STORMWATER REPORT

Lot 11A & Lot 9
at 201 Hilltop Road
(Map 32 Assessor Parcels 1J & 1K)
Lancaster, Massachusetts

December 6, 2021

Prepared For:

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Project No.

HA-111
Stormwater Report.doc

TABLE OF CONTENTS

Contents

1 | Compliance

1.1 Jurisdiction

Commonwealth of Massachusetts - A Stormwater Report must be prepared and submitted to document compliance with the Stormwater Management Standards. For projects that are subject to the Stormwater Management Standards and regulated by the Wetlands Protection Act Regulations, 310 CMR 10.00, and or the 401 Water Quality Certification Regulations, the Stormwater Report must accompany the permit application.

Town of Lancaster Stormwater Control – A stormwater Report may also be required for projects that are regulated by the Town of Lancaster Stormwater Rules and Regulations, the Stormwater Report must accompany the Lancaster Planning Board Stormwater Management Permit Application.

> Exemption - Activities that are subject to the jurisdiction under the Wetlands Protection Act and demonstrate compliance with the Massachusetts Stormwater Management Policy as reflected in an order of conditions issued by the Lancaster Conservation Commission, are exempt from compliance with the Stormwater Control Bylaw.

1.2 Applicability

Scope of Proposed Work: The scope of construction activity is residential based and involves the construction of a single-family dwelling (Lot 9) within the buffer zone; The removal of an Illicit Discharge into the resource areas from the Carriage House on Lot 11A. The construction of stormwater controls within the buffer zone, associated with the construction of an accessory use. The accessory use (Lot 11A) includes site clearing, and grading associated with the construction of stormwater controls relative to a pasture, and riding arenas for private horses to be cared for in the existing stable portion of the carriage house at 201 Hill Top Road.

Commonwealth of Massachusetts – This project is believed to be subject to the Stormwater Management Standards and shall be regulated by the Wetlands Protection Act Regulations, 310 CMR 10.00. as follows:

> Lot 9 – 310 CMR 10.03(2)(b) Activities within the Buffer Zone. he stormwater Management Standards shall apply to the maximum extent practicable to housing development and redevelopment projects comprised of detached single-family dwellings on five to nine lots, provided there is no stormwater discharge that may potentially affect a critical area.
>
> Lot 11A – Redevelopment Project of Carriage House – Illicit Dischage . associated idential Lot located within the buffer zone of a vegetated wetland bordering on the Bank of an intermittent Stream (Land Under Water). (Land The issuance of a Currently a Notice of Intent or the 401 Water Quality Certification Regulations, the Stormwater Report must accompany the permit application.

Town of Lancaster Stormwater Control – A Stormwater Report is also a requirement of the Cease & Desist Order issued by the Planning Board on July 28, 2021.

1.3 Introduction

Development – The land is proposed to be modified to accommodate a new use on Lot 9 and the expansion of the amenities to an accessory use on Lot 11A.

Development Revisions – This Stormwater Report, is based upon "pending" modifications to the resource area delineations under an "Enforcement Order" by the Conservation Commission. In order to satisfy the submittal requirements of a Stormwater Management Permit Application per the "Cease & Desist Order" issued by the Planning Board, plans for development, impose upon the proposed restoration areas. We recognize and have advised the town of this unique situation, associated with concurrent orders.

Notice of Intent (Enforcement Order) - This "Interim" Stormwater Report prepared by "Harrington" incorporates "ongoing adjustments" to the resource areas recently adjusted by LEC Environmental Consultants, INC. and are subject to further adjustments.

Project Site - The site (Lot 11A and Lot 9) is located along the northerly side of Hill Top Road in Lancaster which has a country style form of drainage located at the high point of the hill. Access to the carriage house (#201 Hill Top Road on Lot 11A) is available from three separate paved curb cuts through the existing stone wall along this scenic road. The primary access coincides with the original driveway from the carriage house leading up to the mansion (Lot 10A). To the south of this driveway is the former land of (Lot 8) now absorbed into Lot 11A and the downgradient vacant (Lot 9).

Abutting Properties - The site (Lots 11A & Lot 9) is bounded to the east by the existing "mansion" (Lot 10A), to the north by "Remining Land of the Estate", to the west by land associated with pump house for the public water main system (Parcel A) and to the west by abutting residential dwellings opposite along Hill Top Road.

Existing Utility Easements (Plan Book 951 Plan 82) – The project site includes portions of multiple easements previously prepared by "BSF" on a plan by "Dillis" which also defined the boundaries of the previous Lot 8 and the earlier version of Lot 9.

- Existing water main from Bull Hill Road" up to Parcel A;
- Water service between pump house on Parcel A and mansion building (Lot 10A)
- Existing overhead wires on utility poles over to service area north of mansion building.
- Utility Easement on the Entirety of Lot 9 for the benefit of Lot 11A for any existing utilities on Lot 9 until such time as they are relocated and or removed.

"Discontinued" Bull Hill Road (Plan Book 1325 Plan 33) – The Stormwater Design is proposed to serve a proposed In-door Riding Arena Structure (Lot 11A) which is within a couple feet of this undefined feature. Applicant shall be responsible for confirming status, location and whether any residual setbacks which may apply to any proposed structures or private water supply well (Lot 9).

Existing site drainage – A series of area drains and drop inlet catch basin structures have been discovered within the open land (Lot 11A) which collect and convey groundwater and runoff within a closed drain line under the driveway and across (former Lot 8 and current Lot 9) prior to discharging offsite at a point source (Lot 10a) within the bank of the intermittent stream.

Existing Carriage House Cellar Foundation Drain (if present) (Outfall Point #1)
Existing Floor Drain for garage floor under stable area (if present) (Outfall #1, Outfall Point #2) – A series of "wet weather", and repeated "Dry Weather" field inspections of the drainage structures indicate the drains are not just associated with stormwater. Provisions for new connect points or continued use of the existing drains to the outfall pipes needs to be explored.

Cellar floor depth (El.=484+/-) and garage floor depth (El.=488+/-) below the stable are well below the observed and estimated historic seasonal high groundwaters elevations recorded within the soil evaluation logs obtained at NABOH.

Existing roof drain down spouts – Appear to be disconnected from gutters recessed into roofline resulting in a drip edge along perimeter of carriage house.

Existing drain outfalls – Dye tests observed in the field by representatives of the Board of health confirm that drains discharge offsite onto Lot 10A.

Existing Illicit Discharges – Dye tests also confirmed the discharge of septic tank effluent by the "Siphon Chamber" into the drain line which joins outfall #1 into the stream on Lot 10A.

Siphon Chamber – At a minimum effluent from the septic tank which includes any wash water from the stable floor drain system is collected within this chamber. It has yet to be determined whether this siphon chamber also serves any drain lines or foundation drains associated with the carriage house.

Existing Exempt Discharges – Groundwater from foundation drains are exempt.

Walled Garden Area – Runoff within the walls is collected by six area drains in series which convey runoff under the brick wall during "wet weather" and also conveys groundwater during "dry weather". Sumps are present and groundwater appears to drop below sump elevations following extended periods of "dry weather".

