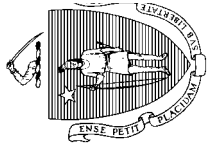


ACELA Engineering Company

Stormwater Drainage Report

VA Central Western Massachusetts
Healthcare System, Northampton
7/2/2018

**Appendix B: Massachusetts Form 11 Test Pit Logs
& OTO Permeability Testing Results**



Commonwealth of Massachusetts
City/Town of

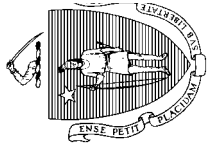
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 1

Date: 2/19/18

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-5	A	10YR3/2				L			GR	FR	
5-21	B	10YR4/4				SL			SBK	FR	
21-105	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water



Commonwealth of Massachusetts
City/Town of

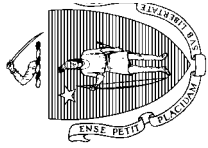
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Date: 2/19/18

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 2

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-5	A	10YR3/2				L			GR	FR	
5-19	B	10YR4/4				SL			SBK	FR	
19-100	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water



Commonwealth of Massachusetts
City/Town of

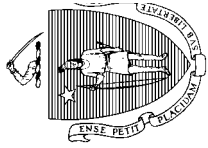
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Date: 2/19/18

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 3

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8	A	10YR3/2				L			GR	FR	
8-23	C	10YR4/4				SL			SBK	FR	
23-100	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water



Commonwealth of Massachusetts
City/Town of

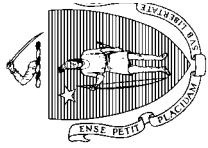
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Date: 2/19/18

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 4

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-8	A	10YR3/2				L			GR	FR	
8-24	B	10YR4/4				SL			SBK	FR	
24-98	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water, weeping @80"



Commonwealth of Massachusetts
City/Town of

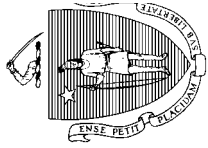
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Date: 2/19/18

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 5

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-9	A	10YR3/2				L			GR	FR	
9-19	B	10YR4/4				SL			SBK	FR	
19-96	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water, weeping @ 70"



Commonwealth of Massachusetts
City/Town of

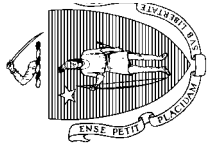
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Date: 2/19/18

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 6

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-10	A	10YR3/2				L			GR	FR	
10-19	B	10YR4/4				SL			SBK	FR	
19-93	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water, weeping @60"



Commonwealth of Massachusetts
City/Town of

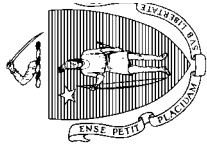
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Date: 2/19/18

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 7

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-4	A	10YR3/2				L			GR	FR	
4-17	B	10YR4/4				SL			SBK	FR	
17-86	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water



Commonwealth of Massachusetts
City/Town of

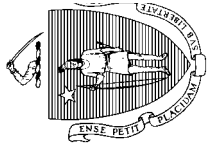
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Date: 2/19/18

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 8

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-4	A	10YR3/2				L			GR	FR	
4-19	B	10YR4/4				SL			SBK	FR	
19-96	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water



Commonwealth of Massachusetts
City/Town of

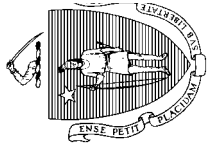
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Date: 2/19/18

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 9

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-5	A	10YR3/2				L			GR	FR	
5-17	B	10YR4/4				SL			SBK	FR	
17-96	C	10YR4/3				LS/SL			M	F	

Additional Notes No indication of ground water



Commonwealth of Massachusetts
City/Town of

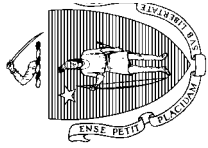
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

Date:2/19/18

VA Medical Center, Leeds, MA
Deep Observation Hole Number:**10**

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-5	A	10YR3/2				L			GR	FR	
5-22	B	10YR4/4				SL			SBK	FR	
22-86	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water



Commonwealth of Massachusetts
City/Town of

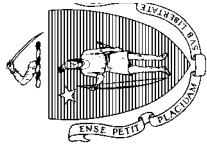
Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

VA Medical Center, Leeds, MA
Deep Observation Hole Number: **11**

Date: 2/19/18

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-36	FILL					LS			-	FR	
36-41	A	10YR3/2				L			GR	FR	
41-58	B	10YR4/4				SL			SBK	FR	
58-84	C	10YR4/3				LS			M	F	

Additional Notes No indication of ground water



Commonwealth of Massachusetts
City/Town of

Form 11 - Soil Suitability Assessment for On-Site Sewage Disposal

VA Medical Center, Leeds, MA
Deep Observation Hole Number: 12

Date: 2/19/18

Depth (In.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
0-84	FILL					LS/SL			M	FR	

Additional Notes No indication of ground water



J2442-05-01
May 22, 2018

T. Reynolds Engineering
110 Pine Street
Florence, Massachusetts 01062
Attn: Terry Reynolds

Re: Stormwater Design Recommendations
Northampton VA Medical Center
421 North Main Street
Leeds, Massachusetts

Dear Mr. Reynolds:

O'Reilly Talbot & Okun Associates, Inc. (OTO) is pleased to provide this letter report for recommendations associated with the design of underground stormwater infiltration systems at the Northampton VA Medical Center. The Site is located at 421 North Main Street in Leeds, Massachusetts. This report is subject to the attached limitations.

