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SOIL SURVEYS & TEST BORINGS
PROPOSED COMMONS EXPANSION
& NORTH BUILDING

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Custom Soil Resource Report for Middlesex County, Massachusetts

December 8, 2015

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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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.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

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

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

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 map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

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

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 15, Sep 28, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 10, 2014—Aug 25, 2014

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

Middlesex County, Massachusetts (MA017)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
1	Water	1.4	4.1%
30B	Raynham silt loam, 0 to 5 percent slopes	2.8	8.1%
51A	Swansea muck, 0 to 1 percent slopes	0.0	0.0%
52A	Freetown muck, 0 to 1 percent slopes	4.9	14.3%
106C	Narragansett-Hollis-Rock outcrop complex, 3 to 15 percent slopes	7.5	21.9%
106D	Narragansett-Hollis-Rock outcrop complex, 15 to 25 percent slopes	5.7	16.7%
261A	Tisbury silt loam, 0 to 3 percent slopes	0.3	0.8%
415C	Narragansett silt loam, 8 to 15 percent slopes	7.4	21.8%
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	1.7	5.1%
652	Udorthents, refuse substratum	2.5	7.2%
654	Udorthents, loamy	0.0	0.1%
Totals for Area of Interest		**34.2**	**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.

Middlesex County, Massachusetts

1—Water

Map Unit Setting

National map unit symbol: 996p
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Setting

Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear

30B—Raynham silt loam, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 991x
Elevation: 50 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
Farmland classification: Not prime farmland

Map Unit Composition

Raynham and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Raynham

Setting

Landform: Depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy glaciolacustrine deposits and/or silty glaciolacustrine deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 33 inches: silt loam
H3 - 33 to 65 inches: silt

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 5 percent
Available water storage in profile: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D

Minor Components

Birdsall

Percent of map unit: 10 percent
Landform: Depressions, flats
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave

Wareham

Percent of map unit: 5 percent
Landform: Deltas, depressions, terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Raypol

Percent of map unit: 5 percent
Landform: Depressions, terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

51A—Swansea muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2trl2
Elevation: 0 to 1,140 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Swansea and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Swansea

Setting

Landform: Swamps, bogs
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material over loose sandy and gravelly glaciofluvial deposits

Typical profile

Oa1 - 0 to 24 inches: muck
Oa2 - 24 to 34 inches: muck
Cg - 34 to 79 inches: coarse sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water storage in profile: Very high (about 16.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8w
Hydrologic Soil Group: B/D

Minor Components

Freetown

Percent of map unit: 10 percent
Landform: Swamps, bogs
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

Scarboro

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

52A—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9
Elevation: 0 to 1,110 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Freetown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Swamps, bogs, depressions, depressions, kettles, marshes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water storage in profile: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D

Minor Components

Swansea

Percent of map unit: 5 percent
Landform: Kettles, marshes, swamps, bogs, depressions, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

106C—Narragansett-Hollis-Rock outcrop complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 98yk
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: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Narragansett and similar soils: 45 percent
Hollis and similar soils: 20 percent
Rock outcrop: 10 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable silty eolian deposits and/or friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from metamorphic rock and/or friable sandy basal till derived from metamorphic rock

Typical profile

H1 - 0 to 2 inches: slightly decomposed plant material
H2 - 2 to 7 inches: silt loam
H3 - 7 to 35 inches: silt loam
H4 - 35 to 60 inches: very gravelly loamy sand
H5 - 60 to 65 inches: very gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 18 to 35 inches to strongly contrasting textural stratification
Natural 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 storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Description of Hollis

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest, head slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Typical profile

H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 14 inches: fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural 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 storage in profile: Very low (about 2.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Granite and gneiss

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

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Minor Components

Canton
Percent of map unit: 9 percent
Landform: Hills
Landform position (two-dimensional): Toeslope, backslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Linear
Across-slope shape: Convex

Charlton
Percent of map unit: 6 percent
Landform: Hills, swales
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Unnamed
Percent of map unit: 5 percent

Scituate
Percent of map unit: 5 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Summit, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Linear
Across-slope shape: Concave

106D—Narragansett-Hollis-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 98yl
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: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Narragansett and similar soils: 45 percent
Hollis and similar soils: 20 percent
Rock outcrop: 10 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable silty eolian deposits and/or friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from metamorphic rock and/or friable sandy basal till derived from metamorphic rock

Typical profile

H1 - 0 to 2 inches: slightly decomposed plant material
H2 - 2 to 7 inches: silt loam
H3 - 7 to 35 inches: silt loam
H4 - 35 to 60 inches: very gravelly loamy sand
H5 - 60 to 65 inches: very gravelly loamy sand

Properties and qualities

Slope: 15 to 25 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 18 to 35 inches to strongly contrasting textural stratification
Natural 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 storage in profile: Moderate (about 6.4 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Description of Hollis

Setting
Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, crest
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Typical profile
H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 14 inches: fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities
Slope: 15 to 25 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural 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 storage in profile: Very low (about 2.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Granite and gneiss

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

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Minor Components

Unnamed

Percent of map unit: 9 percent

Canton

Percent of map unit: 8 percent
Landform: Hills
Landform position (two-dimensional): Toeslope, backslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Linear
Across-slope shape: Convex

Charlton

Percent of map unit: 8 percent
Landform: Swales, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex

261A—Tisbury silt loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 9918
Elevation: 100 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
Farmland classification: All areas are prime farmland

Map Unit Composition

Tisbury and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tisbury

Setting

Landform: Terraces, plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Friable loamy eolian deposits over loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 34 inches: very fine sandy loam
H3 - 34 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Natural drainage class: Moderately well 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 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C

Minor Components

Scio

Percent of map unit: 5 percent
Landform: Depressions, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave

Wareham

Percent of map unit: 5 percent
Landform: Depressions, terraces, deltas
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Raypol

Percent of map unit: 5 percent
Landform: Depressions, terraces
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

415C—Narragansett silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: vqrq
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
Farmland classification: Farmland of statewide importance