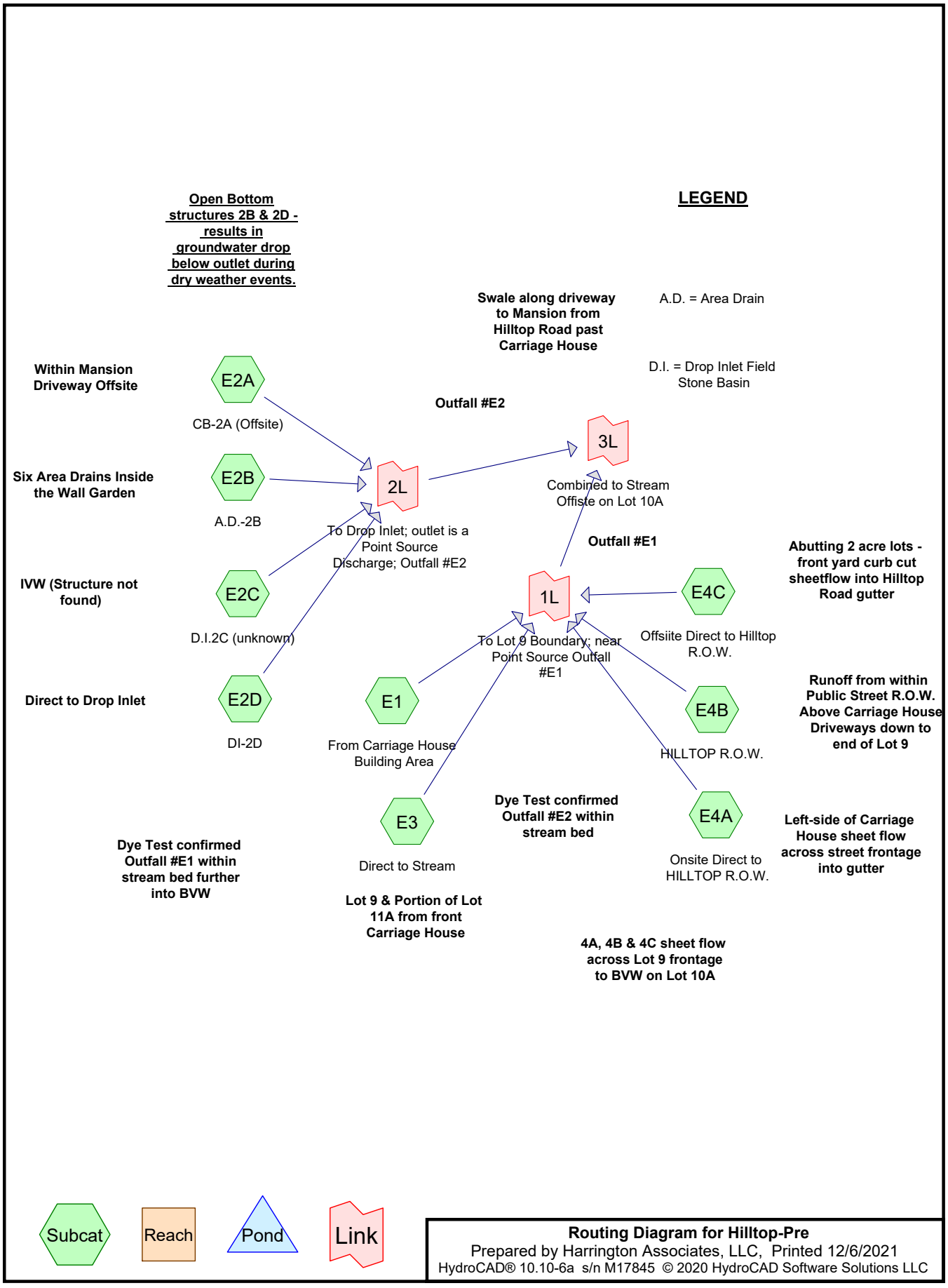
Landscape Architect - Attempts to locate and obtain copies of any record as-built and or design plans of the garden drains and carriage house drains were unsuccessful. Any support or knowledge of the location of these plans is greatly appreciated by representatives and citizens of the town.

1.4 Existing Condition Soils Analysis

The runoff Curve Number (CN) is used to determine the portion of the precipitation depth that will appear as runoff. The CN is a function of the soil type and ground cover. Subcatchments can have multiple CN values due to a combination of varying soil types (HSG C & HSG D) within areas of impervious, woodland and open space ground cover. HydroCAD calculates a weighted-CN value by summing the products of each CN multiplied by its fraction of the total area. This composite value is commonly used in subsequent runoff calculations.

The topography of the land and ground cover is also reviewed to generate a time of concentration (Tc) from which the stormwater runoff rate and volume can be calculated for a given watershed for comparison.

On-site soils are comprised of Paxton sandy loam which has a Hydrologic Soil Group (HSG) rating of C; Woodbridge sandy loam which has a HSG C/D depending on groundwater table and Woodbridge which has a HSG D. Areas within the isolated wetlands and BVW have been designated as HSG D.



Routing Diagram for Hilltop-Pre

Prepared by Harrington Associates, LLC, Printed 12/6/2021

HydroCAD® 10.10-6a s/n M17845 © 2020 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
51,386	77	2 acre lots, 12% imp, HSG C (E4C)
203,155	74	>75% Grass cover, Good, HSG C (E1, E2A, E2B, E2C, E2D, E3, E4A, E4B)
19,182	80	>75% Grass cover, Good, HSG D (E2B, E2C, E2D)
10,818	98	Driveway, HSG C (E2A, E3)
15,358	98	Paved Road, HSG C (E4B)
2,010	98	Paved drives & walkways, HSG C (E4A)
21,835	98	Paved parking, HSG C (E2D)
1,240	98	Paved parking, HSG D (E2D)
11,219	98	Roofs, HSG C (E1, E2B, E2C, E2D)
342,984	70	Woods, Good, HSG C (E2C, E2D, E3, E4A)
53,677	77	Woods, Good, HSG D (E2C, E2D, E3)
732,864	**75**	**TOTAL AREA**

Soil Listing (all nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
0	HSG B	
658,765	HSG C	E1, E2A, E2B, E2C, E2D, E3, E4A, E4B, E4C
74,099	HSG D	E2B, E2C, E2D, E3
0	Other	
732,864		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Sub Num
0	0	51,386	0	0	51,386	2 acre lots, 12% imp	
0	0	203,155	19,182	0	222,337	>75% Grass cover, Good	
0	0	10,818	0	0	10,818	Driveway	
0	0	15,358	0	0	15,358	Paved Road	
0	0	2,010	0	0	2,010	Paved drives & walkways	
0	0	21,835	1,240	0	23,075	Paved parking	
0	0	11,219	0	0	11,219	Roofs	
0	0	342,984	53,677	0	396,661	Woods, Good	
0	**0**	**658,765**	**74,099**	**0**	**732,864**	**TOTAL AREA**	

Time span=9.00-40.00 hrs, dt=0.20 hrs, 156 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: From Carriage House Runoff Area=11,659 sf 84.91% Impervious Runoff Depth>2.34"
Tc=6.0 min CN=94 Runoff=0.61 cfs 2,277 cf

Subcatchment E2A: CB-2A (Offsite) Runoff Area=16,309 sf 18.15% Impervious Runoff Depth=1.20"
Flow Length=215' Tc=7.6 min CN=78 Runoff=0.41 cfs 1,632 cf

Subcatchment E2B: A.D.-2B Runoff Area=42,957 sf 0.96% Impervious Runoff Depth=1.08"
Flow Length=100' Slope=0.0200 '/' Tc=8.4 min CN=76 Runoff=0.93 cfs 3,877 cf

Subcatchment E2C: D.I.2C (unknown) Runoff Area=110,916 sf 0.63% Impervious Runoff Depth=0.87"
Flow Length=575' Tc=13.4 min CN=72 Runoff=1.60 cfs 8,025 cf

Subcatchment E2D: DI-2D Runoff Area=190,504 sf 12.22% Impervious Runoff Depth=1.14"
Flow Length=497' Slope=0.0200 '/' Tc=14.9 min CN=77 Runoff=3.77 cfs 18,112 cf

Subcatchment E3: Direct to Stream Runoff Area=266,370 sf 2.95% Impervious Runoff Depth=0.87"
Flow Length=643' Tc=15.9 min CN=72 Runoff=3.87 cfs 19,273 cf

Subcatchment E4A: Onsite Direct to Runoff Area=15,987 sf 12.57% Impervious Runoff Depth=1.08"
Flow Length=100' Tc=10.5 min CN=76 Runoff=0.32 cfs 1,443 cf

Subcatchment E4B: HILLTOP R.O.W. Runoff Area=26,776 sf 57.36% Impervious Runoff Depth>1.89"
Flow Length=821' Tc=5.5 min CN=88 Runoff=1.13 cfs 4,214 cf

Subcatchment E4C: Offsiite Direct to Runoff Area=51,386 sf 12.00% Impervious Runoff Depth=1.14"
Flow Length=500' Tc=8.4 min CN=77 Runoff=1.18 cfs 4,885 cf

Link 1L: To Lot 9 Boundary; near Point Source Outfall #E1 Inflow=6.07 cfs 32,092 cf
Primary=6.07 cfs 32,092 cf

Link 2L: To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2 Inflow=6.38 cfs 31,645 cf
Primary=6.38 cfs 31,645 cf

Link 3L: Combined to Stream Offiste on Lot 10A Inflow=12.43 cfs 63,737 cf
Primary=12.43 cfs 63,737 cf

Total Runoff Area = 732,864 sf Runoff Volume = 63,737 cf Average Runoff Depth = 1.04"
90.63% Pervious = 664,218 sf 9.37% Impervious = 68,646 sf

