supply(ies) serving a building or structure, or campground on the property.	

1 Water Supply Name/Identifier <input style="width:95%;" type="text"/>	2 Water Supply Owner (if not Applicant) <input style="width:95%;" type="text"/>					
3 Water Source Type <input style="width:95%;" type="text"/>	4 Type of Change to Supply <input style="width:95%;" type="text"/>					
<b>5 Lots/Buildings Served by this Water Supply System</b>						
Design Flows (GPD per Day)						
(a) Lot#	(b) Building ID	(c) Type of Change to the Building's Supply	(d) Existing	(e) Increase	(f) Total	(g) Rule or Meter Based Flows
X <input style="width:50px;" type="text"/>	<input style="width:50px;" type="text"/>	<input style="width:100px;" type="text"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>	Rule-based
<b>Add Another Lot/Building Served by this Supply</b>			6	7	8	
			<input style="width:50px; text-align: right;" type="text" value="0"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>	
9 Is this water supply located off-lot? ..... <input type="radio"/> Yes <input type="radio"/> No						
10 Is this water supply shared? ..... <input type="radio"/> Yes <input type="radio"/> No						
<i>If the water supply is located off-lot or shared, submit a copy of the agreement to provide an easement prior to construction.</i>						
11 Is a variance being requested for this water supply? ..... <input type="radio"/> Yes <input type="radio"/> No						
<i>If Yes, please submit additional details related to the variance request.</i>						
<input type="button" value="Remove This Water Supply"/>						
<b>Add Another Water Supply</b>						

**Section D - Water Supply Design Flows Summary Table**

1 If the project includes more than one water supply, please list each water supply system and provide the total water supply design flows for the project. **IMPORTANT:** Please don't include systems that were identified in this Part on Section C, Line 4 as a "Replacement Area Designation" in this summary table.

		Design Flows (GPD per Day)		
(a) Water Supply Name/Identifier	(b) Existing	(c) Increase	(d) Total	
X <input style="width:500px;" type="text"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>	
<b>Add Another Water Supply</b>		2	3	4
		<input style="width:50px; text-align: right;" type="text" value="0"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>	<input style="width:50px; text-align: right;" type="text" value="0"/>

**Part VI Wastewater Disposal System Information**

**Section A - Wastewater Disposal System Screening Questions**

1 Are you proposing a new wastewater disposal system or replacement area for this project? .....  Yes  No

2 Are you proposing changes to an existing wastewater disposal system for this project? .....  Yes  No

3 Is there a connection to an existing wastewater disposal system for the project? .....  Yes  No

*If you answered No to all three of the above questions, skip to Part VII. Otherwise, proceed with Part VI.*

**Section B - General Wastewater Disposal System Questions**

1 Does this project involve a failed wastewater disposal system? .....  Yes  No

2 Do any of the systems require a curtain or dewatering drain as part of the design? .....  Yes  No

3 Is a hydrogeologic study required for this project? .....  Yes  No

4 If the project has a soil-based wastewater disposal system with design flows that exceed 1,000 GPD, is this project located in a Class A Watershed?.....  Yes  No  NA

If Yes, indicate the Class A Watershed in which the system(s) is located:

(a) Class A Watershed Name

5 Are there any existing or proposed floor drains as part of this project?.....  Yes  No

If Yes, indicate where the floor drains will discharge:  
 (a) Floor Drain Discharge Point

6 If the project utilizes an Innovative/Alternative System or Product, has the applicant received a copy of the Wastewater Management Division's approval letter? .....  Yes  No  NA

7 Is any portion of the proposed wastewater disposal system located in or near a Water Source Protection Area as designated by the Water Supply Division? .....  Yes  No

If Yes, contact the Water Supply Division at (802) 241-3400.

**Section C - Individual Wastewater Disposal System Details**

Please provide the following information for each of the existing and proposed wastewater disposal systems serving a building or structure, or campground on the property.

1 Wastewater Disposal System Name/Identifier Existing Mound on Lot 1	2 Wastewater Disposal System Owner (if not Applicant) Applicant
3 Wastewater Disposal System Type Mound	4 Type of Change to System No Change

5 Lots/Buildings Served by this Wastewater Disposal System

	Disposal Capacity (Gallons per Day)							(h) Rule or Meter Based Flows
	(a) Lot#	(b) Building ID	(c) Type of Change to the Building's System	(d) Existing	(e) Increase	(f) Infiltration	(g) Total	
X	1	1812 Tavern	No Change	270	0	0	270	Rule-based
X	2	Barn Apartment	No Change	150	0	0	150	Rule-based
<b>Add Another Lot/Building Served by this System</b>				6	7	8	9	
				420	0	0	420	

10 Is this wastewater disposal system located off-lot? .....  Yes  No

11 Is this wastewater disposal system shared? .....  Yes  No

If the wastewater disposal system is located off-lot or shared, submit a copy of the agreement to provide an easement prior to initiation of construction.

12 Is a variance being requested for this wastewater disposal system? .....  Yes  No

If Yes, please submit additional details related to the variance request.

13 If this wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number.  
 Indirect Discharge System ID Number

14 If this wastewater disposal system type is a connection to a municipal system, please select the town.  
 Town

15 If this wastewater disposal system is a soil-based system, please select the design approach used.  
 Design Approach Used

16 For soil-based systems, please check all that apply.  
 Storage and Dose  Filtrate

17 If this is an Innovative/Alternative soil-based system, please select the system use type.

Innovative/Alternative System Use Type

18 If this is an Innovative/Alternative soil-based system, please select the Innovative/Alternative system or product.

Innovative/Alternative System or Product

Remove This Wastewater System

1 Wastewater Disposal System Name/Identifier

2 Wastewater Disposal System Owner (if not Applicant)

3 Wastewater Disposal System Type

4 Type of Change to System

5 Lots/Buildings Served by this Wastewater Disposal System

	Flow Capacity (Gallons per Day)							(h) Rule or Meter Based Flows
	(a) Lot#	(b) Building ID	(c) Type of Change to the Building's System	(d) Existing	(e) Increase	(f) Infiltration	(g) Total	
X	1	1812 Tavern	Connection to New System	0	140	0	140	Rule-based
X	2	Barn Apartment	Connection to New System	0	140	0	140	Rule-based
X	3	Future SFH(s)	Connection to New System	0	840	0	840	Rule-based
Add/Another Lot/Building Served by this System				6	7	8	9	
				0	1,120	0	1,120	

10 Is this wastewater disposal system located off-lot? .....  Yes  No

11 Is this wastewater disposal system shared? .....  Yes  No

*If the wastewater disposal system is located off-lot or shared, submit a copy of the agreement to provide an easement prior LAND IS SUBDIVIDED AT A LATER DATE.*

12 Is a variance being requested for this wastewater disposal system? .....  Yes  No

*If Yes, please submit additional details related to the variance request.*

13 If this wastewater disposal system type is a connection to an Indirect Discharge System, please provide the Indirect Discharge System ID number.

Indirect Discharge System ID Number

14 If this wastewater disposal system type is a connection to a municipal system, please select the town.

Town

15 If this wastewater disposal system is a soil-based system, please select the design approach used.

Design Approach Used

16 For soil-based systems, please check all that apply.

Storage and Dose  Filtrate

17 If this is an Innovative/Alternative soil-based system, please select the system use type.

Innovative/Alternative System Use Type

18 If this is an Innovative/Alternative soil-based system, please select the Innovative/Alternative system or product.

Innovative/Alternative System or Product

**Section D - Wastewater Disposal Systems Design Flows Summary Table**

1 If the project includes more than one wastewater disposal system, please list each system on this page and provide the total wastewater disposal design flows for the project. **IMPORTANT:** Please don't include systems that were identified in this Part on Section C, Line 4 as a "Replacement Area Designation" in this summary table.

		Design Flows (Gallons Per Day)			
(a) Wastewater Disposal System Name/Identifier		(b) Existing	(c) Increase	(d) Infiltration	(e) Total
X	Existing Mound on Lot 1	420	0	0	420
X	Proposed Mounds on Lot 3	0	1,120	0	1,120
<input type="button" value="Add Another Wastewater System"/>		2	3	4	5
		420	1,120	0	1,540

**Part VII Application Fees**

1 Fee Amount

2 Fee Calculation Details

Two proposed future single family homes x \$500 per unit = \$1,000

**Part VIII Designer Certification & Copyright License**

**Section A - Certifying Designer 1 Certification & Copyright License**

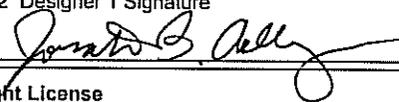
"I hereby certify that in the exercise of my reasonable professional judgment, the design-related information submitted with this application is true and correct, and that the design included in this application for a permit complies with the Vermont Wastewater System and Potable Water Supply Rules and the Vermont Water Supply Rules.

