SANBORN HEAD

Building Trust. Engineering Success.

STORMWATER INFILTRATION DATA REPORT

University Station

Westwood, Massachusetts

Prepared for: Westwood Marketplace Holdings, LLC

File No. 2707.07

November 12, 2012

Mr. Paul Cincotta
Westwood Marketplace Holdings, LLC
c/o New England Development, LLC
One Wells Avenue
Newton, Massachusetts 02459

November 12, 2012
File No. 2707.07

Re: Stormwater Infiltration Data Report
University Station
Westwood, Massachusetts

Dear Paul:

This data report transmits the subsurface information obtained from thirteen (13) test pit explorations and ten (10) stormwater infiltration tests performed by Sanborn, Head & Associates, Inc. (Sanborn Head) on October 3 and 4, 2012 and November 6, 2012 at the proposed University Station site off of University Avenue in Westwood, Massachusetts.

Project Description

We understand the proposed project involves construction a number of subsurface stormwater infiltration chambers below the proposed parking lot surfaces along University Avenue. According to Tetra Tech, the proposed bottom elevation of the stormwater chambers is approximately El. 47 feet. A site plan is provided on Figure 1 that shows the approximate locations of the proposed infiltration stormwater chambers.

Test Pit Explorations

On October 3 and 4, 2012 and November 6, 2012, Sanborn Head observed the excavation of thirteen (13) test pits (designated TP-SH-401 through TP-SH-413) at the approximate locations shown on Figure 1. Each of the test pits were excavated to a depth of approximately 12 to 16 feet by J. D'Amico, Inc. (JDA) of Randolph, Massachusetts. The test pits were observed and logged by Luke Norton of Sanborn Head, a Soil Evaluator certified by the Commonwealth of Massachusetts.

Attachment A includes test pit logs prepared by the Soil Evaluator from Sanborn Head. These logs identify the observed thickness of surface fill materials where applicable, the hydrologic soil group of natural soils observed, textural soil classifications in accordance with U.S. Natural Resources and Conservation Service (NRCS) methodologies, and field observations regarding depth to groundwater, or evidence of seasonal high groundwater table (such as redoximorphic features, or mottling), if any.

The ground surface elevations at the test pit locations were estimated by Sanborn Head by interpolation between topographic contours provided by Tetra Tech and dated April 19, 2007 and are referenced to the North American Vertical Datum of 1988 (NAVD88). An attempt has been made to account for the changes in ground surface elevation due to the recent construction activity at the site; however the ground surface elevations provided on the logs should be considered approximate.

Subsurface Conditions

In the proposed southern infiltration area, at the former 245 University Avenue property, test pits TP-SH-401 and TP-SH-402 encountered an approximately 2.5 to 4-foot thick fill layer. In TP-SH-401, the fill was underlain by an approximately 3.5-foot thick buried subsoil and organic layer which should be considered unsuitable as a receiving layer for stormwater infiltration. TP-SH-401 and SH-TP-402 were terminated in natural sand and gravel deposits at depths of 16 and 12 feet, respectively. The sand and gravel deposits generally consist of fine to coarse sand with significant amounts of gravel and varying amounts of cobbles.

In the proposed southern infiltration area, at the former 201 University Avenue property, test pits TP-SH-403, TP-SH-410, and TP-SH-411 encountered an approximately 1 to 2-foot thick fill layer, underlain by natural outwash sand deposits. The outwash sands generally consist of fine to medium and with varying amounts of silt. The test pits were terminated in the outwash sand deposits at a depth of 12 feet.

In the proposed central infiltration area, at the former 145 University Avenue property, test pits TP-SH-404 and TP-SH-405 encountered a 4 to 4.5-foot thick fill layer and/or buried subsoil layer, underlain by glacial till. The glacial till generally consists of fine to coarse sand with varying amounts of silt, gravel, and cobbles. Test pits TP-SH-406, TP-SH-409, and TP-SH-412 encountered an approximately 4 to 7.5-foot thick fill layer and/or buried subsoil layer, underlain by natural sand and gravel deposits. Additionally, test pits TP-SH-407 and TP-SH-408 encountered 2.5 to 4.5-foot thick fill layers, underlain by outwash sand deposits. The test pits were terminated in a natural soil stratum at a depth of 12 feet.

In the proposed northern infiltration area, at the former 75 University Avenue property, test pit TP-SH-413 encountered approximately 9 feet of fill consisting of soil mixed with recycled crushed concrete, underlain by natural outwash sand deposits. TP-SH-413 was terminated in the outwash sand deposits at a depth of 14.5 feet. It should noted that stormwater should not be infiltrated into the fill material at this location in order to comply with the 2008 Massachusetts Stormwater Handbook. The fill could be removed and replaced with suitable fill and/or the infiltration structure could be installed into the natural soils.

A total of eleven (11) ground water measurement rounds were completed at the project site in 2006 and 2007. The highest and lowest observed groundwater elevations during this time are shown on Figure 1. Historically, groundwater elevations across the proposed stormwater chamber locations have been encountered between El. 44 feet (at the former 245 University Avenue property) and El. 30 feet (at the former 75 University Avenue property). Provided the existing conditions are similar to those observed in 2006 and

2007, groundwater should be between 3 and 17 feet below the proposed bottom elevation of the infiltration stormwater chambers.

During the recent test pit excavation, water was observed seeping into test pits TP-SH-404 and TP-SH-405 above the glacial till; however, a temporary construction stormwater basin is located in close proximity to both test pits. We believe the water observed in these two test pits is not an indication of actual groundwater, but is due to the temporary water storage within the stormwater basin. Further, no visual evidence of seasonal high groundwater was observed in the test pits.

Stormwater Infiltration Tests

Sanborn Head performed ten (10) falling-head permeameter tests at the locations and depths noted in the tables below. The falling-head permeameter tests were completed in general accordance with ASTM D5126-90 (2004) “Standard Guide for Comparison of Field Methods for Determining Hydraulic Conductivity in the Vadose Zone”. This test method is considered a “Dynamic Field” method as described in the Massachusetts Stormwater Handbook (2008) for assessing the saturated hydraulic conductivity of the soil.

The falling-head permeameter tests were performed by excavating a test pit to a prescribed depth, then making an excavation by hand to install a 4-inch diameter standpipe approximately 6 to 12 inches into the receiving layer soil. The annulus space between the outside of the standpipe and the formation soil was sealed with hydrated bentonite. The standpipe was filled with a column of water with initial heights between 16 and 24 inches. The rate of head drop was measured and recorded over time for two to three trials using a water level pressure transducer. The falling head data were analyzed using the Hvorslev (1951) Method – “Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil” to estimate the measured hydraulic conductivity of the soil. The measured hydraulic conductivity from the test was taken as the average of the three trials, or the last trial, whichever was less. In accordance with the Massachusetts Stormwater Handbook (2008), the design hydraulic conductivity from a dynamic test should be 50 percent of the field measured hydraulic conductivity.

Attachment B includes the falling-head permeameter test logs for each test and a summary table of the test results is shown on Figure 1.

There were no falling-head permeameter tests performed in the glacial till encountered in TP-SH-404 or TP-SH-405. Based on our experience, the glacial till soils at the site generally exhibit poor-drainage and should be considered Hydrologic Soil Group, Class D soils.

Soil Laboratory Tests

Bulk soil samples were collected by Sanborn Head at the depth and location of each of the ten falling head permeameter tests. Two samples were selected for soil laboratory testing; one sample considered representative of the natural outwash sand deposits and taken from TP-SH-303, and the other sample considered representative of the natural sand and gravel deposits and taken from TP-SH-306. These two samples were delivered to GeoTesting

Express of Acton, Massachusetts for grain size distribution tests (ASTM D422). The results of these tests were used to support the textural soil classifications noted on the test pit logs and to corroborate the results of the falling head permeameter tests. The laboratory reports are provided in Attachment C.