Summary for Subcatchment E1: From Carriage House Building Area

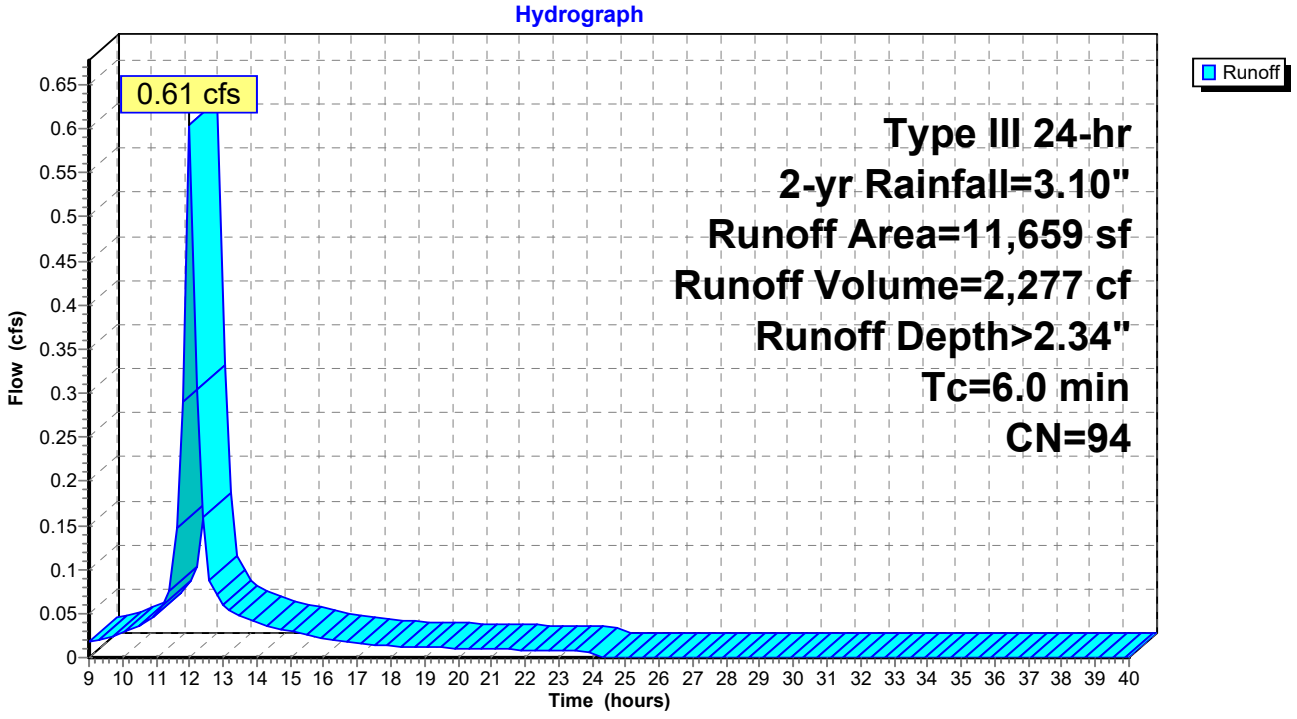
Runoff = 0.61 cfs @ 12.00 hrs, Volume= 2,277 cf, Depth> 2.34"
Routed to Link 1L : To Lot 9 Boundary; near Point Source Outfall #E1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs
Type III 24-hr 2-yr Rainfall=3.10"

	Area (sf)	CN	Description
*	9,900	98	Roofs, HSG C
	1,759	74	>75% Grass cover, Good, HSG C
	11,659	94	Weighted Average
	1,759		15.09% Pervious Area
	9,900		84.91% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, AB**

Subcatchment E1: From Carriage House Building Area



Summary for Subcatchment E2A: CB-2A (Offsite)

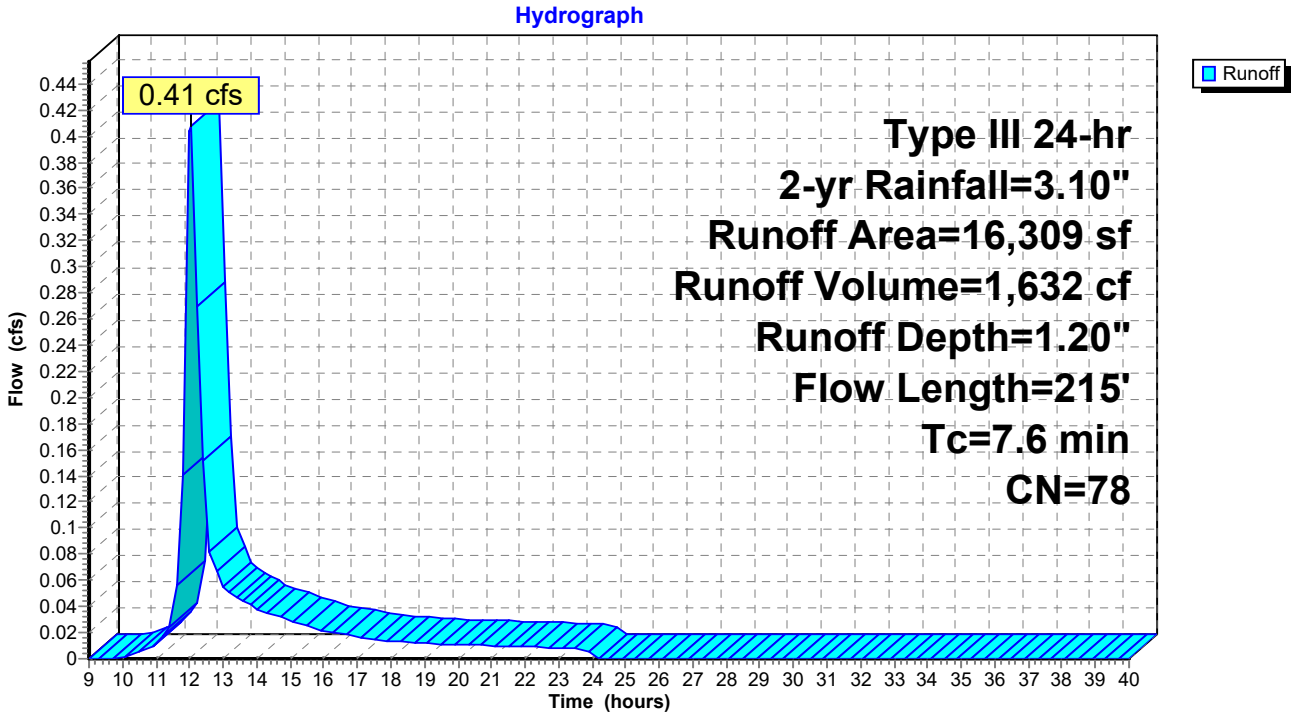
Runoff = 0.41 cfs @ 12.03 hrs, Volume= 1,632 cf, Depth= 1.20"
Routed to Link 2L : To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs
Type III 24-hr 2-yr Rainfall=3.10"

	Area (sf)	CN	Description
	13,349	74	>75% Grass cover, Good, HSG C
*	2,960	98	Driveway, HSG C
	16,309	78	Weighted Average
	13,349		81.85% Pervious Area
	2,960		18.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	50	0.0300	0.12		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.40"
0.4	65	0.0300	2.79		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
0.4	100	0.0400	4.06		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
7.6	215	Total			

Subcatchment E2A: CB-2A (Offsite)



Summary for Subcatchment E2B: A.D.-2B

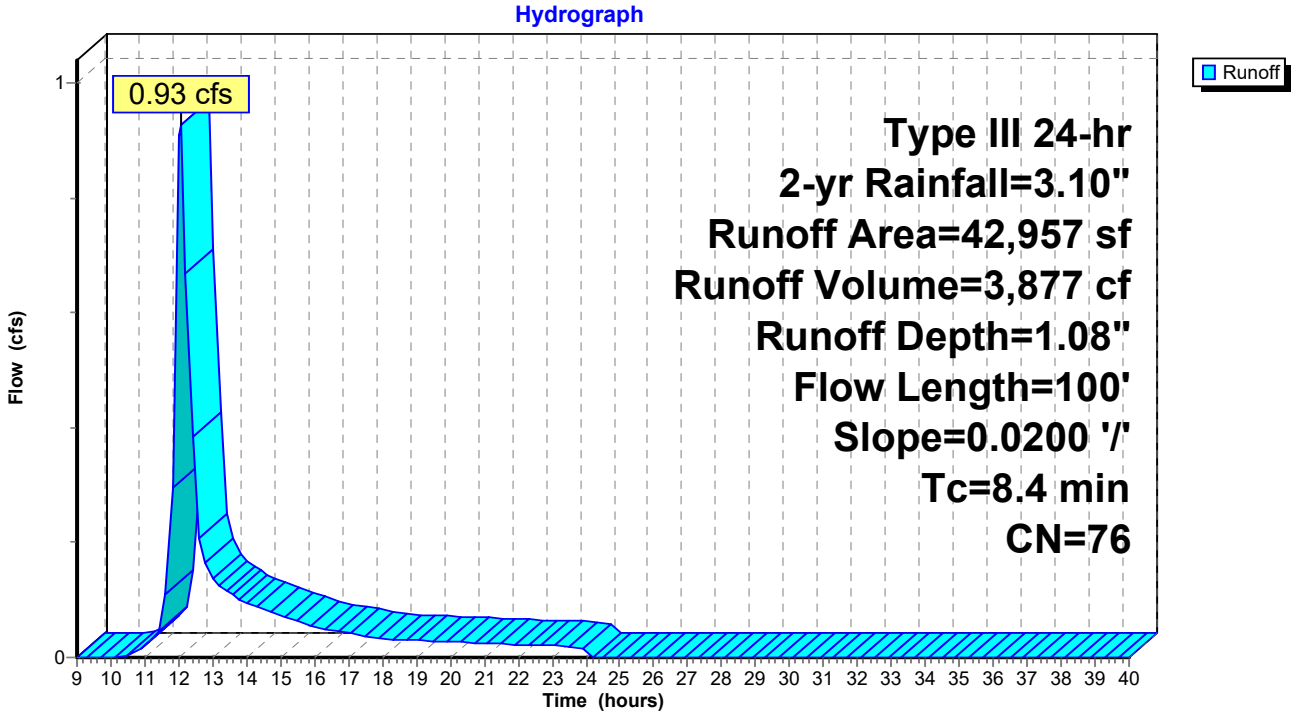
Runoff = 0.93 cfs @ 12.04 hrs, Volume= 3,877 cf, Depth= 1.08"
Routed to Link 2L : To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs
Type III 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
15,414	80	>75% Grass cover, Good, HSG D
27,130	74	>75% Grass cover, Good, HSG C
413	98	Roofs, HSG C
42,957	76	Weighted Average
42,544		99.04% Pervious Area
413		0.96% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	50	0.0200	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.40"
0.4	50	0.0200	2.28		**Shallow Concentrated Flow, BC** Unpaved Kv= 16.1 fps
8.4	100	Total			