Map Unit Composition

Narragansett and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable loamy eolian deposits and/or friable silty eolian deposits over loose sandy glaciofluvial deposits derived from metamorphic rock and/or friable sandy basal till derived from metamorphic rock

Typical profile

H1 - 0 to 2 inches: slightly decomposed plant material
H2 - 2 to 7 inches: silt loam
H3 - 7 to 35 inches: silt loam
H4 - 35 to 60 inches: very gravelly loamy sand
H5 - 60 to 65 inches: very gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 18 to 35 inches to strongly contrasting textural stratification
Natural 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 storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A

Minor Components

Haven

Percent of map unit: 10 percent
Landform: Plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex

Canton

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex

Windsor

Percent of map unit: 5 percent
Landform: Deltas, terraces, flats
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, rise
Down-slope shape: Convex
Across-slope shape: Convex

631C—Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky

Map Unit Setting

National map unit symbol: vr1g
Elevation: 0 to 1,000 feet
Mean annual precipitation: 32 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 40 percent
Charlton and similar soils: 40 percent
Hollis and similar soils: 10 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton

Setting

Landform: Drumlins, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear

Across-slope shape: Convex
Parent material: Friable loamy eolian deposits over friable loamy basal till derived from granite and gneiss

Typical profile
H1 - 0 to 5 inches: fine sandy loam
H2 - 5 to 22 inches: sandy loam
H3 - 22 to 65 inches: gravelly sandy loam

Properties and qualities
Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural 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 storage in profile: Moderate (about 7.3 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A

Description of Urban Land

Setting
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Excavated and filled land

Description of Hollis

Setting
Landform: Ridges, hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Typical profile
H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 14 inches: fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities
Slope: 3 to 15 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural 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 storage in profile: Very low (about 2.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Minor Components

Canton
Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope, toeslope
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Convex

Udorthents, loamy
Percent of map unit: 2 percent

Rock outcrop
Percent of map unit: 2 percent
Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave

Scituate
Percent of map unit: 1 percent
Landform: Depressions, hillslopes
Landform position (two-dimensional): Toeslope, summit
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Linear
Across-slope shape: Concave

Montauk
Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Nose slope, head slope
Down-slope shape: Convex
Across-slope shape: Convex

652—Udorthents, refuse substratum

Map Unit Setting
National map unit symbol: vr1j

Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, refuse substratum, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Refuse Substratum

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till over refuse

Properties and qualities

Slope: 0 to 25 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

Pits, gravel

Percent of map unit: 10 percent
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Concave

Udorthents, sandy

Percent of map unit: 5 percent

Udorthents, loamy

Percent of map unit: 3 percent

Udorthents, wet substratum

Percent of map unit: 2 percent

654—Udorthents, loamy

Map Unit Setting

National map unit symbol: vr1l
Elevation: 0 to 3,000 feet
Mean annual precipitation: 32 to 50 inches
Mean annual air temperature: 45 to 50 degrees F
Frost-free period: 110 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, loamy, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Loamy

Setting

Parent material: Loamy alluvium and/or sandy glaciofluvial deposits and/or loamy glaciolacustrine deposits and/or loamy marine deposits and/or loamy basal till and/or loamy lodgment till

Properties and qualities

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

Udorthents, sandy

Percent of map unit: 10 percent

Udorthents, wet substratum

Percent of map unit: 5 percent

Urban land

Percent of map unit: 5 percent
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Linear

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Basic Search

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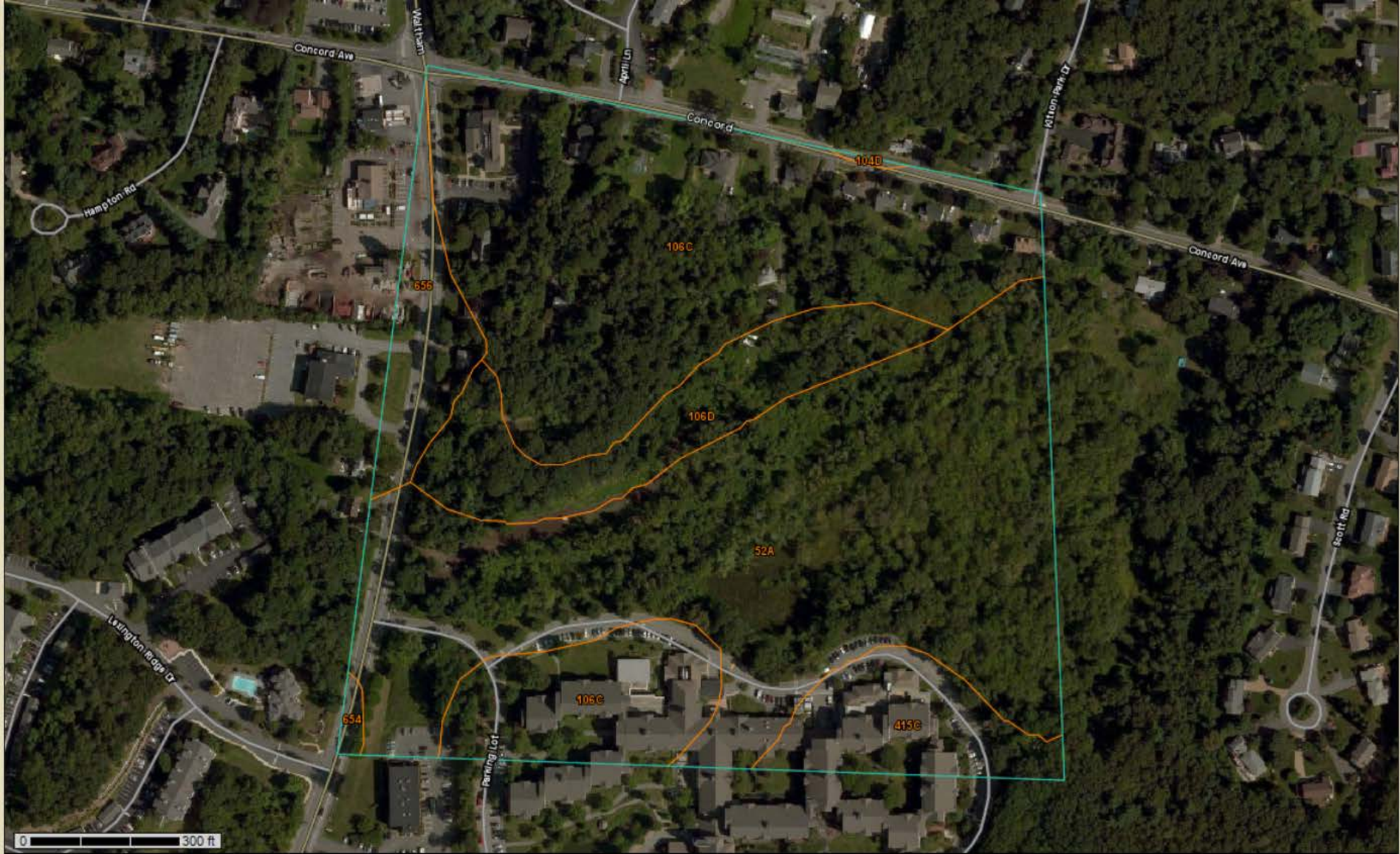
Map Unit Legend