We trust this data report meets the current needs of the project. If you should have any questions, please call.

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.

Luke Norton
Senior Project Engineer

Vernon R. Kokosa, P.E.
Principal/Vice-President

LDN/VRK/SSS: ldn

Encl. Figure 1 – Site Plan
Attachment A - Test Pit Logs (TP-SH-401 through TP-SH-413)
Attachment B – Falling-Head Permeameter Test Logs
Attachment C – Soil Laboratory Reports

S:\WESDATA\2700\2707.07\Source Files\Stormwater Infiltration Report\20121112 University Station Infiltration Data Rpt.docx

FIGURES

FIELD FALLING-HEAD PERMEAMETER TEST RESULTS

	Test Pit Location									
Parameter	**TP-SH-401**	**TP-SH-402**	**TP-SH-403**	**TP-SH-406**	**TP-SH-407**	**TP-SH-408**	**TP-SH-410**	**TP-SH-411**	**TP-SH-412**	**TP-SH-413**
Approximate Ground Surface Elevation (ft)	53.0	53.0	52.0	54.0	52.0	55.0	53.5	54.0	56.0	57.0
Approximate Test Elevation (ft)	45.0	48.5	49.5	47.0	47.0	50.0	49.0	50.7	51.5	47.0
Field Measured Hydraulic Conductivity (in/hr)	25	40	0.9	160	1.2	0.9	1.5	1.1	37	0.6
Design Value Hydraulic Conductivity (in/hr)	12.5	20	0.4	80	0.6	0.5	0.7	0.6	18.5	0.3
Hydrologic Soil Group (HSG)	A	A	B	A	B	B	B	B	A	B

NOTES:

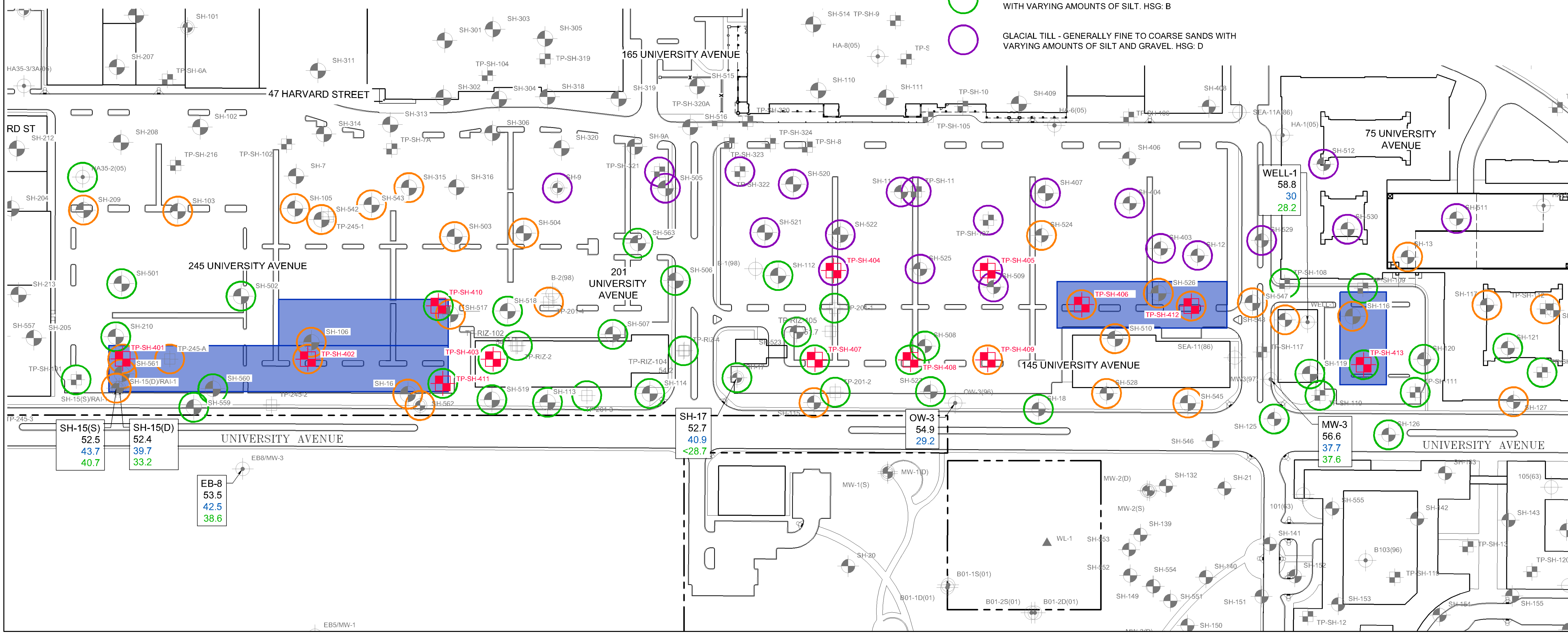
1. THE BASE MAP WAS OBTAINED FROM FILES RECEIVED ELECTRONICALLY FROM TETRA TECH RIZZO, INC. OF MANCHESTER, NH, ON NOVEMBER 12, 2012.
2. THE NATURAL SOIL DEPOSITS SHOWN ON THIS FIGURE DEPICT THE PREDOMINANT NATURAL SOIL TYPE OBSERVED AT THE DEPTH OF THE PROPOSED STORMWATER STRUCTURE. THE NATURAL SOIL DEPOSITS WERE DETERMINED BASED ON THE SUBSURFACE EXPLORATION LOGS, ARE INTENDED TO SHOW GENERAL SITE TRENDS AND SHOULD BE CONSIDERED APPROXIMATE. THE DEPTHS TO THE NATURAL SOIL DEPOSITS VARY CONSIDERABLY ACROSS THE AREA SHOWN.
3. GROUNDWATER ELEVATIONS SHOWN AT MONITORING WELLS WERE COLLECTED BY TETRA TECH RIZZO AND SANBORN HEAD PERSONNEL BETWEEN JUNE 9, 2006 TO MARCH 28, 2007. ONLY THE HIGHEST AND LOWEST OBSERVED GROUNDWATER ELEVATIONS ARE DISPLAYED.

NATURAL DEPOSITS:

- SAND & GRAVEL DEPOSITS - GENERALLY FINE TO COARSE SANDS WITH VARYING AMOUNTS OF GRAVEL AND COBBLES. HSG: A
- OUTWASH DEPOSITS - GENERALLY FINE TO MEDIUM SANDS WITH VARYING AMOUNTS OF SILT. HSG: B
- GLACIAL TILL - GENERALLY FINE TO COARSE SANDS WITH VARYING AMOUNTS OF SILT AND GRAVEL. HSG: D

LEGEND:

- TP-SH-401 — TEST PIT COMPLETED BY SANBORN HEAD IN OCTOBER/NOVEMBER 2012
- PREVIOUSLY COMPLETED SUBSURFACE EXPLORATIONS COMPLETED BY SANBORN HEAD AND OTHERS
- MW-3 / 56.6 / 37.7 / 37.6 — MONITORING WELL LOCATION; APPROXIMATE GROUND SURFACE ELEVATION; HIGHEST OBSERVED GROUNDWATER ELEVATION; LOWEST OBSERVED GROUNDWATER ELEVATION
- PROPOSED STORMWATER INFILTRATION CHAMBER LOCATION



SANBORN | HEAD

GRAPHICAL SCALE: 80' 40' 0' 80' 160'

NO.	DATE	DESCRIPTION	BY

DRAWN BY: R.HIRTLE
DESIGNED BY: L.NORTON
REVIEWED BY: S.SADKOWSKI
PROJECT MGR: S.SADKOWSKI
PIC: V.KOKOSA
DATE: NOVEMBER 2012