Subcatchment E2B: A.D.-2B



Summary for Subcatchment E2C: D.I.2C (unknown)

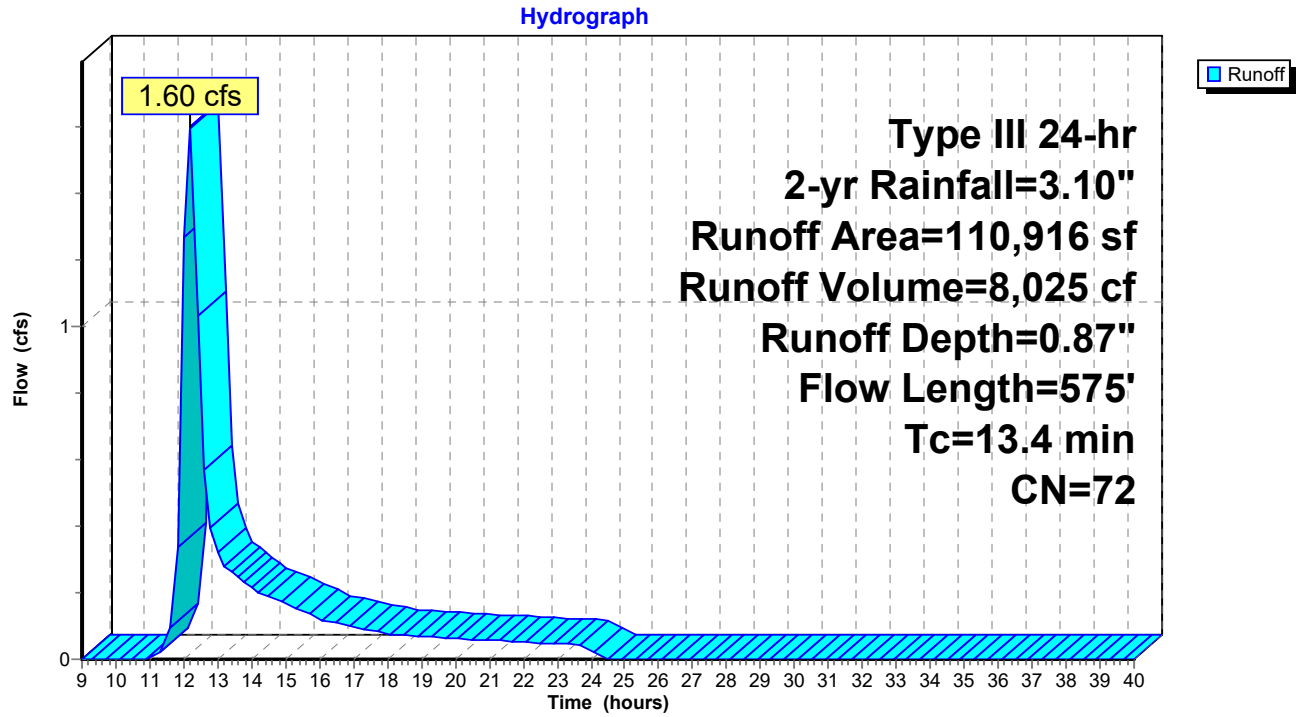
Runoff = 1.60 cfs @ 12.17 hrs, Volume= 8,025 cf, Depth= 0.87"
Routed to Link 2L : To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs
Type III 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
19,500	77	Woods, Good, HSG D
600	80	>75% Grass cover, Good, HSG D
6,800	74	>75% Grass cover, Good, HSG C
83,316	70	Woods, Good, HSG C
700	98	Roofs, HSG C
110,916	72	Weighted Average
110,216		99.37% Pervious Area
700		0.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	50	0.0200	0.10		**Sheet Flow, Segment ID: AB** Grass: Dense n= 0.240 P2= 3.40"
5.4	525	0.0100	1.61		**Shallow Concentrated Flow, Segment ID: BC** Unpaved Kv= 16.1 fps
13.4	575	Total			

Subcatchment E2C: D.I.2C (unknown)



Summary for Subcatchment E2D: DI-2D

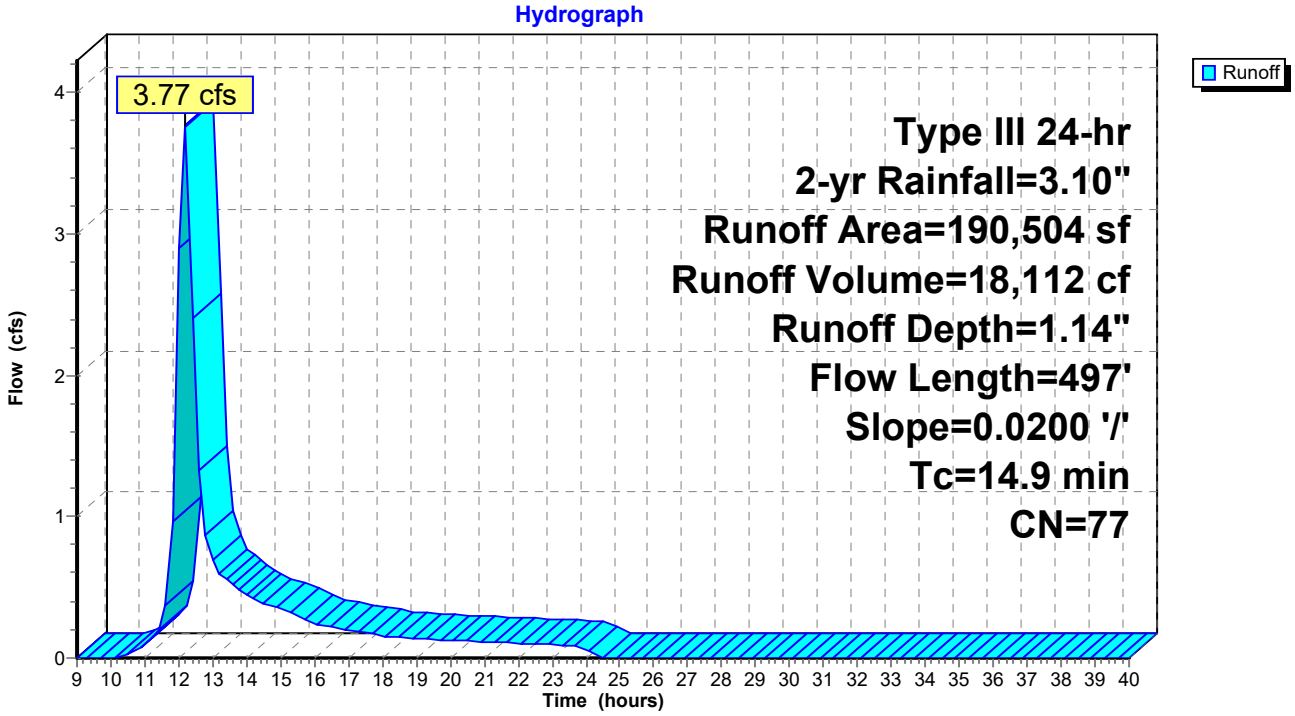
Runoff = 3.77 cfs @ 12.18 hrs, Volume= 18,112 cf, Depth= 1.14"
Routed to Link 2L : To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs
Type III 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
23,377	77	Woods, Good, HSG D
3,168	80	>75% Grass cover, Good, HSG D
41,555	70	Woods, Good, HSG C
206	98	Roofs, HSG C
21,835	98	Paved parking, HSG C
99,123	74	>75% Grass cover, Good, HSG C
1,240	98	Paved parking, HSG D
190,504	77	Weighted Average
167,223		87.78% Pervious Area
23,281		12.22% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.6	50	0.0200	0.07		**Sheet Flow, Segment ID: AB** Woods: Light underbrush n= 0.400 P2= 3.60"
3.3	447	0.0200	2.28		**Shallow Concentrated Flow, Segment ID: BC** Unpaved Kv= 16.1 fps
14.9	497	Total			