Middlesex County, Massachusetts (MA017)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
52A	Freetown muck, 0 to 1 percent slopes	16.7	41.5%
104D	Hollis-Rock outcrop-Charlton complex, 15 to 25 percent slopes	0.0	0.1%
106C	Narragansett-Hollis-Rock outcrop complex, 3 to 15 percent slopes	15.6	38.8%
106D	Narragansett-Hollis-Rock outcrop complex, 15 to 25 percent slopes	3.6	8.9%
415C	Narragansett silt loam, 8 to 15 percent slopes	2.4	5.9%
654	Udorthents, loamy	0.1	0.4%
656	Udorthents-Urban land complex	1.8	4.4%
Totals for Area of Interest		**40.1**	**100.0%**



Middlesex County, Massachusetts

52A—Freetown muck, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2t2q9
Elevation: 0 to 1,110 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Freetown and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Freetown

Setting

Landform: Swamps, bogs, depressions, depressions, kettles, marshes
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Highly decomposed organic material

Typical profile

Oe - 0 to 2 inches: mucky peat
Oa - 2 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Percent of area covered with surface fragments: 0.0 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
Available water storage in profile: Very high (about 19.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: B/D

Minor Components

Swansea

Percent of map unit: 5 percent
Landform: Kettles, marshes, swamps, bogs, depressions, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Scarboro

Percent of map unit: 5 percent
Landform: Depressions, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope, tread, dip
Down-slope shape: Concave
Across-slope shape: Concave

Whitman

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 15, Sep 28, 2015

Middlesex County, Massachusetts

106D—Narragansett-Hollis-Rock outcrop complex, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 98yl
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: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Narragansett and similar soils: 45 percent
Hollis and similar soils: 20 percent
Rock outcrop: 10 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable silty eolian deposits and/or friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from metamorphic rock and/or friable sandy basal till derived from metamorphic rock

Typical profile

H1 - 0 to 2 inches: slightly decomposed plant material
H2 - 2 to 7 inches: silt loam
H3 - 7 to 35 inches: silt loam
H4 - 35 to 60 inches: very gravelly loamy sand
H5 - 60 to 65 inches: very gravelly loamy sand

Properties and qualities

Slope: 15 to 25 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 18 to 35 inches to strongly contrasting textural stratification
Natural 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 storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Description of Hollis

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Head slope, crest
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Typical profile

H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 14 inches: fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 15 to 25 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural 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 storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Granite and gneiss

Properties and qualities

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

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Minor Components

Unnamed

Percent of map unit: 9 percent

Canton

Percent of map unit: 8 percent
Landform: Hills
Landform position (two-dimensional): Toeslope, backslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Linear
Across-slope shape: Convex

Charlton

Percent of map unit: 8 percent
Landform: Swales, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 15, Sep 28, 2015

Middlesex County, Massachusetts

106C—Narragansett-Hollis-Rock outcrop complex, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 98yk
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: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Narragansett and similar soils: 45 percent
Hollis and similar soils: 20 percent
Rock outcrop: 10 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Narragansett

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable silty eolian deposits and/or friable loamy eolian deposits over loose sandy glaciofluvial deposits derived from metamorphic rock and/or friable sandy basal till derived from metamorphic rock

Typical profile

H1 - 0 to 2 inches: slightly decomposed plant material
H2 - 2 to 7 inches: silt loam
H3 - 7 to 35 inches: silt loam
H4 - 35 to 60 inches: very gravelly loamy sand
H5 - 60 to 65 inches: very gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 18 to 35 inches to strongly contrasting textural stratification
Natural 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 storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A

Description of Hollis

Setting

Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Crest, head slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Friable, shallow loamy basal till over granite and gneiss

Typical profile

H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 14 inches: fine sandy loam
H3 - 14 to 18 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 15 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural 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 storage in profile: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D

Description of Rock Outcrop

Setting

Landform: Ledges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Granite and gneiss

Properties and qualities

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

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8s

Minor Components

Canton

Percent of map unit: 9 percent
Landform: Hills
Landform position (two-dimensional): Toeslope, backslope
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Linear
Across-slope shape: Convex

Charlton

Percent of map unit: 6 percent
Landform: Hills, swales
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Convex
Across-slope shape: Convex

Unnamed

Percent of map unit: 5 percent

Scituate

Percent of map unit: 5 percent
Landform: Hillslopes, depressions
Landform position (two-dimensional): Summit, toeslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Linear
Across-slope shape: Concave

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 15, Sep 28, 2015

FORM 11 - SOIL EVALUATOR FORM

No. 151067 Date: 11/13/15

Commonwealth of Massachusetts
Lexington, Massachusetts

Soil Suitability Assessment for Stormwater Management

Performed by: Nicholas Pauling, PE, GPR, Inc. Date: 11/13/15
Witnessed by: - Unwitnessed -

Location Address: or Lot No. 960 Waltham Street Lexington, MA	Owner's Name: Brookhaven Address: 1010 Waltham Street Lexington, MA Telephone No. N/A