As the individual who prepared this application, including all documents that are marked as copyrighted, I hereby grant a non-exclusive, limited license to the State to allow the documents to be made available for public review and copying in order to properly implement and operate the permitting programs for Wastewater Systems and Potable Water Supplies, and for no other purposes. As a condition to this license, the State agrees that it will not make any changes to such documents, nor will the State delete any copyright notices on such documents."

1 Check the design(s) you are certifying. This should be the same as the Designer Role(s) you selected in Part II, Section A, Line 13.

Water Supply Designer

Wastewater Disposal System Designer

1 Designer 1 Name	2 Designer 1 Signature	3 Signature Date
Jonathan B. Ashley		8/1/08

**Section B - Certifying Designer 2 Certification & Copyright License**

"I hereby certify that in the exercise of my reasonable professional judgment, the design-related information submitted with this application is true and correct, and that the design included in this application for a permit complies with the Vermont Wastewater System and Potable Water Supply Rules and the Vermont Water Supply Rules.

As the individual who prepared this application, including all documents that are marked as copyrighted, I hereby grant a non-exclusive, limited license to the State to allow the documents to be made available for public review and copying in order to properly implement and operate the permitting programs for Wastewater Systems and Potable Water Supplies, and for no other purposes. As a condition to this license, the State agrees that it will not make any changes to such documents, nor will the State delete any copyright notices on such documents."

1 Check the design(s) you are certifying. This should be the same as the Designer Role(s) you selected in Part II, Section B, Line 13.

Water Supply Designer

Wastewater Disposal System Designer

1 Designer 2 Name	2 Designer 2 Signature	3 Signature Date
N/A		

**Part IX Applicant(s) Signature & Acknowledgements**

*In order to insure compliance with the requirements of the regulations administered by the Department of Environmental Conservation, Wastewater Management Division, it may be necessary to visit the property. As this would involve a Department employee entering private property, we request your approval to do so.*

1 If we do visit your property, do you have any special instructions?

None.

*"As landowner of the property for which I am requesting a permit from the Department of Environmental Conservation, I understand that by signing this application I am granting permission for the Department employees to enter the property, during normal working hours, to insure compliance of the property with the applicable rules of the Department.*

*I also understand that I am not allowed to commence any site work or construction on this project without written approval from the Department of Environmental Conservation.*

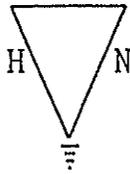
*If my project utilizes an Innovative/Alternative System or Product, I have received a copy of the Wastewater Management Division's approval letter and agree to abide by the conditions of the approval.*

*I also certify that to the best of my knowledge and belief the information submitted above is true, accurate and complete."*

<b>X</b>	2 Print Applicant Name Harriet S. Patrick <i>Harriet S. Patrick</i>	3 Applicant Signature <i>Harriet S. Patrick</i>	4 Signature Date <i>7.25.08</i>
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**Add Applicant Signature Block**

**TEST PIT LOGS AND  
HYDROGEOLOGIC EVALUATION**



**Heindel & Noyes, Inc.**

P.O. Box 4503 Burlington, VT 05406-4503

- Consulting Hydrogeologists
- Engineers
- Environmental Scientists

Voice 802-658-0820/Fax 802-860-1014

**TEST PIT LOGS: West Wastewater Disposal Site  
PATRICK PROPERTY  
Church Hill Road, Charlotte**

These logs are for three series of test pits: The 05-series excavated by backhoe (Scott Barnes) on Oct. 5, 2005; the 08-series excavated by backhoe (Scott Barnes) on Oct. 19, 2007; and AH-07-01 excavated by hand-auger on Nov. 5, 2007 (Jonathan Ashley, Phelps Engg.). Soils were logged by C. Heindel (H&N). Also present: J. Ashley, PE (Phelps Engg.); R. Patrick for first several test pits in the 05-series; S. Harris on Nov. 5, 2007 after AH-07-01 was completed. In October 2005, test pits were also conducted at other locations not at the west wastewater disposal site, including in areas closer to the Tavern which did not indicate usable soils, so those logs are not included here.

SHWT = Seasonal high water table  
 NGWTD = No groundwater to depth  
 NBRTD = No bedrock to depth  
 RMF = Redoximorphic features.

**05-SERIES: 5-Oct-2005**

**TP-05-13  
(center of west WW area)**

0 - 6"	Woods duff (v. thin), loose light brown sandy loam A-horizon;
6" - 11"	Loose red-tan sandy loam B-horizon;
11" - 19"	Tan loose-to-friable sandy loam, no mottles;
19" - 28"	Tan firm sandy loam, mottled;
28"	Bedrock (gray shale).
	<b>SHWT at 19".</b>
	NGWTD.

**TP-05-14  
(further south, at top of south bank, off Phelps map)**

0 - 15"	Woods duff (v. thin), dense tan silty fine sand (till), mottled at 9";
15"	Bedrock.
	<b>SHWT at 9".</b>
	NGWTD.

**TEST PIT LOGS: West Wastewater Disposal Site  
PATRICK PROPERTY  
Church Hill Road, Charlotte**

**TP-05-15  
(between 13 and 14)**

0 - 6"  
6" - 9"  
9" - 16"  
16" - (24")(34")  
(24")(34")

Woods duff (v. thin), loose light brown sandy loam A-horizon;  
Loose red-tan sandy loam B-horizon;  
Tan friable sandy loam, no mottles;  
Variable thickness of tan firm fine sandy loam (till), mottled throughout;  
Variable depth to bedrock (gray shale).  
**SHWT at 16".**  
NGWTD.

**TP-05-16  
(northeast of 13)**

0 - 5"  
5" - 8"  
8" - 12"  
12" - 20"  
20"

Woods duff (v. thin), loose light brown sandy loam A-horizon;  
Loose red-tan sandy loam B-horizon;  
Tan friable sandy loam, no mottles;  
Variable thickness of tan dense platy fine sandy loam (till), mottled throughout;  
Bedrock (gray shale).  
**SHWT at 12".**  
NGWTD.

**TP-05-17  
(northeast of 16)**

0 - 8"  
8" - 11"  
11" - 25"  
25" - 32"  
32"

Woods duff (v. thin), loose light brown sandy loam A-horizon;  
Loose red-tan sandy loam B-horizon;  
Tan friable sandy loam, mottled at 20";  
Gray dense platy silty fine sand (till), mottled throughout;  
Bedrock (gray shale).  
**SHWT at 20".**  
NGWTD.

**TP-05-18  
(north of 17)**

0 - 7"  
7" - 12"  
12" - 46"

Woods duff (v. thin), loose light brown sandy loam A-horizon;  
Loose red-tan sandy loam B-horizon;  
Tan-gray dense platy silty fine sand (till), mottled throughout;  
**SHWT at 12".**  
NGWTD, NBRTD.

**TEST PIT LOGS: West Wastewater Disposal Site  
PATRICK PROPERTY  
Church Hill Road, Charlotte**

**TP-05-19  
(north of 18)**

0 - 8"  
8"

Woods duff (v. thin), dense tan silty fine sand (till);  
Bedrock.  
NGWTD.

**TP-05-20  
(south of 19)**

0 - 5"  
5" - 12"(20")  
12"(20")

Woods duff (v. thin), silt loam A-horizon;  
Variable thickness of gray dense platy silty fine sand (till), mottled throughout;  
Variable depth to bedrock.  
**SHWT at 5".**  
NGWTD.

**TP-05-21  
(south of 20, west of 16 & 17)**

0 - 10"  
10"

Woods duff (v. thin), dense tan silty fine sand (till);  
Bedrock.  
NGWTD.

**TP-05-22  
(south of 21, west of 13 & 16)**

0 - 8"  
8"

Woods duff (v. thin), dense tan silty fine sand (till);  
Bedrock.  
NGWTD.

(end of 05-series pertinent to West WW Site).