Subcatchment E2D: DI-2D



Summary for Subcatchment E3: Direct to Stream

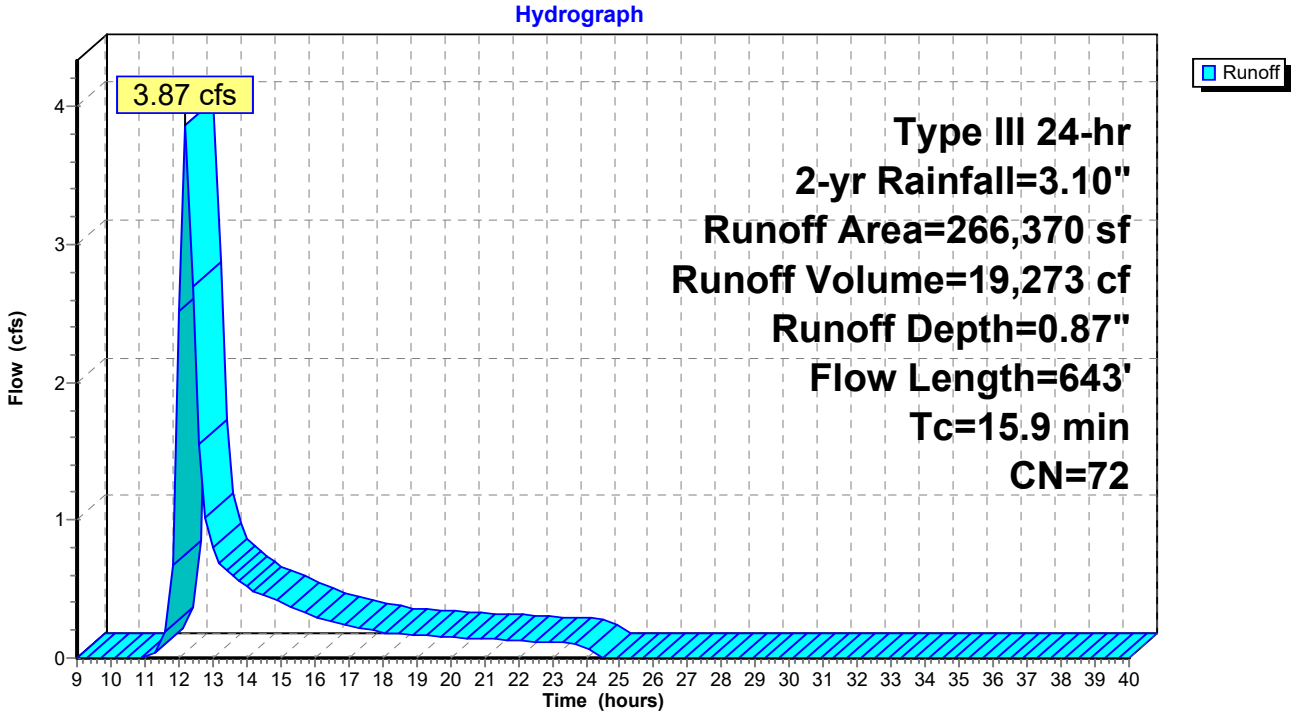
Runoff = 3.87 cfs @ 12.21 hrs, Volume= 19,273 cf, Depth= 0.87"
Routed to Link 1L : To Lot 9 Boundary; near Point Source Outfall #E1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs
Type III 24-hr 2-yr Rainfall=3.10"

	Area (sf)	CN	Description
*	7,858	98	Driveway, HSG C
	34,676	74	>75% Grass cover, Good, HSG C
	10,800	77	Woods, Good, HSG D
	213,036	70	Woods, Good, HSG C
	266,370	72	Weighted Average
	258,512		97.05% Pervious Area
	7,858		2.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.0	50	0.0200	0.10		**Sheet Flow, AB** Grass: Dense n= 0.240 P2= 3.40"
0.5	120	0.0400	4.06		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
7.4	473	0.0450	1.06		**Shallow Concentrated Flow, CD** Woodland Kv= 5.0 fps
15.9	643	Total			

Subcatchment E3: Direct to Stream



Summary for Subcatchment E4A: Onsite Direct to HILLTOP R.O.W.

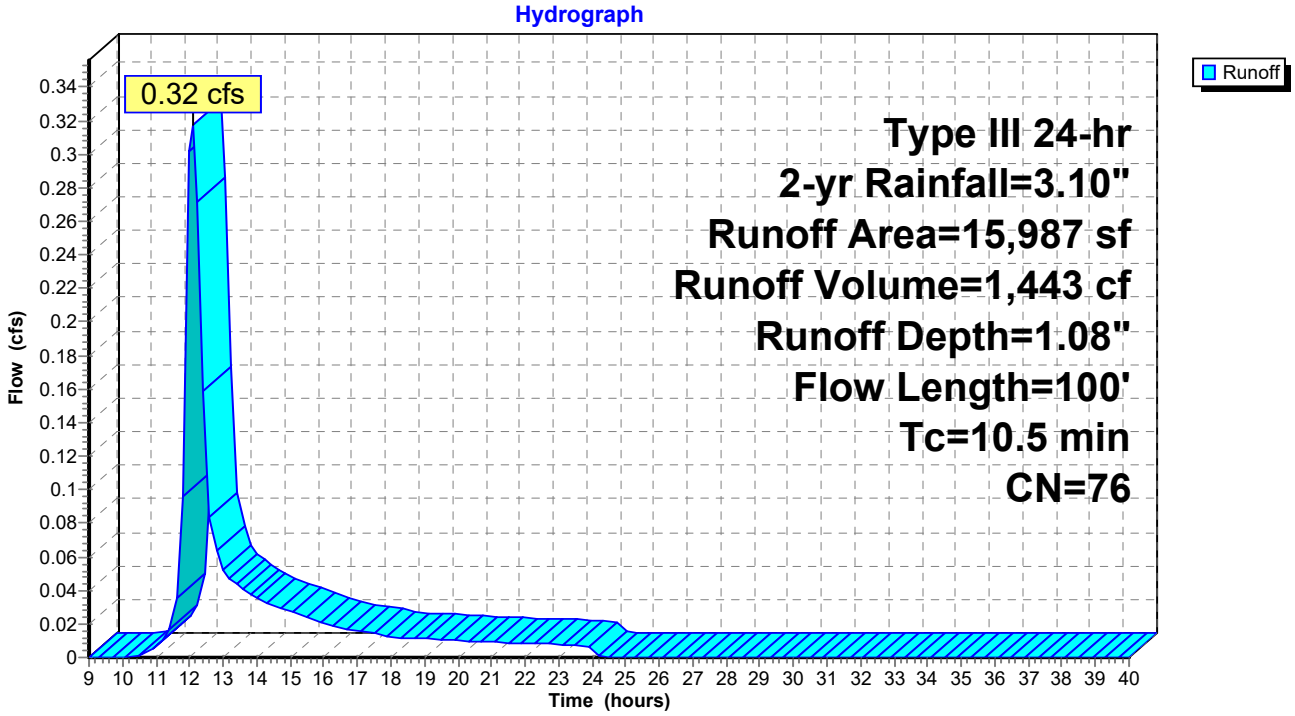
Runoff = 0.32 cfs @ 12.07 hrs, Volume= 1,443 cf, Depth= 1.08"
Routed to Link 1L : To Lot 9 Boundary; near Point Source Outfall #E1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs
Type III 24-hr 2-yr Rainfall=3.10"

	Area (sf)	CN	Description
	8,900	74	>75% Grass cover, Good, HSG C
*	2,010	98	Paved drives & walkways, HSG C
	5,077	70	Woods, Good, HSG C
	15,987	76	Weighted Average
	13,977		87.43% Pervious Area
	2,010		12.57% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.2	50	0.0100	0.08		**Sheet Flow, Segment ID: AB** Grass: Dense n= 0.240 P2= 3.60"
0.3	50	0.0300	2.79		**Shallow Concentrated Flow, Segment ID: BC** Unpaved Kv= 16.1 fps
10.5	100	Total			

Subcatchment E4A: Onsite Direct to HILLTOP R.O.W.



Summary for Subcatchment E4B: HILLTOP R.O.W.

