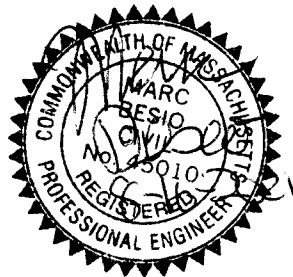


**DRAINAGE REPORT**  
**10-12 Mecahnice Street**  
**Newton, Massachusetts**



January 16, 2020

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VTP project number:  
28194

## IMPERVIOUS AREAS

**Date:** January 16, 2020  
**Address:** 10-12 Mecahnice Street  
**Project:** 28194

<b>Impervious Areas</b>	<b>Existing</b>	<b>Proposed</b>
Buildings	1,240.7 s.f.	2,667.6 s.f.
Driveway	264.5 s.f.	2,246.6 s.f.
Walkways, patios	18.8 s.f.	806.4 s.f.
Retaining Walls	0.0 s.f.	373.1 s.f.
<b>Total</b>	<b>1,524.0 s.f.</b>	<b>6,093.7 s.f.</b>

**Increase in Impervious Area:**  $6,093.7 - 1,524.0 = 4,569.7$  s.f.

**Lot area:** 9,964.0 s.f.

**4% of lot area:** 398.6 s.f.

**4,569.7 s.f. > 398.6 s.f. Drainage Required**



**END GALLEY STORAGE:**

**Design Infiltration Rate:** 59 min/inch = 0.08 ft/hr      Rawls Ratio: 1.02      (Sandy-Loam)

**Infiltration Capacity**

$$\begin{aligned} \text{Bottom Area} &= 8.0' \times 6.0' = 48.0 \text{ sq. ft.} \\ 48.0 \text{ sq. ft.} \times 0.08 \text{ ft/hr} &= 3.8 \text{ cfh} = 91.2 \text{ cf/day} = 0.0021 \text{ ac-ft} \end{aligned}$$

**Galley Storage**

$$\begin{aligned} \text{Total} &= 48.0 \text{ sq. ft.} \times 3.25' = 156.0 \text{ cf} \\ \text{Embedded Galley Volume} &= 4.00' \times 4.00' \times 3.25' = 52.0 \text{ cf} \\ \text{Stone Volume} &= 156.0 \text{ cf} - 52.0 \text{ cf} = 104.0 \text{ cf} \\ \text{Storage} &= \text{stone volume} \times \text{voids ratio} = 104.0 \times 0.35 = 36.4 \text{ cf} \\ \text{Galley Volume} &= 3.50' \times 3.50' \times 3.25' = 39.8 \text{ cf} \\ \text{Total Capacity} &= \text{Galley Volume} + \text{stone void volume} \\ &= 39.8 + 36.4 = 76.2 \text{ cf} = 0.0017 \text{ ac-ft} \end{aligned}$$

$$\begin{aligned} \text{Total stored/infiltrated} &= \text{infiltration capacity} + \text{total capacity} \\ 0.0021 \text{ ac-ft} + 0.0017 \text{ ac-ft} &= \mathbf{0.0038 \text{ ac-ft}} \end{aligned}$$

**MIDDLE GALLEYS STORAGE:**

**Design Infiltration Rate:** 59 min/inch = 0.08 ft/hr      Rawls Ratio: 1.02      (Sandy-Loam)

**Infiltration Capacity**

$$\begin{aligned} \text{Bottom Area} &= 8.0' \times 4.0' = 32.0 \text{ sq. ft.} \\ 32.0 \text{ sq. ft.} \times 0.08 \text{ ft/hr} &= 2.6 \text{ cf/hr} = 62.4 \text{ cf/day} = 0.0014 \text{ ac-ft} \end{aligned}$$

**Galley Storage**

$$\begin{aligned} \text{Total} &= 32.0 \text{ sq. ft.} \times 3.25' = 104.0 \text{ cf} \\ \text{Embedded Galley Volume} &= 4.00' \times 4.00' \times 3.25' = 52.0 \text{ cf} \\ \text{Stone Volume} &= 104.0 \text{ cf} - 52.0 \text{ cf} = 52.0 \text{ cf} \\ \text{Storage} &= \text{stone volume} \times \text{voids ratio} = 52.0 \times 0.35 = 18.2 \text{ cf} \\ \text{Galley Volume} &= 3.50' \times 3.50' \times 3.25' = 39.8 \text{ cf} \\ \text{Total Capacity} &= \text{Galley Volume} + \text{stone void volume} \\ &= 39.8 + 18.2 = 58.0 \text{ cf} = 0.0016 \text{ ac-ft} \end{aligned}$$

$$\begin{aligned} \text{Total stored/infiltrated} &= \text{infiltration capacity} + \text{total capacity} \\ 0.0014 \text{ ac-ft} + 0.0016 \text{ ac-ft} &= \mathbf{0.0030 \text{ ac-ft}} \end{aligned}$$

**REQUIRED SYSTEM STORAGE:**

Storage required: 0.0920 ac-ft

Storage provided: 0.0964 ac-ft

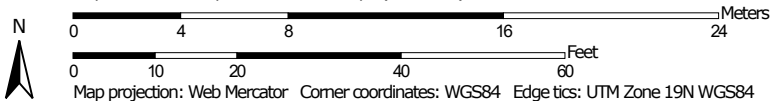
Unit Type	Qty.	Unit Capacity	Total
End:	8	0.0038 ac-ft	0.0304 ac-ft
Middle:	22	0.0030 ac-ft	0.0660 ac-ft
Low Profile End:	0	0.0056 ac-ft	0.0000 ac-ft
Low Profile Middle:	0	0.0038 ac-ft	0.0000 ac-ft
<b>Total =</b>	<b>30 units</b>		<b>0.0964 ac-ft</b>

> 0.0920 ac-ft  
Therefore OK

Soil Map—Middlesex County, Massachusetts  
(10-12 Mechanic Street Newton)




Map Scale: 1:281 if printed on A landscape (11" x 8.5") sheet.



## 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:  
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 19, Sep 12, 2019

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

Date(s) aerial images were photographed: Sep 11, 2019—Oct 5, 2019

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

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
631C	Charlton-Urban land-Hollis complex, 3 to 15 percent slopes, rocky	0.3	100.0%
<b>Totals for Area of Interest</b>		<b>0.3</b>	<b>100.0%</b>



## Middlesex County, Massachusetts

### 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

*Charlton and similar soils:* 40 percent  
*Urban land:* 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

*Hydric soil rating:* No

## **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  
*Hydric soil rating:* No

## **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

*Hydric soil rating:* No

**Udorthents, loamy**

*Percent of map unit:* 2 percent

*Hydric soil rating:* No

**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

*Hydric soil rating:* No

**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

*Hydric soil rating:* No

## Data Source Information

Soil Survey Area: Middlesex County, Massachusetts

Survey Area Data: Version 19, Sep 12, 2019