**08-SERIES: 19-Oct-2007**

**TP-08-01  
(southwest end)**

0 - 15"  
15" - 29"  
29" - 38"

Woods duff, and dark brown loose sandy loam A-horizon, mottled at 12";  
Dark brown friable blocky silt loam B-horizon, mottled throughout;  
Dense tan silt-clay and stones, mottled throughout.  
**SHWT at 12".**  
NGWTD, NBRTD.

**TEST PIT LOGS: West Wastewater Disposal Site  
PATRICK PROPERTY  
Church Hill Road, Charlotte**

**TP-08-02  
(southeast end)**

0 - 7"  
7" - 16"  
16" - 22"  
22" - 35"

Woods duff, and dark brown loose sandy loam A-horizon, no mottles or RMFs;  
Dark brown friable blocky silt loam B-horizon, mottled at 13";  
Dense gray silty loam, mottled throughout;  
Dense gray silt-clay, mottled.  
**SHWT at 13".**  
NGWTD, NBRTD.

**TP-08-03  
(along upper east edge)**

0 - 14"  
14" - 34"

Woods duff, and dark brown blocky silt loam A-horizon, mottled at 12";  
Dense gray silt-clay, mottled.  
**SHWT at 12".**  
NGWTD, NBRTD.

**TP-08-04  
(along upper east edge, N of 08-03)**

0 - 14"  
14" - 28"  
28" - 32"  
32" - 36"

Woods duff, and dark brown blocky silt loam A-horizon, mottled at 12";  
Firm red-tan silt loam, mottled;  
Diggable shale.  
Harder shale.  
**SHWT at 12".**  
NGWTD.

**TP-08-05  
(W of 08-04)**

0 - 8"  
8" - 14"  
14"

Woods duff, and dark brown blocky silt loam A-horizon;  
Firm red-tan silt loam, mottled at 11";  
Bedrock (shale).  
**SHWT at 11".**  
NGWTD.

**TEST PIT LOGS: West Wastewater Disposal Site  
PATRICK PROPERTY  
Church Hill Road, Charlotte**

**TP-08-06  
(along upper east edge, N of 08-04)**

0 - 8"  
8" - 19"  
19" - 28"  
28"

Loose dark brown sandy loam A-horizon;  
Loose to friable red-tan sandy loam and stones, mottled at 15";  
Firm light gray silt loam, mottled throughout;  
Bedrock. (east edge of pit = very shallow to bedrock; this pit's location identifies the eastern edge of bedrock deeper than 24").  
**SHWT at 15".**  
NGWTD.

**TP-08-07  
(along upper east edge, N of 08-06)**

0 - 9"  
9" - 20"  
20" - 32"  
32" - 38"

Loose dark brown sandy loam A-horizon;  
Loose to friable red-tan sandy loam B-horizon and stones, no mottles;  
Loose to friable gray sandy loam with many pebbles, mottled at 29";  
Loose gray medium sand, no mottles.  
**SHWT at 29".**  
NGWTD, NBRTD.

**TP-08-08  
(west of 05-17)**

0 - 14"  
14"

Woods duff, and dark brown sandy loam A-horizon;  
Bedrock (shale).  
  
NGWTD.

**TP-08-09  
(S of HA-07-01)**

0 - 10"  
10" - 28"  
28" - 40"

Loose dark brown sandy loam A-horizon;  
Loose to friable red-tan sandy loam B-horizon and stones, mottles at 25";  
Firm gray silt loam, mottled.  
**SHWT at 25".**  
NGWTD, NBRTD.

**TEST PIT LOGS: West Wastewater Disposal Site  
PATRICK PROPERTY  
Church Hill Road, Charlotte**

**TP-08-10  
(S of 08-05)**

0 - 8"  
8" - 20"  
20" - 30"  
30"

Loose dark brown sandy loam A-horizon;  
Loose to friable red-tan sandy loam B-horizon and stones, mottles at 17";  
Firm gray silt loam, mottled.  
Bedrock.  
**SHWT at 17".**  
NGWTD.

**TP-08-11  
(W of 05-11)**

0 - 8"  
8" - 22"  
28" - 38"

Loose dark brown sandy loam A-horizon;  
Loose to friable red-tan sandy loam B-horizon and stones, mottles at 18";  
Firm gray silt loam, mottled.  
**SHWT at 18".**  
NGWTD, NBRTD.

(end of 08-series).

**AH-07-01: Hand-auger hole on 5-Nov-2007  
(in middle of WW disposal area)**

0 - 8"  
8" - 26"  
26" - 28"

Woods duff (v. thin), loose sandy loam A-horizon;  
loose dark brown sandy loam B-horizon;  
Friable red-tan sandy loam with pebbles; few large stones;  
Mottled at 20";  
Friable light red-tan looser, sandier loam, drier than above, mottled.  
**SHWT at 20".**  
NBRTD, NGWTD.

**SUMMARY OF LIMITING CONDITIONS:**  
**Patrick Property, Old Route 7, Charlotte**  
**West Disposal Site**

Location	Depths Below Ground Surface To:										Limiting Condition	
	Seasonal High Water Table			Impeding Soils			Bedrock	Ground Water	Depth, ft.	Type	Notes	
	Monit., w/ Stats ?	Mottles or Staining ?	Depth, ft.	Type	Depth, ft.	Depth, ft.	Depth, ft.					
TP-05-13	no	yes	1.6	firm sandy loam	1.6	2.3	> 2.3	SHWT, I	1.6	mottles, impeding		
TP-05-14	no	yes	0.8	bedrock	1.3	1.3	> 1.3	SHWT	0.8	mottles		
TP-05-15	no	yes	1.3	firm fine sandy loam	1.3	2.0	> 2.8	SHWT	1.3	mottles		
TP-05-16	no	yes	1.0	dense fine sandy loam	1.0	1.8	> 1.8	SHWT, I	1.0	mottles, impeding		
TP-05-17	no	yes	1.7	dense silty fine sand	2.1	2.7	> 2.7	SHWT	1.7	mottles		
TP-05-18	no	yes	1.0	dense silty fine sand	1.0	> 4.6	> 3.8	SHWT, I	1.0	mottles, impeding		
TP-05-19	no	assume Y	NR	dense silty fine sand	NR	0.7	> 0.7	BR	0.7	bedrock		
TP-05-20	no	yes	0.4	dense silty fine sand	0.4	1.0	> 1.7	SHWT, I	0.4	mottles, impeding		
TP-05-21	no	assume Y	NR	dense silty fine sand	NR	0.8	> 0.8	BR	0.8	bedrock		
TP-05-22	no	assume Y	NR	dense silty fine sand	NR	0.7	> 0.7	BR	0.7	bedrock		
TP-08-01	no	yes	1.0	dense silt-clay	2.4	> 3.2	> 3.2	SHWT	1.0	mottles		
TP-08-02	no	yes	1.1	dense silty loam	1.3	> 2.9	> 2.9	SHWT	1.1	mottles		
TP-08-03	no	yes	1.0	dense silt-clay	1.2	> 2.8	> 2.8	SHWT	1.0	mottles		
TP-08-04	no	yes	1.0	firm silt loam	1.2	2.3	> 2.3	SHWT	1.0	mottles		
TP-08-05	no	yes	0.9	firm silt loam	0.7	1.2	> 1.2	I	0.7	impeding soils		
TP-08-06	no	yes	1.3	firm silt loam	1.6	2.3	> 2.3	SHWT	1.3	mottles		
TP-08-07	no	yes	2.4	none	> 3.2	> 3.2	> 3.2	SHWT	2.4	mottles		
TP-08-08	no	assume Y	NR	bedrock	1.2	1.2	> 1.2	BR	1.2	bedrock		
TP-08-09	no	yes	2.1	firm silt loam	2.3	> 3.3	> 3.3	SHWT	2.1	mottles		
TP-08-10	no	yes	1.4	firm silt loam	1.7	2.5	> 2.5	SHWT	1.4	mottles		
TP-08-11	no	yes	1.5	firm silt loam	2.3	> 3.2	> 3.2	SHWT	1.5	mottles		
AH-07-01	no	yes	1.7	none	> 2.3	> 2.3	> 2.3	SHWT	1.7	mottles		

**Data Sources:**

Limiting Conditions, depths are interpreted by C. Heindel (H&N) from H&N test pit logs.

**Abbreviations:**

> = Not encountered to depth shown.

BR = Bedrock.

I = Impeding Soils.

