Dr. Edward T.T. Chiang. PE.
Civil Consulting Engineer
781-454-5615

Job: Lot "A" (#19) Staniford St, Newton, MA
Sheet No. 1 of
Calculated By T.T.C Date 1/18/22
Checked By Date Revised 2/8/23
Scale

COMMONWEALTH OF MASSACHUSETTS
TSUNG TING CHIANG
No. 23891
REGISTERED PROFESSIONAL ENGINEER

Storm Water Analysis & Control Facility Design

I. Project Description

The proposed project is to construct a residential building includes driveway, parking, and utilities on lot with total land area of 10,070 ft^2 or 0.231 acre. All existing structures shall be razed. On site soil test, performed by Stephen Poole, indicates the soil is sandy gravel with percolation rate under 2 MPI. No sign of ground water can be found in the 8' deep test pits.

II. Storm Water Analysis

Based on city of Newton requirement, any runoff increased, at 24 hours duration, 100-year storm with total rainfall of 8.78 inches, due to development shall be controlled on site. The increase of runoff due to addition of impervious area is the difference of runoff from an impervious area and landscaped area. It is difficult to seperated the runoff from addition, therefore, it is better to completely control the total runoff from the addition impervious area.

Dr. Edward T.T. Chiang, P.E.
Civil Consulting Engineer
781-454-5615

Job: Lot 14 A (#19) Stanford St, Newton, MA
Sheet No: 2 of
Calculated By: T.T.C Date: 1/18/22
Checked By: Date: Revised 2/8/23
Scale:

A. Land Use Analysis: Total Land Area = 10,070 Ft², 0.231 Ac.

1. Pre-Development Land Use

Building Area	2013	Ft²
Pavement Area	2772	Ft²
Other Impervious Area	–	Ft²
Total Impervious Area	4785	Ft²

$$\text{Runoff Coefficient} = \frac{0.3 \times 5285 + 0.9 \times 4785}{10070} = 0.585$$

2. Post-Development Land Use

Building Area:	1,814	Ft²	
Pavement Area:	1,070	Ft²	
Other Impervious Area:	336	Ft²	Patio & Walkway
Total Impervious Area:	3220	Ft²	

COMMONWEALTH OF MASSACHUSETTS
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$$\text{Runoff Coefficient} = \frac{0.3 \times 6850 + 0.9 \times 3220}{10070} = 0.492$$

B. Method Used To Analyze Storm Runoff

Due to small site area (much less than Sq. Mile)
Rational Formula shall be used for runoff analysis.

Dr. Edward T.T. Chiang, P.E.
Civil Consulting Engineer
781-454-5615

Job: Lot 1A (#19) Staniford St, Newton, MA
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Checked By: Date: Revised 2/8/23
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Rational Formula: $Q = CiA$, where

Q = Runoff peak rate, cfs

i = Rainfall Intensity, in/hr

A: Site Area, Acre

For Compute runoff volume, $V_R = CiAt$, where t is rainfall duration time, Hr. Also, A is changed to sq. ft (FT^2), i, rainfall intensity, in ft/hr, and V_R is total runoff volume of the storm from area A, in cu. Ft (FT^3).

C is runoff coefficient, $C = 0.9$ for impervious Area, $C = 0.3$ for wooded/grass, pervious area.

In general, peak runoff rate occurs at short duration high intensity storm, but runoff volume is larger at long duration storm. For small project site, it is difficult to control runoff rate. The easy way is to control the runoff from impervious area, so to reduce runoff volume.

Dr. Edward T.T. Chiang, P.E.
Civil Consulting Engineer
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Job: Lot 14 A (#19) Staniford St, Newton, MA
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Calculated By: T.T.C Date: 1/18/22
Checked By: Date: Revised 2/8/23
Scale:

C. Storm Peak Runoff Rate & Total Runoff Volume @ 8.78"/24 Hr

Storm Duration Hr	Rainfall Intensity In/Hr	Peak Runoff Rate, cfs			Total Runoff Volume, Cu. Ft.		
		Pre-Devel. Condition C=0.585	Post-Devel. Condition C=0.492	Increase (Decrease)	Pre-Develop. Condition C=0.585	Post-Develop Condition C=0.492	Increase (Decrease)
24	0.37	0.05	0.042	(0.008)	4359.3	3666.3	(693.0)
0.5	4.6	0.622	0.523	(0.099)	1129.1	949.6	(179.5)

Minimum Total Runoff Volume Need To Be Controlled

24 Hr, 100-y storm : V_R = 0 FT^3

0.5 Hr, 100-y storm: V_R = 0 FT^3

COMMONWEALTH OF MASSACHUSETTS
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Total Runoff Volume From New Impervious, It is recommended that runoff from all impervious area, new/old, shall be controlled.