HYDROGEOLOGIC ENGINEERING SERVICES
UNIVERSITY STATION
WESTWOOD, MASSACHUSETTS

SITE PLAN

PROJECT NUMBER: 2707.07

SHEET NUMBER: 1

ATTACHMENT A

TEST PIT LOGS

Test Pit Logs

Site Location:	University Station	Client Name:	Westwood Marketplace Holdings, LLC	Date:	10/03/2012
Site Address:	University Avenue, Westwood, MA	Client Address:	One Wells Avenue, Newton, MA	Time:	08:30
Project No.:	2707.07				
Ground Surface Elev. (ft):	± 53.0			Weather :	Overcast, Showers - 60°F

Deep Hole Number: TP-SH-401

Location (Identify on site Plan):

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-4	Asphalt	--	--	--	--	--	--	--	--	--	
4-50	Fill	10 YR 6/3	--	--	--	Gravelly Fine to Coarse Sand	20	10	Structureless	Friable	
50-68	B_B	7.5 YR 5/6	--	--	--	Loamy Sand	10	<5	Weak Subangular	Friable	
68-90	O_B	10 YR 2/1	--	--	--	Hemic Sandy Loam	10	5	Massive	Friable	1
90-192	C_1	10 YR 7/3	--	--	--	Gravelly Fine to Coarse Sand	15	--	Single Grain	Loose	

Additional Notes:
1. Organic layer contained common stumps and organic root material.

Groundwater Observed: No | If Yes; Depth Weeping from Pit Face: No | Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >192"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC		Date: 10/03/2012
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA		Time: 09:30
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 53.0			Weather : Overcast, Showers - 60°F

Deep Hole Number: TP-SH-402

Location (Identify on site Plan):

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-5	Asphalt	--	--	--	--	--	--	--	--	--	
5-31	Fill	10 YR 6/3	--	--	--	Gravelly Fine to Coarse Sand	20	10	Structureless	Friable	
31-48	C_1	7.5 YR 6/4	--	--	--	Gravelly Fine to Coarse Sand	30	10	Single Grain	Loose	
48-144	C_2	10 YR 6/4	--	--	--	Very Gravelly Fine to Coarse Sand	40	20	Single Grain	Loose	

Additional Notes:

Groundwater Observed: No

If Yes; Depth Weeping from Pit Face: No

Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC	Date: 10/03/2012	
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA	Time: 10:40	
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 52.0		Weather : Overcast, Showers - 60°F	

Deep Hole Number: TP-SH-403

Location (Identify on site Plan):

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-10	Fill	10 YR 5/2	--	--	--	Loamy Sand	10	--	Structureless	Friable	
10-144	C_1	10 YR 7/1	--	--	--	Silt Loam	<5	--	Loose	Friable	

Additional Notes:

Groundwater Observed: No

If Yes; Depth Weeping from Pit Face: No

Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC	Date: 10/03/2012	
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA	Time: 11:00	
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 52.0		Weather : Overcast, Showers - 60°F	

Deep Hole Number: TP-SH-404

Location (Identify on site Plan):

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-45	Fill	10 YR 6/3	--	--	--	Gravelly Loamy Sand	30	15	Structureless	Friable	
45-54	O_B	10 YR 2/1	52-54	7.5 YR 5/8	30	Gravelly Loamy Sand	20	<5	Subangular	Friable	1
54-144	C_1	10 YR 6/2	--	--	--	Gravelly Fine to Coarse Sand	30	15	Single Grain	Friable	

Additional Notes:
1. Water observed weeping into test pit at organic layer; construction stormwater basin approximately 10-15 feet east of test pit.

Groundwater Observed: Yes   If Yes; Depth Weeping from Pit Face: ~45"   Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC	Date: 10/03/2012	
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA	Time: 12:00	
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 53.0		Weather : Overcast, Showers - 60°F	

Deep Hole Number: TP-SH-405 Location (Identify on site Plan):

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-48	Fill	10 YR 6/3	--	--	--	Gravelly Loamy Sand	20	<5	Structureless	Friable	
48-78	C_1	10 YR 6/1	--	--	--	Gravelly Loamy Sand	15	<5	Single Grain	Loose	
78-144	C_D	10 YR 6/2	--	--	--	Gravelly Loamy Sand	20	5	Massive	Friable; Firm in Place	1

Additional Notes:

1. Water observed weeping into test pit near top of glacial till layer; construction stormwater basin approximately 30 feet southeast of test pit.

Groundwater Observed: Yes If Yes; Depth Weeping from Pit Face: ~86-90" Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC	Date: 10/03/2012	
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA	Time: 13:15	
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 54.0		Weather : Overcast, Showers - 60°F	

Deep Hole Number: TP-SH-406

Location (Identify on site Plan):

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-54	Fill	10 YR 6/3	--	--	--	Gravelly Loamy Sand	20	10	Structureless	Friable	
54-75	Fill	10 YR 6/2	--	--	--	Gravelly Loamy Sand	20	10	Structureless	Friable	
75-78	B_B	10 YR 5/6	--	--	--	Gravelly Loamy Sand	15	<5	Weak Subangular	Friable	
78-144	C_1	10 YR 4/2	--	--	--	Very Gravelly Fine to Coarse Sand	45	15	Single Grain	Loose	

Additional Notes:

Groundwater Observed: No

If Yes; Depth Weeping from Pit Face: No

Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC		Date: 10/04/2012
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA		Time: 8:00
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 52.0			Weather : Overcast - 60°F

Deep Hole Number: TP-SH-407 Location (Identify on site Plan):

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-30	Fill	10 YR 6/2	--	--	--	Loamy Sand	10	<5	Structureless	Friable	
30-84	C_1	10 YR 7/1	60-75	7.5 YR 7/8	15	Silt Loam	<5	--	Single Grain	Loose	1
84-144	C_2	10 YR 5/2	--	--	--	Very Gravelly Fine to Coarse Sand	35	10	Single Grain	Loose	

Additional Notes:
1. Redoximorphic features not indicative of seasonal high groundwater due absence of consistent concentrations and depletions and no observation of groundwater at full excavation depth.

Groundwater Observed: No If Yes; Depth Weeping from Pit Face: No Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location:	University Station	Client Name:	Westwood Marketplace Holdings, LLC	Date:	10/04/2012
Site Address:	University Avenue, Westwood, MA	Client Address:	One Wells Avenue, Newton, MA	Time:	8:40
Project No.:	2707.07				
Ground Surface Elev. (ft):	± 55.0			Weather :	Overcast - 60°F

Deep Hole Number: TP-SH-408

Location (Identify on site Plan):

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-47	Fill	10 YR 6/3	--	--	--	Loamy Sand	20	15	Structureless	Friable	
47-53	Buried Asphalt	--	--	--	--	--	--	--	--	--	
53-144	C_1	10 YR 7/2	--	--	--	Silt Loam	<5	--	Single Grain	Loose	1

Additional Notes:

1. 4-inch, grey PVC conduit encountered at a depth of approximately 5 feet. 24-inch RCP pipe encountered at a depth of approximately 5.5 feet.

Groundwater Observed: No   If Yes; Depth Weeping from Pit Face: No   Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC	Date: 10/03/2012	
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA	Time: 14:00	
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 55.0		Weather : Overcast, Showers - 60°F	

Deep Hole Number: TP-SH-409

Location (Identify on site Plan):

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-63	Fill	10 YR 6/3	--	--	--	Gravelly Loamy Sand	20	15	Structureless	Friable	
63-90	Fill	10 YR 6/3	--	--	--	Gravelly Loamy Sand	20	10	Structureless	Friable	
90-144	C_1	10 YR 4/2	--	--	--	Very Gravelly Fine to Coarse Sand	45	15	Single Grain	Loose	

Additional Notes:

Groundwater Observed: No

If Yes; Depth Weeping from Pit Face: No

Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location:	University Station	Client Name:	Westwood Marketplace Holdings, LLC	Date:	11/06/2012
Site Address:	University Avenue, Westwood, MA	Client Address:	One Wells Avenue, Newton, MA	Time:	8:00
Project No.:	2707.07				
Ground Surface Elev. (ft):	± 53.5			Weather :	Sunny - 40°F

Deep Hole Number: TP-SH-410

Location (Identify on site Plan): TP-SH-410

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-22	Fill	10 YR 6/3	--	--	--	Gravelly Loamy Sand	20	10	Structureless	Friable	
22-52	C_1	10 YR 7/1	22-52	7.5 YR 5/8	10	Silt Loam	<5	--	Single Grain	Friable	1
52-144	C_2	10 YR 6/1	--	--	--	Gravelly Loamy Sand	20	5	Single Grain	Friable	

Additional Notes:

1. Redoximorphic features not indicative of seasonal high groundwater due absence of consistent concentrations and depletions and no observation of groundwater at full excavation depth.