New Construction ☑ Upgrade ☐ Repair ☐

Office Review

Published Soil Survey Available: No ☐ Yes ☑

Year Published Internet Publication Scale na Soil Map Unit 52A, 106C , 106D
Soil Name Freetown Muck Soil Limitations Poorly Drained/Saturated
Soil Name Narragansett- Hollis Soil Limitations Depth to Bedrock
Soil Name Narragansett- Hollis Soil Limitations Depth to Bedrock

Surficial Geologic Report Available: No ☑ Yes ☐

Year Published Publication Scale
Geologic Material(Map Unit) Glacial Till
Landform Ground Morraine

Flood Insurance Rate Map: 250308 0005 B

Above 500 Year Flood Boundary No ☐ Yes ☑
Within 500 Year Flood Boundary No ☑ Yes ☐
Within 100 Year Flood Boundary No ☑ Yes ☐
Within Velocity Zone No ☑ Yes ☐

Wetland Area:

National Wetlands Inventory Map (map unit) N/A
Wetlands Conservancy Program Map (map unit) N/A

Current Water Resource Conditions (USGS): Month November
Range: Above Normal ☐ Normal ☐ Below Normal ☑
Other Reference Reviewed USGS

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 960 Waltham Street
Lexington, MA

On-Site Review

Deep Hole # : SWM-1 Date: 11/13/15 Time: 7:45 AM Weather: Clear, 48°
Location (identify on site plan) See Attached Sketch
Land Use Woodland Slope (%) 7 - 10% Surfaces Stones Many
(eg woodland, agricultural field, vacant lot etc…)
Vegatation mixed hardwoods and pines
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >100 feet Drainage Way >100 feet
Possible Wet Area 100± feet Property Line 87± feet
Drinking Water Well >100 feet Other:
feet

Deep Observation Hole Log

Hole # SWM-1 NB 27/11 Suface El. 225.5±

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0 - 11	A	SL	10YR 2/2	---	gr, mvfr, many roots
11 - 17	B	SL	10YR 3/6	---	sbk, mvfr
17 - 51	C	SL	2.5Y 4/4	@ 42" 5-10% f-m 5YR 6/8	ma, mvfr, boney, 15% cob, 5% g

Parent Material (geologic) Abalation Till Depth to Bedrock: > 51 inches
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 42 inches
Aditional Notes - large boulder at bottom of hole

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 960 Waltham Street
Lexington, MA

On-Site Review

Deep Hole # : SWM-2 Date: 11/13/15 Time: 8:18 AM Weather: Clear, 48°
Location (identify on site plan) See Attached Sketch
Land Use Woodland Slope (%) 10 - 12% Surfaces Stones many
(eg woodland, agricultural field, vacant lot etc…)
Vegatation mixed hardwoods and pines
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >100 feet Drainage Way >100 feet
Possible Wet Area 113± feet Property Line 165± feet
Drinking Water Well >100 feet Other:
feet

Deep Observation Hole Log

Hole # SWM-2 NB 27/11 Suface El. 229.6±

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0 - 9	A	SL	10YR 2/2	---	gr, mvfr, many roots
9 - 16	B	SL	10YR 3/6	---	sbk, mvfr
16 - 62	C	SL	2.5Y 4/4	@ 38" 5-10% f-m 5YR 6/8	ma, mvfr, boney, 20% cob, 5% g

Parent Material (geologic) Abalation Till Depth to Bedrock: > 62 inches
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 38 inches
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot #: 960 Waltham Street
Lexington, MA

On-Site Review

Deep Hole # : SWM-3 Date: 11/13/15 Time: 8:10 AM Weather: Clear, 48°
Location (identify on site plan) See Attached Sketch
Land Use Woodland Slope (%) 5 - 7% Surfaces Stones many
(eg woodland, agricultural field, vacant lot etc…)
Vegatation mixed hardwoods and pines
Landform Ground Morraine
Position on landscape See attached Sketch
Distances from:

Open Water Body >150 feet Drainage Way >150 feet
Possible Wet Area 69± feet Property Line >150 feet
Drinking Water Well >150 feet Other:
feet

Deep Observation Hole Log

Hole # SWM-3 NB 27/11 Suface El. 223.8±

Depth from Surface (inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (MUNSELL)	Soil Mottling	Other (Stucture, Stones, Boulders, Consistency, % Gravel)
0 - 9	A	SL	10YR 2/2	---	gr, mvfr, many roots
9 - 14	B	SL	10YR 3/6	---	sbk, mvfr
14 - 41	C	SL	2.5Y 4/4	@ 28" 5-10% f-m 5YR 6/8	ma, mvfr, boney, 15% cob, 5% g

Parent Material (geologic) Abalation Till Depth to Bedrock: > 41 inches
Depth to Groundwater: Standing Water in the Hole None Weeping from Pit Face: None
Estimated Seasonal High Groundwater in the Hole 28 inches
Aditional Notes

FORM 11 - SOIL EVALUATOR FORM

Location Address or Lot#: 960 Waltham Street
Lexington, MA

Determination for Seasonal High Water Table

Method Used:

- ☐ Depth observed standing in observation hole ..... inches .....
- ☐ Depth weeping from side of observation hole ..... inches .....
- ☑ Depth to soil mottles * inches See individual Reports
- ☐ Ground water adjustment ..... feet .....

Index Well Number ..... Reading Date ..... Index Well Level .....

Adjustment Factor ..... Adjusted Ground Water Level .....