NR = Not Recorded in test pit logs.

SHWT = Seasonal High Water Table indications.

**Summary of Transmitting Soils: West Disposal Area  
Patrick Property, Old Route 7, Charlotte**

Location	Limiting Condition		TRANSMITTING SOILS above Limiting Condition:				
	Depth, ft.	Type	Soil Description from Test Pit Logs:	[1A] Table 1 Categ. #	Assumed Soil Structure [1A]		Assumed K-value, [1B] ft/day
					Shape	Grade	
TP-05-13	1.6	SHWT, I	loose to friable sandy loam	2	GR	2, 3	50
TP-05-14	0.8	SHWT	dense silty fine sand	3	PL / BK	M, 1	10
TP-05-15	1.3	SHWT	loose to friable sandy loam	2	GR	2, 3	50
TP-05-16	1.0	SHWT, I	friable sandy loam	2	GR	2, 3	50
TP-05-17	1.7	SHWT	friable sandy loam	2	GR	2, 3	50
TP-05-18	1.0	SHWT, I	loose sandy loam	2	GR	2, 3	50
TP-05-19	0.7	BR	dense silty fine sand	3	PL / BK	M, 1	10
TP-05-20	0.4	SHWT, I	dense silty fine sand	3	PL / BK	M, 1	10
TP-05-21	0.8	BR	dense silty fine sand	3	PL / BK	M, 1	10
TP-05-22	0.7	BR	dense silty fine sand	3	PL / BK	M, 1	10
TP-08-01	1.0	SHWT	loose sandy loam	2	GR	2, 3	50
TP-08-02	1.1	SHWT	loose sandy loam	2	GR	2, 3	50
TP-08-03	1.0	SHWT	blocky silt loam	5	BK	2, 3	20
TP-08-04	1.0	SHWT	blocky silt loam	5	BK	2, 3	20
TP-08-05	0.7	I	silt loam	5	M	--	10
TP-08-06	1.3	SHWT	loose to friable sandy loam	2	GR	2, 3	50
TP-08-07	2.4	SHWT	loose to friable sandy loam	2	GR	2, 3	50
TP-08-08	1.2	BR	sandy loam	2	GR	2, 3	50
TP-08-09	2.1	SHWT	loose to friable sandy loam	2	GR	2, 3	50
TP-08-10	1.4	SHWT	loose to friable sandy loam	2	GR	2, 3	50
TP-08-11	1.5	SHWT	loose to friable sandy loam	2	GR	2, 3	50
AH-07-01	1.7	SHWT	friable sandy loam	2	GR	2, 3	50

**Notes:**

1. "Table 1" refers to *Hydraulic Loading Method for Detailed Soil Descriptions in Vermont, 2003*.

1A. Soil textures and assumed soil structures are selected by C. Heindel, H&N, by referring to test pit logs.

Soil Structure Grades: 0 = structureless; SG = single grain; M = massive; 1 = weak; 2 = moderate; 3 = strong.

Soil Structure Shapes: see abbreviations below.

1B. Assumed K-values (saturated hydraulic conductivity) are from Table 1.

**Abbreviations:**

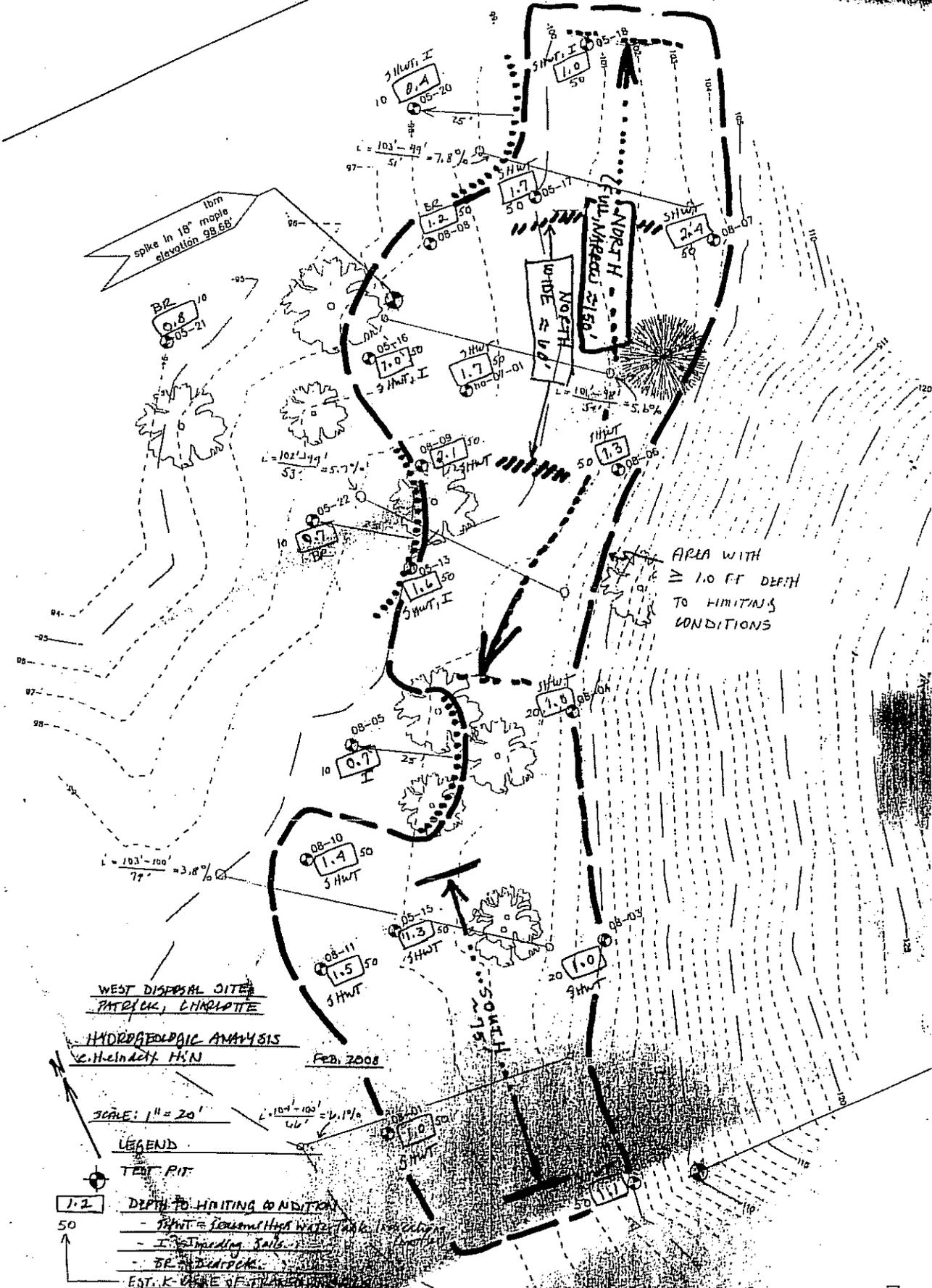
SHWT = Seasonal High Water Table

BK/GR (Soil Structure Shape) = Blocky or Granular.

PL (Soil Structure Shape) = Platy.

PR (Soil Structure Shape) = Prismatic.

GR (Soil Structure Shape) = Granular.



10m spike in 18" maple elevation 99.55

AREA WITH  $\geq 1.0$  FT DEPTH TO LIMITING CONDITIONS

WEST DISPOSAL SITE  
PATRICK, CHARLOTTE  
HYDROGEOLOGIC ANALYSIS  
C. HELMICK HEN  
FEB, 2008

SCALE: 1" = 20'

- LEGEND
- TEST PIT
  - 1.2 DEPTH TO LIMITING CONDITION
  - 50 - SHWT = Seasonal High Water Table (Indicated by Dotted Line)
  - I = Infiltration Tails
  - BR = BENTONITE
  - EST. K-URGE OF FLY LANE

HYDROGEOLOGIC SKETCH MAP  
PAT

BASE TOPO. TP LOCATION

# **BASIS OF DESIGN CALCULATIONS**

*Phelps Engineering Inc.*

**WASTEWATER DISPOSAL SYSTEM BASIS OF DESIGN  
NORTHERN MOUND SYSTEM  
EFFLUENT ONLY, NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
 Site: 1355 Church Hill Road, Charlotte, Vermont  
 Date: 8/1/2008  
 Preparer: JBA  
 File: 89049 Technical

**I. SOIL EVALUATION RESULTS AND SELECTION OF SYSTEM TYPE****NORTHERN MOUND SITE SOIL EVALUATION**

Based on soil evaluation results, the depth to limiting  
 conditions = 12 inches

Based on these soil conditions, the location is suitable for a performance-based mound.