Groundwater Observed: No

If Yes; Depth Weeping from Pit Face: No

Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC	Date: 11/06/2012	
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA	Time: 7:30	
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 54		Weather : Sunny - 40°F	

Deep Hole Number: TP-SH-411   Location (Identify on site Plan): TP-SH-411

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-24	Fill	10 YR 6/3	--	--	--	Gravelly Loamy Sand	20	<5	Structureless	Friable	
24-34	B_w	10 YR 5/6	--	--	--	Sandy Loam	5	--	Single Grain	Friable	
34-144	C_1	10 YR 7/1	--	--	--	Silt Loam	<5	--	Single Grain	Loose	

Additional Notes:

Groundwater Observed: No   If Yes; Depth Weeping from Pit Face: No   Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC	Date: 11/06/2012	
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA	Time: 11:00	
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 56		Weather : Sunny - 40°F	

Deep Hole Number: TP-SH-412   Location (Identify on site Plan): TP-SH-412

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-48	Fill	10 YR 6/3	--	--	--	Gravelly Loamy Sand	20	10	Structureless	Friable	
48-144	C_1	10 YR 4/2	--	--	--	Gravelly Fine to Coarse Sand	30	5	Single Grain	Loose	

Additional Notes:

Groundwater Observed: No   If Yes; Depth Weeping from Pit Face: No   Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >144"

Test Pit Logs

Site Location: University Station	Client Name: Westwood Marketplace Holdings, LLC		Date: 11/06/2012
Site Address: University Avenue, Westwood, MA	Client Address: One Wells Avenue, Newton, MA		Time: 13:00
Project No.: 2707.07			
Ground Surface Elev. (ft): ± 57			Weather : Sunny - 40°F

Deep Hole Number: TP-SH-413 Location (Identify on site Plan): TP-SH-413

Depth (inches)	Soil Horizon or Layer	Soil Matrix Color (Moist)	Redoximorphic Features			Soil Texture (NRCS)	Coarse Fragments (% by Volume)		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles			
0-108	Concrete Fill	10 YR 5/1	--	--	--	Soil Component Sandy Loam	15	70	Structureless	Loose	1
108-116	C_1	10 YR 4/4	108-116	5 YR 5/6	30	Sandy Loam	15	<5	Single Grain	Loose	2
116-174	C_2	10 YR 6/1	--	--	--	Silt Loam	10	--	Single Grain	Loose	

Additional Notes:

1. Fill composed primarily of crushed concrete and recycled demolition debris (brick, rebar, etc.).
2. Redoximorphic features not indicative of seasonal high groundwater due absence of consistent concentrations and depletions and no observation of groundwater at full excavation depth.

Groundwater Observed: No If Yes; Depth Weeping from Pit Face: No Standing Water in the Hole: No

Estimated Depth to Seasonal High Ground Water: >174"

ATTACHMENT B

FALLING-HEAD PERMEAEMETER TEST LOGS

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 10/3/2012
	Project Location: Westwood, MA	Finish Date: 10/3/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-401
Approximate Ground Surface Elev. (ft.):	53.0
Test Depth (in.):	96
Test Elev. (ft.):	45

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	33.4	28.7	25.1		29.1
Measured Hydraulic Conductivity (in/hr):	25.1				
Design Hydraulic Conductivity (in/hr):	12.5				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 10/4/2012
	Project Location: Westwood, MA	Finish Date: 10/4/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-402
Approximate Ground Surface Elev. (ft.):	53.0
Test Depth (in.):	54
Test Elev. (ft.):	48.5

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	76.5	57.5	40.0		58.0
Measured Hydraulic Conductivity (in/hr):	40.0				
Design Hydraulic Conductivity (in/hr):	20.0				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 10/4/2012
	Project Location: Westwood, MA	Finish Date: 10/4/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-403
Approximate Ground Surface Elev. (ft.):	52.0
Test Depth (in.):	30
Test Elev. (ft.):	49.5

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	1.6	0.9			1.2
Measured Hydraulic Conductivity (in/hr):	0.9				
Design Hydraulic Conductivity (in/hr):	0.4				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 10/4/2012
	Project Location: Westwood, MA	Finish Date: 10/4/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-406
Approximate Ground Surface Elev. (ft.):	54.0
Test Depth (in.):	84
Test Elev. (ft.):	47.0

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	198.9	177.1	160.6		178.9
Measured Hydraulic Conductivity (in/hr):	160.6				
Design Hydraulic Conductivity (in/hr):	80.3				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 10/4/2012
	Project Location: Westwood, MA	Finish Date: 10/4/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-407
Approximate Ground Surface Elev. (ft.):	52.0
Test Depth (in.):	60
Test Elev. (ft.):	47.0

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	2.4	1.2			1.8
Measured Hydraulic Conductivity (in/hr):	1.2				
Design Hydraulic Conductivity (in/hr):	0.6				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 10/4/2012
	Project Location: Westwood, MA	Finish Date: 10/4/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-408
Approximate Ground Surface Elev. (ft.):	55.0
Test Depth (in.):	60
Test Elev. (ft.):	50.0

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	1.1	0.9			1.0
Measured Hydraulic Conductivity (in/hr):	0.9				
Design Hydraulic Conductivity (in/hr):	0.5				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 11/6/2012
	Project Location: Westwood, MA	Finish Date: 11/6/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-410
Approximate Ground Surface Elev. (ft.):	53.5
Test Depth (in.):	54
Test Elev. (ft.):	49.0

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	1.9	1.5			1.7
Measured Hydraulic Conductivity (in/hr):	1.5				
Design Hydraulic Conductivity (in/hr):	0.7				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 11/6/2012
	Project Location: Westwood, MA	Finish Date: 11/6/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-411
Approximate Ground Surface Elev. (ft.):	54.0
Test Depth (in.):	40
Test Elev. (ft.):	50.7

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	1.3	1.1			1.2
Measured Hydraulic Conductivity (in/hr):	1.1				
Design Hydraulic Conductivity (in/hr):	0.6				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 11/6/2012
	Project Location: Westwood, MA	Finish Date: 11/6/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-412
Approximate Ground Surface Elev. (ft.):	56.0
Test Depth (in.):	54
Test Elev. (ft.):	51.5

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	38.1	37.2	36.9		37.7
Measured Hydraulic Conductivity (in/hr):	36.9				
Design Hydraulic Conductivity (in/hr):	18.5				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

Falling-Head Permeameter Test Log

SANBORN HEAD	Project Name: University Station	Start Date: 11/6/2012
	Project Location: Westwood, MA	Finish Date: 11/6/2012
	Project No: 2707.07	Test Performed By: L. Norton

Falling-Head Permeability Test Pit Number:	TP-SH-413
Approximate Ground Surface Elev. (ft.):	57.0
Test Depth (in.):	120
Test Elev. (ft.):	47.0

	Trial 1	Trial 2	Trial 3	Trial 4	Average
Trial Hydraulic Conductivity (in/hr):	0.7	0.6			0.6
Measured Hydraulic Conductivity (in/hr):	0.6				
Design Hydraulic Conductivity (in/hr):	0.3				

Comments:
1. The trial hydraulic conductivitiy is calculated using the Hvorslev (1951) Method - "Basic Time Lag, Falling Head Permeability, Flush Bottom in Uniform Soil".
2. The measured hydraulic conductivity is calculated as the last trial hydraulic conductivity or the average hydraulic conductivity, whichever is lowest.
2. The design hydraulic conductivity for the stormwater infiltration system is required to be one half of the measured infiltration rate according to the Commonwealth of Massachusetts Stormwater Handbook (2008).