Depth of Naturally Occuring Pervious Material

Does at least four feet of naturally occuring pervious material exist in all areas observed throughout the area proposed for the soil absorption system? Yes

If not, what is the depth of naturally occuring pervious material? _____ Feet

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct soil evaluations and that the above analysis has been performed by me consistent with the training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated, on the attached soil evaluation form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature Nicholas Pentney Date 11/13/15

Notes: _____

ADJUST EX. ENTRANCE FOR 5' MIN. SEPARATION TO PROPERTY LINE
"EMERGENCY ENTRANCE ONLY" SIGNS FACING WALTHAM ST.
EMERGENCY ACCESS ONLY
"NO EXIT" SIGNS
8" WET TAP TO EX. 10" WATERMAIN IN WALTHAM ST (FINAL SIZE TBD)
UTILITY POLE RELOCATION
BOLLARDS & CHAIN PROHIBITING VEHICULAR ACCESS FOR FIRE ACCESS ONLY
STREET LIGHTS (TYP.)
BURIED GARAGE STRUCTURE (SEE ARCH. DWGS)
RETAINING WALL AS NEEDED FOR FINAL GRADES
RETAINING WALL WITH GUARDRAIL AT END OF FIRE LANE
EXPOSED GARAGE STRUCTURE (SEE ARCH. DWGS)
FIRE LANE ACCESS ONLY W/ GUARDRAIL
FIRE LANE TURNAROUND
GARAGE PARKING SPACES
GARAGE ENTRANCE
NATURAL GAS SERVICE CONNECTION FROM WALTHAM ST.
EXPOSED GARAGE STRUCTURE (SEE ARCH. DWGS)
ACCESS #2 TO LEVEL 3 PLAZA
ACCESS #1 TO LEVEL 3 PLAZA
NORTH BUILDING MAIN ENTRANCE
STORMWATER RECHARGE SYSTEM #2
5' WALK (TYP.)
5' GRASS STRIP (TYP.)
RETAINING WALL AND GUARDRAIL ADJACENT TO ROADWAY
STORMWATER RECHARGE SYSTEM #1
CROSSWALK
PAVILLION #1 (SEE ARCH. DWGS)
8" SANITARY SEWER CONNECTION IN WALTHAM STREET
STORMWATER BASIN #1
BOLLARD LIGHTS (TYP.)
CHESTER BROOK MARKER SIGNS
ARCH SPAN CULVERT AND WINGWALLS
PAVILLION #2 (SEE ARCH. DWGS)
RICCI LANE HISTORIC MARKER
COMMUNICATIONS DUCT BANK CONNECTION BETWEEN NORTH BUILDING AND COMMONS EXPANSION
EX. STORMWATER DETENTION BASIN - TO BE MODIFIED
EX. IRRIGATION SHED (TO REMAIN)
25' BUFFER ZONE
N/F TOWN OF LEXINGTON 12180/310
AREA = 266,287±S.F. =6.11±ACRES
OHI B1
OHI B2
OHI B3
OHI B4
OHI B5
OHI B6
OHI B7
OHI B8
OHI B9
OHI B10
ACCESS TO PLAZA
WELLNESS/POOL UNIT
SKILLED NURSING UNIT
3 STY WOOD
1 STY BRICK
BRICK PATIO
STORMWATER RECHARGE SYSTEM #3
PORCH
FF=233.1' (FIELD)
FF=244'
GRAPHIC SCALE
(IN FEET)
1 INCH = 30 FEET

LEGEND

EXISTING		PROPOSED
	ELEVATION CONTOUR	
	SPOT GRADE	
	PROPERTY LINE	
	BUILDING ENVELOPE	
	AQUIFER PROTECTION DISTRICT	
	EDGE OF PAVEMENT	
	CHAINLINK FENCE	
	WATER MAIN	
	WATER SERVICE	
	WATER VALVE	
	FIRE HYDRANT	
	GRAVITY SEWER LINE	
	SEWER MANHOLE	
	GAS LINE	
	GAS VALVE	
	GAS METER	
	OVERHEAD POWER LINE	
	UTILITY POLE	
	GUY WIRE	
	ELECTRIC MANHOLE	
	ELECTRIC METER	
	STORM DRAIN	
	ROOF DRAIN	
	CATCH BASIN	
	LEACHING CATCH BASIN	
	SITE LUMINAIRE	
	BOLLARD	
	SIGN	
	ELEVATION BENCHMARK	
	SURFACE RUNOFF DIRECTION	
	STONE BOUND	
	IRON ROD	
	NUMBER OF PARKING SPACES	

ABBREVIATIONS

AC	ACRES	TP	TOP OF PAVEMENT
FT	FEET	TW	TOP OF WALL
L	LENGTH	BW	BOTTOM OF WALL
S	SLOPE	N/F	NOW OR FORMERLY
INV	INVERT	SF	SQUARE FEET
EL	ELEVATION	PVC	POLYVINYL CHLORIDE
R	RADIUS	HDPE	HIGH DENSITY POLYETHYLENE
DIA	DIAMETER	CB	CATCH BASIN
BOT	BOTTOM	CLF	CHAIN LINK FENCE
FF	FINISH FLOOR	UP	UTILITY POLE

NOTES

1. ELEVATIONS SHOWN TO AN EXISTING DATUM ALIGNED TO THE EXISTING BROOKHAVEN CAMPUS.

2. INFORMATION NORTH OF CHESTER BROOK IS BASED ON AN ON-THE-GROUND SURVEY BY GPR IN NOVEMBER 2015. OTHER INFORMATION IS SHOW FROM AVAILABLE RECORDS.

3. UTILITY LOCATIONS SHOWN ARE APPROXIMATE, SUBJECT TO FINAL ENGINEERING AND FINAL SITE CONDITIONS DURING CONSTRUCTION.

4. CONTRACTORS ARE RESPONSIBLE FOR VERIFYING THE LOCATION OF ALL EXISTING UTILITIES. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES IN UTILITY LOCATIONS AND ANY CONFLICTS DISCOVERED DURING CONSTRUCTION.

DRAWING ISSUED FOR:

- ■ CONCEPT
- ☐ CONSTRUCTION
- ☐ PERMIT
- ☐ CONSTRUCTION RECORD

PROPOSED CONCEPTS SHOWN ON THIS DRAWING MAY NOT COMPLY WITH LOCAL BYLAWS / ORDINANCES, AND MAY NOT BE RENDERED IN DETAIL SUFFICIENT FOR PERMITTING PURPOSES. THIS DRAWING IS NOT INTENDED FOR CONSTRUCTION.