**B. DETERMINE LINEAR LOADING RATE**

Soil texture = friable sandy loam  
 Ground slope = 5.6%  
 k = 50 feet per day  
 h = 0.50 feet  
 A = 60 feet long x h = 30 square feet  
 LLR = 10.5 gpd/lf  
 Q = 628 gallons per day

**I. MOUND DESIGN****1. PROPOSED WASTEWATER FLOW TO BOTH MOUNDS (Q)**

Apartment	1	bedroom @	140	gpd/bedroom =	140	gpd
Apartment	1	bedroom @	140	gpd/bedroom =	140	gpd
SFH	3	bedrooms @	140	gpd/employee =	420	gpd
SFH	3	bedrooms @	140	gpd/employee =	420	gpd
				Total =	1,120	gpd

**1A. PROPOSED DISPOSAL CAPACITY (BOTH MOUNDS)**

Northern Mound =	628	gpd
Southern Mound =	504	gpd
TOTAL =	1,132	gpd

Proposed Disposal Capacity > Q; therefore acceptable

**2. PERCOLATION RATE (P)**

friable sandy foam <60 min./inch  
 Design percolation rate = <60 min./inch

**3. APPLICATION RATE (Ra and Rb)**

Ra = Application rate for sizing leachfield area (A)  
 Ra maximum = 1.0 gpd/sf for Mounds  
 Ra = 3/(square root P) for Inground Systems  
 Selected Ra = 1.0 gpd/sf

Rb = Application rate for sizing basal area (BA)  
 Rb = 0.74 gpd/sf for P < 60 min./inch  
 Rb = 0.24 gpd/sf for 60 min./inch < P < 120 min./inch  
 Selected Rb = 0.74 gpd/sf

**4. LEACHFIELD AREA REQUIRED (AR)**

AR = Q / Ra / No. of Mounds  
 AR = 628 ÷ 1.0  
 AR = 628 sf

**5. LEACHFIELD AREA PROPOSED (A)**

LENGTH REQUIRED = Q/LLR  
 Q = 628 gpd  
 LLR = 10.5 gpd/lf  
 min. L = 60.0 ft

*Phelps Engineering Inc.*

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A = LENGTH (L) x WIDTH (W) x NUMBER OF TRENCHES/BEDS (N)

L =	63	ft
W =	10	ft
N =	1	bed

A = 630 sf

A > AR therefore A is acceptable

**6. BASAL AREA REQUIRED (BR)**

BR = Q / R<sub>b</sub>

BR =	628	+	0.74
BR =	849	sf	

**7. BASAL AREA PROPOSED (BA)**

BA = L x Distance from uphill side of trench to downhill toe of mound (DT)

L =	63	ft
DT =	26	ft

BA = 1,638 sf

BA > BR therefore BR is acceptable

**II. PRESSURE DISTRIBUTION DESIGN**

**1. REQUIRED DATA SUMMARY**

Bed Length (L1) =	63	ft
Bed Width (W) =	10	ft
Number of Laterals & Headers =	2 Laterals	2 Headers
Total Leachfield Area =	630	sf
Minimum Hole Diameter =	0.25	in
Minimum Hole Area (HA) =	0.00034	sf
Desired Leach Area per Hole =	25	sf (Maximum = 25 sf)
Minimum Hole Outlet Pressure =	1	psi = 2.31 ft of head
Leach Trench Lateral Invert =	104.5	ft
Desired Hole Outlet Pressure (Hh) =	2	psi = 4.62 ft of head

**2. TOTAL NUMBER OF HOLES REQUIRED**

HR1 = (A1 / LA1)

HR1 =	630	+	25
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HR1 =	25.2	holes
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Use HR1 =	26	holes
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**3. ACTUAL LEACH AREA PER HOLE**

AL1 = A1 / HR1

AL1 =	24.2	sf
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**4. NUMBER OF HOLES PER LATERAL**

NH1 = HR1 / NL1

NH1 =	13.0
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**5. HOLE SPACING REQUIRED**

HS1 = L1 / HR1 \* number of headers

HS1 =	4.65	ft o.c.
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**6. DISTANCE FROM END OF LATERAL TO END OF BED**

DE1 = HS1 / 2

DE1 =	2.42	ft
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**7. LATERAL LENGTH**

LL1 = (L1/N1) - DE1

LL1 =	60.58	ft
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*Phelps Engineering Inc.*

**WASTEWATER DISPOSAL SYSTEM BASIS OF DESIGN  
NORTHERN MOUND SYSTEM  
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**8. FLOW RATE PER HOLE (QH) (Recommended range = 2 to 5 gpm)**

$QH = C_d \times V \times HA$

$C_d = \text{Coeff.} = 0.6$   
 $V = \text{sq. root}(2 \times g \times Hh) = \text{sq. root}(2 \times 32 \times 4.62) = 17.25 \text{ ft/s}$   
 $QH = 0.6 \times 17.25 \times 0.00034 = 0.0035 \text{ cfs} = 1.58 \text{ gpm per hole}$

**9. SIZE LATERALS TO GIVE MAX. VARIATION OF 10% IN DISCHARGE BETWEEN ANY TWO HOLES**

	Lateral Dia. (minimum 1 inch) =	1.6	in	Total Volume in Lateral				
	Length of Lateral =	60.58	ft	6.3	Gal.			
	Hazen Williams C Factor =	130						
	Length (ft)	Flow (gpm)	Headloss across length (ft)	Sum of Headloss (ft)	Available Head (ft)	Velocity (ft/s)	Hole Flow (gpm)	Variation In Flow (%)
1	2.25	10.93	0.02	0.02	4.60	17.15	1.57	0.0%
2	4.85	9.36	0.04	0.06	4.56	17.08	1.57	0.4%
3	4.85	7.79	0.03	0.09	4.53	17.02	1.56	0.7%
4	4.85	6.23	0.02	0.11	4.51	16.99	1.56	0.9%
5	4.85	4.67	0.01	0.12	4.50	16.97	1.56	1.1%
6	4.85	3.11	0.01	0.13	4.49	16.96	1.56	1.1%
7	4.85	1.55	0.00	0.13	4.49	16.96	1.56	1.1%
	<u>31.33</u>	Total Lateral HL=	<u>0.13</u>				<u>10.93</u>	

All % Variations in flow are < 10%, therefore selected lateral diameter is sufficient

**III. CALCULATE DOSE SIZE**

Total flow for pressure distribution system = Flow to each lateral (based on orifice flow) x no. of laterals x no. of headers = 41 gpm

Total volume of disposal piping = 25.3 gallons

Minimum dose (at least 5x the volume of the disposal piping) = 126.6 gallons

Minimum doses per day per mound = 2

Maximum dose = 2 doses per day at average flow = 314 gallons

*Phelps Engineering Inc.*

**WASTEWATER DISPOSAL SYSTEM BASIS OF DESIGN  
SOUTHERN MOUND SYSTEM  
EFFLUENT ONLY, NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
 Site: 1355 Church Hill Road, Charlotte, Vermont  
 Date: 8/1/2008  
 Preparer: JBA  
 File: 89049 Technical

**I. SOIL EVALUATION RESULTS AND SELECTION OF SYSTEM TYPE****SOUTHERN MOUND SITE SOIL EVALUATION**

Based on soil evaluation results, the depth to limiting  
 conditions = 12 inches

Based on these soil conditions, the location is suitable for a performance-based mound.