24 Hr, 100-y storm, $V_R = \frac{8.78}{12} \times 0.9 \times 3220 = 2120.4$ FT^3

0.5 Hr, 100-y storm, $V_R = \frac{4.6}{12} \times 0.5 \times 0.9 \times 3220 = 555.5$ FT^3

There shall be much less runoff at post-condition than at pre-development condition from the site.

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Job: Lot 14 A (#19) Staniford St, Newton, MA
Sheet No. 5 of
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Checked By Date Revised 2/8/23
Scale

III. Runoff Control Facility Design

For small watershed area, control of the increased runoff rate is very difficult, therefore control runoff from selected impervious area is a better way to control the runoff increased due to development.

A. Minimum Required Control Volume – At 100-y Storm

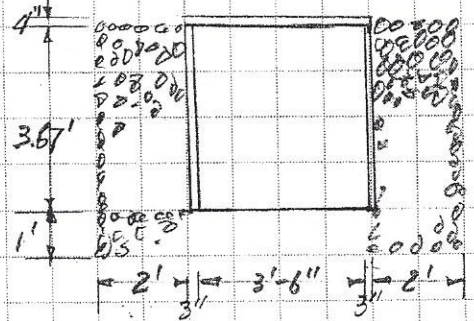
0.5 Hour Duration, $V_R = 0$

24 Hour Duration, $V_R = 0$

COMMONWEALTH OF MASSACHUSETTS
TSUNG TING CHIANG
No. 23891
REGISTERED PROFESSIONAL ENGINEER

B. Control Facility

1. Leaching Galley: 4'x4'x4' with 2 ft thickness crushed stone around it and 1.0 ft thickness crushed stone under it



Storage Volume = $3.5 \times 3.5 \times 3.67 = 45\ ft^3$

Stone Void = $0.35[4\times4\times2\times2$ (2-sides) $+ 4\times8\times2\times2$ (2-Ends) $+ 8\times8\times1$ (bottom)$]$
$= 0.35 \times 256 = 89.6\ ft^3/Ea.$

Total Storage Capacity = $89.6 + 45 = 134.6\ ft^3/Ea$

Exfiltration Volume (Use Bottom Area Only) = $64 \times \frac{1}{12} \times \frac{60}{2} \times \frac{1}{2}$ (Safety Factor)
$= 80\ ft^3/Hr/Ea.$

Dr. Edward T.T. Chiang, P.E.
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781-454-5615

Job: Lot A (#19) Staniford St, Newton, MA

Sheet No: 6 of

Calculated By: T.T.C Date: 1/18/22

Checked By: Date: Revised 2/8/23

Scale:

Total Capacity of Galley

At 0.5 Hr Storm = $134.6 + 0.5 \times 80 = 174.6$ Ft^3/Ea

At 24 Hr Storm = $134.6 \times 6 = 807.6$ Ft^3/Ea

or

$= 134.6 + 80 \times 24 = 2054.6$ Ft^3/Ea Use the lower.

C. Control Area Analysis & Control System Design

1. Front System - Control Area

Front Part of House 944 Ft^2

Walk & Pavement 1070 Ft^2

Total Impervious : 2014 Ft^2

100-year storm runoff Volume :

At 0.5 Hr Storm = $0.9 \times 2014 \times \frac{4.6}{12} \times 0.5 = 347.4$ Ft^3

At 24 Hr storm = $0.9 \times 2014 \times \frac{0.37}{12} \times 24 = 1341.3$ Ft^3

Number of Galley Need = $\frac{347.4}{174.6} = 1.99$ Say 2

$= \frac{1341.3}{807.6} = 1.66$ Say 2

Use Trench Grate to collect runoff from Paved Area and use a manhole with Sump and oil/Gas Seperator

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Civil Consulting Engineer
781-454-5615

Job: Lot 14 A (#19) Staniford St., Newton, MA
Sheet No: 7 of
Calculated By: T.T.C Date: 1/18/22
Checked By: Date: Revised 2/8/23
Scale:

for control water quality before discharge to leaching galleys.