NO.	DATE	BY	APP	REVISION DESCRIPTION

GPR Engineering Solutions for Land & Structures

GOLDSMITH, PREST & RINGWALL, INC.
39 MAIN STREET, SUITE 301, AYER, MA 01432
CIVIL ENGINEERING • LAND SURVEYING • LAND PLANNING
VOICE: 978.772.1690 FAX: 978.772.1691
www.gpr-inc.com

SITE/UTILITY PLAN

NORTH BUILDING & COMMONS EXPANSION

960 – 1010 WALTHAM STREET
LEXINGTON, MA

OWNER:
BROOKHAVEN AT LEXINGTON
1010 WALTHAM STREET
LEXINGTON, MA 02421

PROGRESS PRINT

SCALE 1"=30'

DES. BY: KFB
CHK. BY: DCM
DATE: DEC. 11 2015
JOB 151067
1 OF 1

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SOIL TEST BORING LOG & MONITORING WELL COMPLETION REPORT

OHI Engineering, Inc.
Engineers and Environmental Scientists

44 Wood Avenue
Mansfield, MA 02048
Voice: (508) 339-3929
Fax: (508) 339-2893

PROJECT: *Brookhaven at Lexington*
1010 Waltham Street
Lexington, MA

BORING: **OHI B-1**
WELL: **n/a**
SHEET: **1 of 1**

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**		**START DATE:**	12/2/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM		**FINISH DATE:**	12/2/2015
DRILL RIG:	Auger Run/ Rig CME 60	**FALL: 30 in**				**SURFACE GRADE:**	221 +/-

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Grade- 221 +/-*	Culvert
1		2	3	12	15	30%		Dark Organic Material to Black Medium SAND to Fine Brown Sand.	
2									
3								Auger Cobbles	
4									
5		10	14	19	23	50%		Pulverized Cobble end of Spoon. Wet Medium to Fine Brown SAND with Trace of Pebbles. (Till)	
6									
7									Depth to water 6' +/-
8									
9		14	15	22	26	50%		Pulverized Cobbles. Wet, Tan, Fine to Medium SAND with Trace of Silt. (Till)	
10									
11								Auger Refusal @ 11'. End Exploration.(Approx. El. 210 +/-)	
12									
13									
14									
15									End of Exploration
16								DTW: Approx. 6' +/-	

Penetration Resistance

Cohesionless Density

0 - 4	very loose
5 - 9	loose
10 - 29	med. dense
30 - 49	dense
50+	very dense

Cohesive Consistency

0 - 2	very soft
3 - 4	soft
5 - 8	med. stiff
9 - 15	stiff
16 - 30	very stiff
31+	hard

Terms

Proportion Definition

trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈ 6'

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours

SOIL TEST BORING LOG & MONITORING WELL COMPLETION REPORT

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PROJECT: *Brookhaven at Lexington*
1010 Waltham Street
Lexington, MA

BORING: OHI B-2
WELL: n/a
SHEET: 1 of 1

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**	**START DATE:** 12/3/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM	**FINISH DATE:** 12/3/2015
DRILL RIG:	Rig CME 60	**FALL: 30 in**			**SURFACE GRADE:** 229 +/-

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Elev. 229'+/-* *Top Weathered Rock 5.0+/- BSG 224'*	Drive & Wash
1		3	3	5	11	70%		Dark Organic Forest Material to Dry, Tan Fine to Medium SAND with Trace of Pebbles	
2									
3								Roller Cobbles	
4									
5		62	94	100/3"		50%		Spoon Refusal. Gray Fine to Medium Sand with Trace of Pebble. Pulverized Cobble End of Spoon-Weathered Rock. Roller to Clean Hole to 7.0'.	
6									
7									Depth to water 6' +/-
8								Core 7.0' to 11.0' RQD 10% High angle Fractures complex fine grain diorite quartzite lens Granodiorite	
9									Penetration Rate 5 min/foot
10									
11									
12								11.0'-16.0' RQD 40% Fine Grain felsite and quartzite matrix in a Granodiorite	
13									Penetration Rate 5 min/foot
14									
15									
16									
17								End Exploration @ 16.5'. (El. 212.5' +/-)	
18									End of Exploration
19									
20								DTW: Approx. 6' +/-	

Penetration Resistance

Cohesionless Density		Cohesive Consistency	
0 - 4	very loose	0 - 2	very soft
5 - 9	loose	3 - 4	soft
10 - 29	med. dense	5 - 8	med. stiff
30 - 49	dense	9 - 15	stiff
50+	very dense	16 - 30	very stiff
		31+	hard

Terms

Proportion Definition	
trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈ 6'

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours

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PROJECT: *Brookhaven at Lexington*
1010 Waltham Street
Lexington, MA

BORING: **OHI B-3**
WELL: **n/a**
SHEET: **1 of 1**

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**	**START DATE:** 12/3/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM	**FINISH DATE:** 12/3/2015
DRILL RIG:	Rig CME 60	**FALL: 30 in**			**SURFACE GRADE:** 228 +/-

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Elev. 228'+/-* *Total Run 12.0' End 216 ' +/-*	Drive & Wash
1		1	1	2	3	20%		Dark Organic Material to Dry, Fine Brown SAND	
2									
3									
4									
5		19	40	51	58	70%		Fine to Medium Gray SAND with Trace of Silt and Pebbles. (Till)	
6									
7								Roller to 7.0'.	Depth to water 6' +/-
8								RQD 90% Penetration Rate 9 min/foot. Complex of diorite - Granodiorite. Low angle fractures	
9									
10									
11									
12									End of Exploration
13									
14									
15									
16									
17									
18									End of Exploration
19								DTW: Approx. 6' +/-	

Penetration Resistance

Cohesionless Density		Cohesive Consistency	
0 - 4	very loose	0 - 2	very soft
5 - 9	loose	3 - 4	soft
10 - 29	med. dense	5 - 8	med. stiff
30 - 49	dense	9 - 15	stiff
50+	very dense	16 - 30	very stiff
		31+	hard

Terms

Proportion Definition	
trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈ 6'

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours

SOIL TEST BORING LOG & MONITORING WELL COMPLETION REPORT

OHI Engineering, Inc.
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PROJECT: *Brookhaven at Lexington*
1010 Waltham Street
Lexington, MA