**B. DETERMINE LINEAR LOADING RATE**

Soil texture = friable sandy loam  
 Ground slope = 3.8%  
 k = 50 feet per day  
 h = 0.50 feet  
 A = 72 feet long x h = 36 square feet  
 LLR = 7.1 gpd/lf  
 Q = 512 gallons per day

**I. MOUND DESIGN****1. PROPOSED WASTEWATER FLOW TO BOTH MOUNDS (Q)**

See NORTHERN MOUND design =

Total =	1,120	gpd
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**1A. PROPOSED DISPOSAL CAPACITY (BOTH MOUNDS)**

Northern Mound =	628	gpd
Southern Mound =	504	gpd
<b>TOTAL =</b>	<b>1,132</b>	<b>gpd</b>

Proposed Disposal Capacity > Q; therefore acceptable

**2. PERCOLATION RATE (P)**

friable sandy loam <60 min./inch  
 Design percolation rate = <60 min./inch

**3. APPLICATION RATE (Ra and Rb)**

Ra = Application rate for sizing leachfield area (A)  
 Ra maximum = 1.0 gpd/sf for Mounds  
 Ra = 3/(square root P) for Inground Systems  
 Selected Ra = 1.0 gpd/sf

Rb = Application rate for sizing basal area (BA)  
 Rb = 0.74 gpd/sf for P < 60 min/inch  
 Rb = 0.24 gpd/sf for 60 min/inch < P < 120 min/inch  
 Selected Rb = 0.74 gpd/sf

**4. LEACHFIELD AREA REQUIRED (AR)**

AR = Q / Ra / No. of Mounds  
 AR = 504 ÷ 1.0  
 AR = 504 sf

**5. LEACHFIELD AREA PROPOSED (A)**

LENGTH REQUIRED = Q/LLR  
 Q = 504 gpd  
 LLR = 7.1 gpd/lf  
 min. L = 70.9 ft

**Phelps Engineering Inc.**

**WASTEWATER DISPOSAL SYSTEM BASIS OF DESIGN  
SOUTHERN MOUND SYSTEM  
EFFLUENT ONLY, NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
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 Date: 8/1/2008  
 Preparer: JBA  
 File: 89049 Technical

A = LENGTH (L) x WIDTH (W) x NUMBER OF TRENCHES/BEDS (N)

L =	72	ft
W =	7	ft
N =	1	bed

A = 504 sf

A = AR therefore A is acceptable

**6. BASAL AREA REQUIRED (BR)**

BR = Q / Rb

BR =	504	÷	0.74
BR =	681	sf	

**7. BASAL AREA PROPOSED (BA)**

BA = L x Distance from uphill side of trench to downhill toe of mound (DT)

L =	72	ft
DT =	25	ft

BA = 1,800 sf

BA > BR therefore BR is acceptable

**II. PRESSURE DISTRIBUTION DESIGN**

**1. REQUIRED DATA SUMMARY**

Bed Length (L1) =	72	ft
Bed Width (W) =	7	ft
Number of Laterals & Headers =	2 Laterals	2 Headers
Total Leachfield Area =	504	sf
Minimum Hole Diameter =	0.25	in
Minimum Hole Area (HA) =	0.00034	sf
Desired Leach Area per Hole =	25	sf (Maximum = 25 sf)
Minimum Hole Outlet Pressure =	1	psi = 2.31 ft of head
Leach Trench Lateral Invert =	106.5	ft
Desired Hole Outlet Pressure (Hh) =	2	psi = 4.62 ft of head

**2. TOTAL NUMBER OF HOLES REQUIRED**

HR1 = (A1 / LA1)

HR1 =	504	÷	25
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HR1 =	20.2	holes
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Use HR1 =	22	holes
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**3. ACTUAL LEACH AREA PER HOLE**

AL1 = A1 / HR1

AL1 =	22.9	sf
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**4. NUMBER OF HOLES PER LATERAL**

NH1 = HR1 / NL1

NH1 =	11.0
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**5. HOLE SPACING REQUIRED**

HS1 = L1 / HR1 \* number of headers

HS1 =	6.55	ft o.c.
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**6. DISTANCE FROM END OF LATERAL TO END OF BED**

DE1 = HS1 / 2

DE1 =	3.27	ft
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**7. LATERAL LENGTH**

LL1 = (L1/N1) - DE1

LL1 =	68.73	ft
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*Phelps Engineering Inc.*

**WASTEWATER DISPOSAL SYSTEM BASIS OF DESIGN  
SOUTHERN MOUND SYSTEM  
EFFLUENT ONLY, NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
 Site: 1355 Church Hill Road, Charlotte, Vermont  
 Date: 8/1/2008  
 Preparer: JBA  
 File: 89049 Technical

**8. FLOW RATE PER HOLE (QH) (Recommended range = 2 to 5 gpm)**

$QH = Cd \times V \times HA$

$Cd = \text{Coeff.} = 0.6$   
 $V = \text{sq. root}(2 \times g \times Hh) = \text{sq. root}(2 \times 32 \times 4.62) = 17.25 \text{ ft/s}$   
 $QH = 0.6 \times 17.25 \times 0.00034 = 0.0035 \text{ cfs} = 1.58 \text{ gpm per hole}$

**9. SIZE LATERALS TO GIVE MAX. VARIATION OF 10% IN DISCHARGE BETWEEN ANY TWO HOLES**

	Lateral Dia. (minimum 1 inch) =	Length of Lateral =	Hazen Williams C Factor =	Length (ft)	Flow (gpm)	Headloss across length (ft)	Sum of Headloss (ft)	Available Head (ft)	Velocity (ft/s)	Hole Flow (gpm)	Variation in Flow (%)
	1.6 in	68.73 ft	130	1.75	9.40	0.01	0.01	4.61	17.17	1.58	0.0%
				6.55	7.82	0.04	0.05	4.57	17.10	1.57	0.4%
				6.55	6.25	0.03	0.08	4.54	17.05	1.57	0.7%
				6.55	4.69	0.01	0.09	4.53	17.02	1.56	0.9%
				6.55	3.13	0.01	0.10	4.52	17.01	1.56	0.9%
				6.55	1.57	0.00	0.10	4.52	17.00	1.56	1.0%
				<u>34.48</u>	<u>Total Lateral HL=</u>	<u>0.10</u>				<u>9.40</u>	

All % Variations in flow are < 10%, therefore selected lateral diameter is sufficient

**III. CALCULATE DOSE SIZE**

Total flow for pressure distribution system = Flow to each lateral (based on orifice flow) x no. of laterals x no. of headers = 34 gpm

Total volume of disposal piping = 28.7 gallons

Minimum dose (at least 5x the volume of the disposal piping) = 143.6 gallons

Minimum doses per day per mound = 2

Maximum dose = 2 doses per day at average flow = 252 gallons

**Phelps Engineering Inc.**

**FINAL DISPOSAL PUMP STATION - BASIS OF DESIGN (SOUTHERN MOUND)  
EFFLUENT ONLY - NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
 Site: 1355 Church Hill Road, Charlotte, Vermont  
 Date: 8/1/2008  
 Preparer: BS  
 File: 89049 Technical

**I. PUMP STATION DESIGN**

Notes

Design a 1,500 gallon pump station to alternate doses to the southern and northern mound systems

**WASTEWATER FLOW (Q)**

Design day flow rate =	504	gpd	(1)
Average rate of flow based on 16 hour days (Qavg)	0.5	gpm	

**MINIMUM PUMPING RATE BASED ON DESIGN FLOW (Qp)**

Peaking Factor =	5.0		(2)
Qp =	0.5	gpm x	5.0
Qp =	2.6	gpm	

**MINIMUM FORCE MAIN FLOW RATE REQUIRED TO GIVE MINIMUM VELOCITY (Qf)**

Qf = A x V

Force main Diameter =	2.193	in	(3)
Force main area (AF) =	0.026	sf	
Minimum Velocity (V) for resuspension =	2.0	fps	(4)
Qf =	0.026	x	2.0
Qf =	0.05	cfs	
Qf =	23.5	gpm	

MINIMUM DESIGN PUMPING RATE (Qmp) =	23.5	gpm	(5)
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**PUMP DOSE (Do)**

Wet well/storage length	12.00	feet	
Wet well/storage length	6.00	feet	
Wet well/storage height	3.83	feet	
Wet well/storage QTY	1.00	each	
Wet well volume/foot	539	gallons	
Required Pump Dose	144	to	252
Selected pump dose height	0.24	feet =	2.88
Selected pump dose Do =	129.3	gallons	(8)

**Verification of selected pump dose based on design pumping rate:**

Avg. Cycle time	6 min		Avg. Detention Time	246	min
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**Verification of selected pump dose based on selected pump pumping rate:**

Avg. Cycle time	4 min		Avg. Detention Time	246	min
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**EMERGENCY STORAGE REQUIRED**

for duplex pumping systems - longest power outage period or 4 hours, whichever is longer must be provided

for simplex pumping systems - one day's storage must be provided

Type:	1 Day		
Duration of Storage:	16	hours	(9)
Storage Volume Required:	504	gallons	(10)
Number of Pump Stations in Series	1		
Volume Required per pump Station	504		

Emergency Storage Provided? Yes - With Use of Forcemain Capacity from Dosing Chamber

**LIMITING OVERFLOW ELEVATION FOR EMERGENCY STORAGE (LOE) (NO SEWER SURCHARGE)**

Inlet elevation to Tank	75.50	feet elev.	
Limiting overflow elevation (LOE):	75.50	feet elev.	(11)

**SET DEPTH OF PUMP STATION WET WELL**

Inlet Invert	75.50	feet elev.	
Required Pump Submergence	1.30	feet	(15)
Pump Dose Height	0.24	feet	
Computed Floor Elevation of Wet Well	72.77	feet elev.	(16)
Actual Floor Elevation Based on selected Tank	71.67	feet elev.	