2. Rear System - Control Area

Rear Part of House: 870 ft^2

Patio 336 ft^2

Total Impervious Area 1206 ft^2

100-year storm runoff volume

At 0.5 Hr Storm = $0.9 \times 1206 \times \frac{4.6}{12} \times 0.5 = 208.0\ ft^3$

At 24 Hr Storm = $0.9 \times 1206 \times \frac{0.37}{12} \times 24 = 803.2\ ft^3$

Number of Galley Need = $\frac{208}{174.6} = 1.19$
At 0.5 Hr, 100y storm

At 24 Hr, 100-y storm = $\frac{803.2}{807.6} = 0.99$.

Use One galley with 3' thickness crushed around it and 1' thickness crushed stone under it. to increase the storage capacity and the exfiltration capacity

Bottom Area increased = $8 \times 2 + 10 \times 2 = 36\ ft^2$

Exfiltration Capacity increased = $\frac{36}{12} \times \frac{60}{2} \times \frac{1}{2} = 45\ ft^3/Hr$

Storage Capacity Increased = $0.35[4.67(2 \times 8 + 2 \times 10)] = 58.8\ ft^3/Ea.$

Dr. Edward T.T. Chiang, P.E.
Civil Consulting Engineer
781-454-5615

Job: Lot A (#19) Stamford St, Newton, MA
Sheet No: 8 of
Calculated By: T.T.C Date: 1/18/22
Checked By: Date: Revised 2/9/23
Scale:

Total Capacity of Galley:

At 0.5 Hr Storm = $174.6 + 58.8 + \frac{45}{2} = 255.9$ Ft³/Ea

> 208 Ft³/Ea.

D. Control Facilities Arrangement

As shown on Plan.

Notes: All PVC pipe under paved area shall be Sch. 40.

All downspouts shall have an overflow Y-section in case of strange storm, or suddenly weather changes.

COMMONWEALTH OF MASSACHUSETTS
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E. Runoff Reduction Due to Development