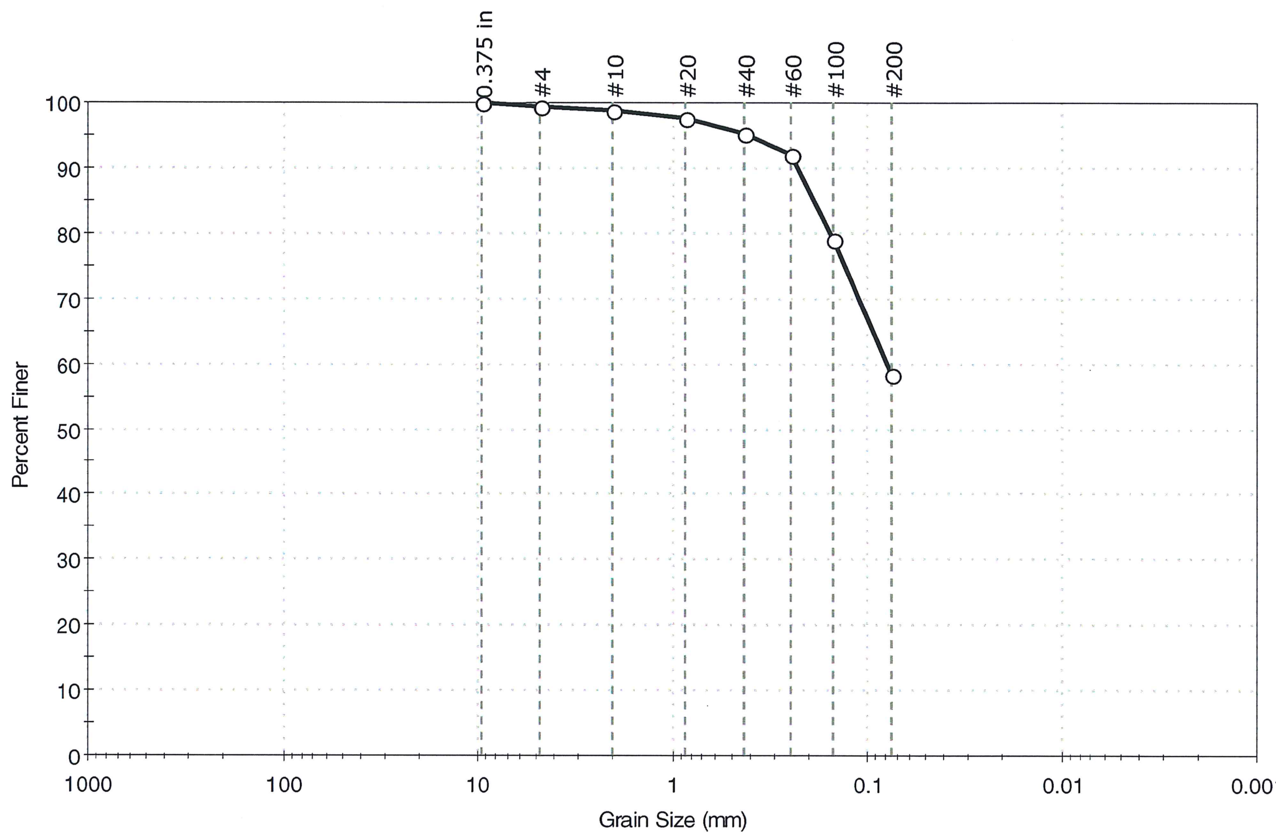
ATTACHMENT C

SOIL LABORATORY REPORTS

GeoTesting EXPRESS

Client:	Sanborn, Head & Associates				
Project:	University Station				
Location:	Westwood, MA			Project No:	GTX-12306
Boring ID:	TP-SH-303	Sample Type:	bag	Tested By:	jbr
Sample ID:	C1	Test Date:	10/11/12	Checked By:	jdt
Depth :	10-144 in.	Test Id:	251701		
Test Comment:	---				
Sample Description:	Moist, light yellowish brown sandy silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.6	40.9	58.5

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	99		
#20	0.85	98		
#40	0.42	95		
#60	0.25	92		
#100	0.15	79		
#200	0.075	59		

Coefficients

D_{85} = 0.1896 mm
D_{30} = N/A
D_{60} = 0.0789 mm
D_{15} = N/A
D_{50} = N/A
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample/Test Description

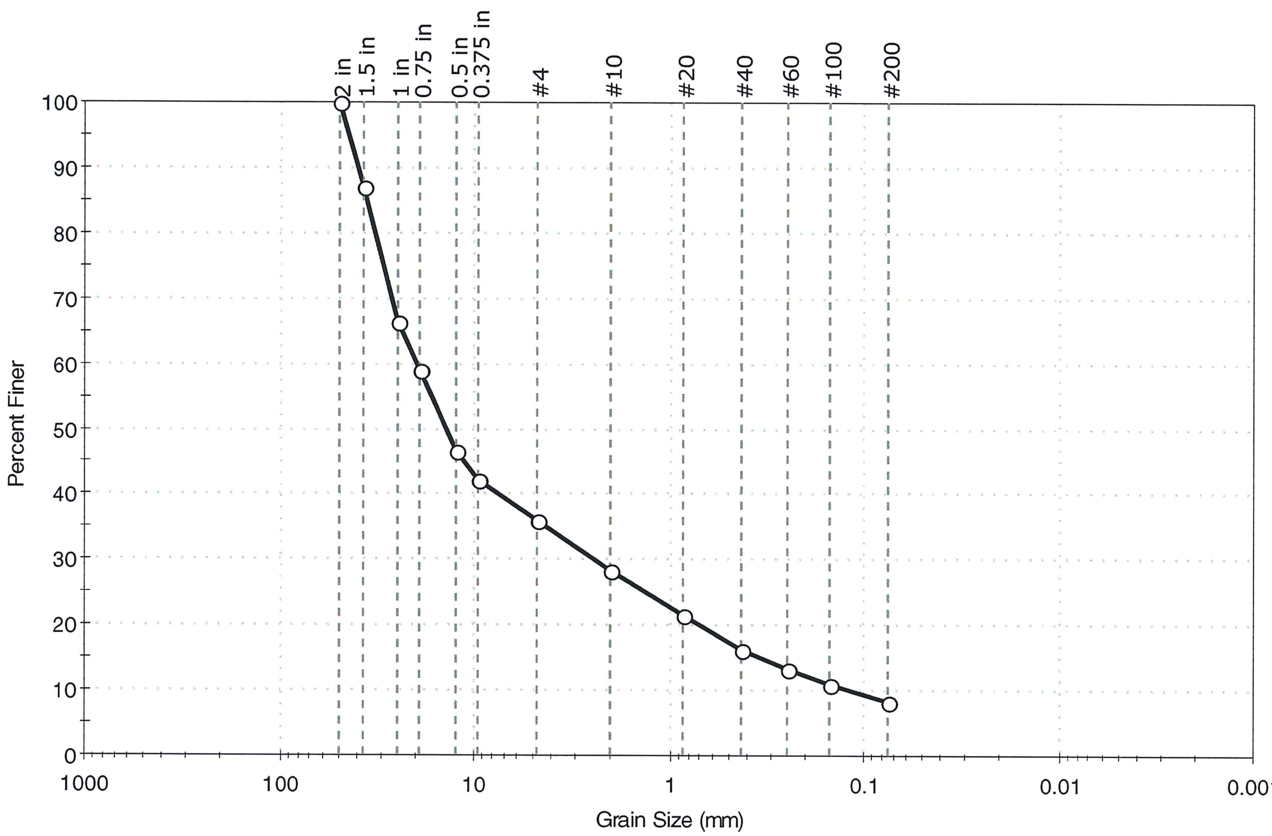
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

printed 10/19/2012 12:45:06 PM

Client:	Sanborn, Head & Associates		
Project:	University Station		
Location:	Westwood, MA	Project No:	GTX-12306
Boring ID: TP-SH-306	Sample Type: bag	Tested By:	jbr
Sample ID:C1	Test Date: 10/09/12	Checked By:	jdt
Depth : 78-144 in.	Test Id: 251702		
Test Comment:	---		
Sample Description:	Moist, light olive brown gravel with silt and sand		
Sample Comment:	---		