If actual floor elevation based on selected tank is lower than computed floor elevation, the tank is acceptable.

OK- With Use of Forcemain Capacity from Dosing Chamber

**FINAL DISPOSAL PUMP STATION - BASIS OF DESIGN (SOUTHERN MOUND)  
EFFLUENT ONLY - NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
 Site: 1355 Church Hill Road, Charlotte, Vermont  
 Date: 8/1/2008  
 Preparer: BS  
 File: 89049 Technical

**PUMP CONTROL ELEVATIONS**

PUMP OFF elev. 72.97 feet elev. (19)  
 PUMP ON elev. 73.21 feet elev. (21)  
 HIGH ALARM 73.46 feet elev. (22)

**II. PUMP SELECTION**

**STATIC HEAD (Hs)**

Hs= Highest force main elevation - PUMP OFF elev.  
 Hs= 106.5 - 72.97  
 Hs= 33.5 ft

**PUMP STATION FITTINGS EQUIVALENT LENGTH (EL)**

Item	No. fittings	Equiv. Length (ft)	Total
Check Valve	1	15	15 ft
90 Bend	1	3	3
Tee fitting Branch	0	15.3	0
Tee Fitting Run	0	5.11	0
Wye (thru)	0	3	0
Plug Valve (Open)	1	2	2
Straight Pipe	5	1	5
		<b>TOTAL</b>	<b>25 ft</b>
Size Of Pump Station Piping	2		

**FRICTION HEADLOSS IN FORCE MAIN (Hf) and PUMP STATION (Hp)**

Use Hazen-Williams with following parameters:

Force Main Length (Lf) = 880 lf  
 Force Main Fitting Equivalent Length (Lf) = 40 lf  
 Force Main Total Equivalent Length = 920 lf  
 Force Main Diameter = 2.19 in  
 PS Fittings Equivalent Length (Lp) = 25 lf  
 Flow rates for system curve = 0 15 30 45 60  
 Hazen Williams C Factor = 130

**Friction loss from force main**

Hf1= 0.0 ft  
 Hf2= 3.9 ft  
 Hf3= 14.0 ft  
 Hf4= 29.6 ft  
 Hf5= 50.3 ft

**Friction loss from pump station fittings and piping**

Hp1= 0.0 ft  
 Hp2= 0.2 ft  
 Hp3= 0.6 ft  
 Hp4= 1.3 ft  
 Hp5= 2.1 ft

Head Required at Mound 2.0

**TOTAL DYNAMIC HEAD AND SYSTEM CURVE**

Flow	Hs +	Hf +	Hm +	Hp =	TDH
0	33.5	0.0	2.0	0.0	35.5 ft
15	33.5	3.9	2.0	0.2	39.6 ft
30	33.5	14.0	2.0	0.6	50.1 ft
45	33.5	29.6	2.0	1.3	66.4 ft
60	33.5	50.3	2.0	2.1	88.0 ft

Design Condition

**FINAL DISPOSAL PUMP STATION - BASIS OF DESIGN (SOUTHERN MOUND)  
EFFLUENT ONLY - NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
 Site: 1355 Church Hill Road, Charlotte, Vermont  
 Date: 8/1/2008  
 Preparer: BS  
 File: 89049 Technical

**PUMP SELECTED**

Goulds WE0718H

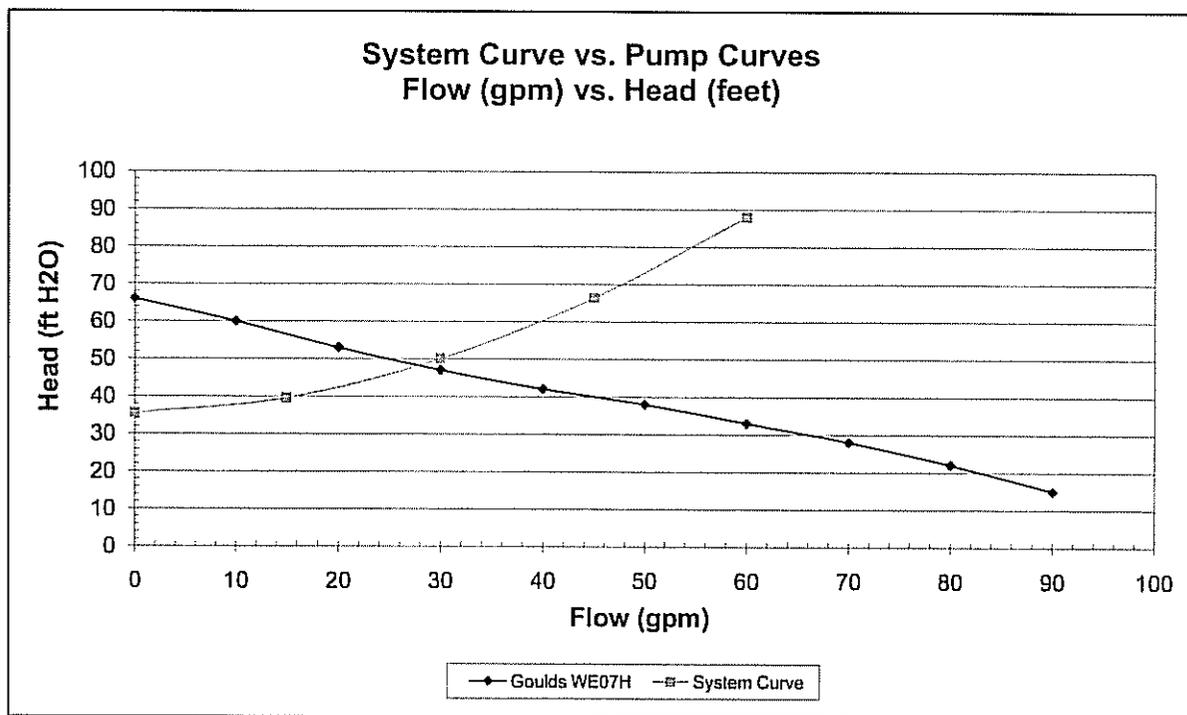
0.750 HP      208 volt  
 3500 rpm      1 phase  
                  11 amps

- Explosion Proof Motor
- Standard Motor

Required pump submergence

1.3 ft

(23)



**PUMP OPERATING POINT:                      28 gpm @                      48 ft H<sub>2</sub>O**

**Phelps Engineering Inc.****FINAL DISPOSAL PUMP STATION - BASIS OF DESIGN (NORTHERN MOUND)  
EFFLUENT ONLY - NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
 Site: 1355 Church Hill Road, Charlotte, Vermont  
 Date: 8/1/2008  
 Preparer: BS  
 File: 89049 Technical

**I. PUMP STATION DESIGN**

Notes

Design a 1,500 gallon pump station to alternate doses to the southern and northern mound systems

**WASTEWATER FLOW (Q)**

Design day flow rate = 628 gpd (1)  
 Average rate of flow based on 16 hour days (Qavg) 0.7 gpm

**MINIMUM PUMPING RATE BASED ON DESIGN FLOW (Qp)**

Peaking Factor = 5.0 (2)  
 Qp = 0.7 gpm x 5.0  
 Qp = 3.3 gpm

**MINIMUM FORCE MAIN FLOW RATE REQUIRED TO GIVE MINIMUM VELOCITY (Qf)**

Qf = A x V

Force main Diameter = 2.193 in (3)  
 Force main area (AF) = 0.026 sf  
 Minimum Velocity (V) for resuspension = 2.0 fps (4)  
 Qf = 0.026 x 2.0  
 Qf = 0.05 cfs  
 Qf = 23.5 gpm