BORING: **OHI B-4**
WELL: **n/a**
SHEET: **1 of 1**

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**	**START DATE:** 12/4/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM	**FINISH DATE:** 12/4/2015
DRILL RIG:	CME 45	**FALL: 30 in**			**SURFACE GRADE:** 231 +/-

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Elev. 231'+/-*	
1		2	2	2	2	40%		Dark Organic Material to Dry Tan to Borwn Fine SAND with some Pebbles.	
2									
3									
4									
5		27	22	49	62	60%		Tan to Gray Fine to Medium "SAND" with Trace of Pebbles. (Till)	
6									
7								Roller Cobbles.	Depth to water 6' +/-
8									
9	Boulders							8.5-11' Jammed Core Barrel on boulder. Penetration Rate 3 min/foot.	
10									
11									
12								End Exploration @ 11'. (El. 220' +/-)	
13									
14									
15									
16									
17									
18									End of Exploration
19								DTW: Approx. 6' +/-	

Penetration Resistance

Cohesionless Density		Cohesive Consistency	
0 - 4	very loose	0 - 2	very soft
5 - 9	loose	3 - 4	soft
10 - 29	med. dense	5 - 8	med. stiff
30 - 49	dense	9 - 15	stiff
50+	very dense	16 - 30	very stiff
		31+	hard

Terms

Proportion Definition	
trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈ 6'

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours

SOIL TEST BORING LOG & MONITORING WELL COMPLETION REPORT

OHI Engineering, Inc.
Engineers and Environmental Scientists

44 Wood Avenue
Mansfield, MA 02048
Voice: (508) 339-3929
Fax: (508) 339-2893

PROJECT: *Brookhaven at Lexington*
1010 Waltham Street
Lexington, MA

BORING: **OHI B-5**
WELL: **n/a**
SHEET: **1 of 1**

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**	**START DATE:** 12/4/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM	**FINISH DATE:** 12/9/2015
DRILL RIG:	CME <15	**FALL: 30 in**			**SURFACE GRADE:** 243' +/-

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Elev. 243'+/-*	
1		40	96	20	10	50%		Pulverized Cobble at 0.5' to Black Organics.	
2									
3								Roller to 4'	
4									
5		4	4	4	2	0%		No Recovery.	
6									
7									
8									
9									
10		8	26	100/3"		40%		Gray Fine to Medium SAND (Till) with Pulverized Cobble at End of Spoon. Roll to 11.0'.	
11									
12	Set Casing and Roll to 14.0'.								
13									
14									
15		100/5"						"Wash" Pulverized Cobble at End.	12/9/2015
16									
17								Roll to 17.0'.	
18	Set Casing and Core - 5' Core Run							Penetration Rate 5 min/foot RQD 50 % - complex of diorite to granodiorite low angle fractures	
19									
20									
21									
22									
23								End Exploration @ 22'. (El. 221' +/-)	End of Exploration
24									

Penetration Resistance

Cohesionless Density

0 - 4	very loose
5 - 9	loose
10 - 29	med. dense
30 - 49	dense
50+	very dense

Cohesive Consistency

0 - 2	very soft
3 - 4	soft
5 - 8	med. stiff
9 - 15	stiff
16 - 30	very stiff
31+	hard

Terms

Proportion Definition

trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours

SOIL TEST BORING LOG & MONITORING WELL COMPLETION REPORT

OHI Engineering, Inc.
Engineers and Environmental Scientists

44 Wood Avenue
Mansfield, MA 02048
Voice: (508) 339-3929
Fax: (508) 339-2893

PROJECT: *Brookhaven at Lexington*
1010 Waltham Street
Lexington, MA

BORING: **OHI B-6**
WELL: **n/a**
SHEET: **1 of 1**

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**	**START DATE:** 12/7/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM	**FINISH DATE:** 12/8/2015
DRILL RIG:	Truck Rig CME 57	**FALL: 30 in**			**SURFACE GRADE:** 253 +/-

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Elev. 253+/-*	
1		14	36	53	52	30%		Dry, Tan to Gray Fine SAND with Pulverized Cobble at the end of Spoon.	
2									
3									
4									
5		100/3"				0%		Refusal. No Recovery. "Wash" and Roller Cobbles	
6									
7								Roller Cobbles.	
8									
9									
10		100/3"				0%		Refusal. No Recovery. "Wash" and Set Up to Core.	
11									
12								Complex of diorite to Granodiorite RQD 30% high angle fractures	Penetration Rate 5 min/ft
13									
14									
15									
16									
17								complex of diorite to Granodiorite RQD 60%	
18									
19									
20									
21									
22								complex of diorite to Granoditorite RQD 80%	
23									
24									
25									
26									
27								End Exploration @ 26'. (El. 226' +/-)	
28									
29									End of Exploration
30									

Penetration Resistance

Cohesionless Density

0 - 4	very loose
5 - 9	loose
10 - 29	med. dense
30 - 49	dense
50+	very dense

Cohesive Consistency

0 - 2	very soft
3 - 4	soft
5 - 8	med. stiff
9 - 15	stiff
16 - 30	very stiff
31+	hard

Terms

Proportion Definition

trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours

SOIL TEST BORING LOG & MONITORING WELL COMPLETION REPORT

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PROJECT: *Brookhaven at Lexington*
1010 Waltham Street
Lexington, MA

BORING: **OHI B-7**
WELL: **n/a**
SHEET: **1 of 1**

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**	**START DATE:** 12/8/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM	**FINISH DATE:** 12/8/2015
DRILL RIG:	Truck Rig CME 57	**FALL: 30 in**			**SURFACE GRADE:** 254+/-