1. Controlled Impervious Area Runoff.

At 100-y, 24 Hr Storm = $803.2 + 1341.3 = 2144.5$ Ft³

2. Change Impervious Area to landscaping Area

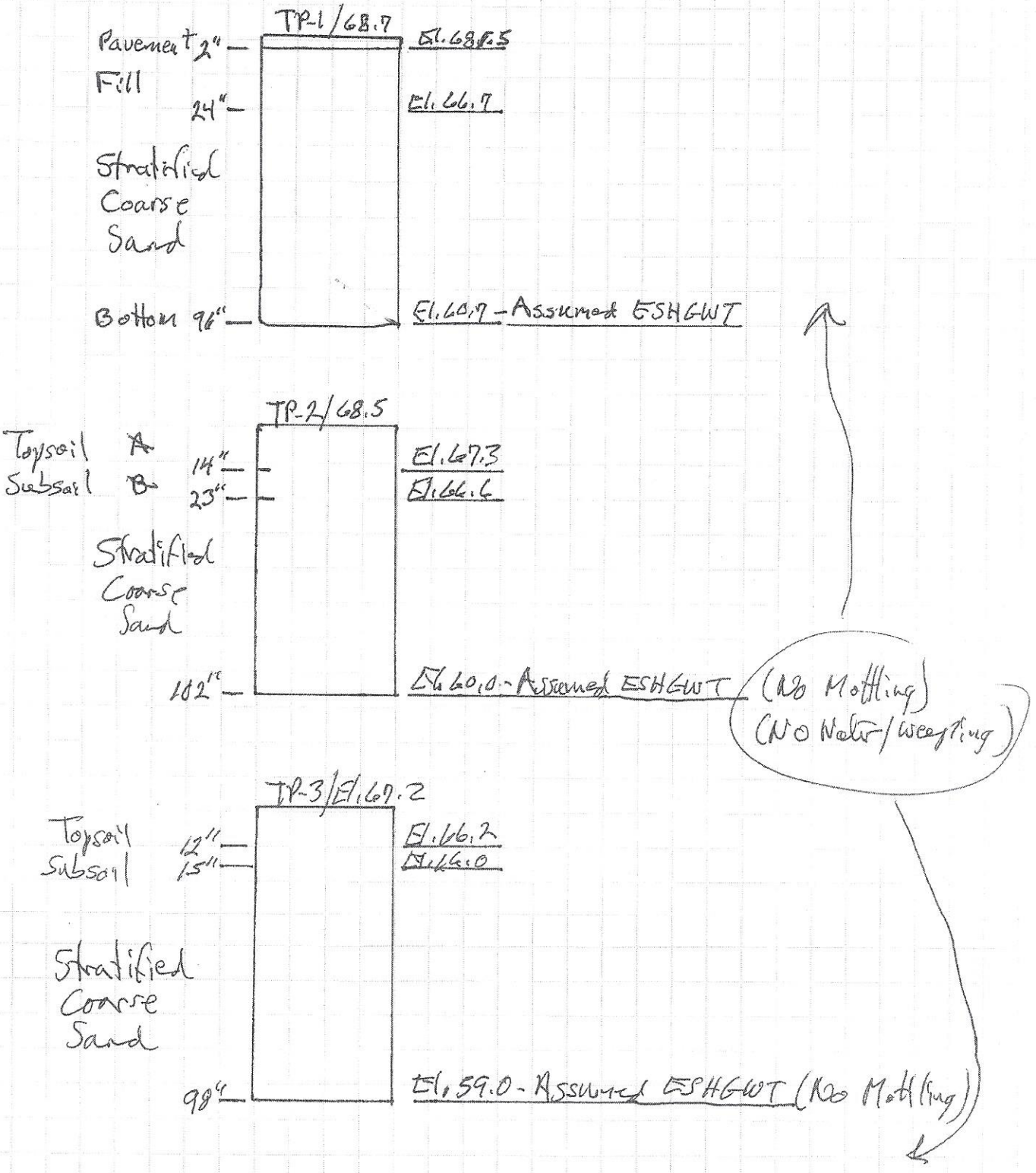
Area = $4785 - 3220 = 1565$ Ft²

At 100-y-24 Hr Storm. = $1565 \times (0.9-0.3) \times \frac{0.37}{12} \times 24$

$= 694.9$ Ft³

3. Total Runoff Volume Reduction at 100-y, 24 Hr Storm = 2839.4 Ft³

Soil Logs - Stamford St.



Note: See Soils Report for Full Description of soils

Commonwealth of Massachusetts
City/Town of Newton

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

A. Facility Information

Kane Built, Inc.
Owner Name

19 Staniford Street
Street Address

41013 / 0006
Map/Lot #

Newton
City

MA
State

02466-1209
Zip Code

B. Site Information

1. (Check one) ☒ New Construction ☐ Upgrade ☐ Repair

2. Published Soil Survey Available? ☒ Yes ☐ No
   If yes: 1995 (Year Published) 1:25,000 (Publication Scale) 626B(NRCS) (Soil Map Unit)
   Merrimac Urban Land Complex
   Soil Name
   Rapid Infiltration Rate
   Soil Limitations

3. Surficial Geological Report Available? ☐ Yes ☒ No
   If yes: (Year Published) (Publication Scale) (Map Unit)
   Glacial Outwash
   Geologic Material
   Kame Terrace
   Landform

4. Flood Rate Insurance Map

   Above the 500-year flood boundary? ☒ Yes ☐ No
   Within the 100-year flood boundary? ☐ Yes ☒ No

   Within the 500-year flood boundary? ☐ Yes ☒ No
   Within a velocity zone? ☐ Yes ☒ No

5. Wetland Area:
   National Wetland Inventory Map — N/A (Map Unit) (Name)
   Wetlands Conservancy Program Map — N/A (Map Unit) (Name)

6. Current Water Resource Conditions (USGS): Jan. 2023 (Month/Year)
   Range: ☐ Above Normal ☒ Normal ☐ Below Normal

7. Other references reviewed: N/A

Commonwealth of Massachusetts
City/Town of Newton

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

C. On-Site Review (*minimum of two holes required at every proposed primary and reserved disposal area)*

Deep Observation Hole Number: DH-1 | 01/24/23 (Date) | AM (Time) | Fair (Weather)

1. Location

Ground Elevation at Surface of Hole: 68.7+/- | Location (identify on plan): See Site Plan