MINIMUM DESIGN PUMPING RATE (Qmp) = 23.5 gpm (5)

**PUMP DOSE (Do)**

Wet well/storage length 12.00 feet  
 Wet well/storage length 6.00 feet  
 Wet well/storage height 3.83 feet  
 Wet well/storage QTY 1.00 each  
 Wet well volume/foot 539 gallons  
 Required Pump Dose 127 to 314 gallons  
 Selected pump dose height 0.29 feet = 3.48 inches (8)  
 Selected pump dose Do = 156.2 gallons

**Verification of selected pump dose based on design pumping rate:**

Avg. Cycle time 7 min Avg. Detention Time 239 min

**Verification of selected pump dose based on selected pump pumping rate:**

Avg. Cycle time 5 min Avg. Detention Time 239 min

**EMERGENCY STORAGE REQUIRED**

for duplex pumping systems - longest power outage period or 4 hours, whichever is longer must be provided

for simplex pumping systems - one day's storage must be provided

Type: 1 Day  
 Duration of Storage: 16 hours (9)  
 Storage Volume Required: 628 gallons (10)  
 Number of Pump Stations in Series 1  
 Volume Required per pump Station 628

Emergency Storage Provided? Yes - With Use of Forcemain Capacity from Dosing Chamber (North and South Mound)

**LIMITING OVERFLOW ELEVATION FOR EMERGENCY STORAGE (LOE) (NO SEWER SURCHARGE)**

Inlet elevation to Tank 75.50 feet elev.  
 Limiting overflow elevation (LOE): 75.50 feet elev. (11)

**SET DEPTH OF PUMP STATION WET WELL**

Inlet Invert 75.50 feet elev.  
 Required Pump Submergence 1.30 feet (15)  
 Pump Dose Height 0.29 feet  
 Computed Floor Elevation of Wet Well 72.49 feet elev. (16)  
 Actual Floor Elevation Based on selected Tank 71.67 feet elev.

If actual floor elevation based on selected tank is lower than computed floor elevation, the tank is acceptable.

OK- With Use of Forcemain Capacity from Dosing Chamber (North and South Mound)

**FINAL DISPOSAL PUMP STATION - BASIS OF DESIGN (NORTHERN MOUND)  
EFFLUENT ONLY - NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
 Site: 1355 Church Hill Road, Charlotte, Vermont  
 Date: 8/1/2008  
 Preparer: BS  
 File: 89049 Technical

**PUMP CONTROL ELEVATIONS**

PUMP OFF elev. 72.97 feet elev. (19)  
 PUMP ON elev. 73.26 feet elev. (21)  
 HIGH ALARM 73.51 feet elev. (22)

**II. PUMP SELECTION**

**STATIC HEAD (Hs)**

Hs= Highest force main elevation - PUMP OFF elev.

Hs= 104.5 - 72.97

Hs= 31.5 ft

**PUMP STATION FITTINGS EQUIVALENT LENGTH (EL)**

Item	No. fittings	Equiv. Length (ft)	Total
Check Valve	1	15	15 ft
90 Bend	1	3	3
Tee fitting Branch	0	15.3	0
Tee Fitting Run	0	5.11	0
Wye (thru)	0	3	0
Plug Valve (Open)	1	2	2
Straight Pipe	5	1	5
		<b>TOTAL</b>	<b>25 ft</b>
Size Of Pump Station Piping	2		

**FRICTION HEADLOSS IN FORCE MAIN (Hf) and PUMP STATION (Hp)**

Use Hazen-Williams with following parameters:

Force Main Length (Lf) =	740	lf			
Force Main Fitting Equivalent Length (Lf)	40	lf			
Force Main Total Equivalent Length	780	lf			
Force Main Diameter =	2.19	in			
PS Fittings Equivalent Length (Lp) =	25	lf			
Flow rates for system curve=	0	15	30	45	60
Hazen Williams C Factor =	130				

**Friction loss from force main**

Hf1=	0.0	ft
Hf2=	3.3	ft
Hf3=	11.8	ft
Hf4=	25.1	ft
Hf5=	42.7	ft

**Friction loss from pump station fittings and piping**

Hp1=	0.0	ft
Hp2=	0.2	ft
Hp3=	0.6	ft
Hp4=	1.3	ft
Hp5=	2.1	ft

Head Required at Mound 2.0

**TOTAL DYNAMIC HEAD AND SYSTEM CURVE**

Flow	Hs +	Hf +	Hm +	Hp =	TDH
0	31.5	0.0	2.0	0.0	33.5 ft
15	31.5	3.3	2.0	0.2	37.0 ft
30	31.5	11.8	2.0	0.6	46.0 ft
45	31.5	25.1	2.0	1.3	59.9 ft
60	31.5	42.7	2.0	2.1	78.4 ft

Design Condition

**FINAL DISPOSAL PUMP STATION - BASIS OF DESIGN (NORTHERN MOUND)  
EFFLUENT ONLY - NO RAW SEWAGE**

Project No.: 89049  
 Project Name: Happy Patrick 1812 Tavern Wastewater System  
 Site: 1355 Church Hill Road, Charlotte, Vermont  
 Date: 8/1/2008  
 Preparer: BS  
 File: 89049 Technical

**PUMP SELECTED**

Goulds WE071BH

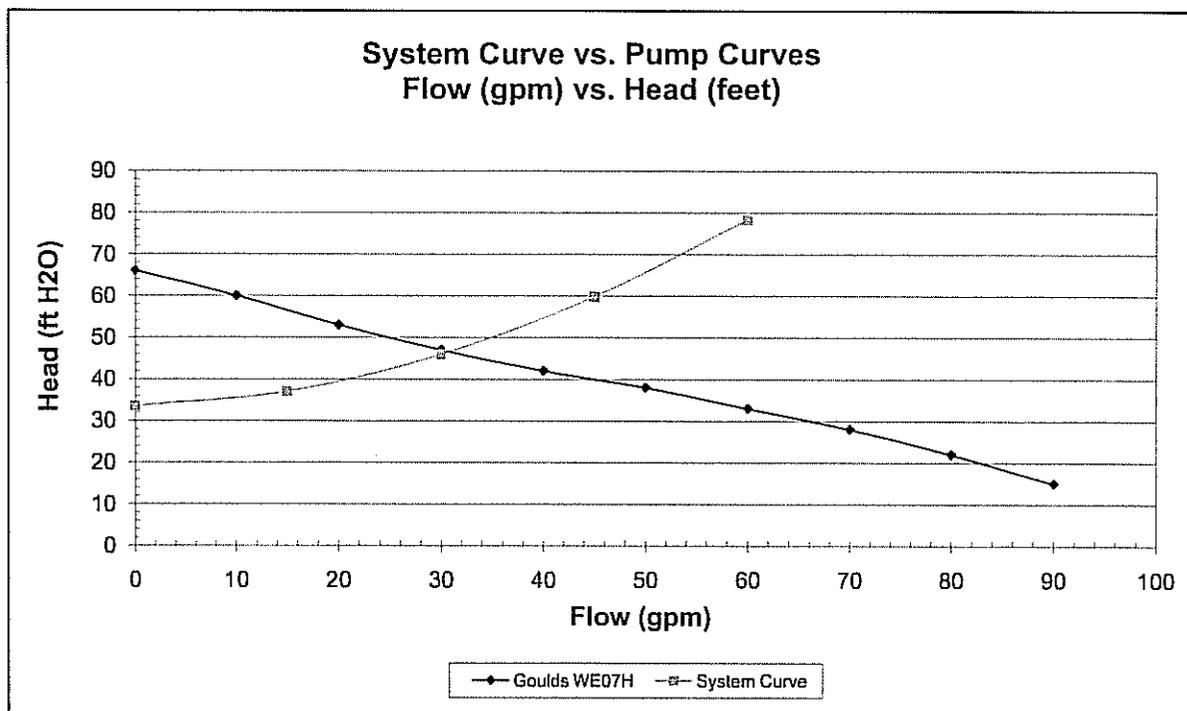
0.750 HP                      208     volt  
 3500 rpm                      1        phase  
    11        amps

- Explosion Proof Motor
- Standard Motor

Required pump submergence

1.3 ft

(23)



**PUMP OPERATING POINT:                      30 gpm @                      47 ft H<sub>2</sub>O**