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Elev. 254'+/-*	
1		5	8	10	46	15%		Tan Fine SAND with Some Pebbles. Pulverized Cobble at End of Spoon.	
2									
3									
4									
5		40	100/3"			15%		Gray Fine to Medium SAND. Top of Rock 6'+/-	
6									
7								Roller to 7.0'	
8								Penetration Rate 5 min/Foot. RQD 70% Complex of diorite to Granodiorite large horizontal fractire at 12.0 feet	
9									
10									
11									
12									
13								Penetration Rate 5 min/Foot. RQD 70% Granodiorite low angle fractures	
14									
15									
16									
17									
18								Penetration Rate 5 min/Foot. RQD 80% Granodiotrite low angle fractures	
19									
20									
21									
22									
23								Granodiorite Penetration Rate 5 min/Foot. RQD 90%	
24									
25								End Exploration @ 24'. (El. 230' +/-)	
26									End of Exploration
27									

Penetration Resistance

Cohesionless Density		Cohesive Consistency	
0 - 4	very loose	0 - 2	very soft
5 - 9	loose	3 - 4	soft
10 - 29	med. dense	5 - 8	med. stiff
30 - 49	dense	9 - 15	stiff
50+	very dense	16 - 30	very stiff
		31+	hard

Terms

Proportion Definition	
trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours

SOIL TEST BORING LOG & MONITORING WELL COMPLETION REPORT

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PROJECT: *Brookhaven at Lexington*
1010 Waltham Street
Lexington, MA

BORING: **OHI B-8**
WELL: **n/a**
SHEET: **1 of 1**

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**	**START DATE:** 12/8/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM	**FINISH DATE:** 12/9/2015
DRILL RIG:	CME <15	**FALL: 30 in**			**SURFACE GRADE:** 252' +/-

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Elev. 252'+/-*	
1		6	14	11	17	50%		Tan to Gray Fine to Medium SAND with Trace of Pebbles (Till)	Overburden
2									
3									
4									
5		48	100/6"R			25%		Tan to Gray Fine to Medium SAND with Trace of Pebbles (Till)	
6									
7								Roller to 7.0' and Set Casing	
8	Set Core - 15 foot Core Run							Jam at 9.0'	Penetration Rates of 5 min/foot
9									
10								Penetration Rate 5 min/foot	
11									
12									
13								Quartzite Contact- Multiple Fractures Olivene lens- Granodiorite RQD 60%	
14									
15									
16									
17									
18								complex of diorite to Granodiorite RQD 50%	
19									
20									
21									
22									
23								End Exploration @ 22'. (El. 230' +/-)	
24									
25									End of Exploration
26									

Penetration Resistance

Cohesionless Density

0 - 4	very loose
5 - 9	loose
10 - 29	med. dense
30 - 49	dense
50+	very dense

Cohesive Consistency

0 - 2	very soft
3 - 4	soft
5 - 8	med. stiff
9 - 15	stiff
16 - 30	very stiff
31+	hard

Terms

Proportion Definition

trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours

SOIL TEST BORING LOG & MONITORING WELL COMPLETION REPORT

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PROJECT: *Brookhaven at Lexington*
1010 Waltham Street
Lexington, MA

BORING: **OHI B-9**
WELL: **n/a**
SHEET: **1 of 1**

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**	**START DATE:** 12/10/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM	**FINISH DATE:** 12/10/2015
DRILL RIG:	CME 45	**FALL: 30 in**			**SURFACE GRADE:** 232 +/-

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Elev. 232'+/-*	
1		2	3	3	16	15%		Brown Medium SAND with Trace of Pebbles to Gray Sand with Pulverized Cobble at End of Spoon.	
2									
3								2.5'- Casing Refusal - Set Up Roller Cobbles- "Wash"	
4									
5		100/5"				0%		No Recovery "Wash"	
6									
7								Roller	
8									
9								Roller - Refusal at 8.5' BOULDER	
10		100/1"				20%		Gray Medium SAND with Trace of Silt. Pulverized Cobble at End of Spoon.	
11									
12								Roller to 14'	
13									
14		100/3'							
15								Gray Fine to Medium SAND with Trace of Silt (Till)	
16									
17								End Exploration @ 15'. (El. 217' +/-)	
18									End of Exploration
19									

Penetration Resistance

Cohesionless Density		Cohesive Consistency	
0 - 4	very loose	0 - 2	very soft
5 - 9	loose	3 - 4	soft
10 - 29	med. dense	5 - 8	med. stiff
30 - 49	dense	9 - 15	stiff
50+	very dense	16 - 30	very stiff
		31+	hard

Terms

Proportion Definition	
trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours

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PROJECT: *Brookhaven at Lexington*
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Lexington, MA

NOT DONE YET!

BORING: **OHI B-10**
WELL: **n/a**
SHEET: **1 of 1**

CONTRACTOR:	Geologic	**SIZE:**	4" Casing	**SAMPLER:**		**START DATE:**	12/10/2015
GEOLOGIST/ENG.:	DM	**WEIGHT: 140 lbs**		DM		**FINISH DATE:**	12/10/2015
DRILL RIG:	CME 45	**FALL: 30 in**				**SURFACE GRADE:**	

DEPTH (FT)	PID (ppmv)	BLOW COUNTS 0 - 6"	6" - 12"	12" - 18"	18" - 24"	REC		DESCRIPTION	DIAGRAM
+1						%		*Surface Elev. 231'+/-*	
1		6	42	26	25	50%		Dark Organic Material to Dry Tan to Borwn Fine SAND with some Pebbles.	
2									
3									
4									
5		29	45	100/3'		60%		Tan to Gray Fine to Medium "SAND" with Trace of Pebbles. (Till)	
6									
7								Spin Casing	
8									
9									
10									
11									
12								End Exploration @ 7.0'. (El. 224' +/-)	
13									
14									
15									
16									
17									
18									End of Exploration
19									

Penetration Resistance

Cohesionless Density		Cohesive Consistency	
0 - 4	very loose	0 - 2	very soft
5 - 9	loose	3 - 4	soft
10 - 29	med. dense	5 - 8	med. stiff
30 - 49	dense	9 - 15	stiff
50+	very dense	16 - 30	very stiff
		31+	hard

Terms

Proportion Definition	
trace	0% - 10%
little	10% - 20%
some	20% - 35%
and	35% - 50%

Groundwater Observations

DTW Oberserved in Spoon ≈ 6'

@ _____ ft. after _____ hours

@ _____ ft. after _____ hours