2. Land Use: Residential (e.g., woodland, agricultural field, vacant lot, etc.) | N/A (Surface Stones) | 1% (Slope (%))

Driveway Area (Vegetation) | Kame Terrace (Landform) | See Site PLan (Position on Landscape (attach sheet))

3. Distances from:

Open Water Body	> 100 feet	Drainage Way	> 100 feet	Possible Wet Area	>100 feet
Property Line	28' feet	Drinking Water Well	> 100 feet	Other	feet

4. Parent Material: Glacial Outwash | Unsuitable Materials Present: ☒ Yes ☐ No

If Yes: ☐ Disturbed Soil ☐ Fill Material ☒ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No | If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

Estimated Depth to High Groundwater: >96" (inches) | 60.7+/- (elevation)

Commonwealth of Massachusetts
City/Town of Newton

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

C. On-Site Review (continued)

Deep Observation Hole Number: DH-1

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
2"	Pavement										
24"	Fill					Loam & Gravel					
96"	C	7.5 YR 4/6				Sand	25%	10%	Single Grain	Dry	Coarse, Stratified

Additional Notes:

Commonwealth of Massachusetts
City/Town of Newton

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

C. On-Site Review (continued)

Deep Observation Hole Number: DH-2 | 01/24/23 (Date) | AM (Time) | Fair (Weather)

1. Location

   Ground Elevation at Surface of Hole: 68.5 | Location (identify on plan): See Site plan

2. Land Use: Residential (e.g., woodland, agricultural field, vacant lot, etc.) | N/A (Surface Stones) | 1% (Slope (%))

   Lawn (Vegetation) | Kame Terrace (Landform) | See Site Plan (Position on Landscape (attach sheet))

3. Distances from:

Open Water Body	<100 feet	Drainage Way	<100 feet	Possible Wet Area	< 100 feet
Property Line	40' feet	Drinking Water Well	<100 feet	Other	feet

4. Parent Material: Glacial Outwash | Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No | If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: >102" inches | 60.0+/- elevation

Commonwealth of Massachusetts
City/Town of Newton

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

C. On-Site Review (continued)

Deep Observation Hole Number: DH-2

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
14"	A	10 YR 3/2				Sandy Loam			Massive	Dry	Rooted
23"	B	10 YR 5/6				Loamy Sand			Single Grain	Dry	Fine
102"	C	7.5 YR 4/6				Sand	30%	15%	Single Grain	Dry	Coarse. Stratified

Additional Notes:

Commonwealth of Massachusetts
City/Town of Newton

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

C. On-Site Review *(minimum of two holes required at every proposed primary and reserved disposal area)*

Deep Observation Hole Number: DH-3 | 01/24/22 (Date) | AM (Time) | Fair (Weather)

1. Location

   Ground Elevation at Surface of Hole: 67.2 | Location (identify on plan): See Site Plan

2. Land Use: Residential (e.g., woodland, agricultural field, vacant lot, etc.) | N/A (Surface Stones) | 1% (Slope (%))

   Lawn (Vegetation) | Kame Terrace (Landform) | See Site PLan (Position on Landscape (attach sheet))

3. Distances from:

Open Water Body	> 100 feet	Drainage Way	> 100 feet	Possible Wet Area	>100 feet
Property Line	15' feet	Drinking Water Well	> 100 feet	Other	feet

4. Parent Material: Glacial Outwash | Unsuitable Materials Present: ☐ Yes ☒ No

   If Yes: ☐ Disturbed Soil ☐ Fill Material ☐ Impervious Layer(s) ☐ Weathered/Fractured Rock ☐ Bedrock

5. Groundwater Observed: ☐ Yes ☒ No | If yes: N/A (Depth Weeping from Pit) | N/A (Depth Standing Water in Hole)

   Estimated Depth to High Groundwater: >98" inches | 59.0 elevation

Commonwealth of Massachusetts
City/Town of Newton

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

C. On-Site Review (continued)

Deep Observation Hole Number: DH-3

Depth (in.)	Soil Horizon/ Layer	Soil Matrix: Color-Moist (Munsell)	Redoximorphic Features (mottles)			Soil Texture (USDA)	Coarse Fragments % by Volume		Soil Structure	Soil Consistence (Moist)	Other
			Depth	Color	Percent		Gravel	Cobbles & Stones			
12"	A	7.5 YR 3/2				Sandy Loam			Massive	Dry	Fine
15"	B	7.5 YR 5/6				Loamy Sand			Single Grain	Dry	Fine
98"	C	7.5 YR 4/6				Sand	30%	15%	Single Grain	Dry	Coarse, Stratied