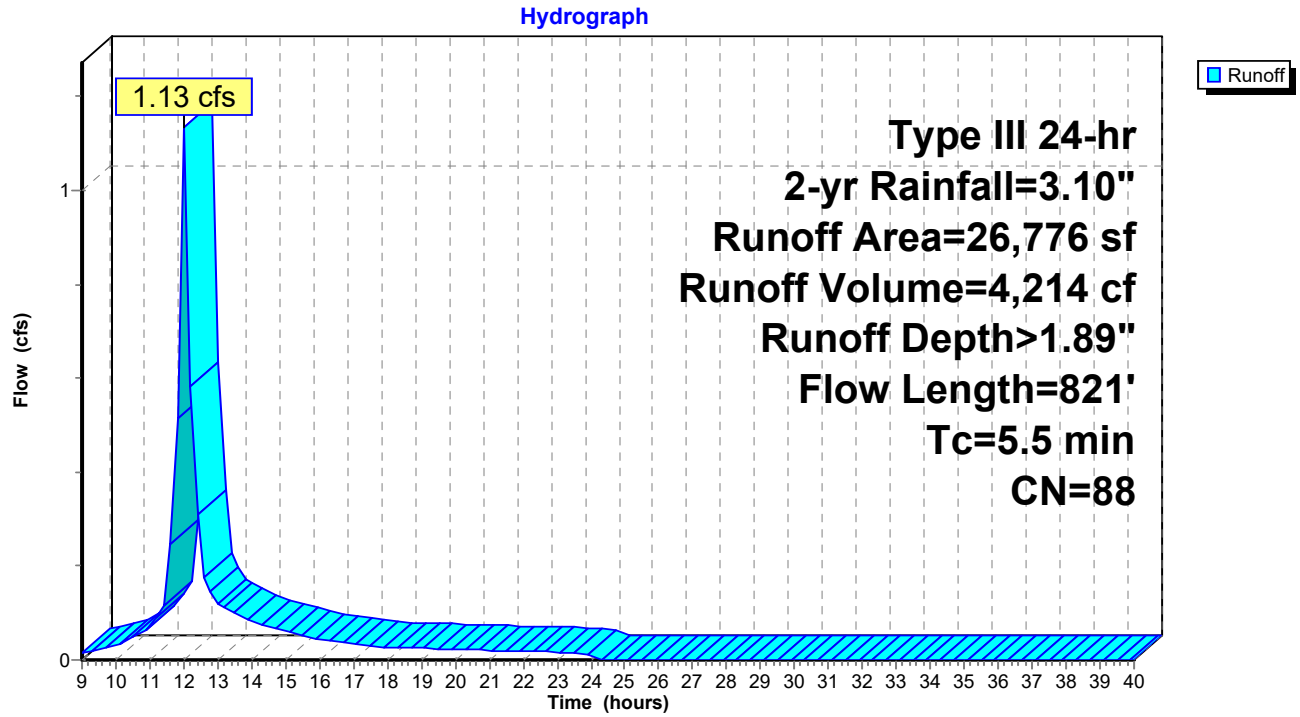
Runoff = 1.13 cfs @ 12.01 hrs, Volume= 4,214 cf, Depth> 1.89"
Routed to Link 1L : To Lot 9 Boundary; near Point Source Outfall #E1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs
Type III 24-hr 2-yr Rainfall=3.10"

	Area (sf)	CN	Description
	11,418	74	>75% Grass cover, Good, HSG C
*	15,358	98	Paved Road, HSG C
	26,776	88	Weighted Average
	11,418		42.64% Pervious Area
	15,358		57.36% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.5	15	0.0300	0.10		**Sheet Flow, Segment ID: AB** Grass: Dense n= 0.240 P2= 3.60"
3.0	806	0.0500	4.54		**Shallow Concentrated Flow, BC** Paved Kv= 20.3 fps
5.5	821	Total			

Subcatchment E4B: HILLTOP R.O.W.



Summary for Subcatchment E4C: Offsiite Direct to Hilltop R.O.W.

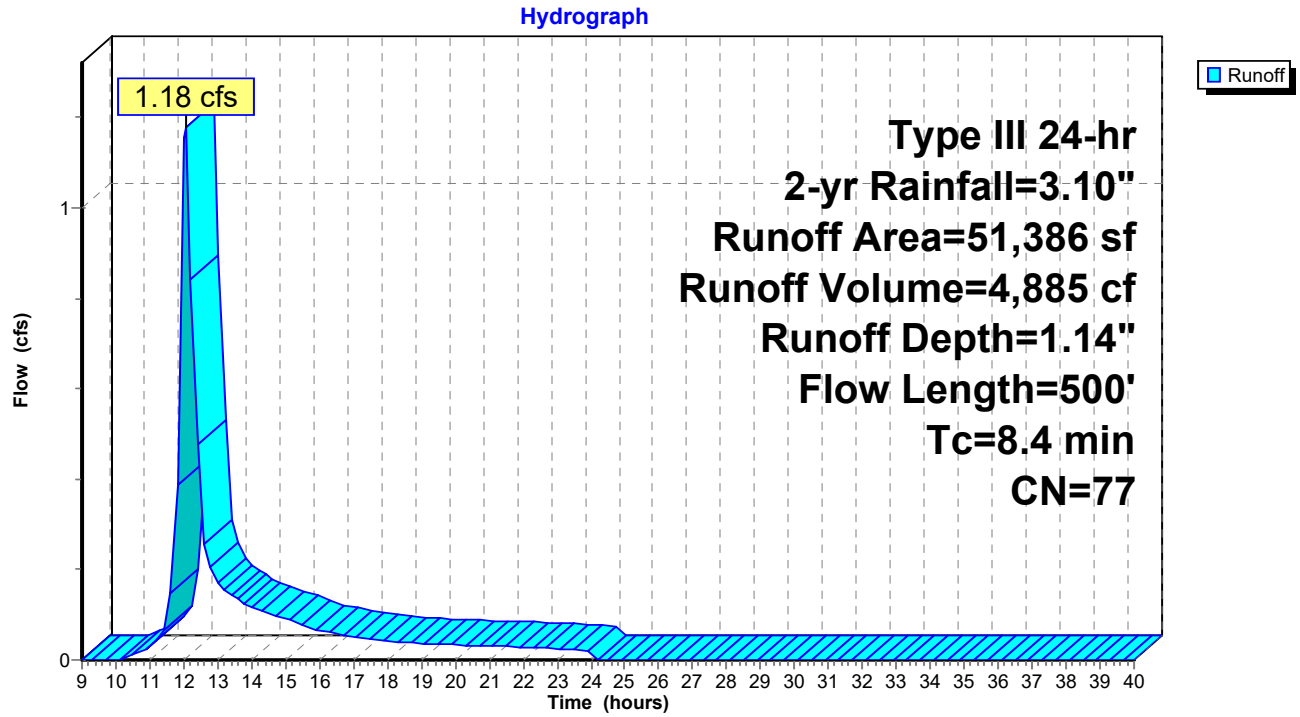
Runoff = 1.18 cfs @ 12.04 hrs, Volume= 4,885 cf, Depth= 1.14"
Routed to Link 1L : To Lot 9 Boundary; near Point Source Outfall #E1

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs
Type III 24-hr 2-yr Rainfall=3.10"

Area (sf)	CN	Description
51,386	77	2 acre lots, 12% imp, HSG C
45,220		88.00% Pervious Area
6,166		12.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.6	50	0.0300	0.13		**Sheet Flow, A-B** Grass: Dense n= 0.240 P2= 3.60"
0.5	100	0.0400	3.22		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
1.3	350	0.0500	4.54		**Shallow Concentrated Flow, C-D** Paved Kv= 20.3 fps
8.4	500	Total			

Subcatchment E4C: Offsiite Direct to Hilltop R.O.W.

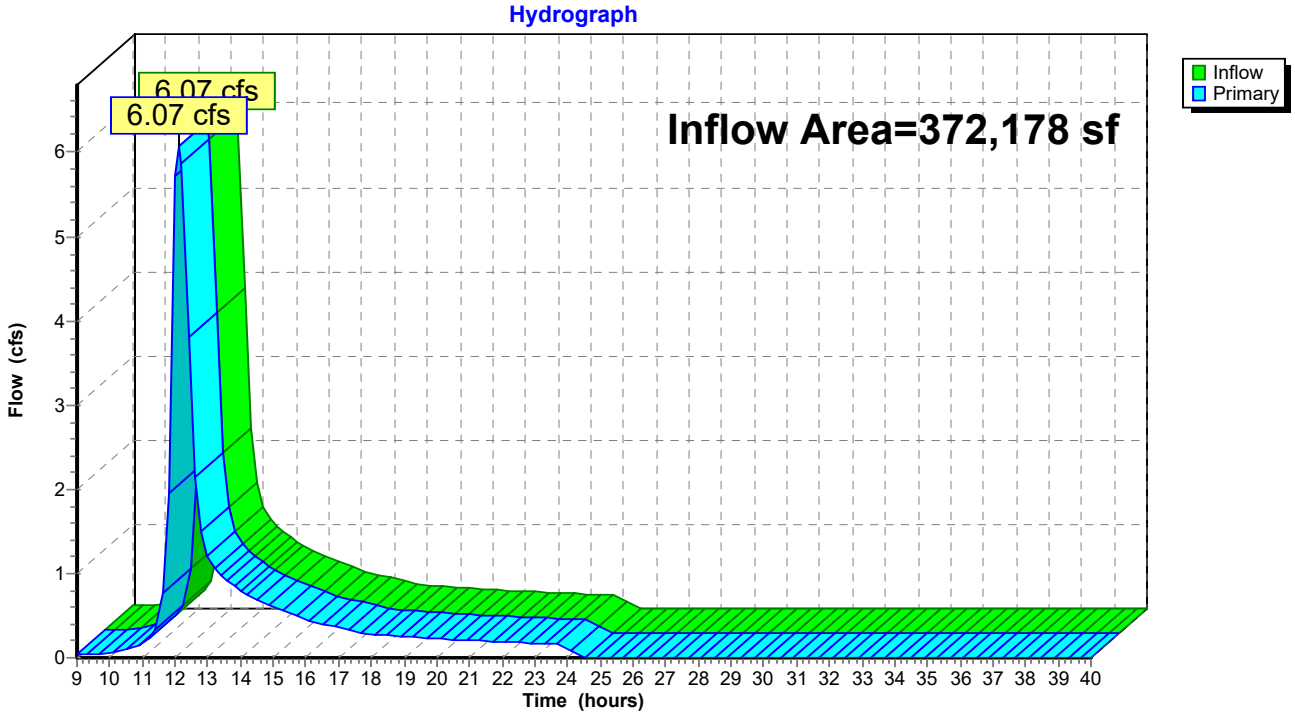


Summary for Link 1L: To Lot 9 Boundary; near Point Source Outfall #E1

Inflow Area = 372,178 sf, 11.09% Impervious, Inflow Depth > 1.03" for 2-yr event
Inflow = 6.07 cfs @ 12.11 hrs, Volume= 32,092 cf
Primary = 6.07 cfs @ 12.11 hrs, Volume= 32,092 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 3L : Combined to Stream Offiste on Lot 10A