Particle Size Analysis - ASTM D 422-63 (reapproved 2002)



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	64.1	27.5	8.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
2 in	50.00	100		
1.5 in	37.50	87		
1 in	25.00	66		
0.75 in	19.00	59		
0.5 in	12.50	47		
0.375 in	9.50	42		
#4	4.75	36		
#10	2.00	28		
#20	0.85	21		
#40	0.42	16		
#60	0.25	13		
#100	0.15	11		
#200	0.075	8		

Coefficients

D_{85} =36.0523 mm — D_{30} =2.4333 mm

D_{60} =19.7710 mm — D_{15} =0.3375 mm

D_{50} =14.0510 mm — D_{10} =0.1174 mm

C_u =168.407 — C_c =2.551

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-a (0))

Sample/Test Description

Sand/Gravel Particle Shape : ROUNDED

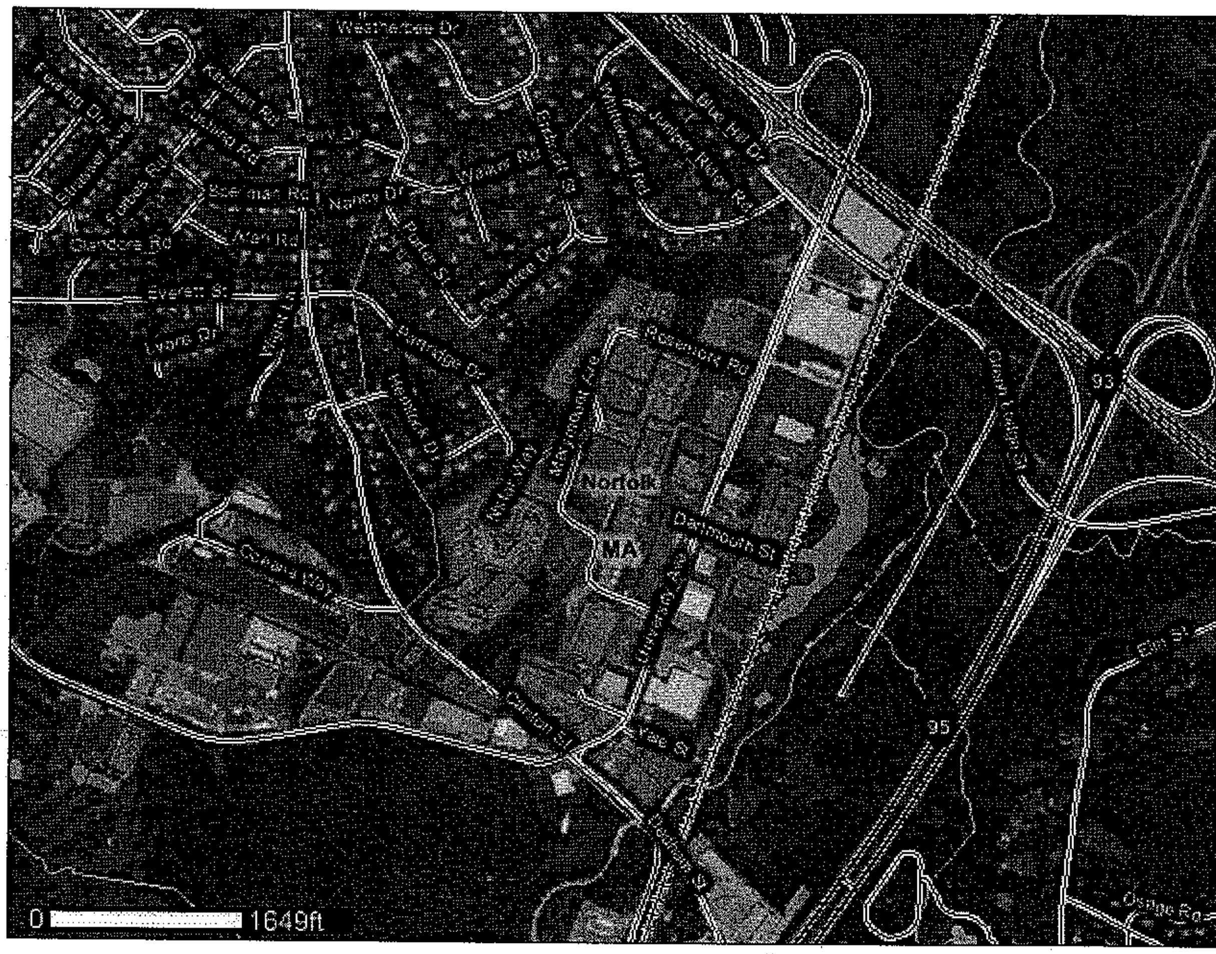
Sand/Gravel Hardness : HARD

USDA United States Department of Agriculture

NRCS Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Norfolk and Suffolk Counties, Massachusetts



October 8, 2012

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

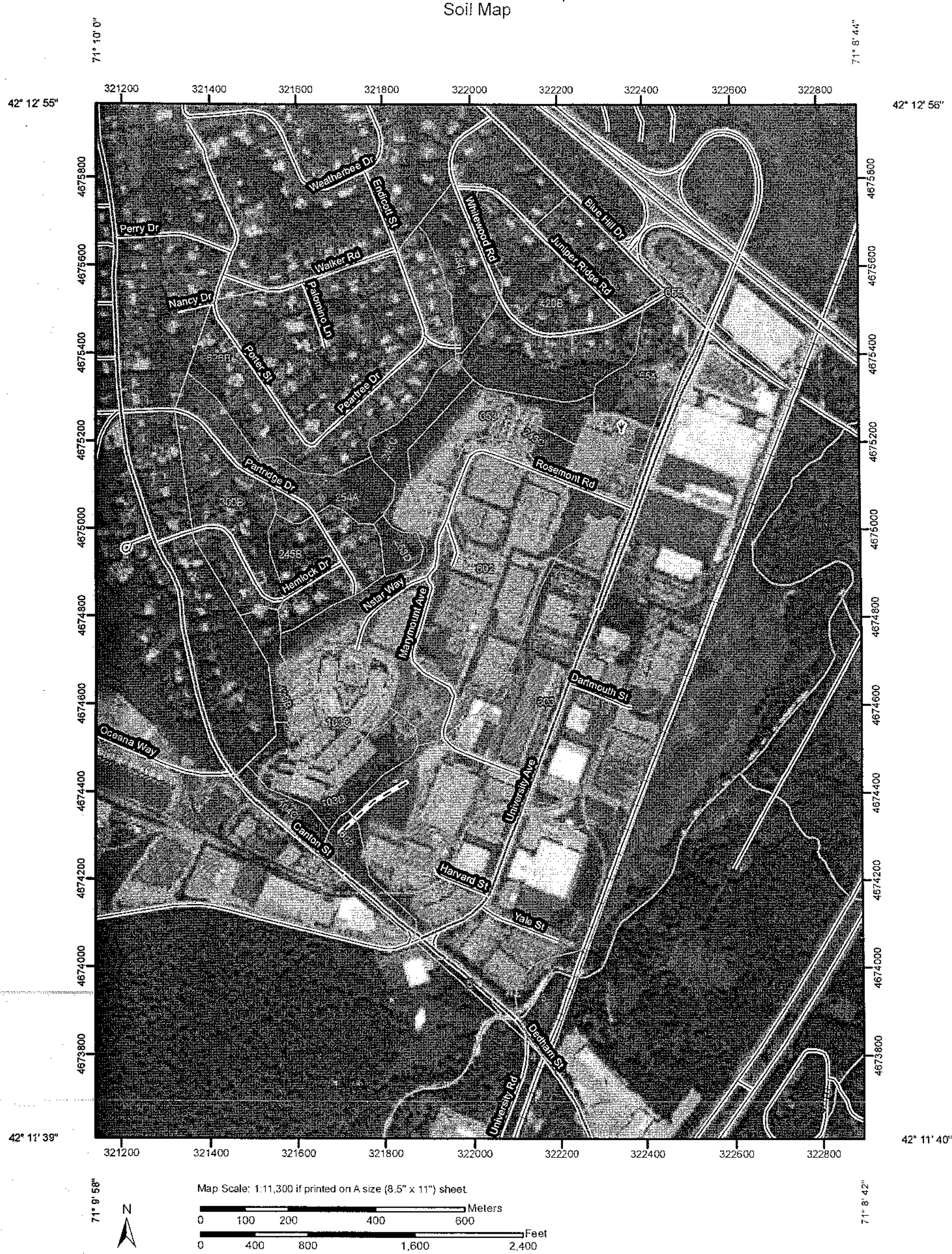
Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:11,300 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 8, Jul 23, 2010