Additional Notes:

Commonwealth of Massachusetts
City/Town of Newton

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

D. Determination of High Groundwater Elevation

1. Method Used:

	A.	B.
☐ Depth observed standing water in observation hole	A. ____ inches	B. ____ inches
☐ Depth weeping from side of observation hole	A. ____ inches	B. ____ inches
☒ Depth to soil redoximorphic features (mottles)	A. 96" inches	B. 102" inches
☐ Groundwater adjustment (USGS methodology)	A. ____ inches	B. ____ inches

2. ____ Index Well Number ____ Reading Date ____ Index Well Level

____ Adjustment Factor ____ Adjusted Groundwater Level

E. Depth of Pervious Material

1. Depth of Naturally Occurring Pervious Material
   a. Does at least four feet of naturally occurring pervious material exist in all areas observed throughout the area proposed for the soil absorption system?
      ☒ Yes ☐ No
   b. If yes, at what depth was it observed? Upper boundary: 23" inches Lower boundary: 102" inches

Commonwealth of Massachusetts
City/Town of Newton

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

F. 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 required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.100 through 15.107.

Signature of Soil Evaluator	02/06/23 Date
Stephen E. Poole SE1955 Typed or Printed Name of Soil Evaluator / License #	July 1995 Date of Soil Evaluator Exam
None Name of Board of Health Witness	N/A Board of Health

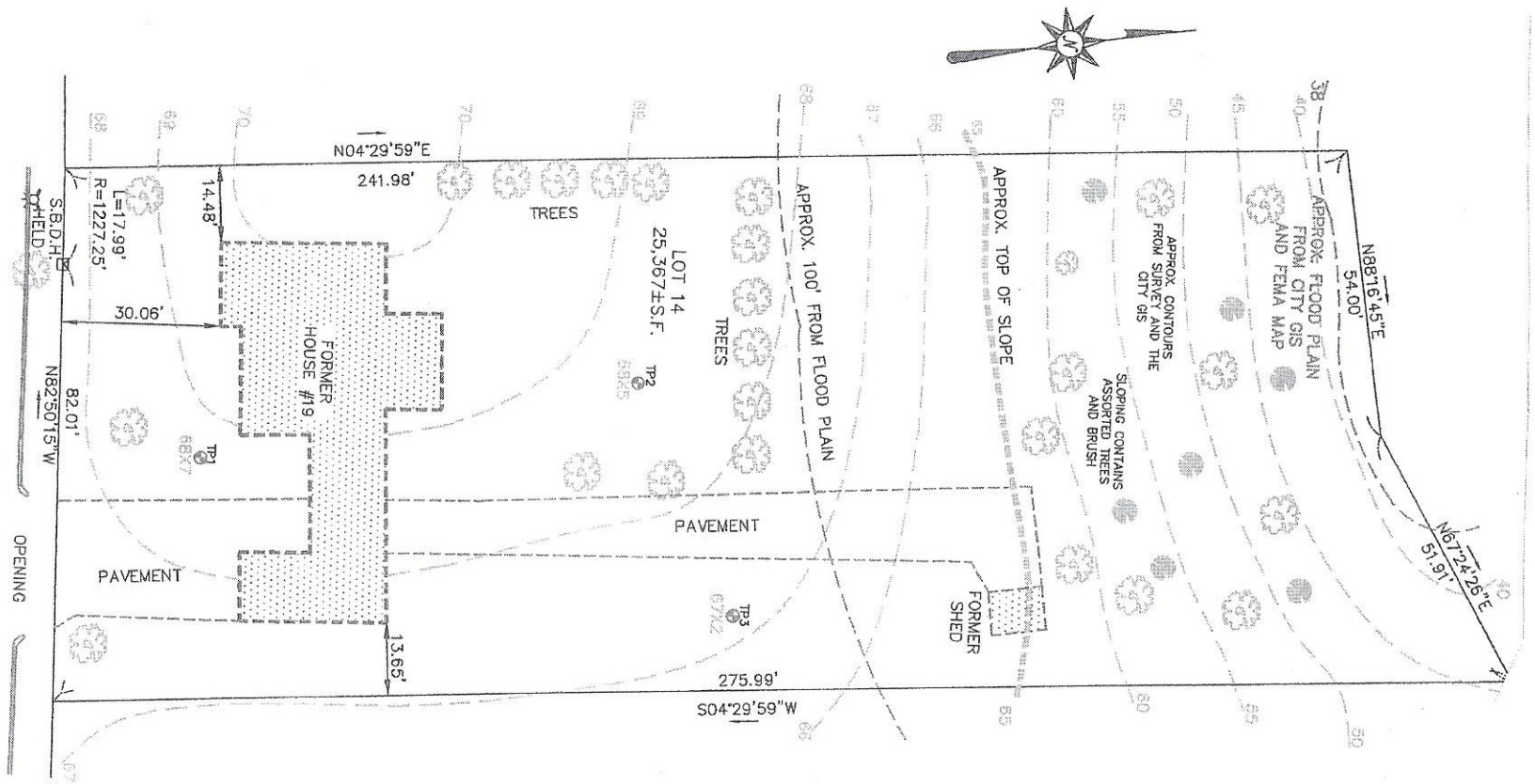
Note: In accordance with 310 CMR 15.018(2) this form must be submitted to the approving authority within 60 days of the date of field testing, and to the designer and the property owner with Percolation Test Form 12.