Primary outflow = Inflow, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs

Link 1L: To Lot 9 Boundary; near Point Source Outfall #E1

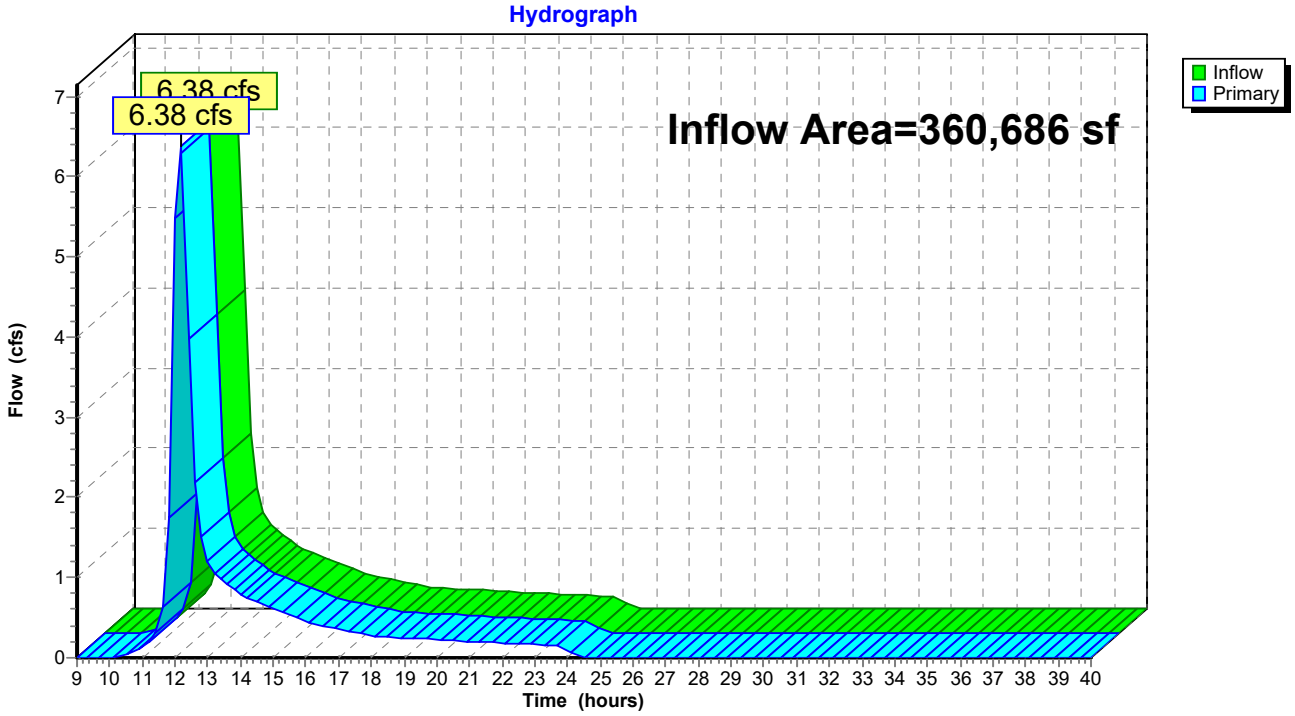


Summary for Link 2L: To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2

Inflow Area = 360,686 sf, 7.58% Impervious, Inflow Depth = 1.05" for 2-yr event
Inflow = 6.38 cfs @ 12.15 hrs, Volume= 31,645 cf
Primary = 6.38 cfs @ 12.15 hrs, Volume= 31,645 cf, Atten= 0%, Lag= 0.0 min
Routed to Link 3L : Combined to Stream Offiste on Lot 10A

Primary outflow = Inflow, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs

Link 2L: To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2

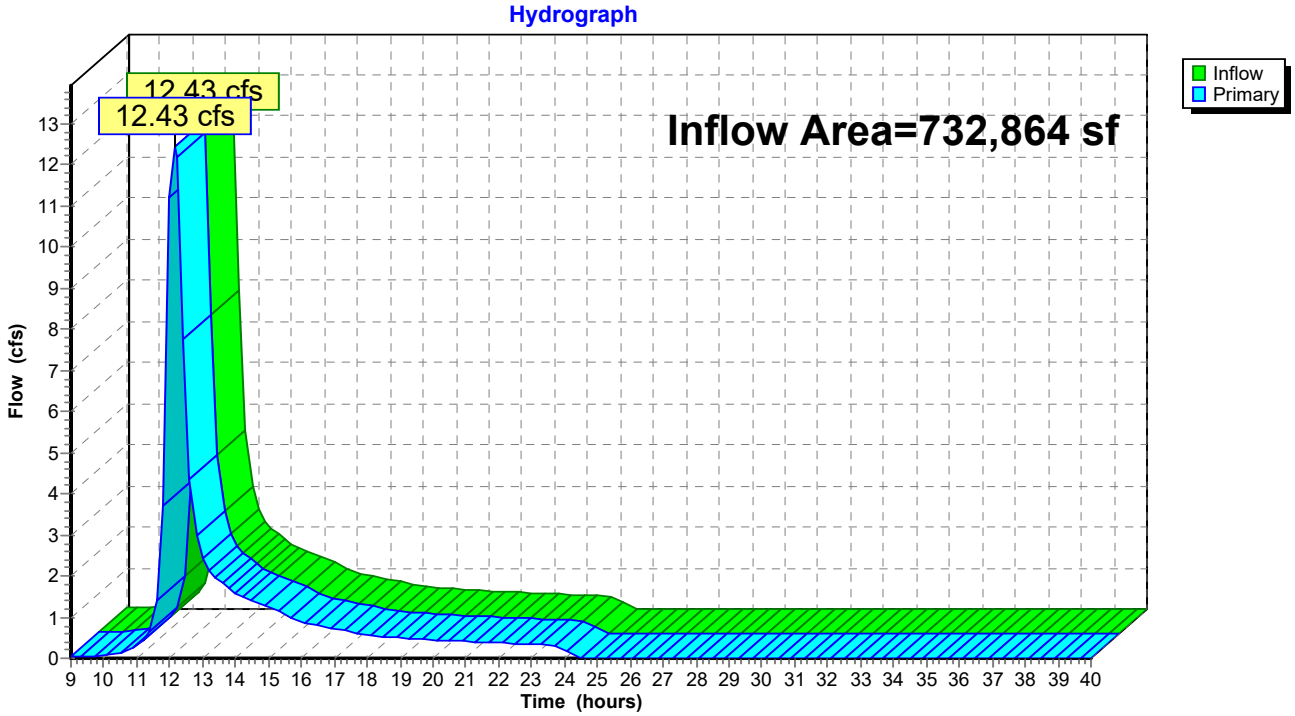


Summary for Link 3L: Combined to Stream Offiste on Lot 10A

Inflow Area = 732,864 sf, 9.37% Impervious, Inflow Depth > 1.04" for 2-yr event
Inflow = 12.43 cfs @ 12.14 hrs, Volume= 63,737 cf
Primary = 12.43 cfs @ 12.14 hrs, Volume= 63,737 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 9.00-40.00 hrs, dt= 0.20 hrs

Link 3L: Combined to Stream Offiste on Lot 10A



Time span=9.00-40.00 hrs, dt=0.20 hrs, 156 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: From Carriage House Runoff Area=11,659 sf 84.91% Impervious Runoff Depth>3.59"
Tc=6.0 min CN=94 Runoff=0.92 cfs 3,485 cf

Subcatchment E2A: CB-2A (Offsite) Runoff Area=16,309 sf 18.15% Impervious Runoff Depth>2.29"
Flow Length=215' Tc=7.6 min CN=78 Runoff=0.80 cfs 3,114 cf