Date(s) aerial images were photographed: 7/10/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Norfolk and Suffolk Counties, Massachusetts (MA616)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
4	Rippowam silt loam, 0 to 3 percent slopes	0.3	0.1%
5	Saco silt loam, 0 to 3 percent slopes	6.6	1.5%
103C	Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes	8.5	2.0%
103D	Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes	10.6	2.5%
104C	Hollis-Rock outcrop-Charlton complex, 3 to 15 percent slopes	3.4	0.8%
245B	Hinckley sandy loam, 3 to 8 percent slopes	12.5	2.9%
245C	Hinckley sandy loam, 8 to 15 percent slopes	10.1	2.4%
253D	Hinckley loamy sand, 15 to 35 percent slopes	2.2	0.5%
254A	Merrimac fine sandy loam, 0 to 3 percent slopes	7.8	1.8%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	9.4	2.2%
300B	Montauk fine sandy loam, 3 to 8 percent slopes	19.6	4.6%
420B	Canton fine sandy loam, 3 to 8 percent slopes	41.9	9.9%
602	Urban land, 0 to 15 percent slopes	67.4	15.8%
603	Urban land, wet substratum, 0 to 3 percent slopes	148.8	35.0%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	52.8	12.4%
653	Udorthents, sandy	11.1	2.6%
654	Udorthents, loamy	11.8	2.8%
655	Udorthents, wet substratum	0.4	0.1%
Totals for Area of Interest		**425.1**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Norfolk and Suffolk Counties, Massachusetts

4—Rippowam silt loam, 0 to 3 percent slopes

Map Unit Setting

Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Rippowam and similar soils: 80 percent
Minor components: 20 percent

Description of Rippowam

Setting

Landform: Alluvial flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Friable coarse-loamy alluvium over loose sandy alluvium

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 45 inches to strongly contrasting textural stratification
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 18 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: Very low (about 2.9 inches)

Interpretive groups

Land capability (nonirrigated): 4w

Typical profile

0 to 10 inches: Fine sandy loam
10 to 18 inches: Fine sandy loam
18 to 60 inches: Stratified coarse sand to loamy fine sand

Minor Components

Saco

Percent of map unit: 10 percent
Landform: Alluvial flats

Occum

Percent of map unit: 5 percent

Winooski

Percent of map unit: 5 percent

5—Saco silt loam, 0 to 3 percent slopes

Map Unit Setting

Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Saco and similar soils: 85 percent
Minor components: 15 percent

Description of Saco

Setting

Landform: Alluvial flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Soft coarse-silty alluvium

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: 40 to 80 inches to strongly contrasting textural stratification
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Available water capacity: Very high (about 13.2 inches)

Interpretive groups

Land capability (nonirrigated): 6w

Typical profile

0 to 26 inches: Silt loam
26 to 58 inches: Silt loam
58 to 60 inches: Stratified coarse sand to loamy fine sand

Minor Components

Freetown

Percent of map unit: 5 percent
Landform: Bogs

Rippowam

Percent of map unit: 4 percent
Landform: Alluvial flats

Swansea

Percent of map unit: 4 percent
Landform: Bogs

Scarboro

Percent of map unit: 2 percent
Landform: Terraces

103C—Charlton-Hollis-Rock outcrop complex, 8 to 15 percent slopes

Map Unit Setting

Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days

Map Unit Composition

Charlton and similar soils: 47 percent
Hollis and similar soils: 18 percent
Rock outcrop: 10 percent
Minor components: 25 percent

Description of Charlton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable coarse-loamy ablation till derived from granite

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 6 inches: Fine sandy loam
6 to 36 inches: Fine sandy loam
36 to 60 inches: Fine sandy loam

Description of Hollis

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Shallow, friable loamy ablation till derived from igneous rock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 3 inches: Fine sandy loam
3 to 14 inches: Gravelly fine sandy loam
14 to 18 inches: Unweathered bedrock

Description of Rock Outcrop

Setting

Parent material: Igneous and metamorphic rock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability (nonirrigated): 8s

Minor Components

Canton

Percent of map unit: 10 percent

Chatfield

Percent of map unit: 6 percent

Scituate

Percent of map unit: 5 percent

Montauk

Percent of map unit: 2 percent

Whitman

Percent of map unit: 2 percent
Landform: Depressions

103D—Charlton-Hollis-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days

Map Unit Composition

Charlton and similar soils: 35 percent
Hollis and similar soils: 25 percent
Rock outcrop: 20 percent
Minor components: 20 percent

Description of Charlton

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable coarse-loamy ablation till derived from granite

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 6 inches: Fine sandy loam
6 to 36 inches: Fine sandy loam
36 to 60 inches: Fine sandy loam

Description of Hollis

Setting

Landform: Hills
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Shallow, friable loamy ablation till derived from igneous rock

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 3 inches: Fine sandy loam
3 to 14 inches: Gravelly fine sandy loam
14 to 18 inches: Unweathered bedrock

Description of Rock Outcrop

Setting

Parent material: Igneous and metamorphic rock

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability (nonirrigated): 8s

Minor Components

Canton

Percent of map unit: 8 percent

Chatfield

Percent of map unit: 8 percent

Montauk

Percent of map unit: 4 percent

104C—Hollis-Rock outcrop-Charlton complex, 3 to 15 percent slopes

Map Unit Setting

Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days

Map Unit Composition

Hollis and similar soils: 40 percent
Charlton and similar soils: 25 percent
Rock outcrop: 25 percent
Minor components: 10 percent

Description of Hollis

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Shallow, friable loamy ablation till derived from igneous and metamorphic rock

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 3 inches: Fine sandy loam
3 to 14 inches: Gravelly fine sandy loam
14 to 18 inches: Unweathered bedrock

Description of Rock Outcrop

Setting

Parent material: Igneous and metamorphic rock

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: 0 inches to lithic bedrock

Interpretive groups

Land capability (nonirrigated): 8s

Description of Charlton

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy ablation till derived from granite

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.8 inches)