Commonwealth of Massachusetts
City/Town of Newton

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

Field Diagrams

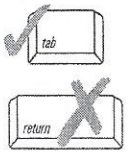
Use this sheet for field diagrams:



Commonwealth of Massachusetts
City/Town of
Percolation Test
Form 12

Percolation test results must be submitted with the Soil Suitability Assessment for On-site Sewage Disposal. DEP has provided this form for use by local Boards of Health. Other forms may be used, but the information must be substantially the same as that provided here. Before using this form, check with the local Board of Health to determine the form they use.

Important:
When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A. Site Information

Kane Built, Inc.
Owner Name

19 Staniford Street
Street Address or Lot #

Newton | MA | 02466-1209
City/Town | State | Zip Code

Contact Person (if different from Owner) | Telephone Number

B. Test Results

	01/24/23 (Date)	10:10 AM (Time)	01/04/23 (Date)	10:30 AM (Time)
Observation Hole #	#1 (P-1)		#3 (P-2)	
Depth of Perc	54" (64.2)		48" (63.2)	
Start Pre-Soak	10:10 AM		10:30 AM	
End Pre-Soak	10:20 AM		10:44 AM	
Time at 12"				
Time at 9"				
Time at 6"				
Time (9"-6")	<15 Min.		<15 Min.	
Rate (Min./Inch)	2 MPI		2 MPI	
	Test Passed: ☒ Test Failed: ☐		Test Passed: ☒ Test Failed: ☐	