HYDRAULIC CONDUCTIVITY TESTING

Hydraulic conductivity tests were performed within five shallow pits (IF-1 through IF-5), on April 26, 2018. The shallow pits were performed within proposed stormwater infiltration areas located in the western portion of the campus. Tests IF-1 and IF-5 were performed in the proposed basin to the north of the transfer lot. Tests IF-2 through IF-4 were performed in the proposed basin to the south of the transfer lot, within the existing grass field. Infiltration tests (hydraulic conductivity) were performed within each of the pits at a depth of between 3 feet and 4.5 feet below existing grade. An OTO geotechnical engineer performed the hydraulic conductivity tests. We understand a Site plan identifying the test locations will be prepared by T. Reynolds Engineering.

SUBSURFACE CONDITIONS

At each of the test locations, topsoil followed by a thin layer of silty sand was present at the surface. The surficial soils were underlain by glacial till. Glacial till is a very dense, heterogeneous mixture of silt, clay, sand and gravel, and is generally present immediately above bedrock throughout New England. The glacial till consisted of gray, fine sand with little to some amounts of silt, little medium sand, and trace to little amounts of gravel. In some locations, the underlying till was very dense. We understand that deep test pits were previously performed at these locations to observe the soil profile and indications of a saturated soil condition. Therefore, deep test pits were not performed as part of this work.

HYDRAULIC CONDUCTIVITY TESTING RESULTS

In-Situ hydraulic conductivity (or permeability) testing was performed at each of the test locations (IF-1 through IF-5), to aid in the design of the stormwater control disposal system. The test and results are described below.

The tests were performed using a constant head methodology, via a Guelph permeameter. The Guelph permeameter allows the rate of water recharge into an unsaturated soil to be measured while a constant water head is maintained. The permeability test was performed by auguring a shallow hole into the soil at the base of the shallow pit, adding water to the apparatus, and then recording the change in the rate of water flow from a reservoir over time. These data were then used to estimate the coefficient of permeability or hydraulic conductivity.

The tests were performed between a depth of 3 to 4.5 feet below existing ground surface. The soils encountered at the test intervals consisted of a fine sand with little to some silt, little medium sand, and trace to little gravel (glacial till). In pits IF-1, IF-3, and IF-4, the soils encountered at the test interval were dense to very dense. The saturated hydraulic conductivity (K) values determined by these tests are presented in Table 1.

Table 1
Hydraulic Conductivity Test Results

Infiltration Test/Basin	Test Depth (feet)	Soil Conditions	K Value (feet/day)
IF-1 (North)	4.5	Very dense, fine sand, little to some silt, little medium sand, trace (+) coarse sand, trace-little gravel (Glacial Till)	< 0.02*
IF-2 (South)	4	Fine sand, little silt, little medium sand, trace (+) coarse gravel (Glacial Till)	2
IF-3 (South)	3.5	Very dense, fine sand, little to some silt, little medium sand, trace-little gravel (Glacial Till)	0.02
IF-4 (South)	3	Very dense, fine sand, little to some silt, little medium sand, trace-little gravel (Glacial Till)	0.3
IF-5 (North)	4	Fine sand, little-some silt, little medium sand, trace (+) gravel (Glacial Till)	0.6
Note: *Little to no infiltration observed in test apparatus during IF-1			

Based upon the results of these tests, it does not appear that Site conditions are favorable for infiltration. We recommend that the field conditions be verified during installation of the stormwater structures, to ensure that actual conditions are similar to those observed during these investigations and assumed for design. If conditions are different than those observed, OTO should be contacted to review conditions.

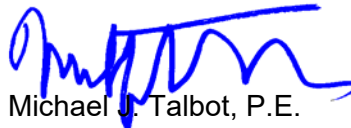
Stormwater Design Recommendations
Northampton VA Medical Center
421 North Main Street
Leeds, Massachusetts
May 22, 2018

We appreciated the opportunity to be of service on this project. If you have any questions, please contact the undersigned.

Sincerely yours
O'Reilly, Talbot & Okun Associates, Inc.



Ashley L. Sullivan, P.E.
Associate



Michael J. Talbot, P.E.
Principal



Stephen McLaughlin
Project Engineer

Attachments: Limitations

LIMITATIONS

1. The observations presented in this report were made under the conditions described herein. The conclusions presented in this report were based solely upon the services described in the report and not on scientific tasks or procedures beyond the scope of the project or the time and budgetary constraints imposed by the client. The work described in this report was carried out in accordance with the Statement of Terms and Conditions attached to our proposal.
2. The analysis and recommendations submitted in this report are based in part upon the data obtained from widely spaced subsurface explorations. The nature and extent of variations between these explorations may not become evident until construction. If variations then appear evident, it may be necessary to reevaluate the recommendations of this report.
3. The generalized soil profile described in the text is intended to convey trends in subsurface conditions. The boundaries between strata are approximate and idealized and have been developed by interpretations of widely spaced explorations and samples; actual soil transitions are probably more erratic. For specific information, refer to the boring logs.
4. In the event that any changes in the nature, design or location of the proposed structures are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing by O'Reilly, Talbot & Okun Associates Inc. It is recommended that we be retained to provide a general review of final plans and specifications.
5. Our report was prepared for the exclusive benefit of our client. Reliance upon the report and its conclusions is not made to third parties or future property owners.