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 6 inches: Fine sandy loam
6 to 36 inches: Fine sandy loam
36 to 60 inches: Fine sandy loam

Minor Components

Canton

Percent of map unit: 5 percent

Chatfield

Percent of map unit: 5 percent

245B—Hinckley sandy loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 0 to 1,000 feet

Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition
Hinckley and similar soils: 80 percent
Minor components: 20 percent

Description of Hinckley

Setting
Landform: Outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loose sandy and gravelly glaciofluvial deposits

Properties and qualities
Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)

Interpretive groups
Land capability (nonirrigated): 3s

Typical profile
0 to 10 inches: Sandy loam
10 to 14 inches: Gravelly loamy sand
14 to 60 inches: Stratified very gravelly loamy fine sand to cobbly coarse sand

Minor Components

Windsor
Percent of map unit: 10 percent

Merrimac
Percent of map unit: 5 percent

Sudbury
Percent of map unit: 5 percent

245C—Hinckley sandy loam, 8 to 15 percent slopes

Map Unit Setting
Elevation: 0 to 1,000 feet

Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Hinckley and similar soils: 80 percent
Minor components: 20 percent

Description of Hinckley

Setting

Landform: Kame terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loose sandy and gravelly glaciofluvial deposits

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability (nonirrigated): 4s

Typical profile

0 to 10 inches: Sandy loam
10 to 14 inches: Gravelly loamy sand
14 to 60 inches: Stratified very gravelly loamy fine sand to cobbly coarse sand

Minor Components

Merrimac

Percent of map unit: 7 percent

Windsor

Percent of map unit: 7 percent

Canton

Percent of map unit: 4 percent

Sudbury

Percent of map unit: 2 percent

253D—Hinckley loamy sand, 15 to 35 percent slopes

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Hinckley and similar soils: 85 percent
Minor components: 15 percent

Description of Hinckley

Setting

Landform: Kames
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loose sandy and gravelly glaciofluvial deposits

Properties and qualities

Slope: 15 to 35 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.2 inches)

Interpretive groups

Land capability (nonirrigated): 7s

Typical profile

0 to 10 inches: Loamy sand
10 to 14 inches: Gravelly loamy sand
14 to 60 inches: Stratified very gravelly loamy fine sand to cobbly coarse sand

Minor Components

Windsor

Percent of map unit: 10 percent

Merrimac

Percent of map unit: 5 percent

254A—Merrimac fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Merrimac and similar soils: 90 percent
Minor components: 10 percent

Description of Merrimac

Setting

Landform: Outwash plains
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy eolian deposits over loose sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 18 to 30 inches to strongly contrasting textural stratification
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability (nonirrigated): 2s

Typical profile

0 to 19 inches: Fine sandy loam
19 to 23 inches: Gravelly loamy sand
23 to 60 inches: Stratified sand to very gravelly coarse sand

Minor Components

Hinckley

Percent of map unit: 5 percent

Sudbury

Percent of map unit: 3 percent

Udorthents

Percent of map unit: 2 percent

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent

Description of Merrimac

Setting

Landform: Outwash plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy eolian deposits over loose sandy glaciofluvial deposits

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 30 inches to strongly contrasting textural stratification
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability (nonirrigated): 2s

Typical profile

0 to 19 inches: Fine sandy loam
19 to 23 inches: Gravelly loamy sand
23 to 60 inches: Stratified sand to very gravelly coarse sand

Minor Components

Sudbury

Percent of map unit: 8 percent

Hinckley

Percent of map unit: 5 percent

Udorthents

Percent of map unit: 2 percent

300B—Montauk fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Montauk and similar soils: 85 percent
Minor components: 15 percent

Description of Montauk

Setting

Landform: Drumlins
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy eolian deposits over dense sandy lodgment till derived from granite and gneiss

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 38 inches to dense material
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low (0.02 to 0.06 in/hr)
Depth to water table: About 24 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.2 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 9 inches: Sandy loam
9 to 29 inches: Fine sandy loam
29 to 60 inches: Loamy sand

Minor Components

Canton

Percent of map unit: 7 percent

Paxton

Percent of map unit: 6 percent

Scituate

Percent of map unit: 2 percent

420B—Canton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

Elevation: 0 to 1,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Canton and similar soils: 80 percent
Minor components: 20 percent

Description of Canton

Setting

Landform: Ice-contact slopes
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy eolian deposits over loose sandy and gravelly ablation till

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 36 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.7 inches)

Interpretive groups

Land capability (nonirrigated): 2e

Typical profile

0 to 3 inches: Fine sandy loam
3 to 18 inches: Fine sandy loam
18 to 60 inches: Gravelly loamy sand

Minor Components

Charlton

Percent of map unit: 5 percent

Merrimac

Percent of map unit: 5 percent

Montauk

Percent of map unit: 5 percent

Scituate

Percent of map unit: 5 percent

602—Urban land, 0 to 15 percent slopes

Map Unit Setting

Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 120 to 200 days

Map Unit Composition

Urban land: 99 percent
Minor components: 1 percent

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Rock outcrops

Percent of map unit: 1 percent

603—Urban land, wet substratum, 0 to 3 percent slopes

Map Unit Setting

Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 120 to 200 days

Map Unit Composition

Urban land: 85 percent
Minor components: 15 percent

Description of Urban Land

Setting

Parent material: Excavated and filled land over herbaceous organic material and/or alluvium and/or marine deposits

Minor Components

Udorthents

Percent of map unit: 13 percent

Beaches

Percent of map unit: 2 percent

626B—Merrimac-Urban land complex, 0 to 8 percent slopes

Map Unit Setting

Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 120 to 240 days

Map Unit Composition

Merrimac and similar soils: 50 percent
Urban land: 30 percent
Minor components: 20 percent

Description of Merrimac

Setting

Landform: Outwash plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Friable coarse-loamy eolian deposits over loose sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 18 to 30 inches to strongly contrasting textural stratification
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 3.5 inches)

Interpretive groups

Land capability (nonirrigated): 2s

Typical profile

0 to 19 inches: Fine sandy loam
19 to 23 inches: Gravelly loamy sand
23 to 60 inches: Stratified sand to very gravelly coarse sand

Description of Urban Land

Setting

Parent material: Excavated and filled land

Minor Components

Windsor

Percent of map unit: 10 percent

Hinckley

Percent of map unit: 7 percent

Sudbury

Percent of map unit: 3 percent

653—Udorthents, sandy

Map Unit Setting

Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Udorthents and similar soils: 85 percent
Minor components: 15 percent

Description of Udorthents

Setting

Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Excavated and filled sandy glaciofluvial deposits

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 6 inches: Variable

6 to 60 inches: Variable

Minor Components

Udorthents

Percent of map unit: 8 percent

Urban land

Percent of map unit: 5 percent

Swansea

Percent of map unit: 2 percent
Landform: Bogs

654—Udorthents, loamy

Map Unit Setting

Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition

Udorthents and similar soils: 80 percent
Minor components: 20 percent

Description of Udorthents

Setting

Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Excavated and filled coarse-loamy human transported material

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability (nonirrigated): 6s

Typical profile

0 to 6 inches: Variable
6 to 60 inches: Variable

Minor Components

Udorthents,sandy
Percent of map unit: 8 percent

Udorthents,wet substr.
Percent of map unit: 8 percent

Urban land
Percent of map unit: 4 percent

655—Udorthents, wet substratum

Map Unit Setting
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days

Map Unit Composition
Udorthents and similar soils: 95 percent
Minor components: 5 percent

Description of Udorthents

Setting
Landform position (two-dimensional): Footslope, shoulder
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Excavated and filled sandy and gravelly human transported material over highly-decomposed herbaceous organic material

Properties and qualities
Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Minor Components

Urban land
Percent of map unit: 3 percent

Ipswich
Percent of map unit: 2 percent
Landform: Marshes