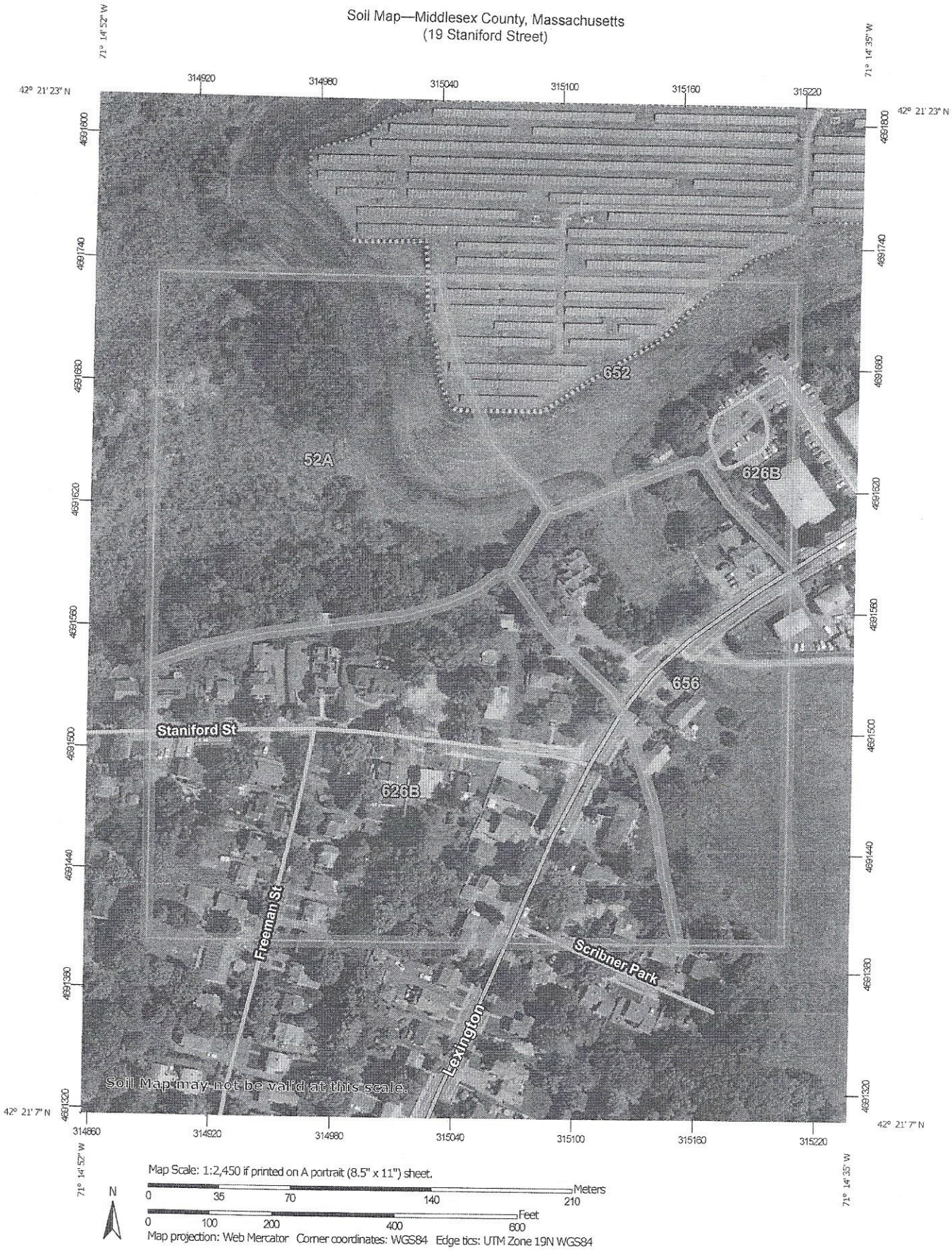
Stephen E. Poole, SE 1955
Test Performed By:

Witnessed By:

Comments:

Very Stony Gravel, Stratified Loose, Sand & Gravel Layers

Soil Map—Middlesex County, Massachusetts
(19 Staniford Street)



USDA Natural Resources Conservation Service

Web Soil Survey
National Cooperative Soil Survey

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 22, Sep 9, 2022

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

Date(s) aerial images were photographed: May 22, 2022—Jun 5, 2022

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
52A	Freetown muck, 0 to 1 percent slopes	7.1	27.4%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	10.1	39.1%
652	Udorthents, refuse substratum	3.7	14.3%
656	Udorthents-Urban land complex	5.0	19.2%
Totals for Area of Interest		**25.8**	**100.0%**

Middlesex County, Massachusetts

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

Map Unit Setting

National map unit symbol: 2tyr9
Elevation: 0 to 820 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Merrimac and similar soils: 45 percent
Urban land: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Crest, side slope, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam
Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 2 percent
Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)

Sodium adsorption ratio, maximum: 1.0
Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Description of Urban Land

Typical profile
M - 0 to 10 inches: cemented material

Properties and qualities
Slope: 0 to 8 percent
Depth to restrictive feature: 0 inches to manufactured layer
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Available water supply, 0 to 60 inches: Very low (about 0.0 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Windsor
Percent of map unit: 5 percent
Landform: Outwash terraces, dunes, outwash plains, deltas
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Sudbury
Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley
Percent of map unit: 5 percent
Landform: Deltas, kames, eskers, outwash plains
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Head slope, nose slope, crest, side slope, rise
Down-slope shape: Convex

Across-slope shape: Convex, linear
Hydric soil rating: No

Data Source Information

Soil Survey Area: Middlesex County, Massachusetts
Survey Area Data: Version 22, Sep 9, 2022