Subcatchment E2B: A.D.-2B Runoff Area=42,957 sf 0.96% Impervious Runoff Depth>2.13"
Flow Length=100' Slope=0.0200 '/' Tc=8.4 min CN=76 Runoff=1.90 cfs 7,624 cf

Subcatchment E2C: D.I.2C (unknown) Runoff Area=110,916 sf 0.63% Impervious Runoff Depth=1.82"
Flow Length=575' Tc=13.4 min CN=72 Runoff=3.51 cfs 16,826 cf

Subcatchment E2D: DI-2D Runoff Area=190,504 sf 12.22% Impervious Runoff Depth>2.21"
Flow Length=497' Slope=0.0200 '/' Tc=14.9 min CN=77 Runoff=7.42 cfs 35,091 cf

Subcatchment E3: Direct to Stream Runoff Area=266,370 sf 2.95% Impervious Runoff Depth=1.82"
Flow Length=643' Tc=15.9 min CN=72 Runoff=8.50 cfs 40,407 cf

Subcatchment E4A: Onsite Direct to Runoff Area=15,987 sf 12.57% Impervious Runoff Depth>2.13"
Flow Length=100' Tc=10.5 min CN=76 Runoff=0.65 cfs 2,837 cf

Subcatchment E4B: HILLTOP R.O.W. Runoff Area=26,776 sf 57.36% Impervious Runoff Depth>3.12"
Flow Length=821' Tc=5.5 min CN=88 Runoff=1.87 cfs 6,956 cf

Subcatchment E4C: Offsiite Direct to Runoff Area=51,386 sf 12.00% Impervious Runoff Depth>2.21"
Flow Length=500' Tc=8.4 min CN=77 Runoff=2.37 cfs 9,464 cf

Link 1L: To Lot 9 Boundary; near Point Source Outfall #E1 Inflow=12.93 cfs 63,150 cf
Primary=12.93 cfs 63,150 cf

Link 2L: To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2 Inflow=12.96 cfs 62,654 cf
Primary=12.96 cfs 62,654 cf

Link 3L: Combined to Stream Offiste on Lot 10A Inflow=25.51 cfs 125,804 cf
Primary=25.51 cfs 125,804 cf

Total Runoff Area = 732,864 sf Runoff Volume = 125,804 cf Average Runoff Depth = 2.06"
90.63% Pervious = 664,218 sf 9.37% Impervious = 68,646 sf

Time span=9.00-40.00 hrs, dt=0.20 hrs, 156 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: From Carriage House Runoff Area=11,659 sf 84.91% Impervious Runoff Depth>4.38"
Tc=6.0 min CN=94 Runoff=1.12 cfs 4,257 cf

Subcatchment E2A: CB-2A (Offsite) Runoff Area=16,309 sf 18.15% Impervious Runoff Depth>3.04"
Flow Length=215' Tc=7.6 min CN=78 Runoff=1.07 cfs 4,133 cf

Subcatchment E2B: A.D.-2B Runoff Area=42,957 sf 0.96% Impervious Runoff Depth>2.86"
Flow Length=100' Slope=0.0200 '/' Tc=8.4 min CN=76 Runoff=2.58 cfs 10,251 cf

Subcatchment E2C: D.I.2C (unknown) Runoff Area=110,916 sf 0.63% Impervious Runoff Depth>2.51"
Flow Length=575' Tc=13.4 min CN=72 Runoff=4.87 cfs 23,202 cf

Subcatchment E2D: DI-2D Runoff Area=190,504 sf 12.22% Impervious Runoff Depth>2.95"
Flow Length=497' Slope=0.0200 '/' Tc=14.9 min CN=77 Runoff=9.92 cfs 46,898 cf

Subcatchment E3: Direct to Stream Runoff Area=266,370 sf 2.95% Impervious Runoff Depth>2.51"
Flow Length=643' Tc=15.9 min CN=72 Runoff=11.80 cfs 55,721 cf

Subcatchment E4A: Onsite Direct to Runoff Area=15,987 sf 12.57% Impervious Runoff Depth>2.86"
Flow Length=100' Tc=10.5 min CN=76 Runoff=0.89 cfs 3,815 cf

Subcatchment E4B: HILLTOP R.O.W. Runoff Area=26,776 sf 57.36% Impervious Runoff Depth>3.92"
Flow Length=821' Tc=5.5 min CN=88 Runoff=2.34 cfs 8,740 cf

Subcatchment E4C: Offsiite Direct to Runoff Area=51,386 sf 12.00% Impervious Runoff Depth>2.95"
Flow Length=500' Tc=8.4 min CN=77 Runoff=3.18 cfs 12,643 cf

Link 1L: To Lot 9 Boundary; near Point Source Outfall #E1 Inflow=17.63 cfs 85,177 cf
Primary=17.63 cfs 85,177 cf

Link 2L: To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2 Inflow=17.55 cfs 84,484 cf
Primary=17.55 cfs 84,484 cf

Link 3L: Combined to Stream Offiste on Lot 10A Inflow=34.68 cfs 169,661 cf
Primary=34.68 cfs 169,661 cf

Total Runoff Area = 732,864 sf Runoff Volume = 169,661 cf Average Runoff Depth = 2.78"
90.63% Pervious = 664,218 sf 9.37% Impervious = 68,646 sf

Time span=9.00-40.00 hrs, dt=0.20 hrs, 156 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E1: From Carriage House Runoff Area=11,659 sf 84.91% Impervious Runoff Depth>5.44"
Tc=6.0 min CN=94 Runoff=1.39 cfs 5,282 cf

Subcatchment E2A: CB-2A (Offsite) Runoff Area=16,309 sf 18.15% Impervious Runoff Depth>4.07"
Flow Length=215' Tc=7.6 min CN=78 Runoff=1.43 cfs 5,533 cf

Subcatchment E2B: A.D.-2B Runoff Area=42,957 sf 0.96% Impervious Runoff Depth>3.88"
Flow Length=100' Slope=0.0200 '/' Tc=8.4 min CN=76 Runoff=3.51 cfs 13,880 cf

Subcatchment E2C: D.I.2C (unknown) Runoff Area=110,916 sf 0.63% Impervious Runoff Depth>3.49"
Flow Length=575' Tc=13.4 min CN=72 Runoff=6.78 cfs 32,221 cf

Subcatchment E2D: DI-2D Runoff Area=190,504 sf 12.22% Impervious Runoff Depth>3.98"
Flow Length=497' Slope=0.0200 '/' Tc=14.9 min CN=77 Runoff=13.36 cfs 63,165 cf

Subcatchment E3: Direct to Stream Runoff Area=266,370 sf 2.95% Impervious Runoff Depth>3.49"
Flow Length=643' Tc=15.9 min CN=72 Runoff=16.43 cfs 77,392 cf

Subcatchment E4A: Onsite Direct to Runoff Area=15,987 sf 12.57% Impervious Runoff Depth>3.88"
Flow Length=100' Tc=10.5 min CN=76 Runoff=1.21 cfs 5,167 cf

Subcatchment E4B: HILLTOP R.O.W. Runoff Area=26,776 sf 57.36% Impervious Runoff Depth>4.99"
Flow Length=821' Tc=5.5 min CN=88 Runoff=2.97 cfs 11,124 cf

Subcatchment E4C: Offsiite Direct to Runoff Area=51,386 sf 12.00% Impervious Runoff Depth>3.97"
Flow Length=500' Tc=8.4 min CN=77 Runoff=4.31 cfs 17,020 cf

Link 1L: To Lot 9 Boundary; near Point Source Outfall #E1 Inflow=24.18 cfs 115,986 cf
Primary=24.18 cfs 115,986 cf

Link 2L: To Drop Inlet; outlet is a Point Source Discharge; Outfall #E2 Inflow=23.90 cfs 114,798 cf
Primary=23.90 cfs 114,798 cf

Link 3L: Combined to Stream Offiste on Lot 10A Inflow=48.51 cfs 230,784 cf
Primary=48.51 cfs 230,784 cf

Total Runoff Area = 732,864 sf Runoff Volume = 230,784 cf Average Runoff Depth = 3.78"
90.63% Pervious = 664,218 sf 9.37% Impervious = 68,646 sf

1.5 Existing Condition Outlet Drain Profile Analysis

The extent and location of ALL area drain line and Illicit Discharge Locations connections, are still pending completion. Initial camera work has indicated that the drain lines are broken and partially clogged with tree roots and gravel, where pipe has been has broken. Lines consist of 8-inch clay pipe section at 3' intervals with bell-end placed downstream. Joints are believed to be mortared. Additional camera work is recommended to accurately locate drain lines.

Drain Line Profiles (Outfalls E1 & E2)
(highest to lowest spot grades)

Elev. – Description of Spot Grade Location:

Along Outfall Pipe #E1 – Carriage House to Stream
502+ - High point along Hill Top Road centerline past house
500+ – Front yard at Pump House (Parcel A)
498+ - Rear yard at Carriage House
497+ - Front yard at Carriage House
489+ - Septic tank inverts prior to Siphon
488+ - Cellar Floor #2 under Stable Area of Carriage House-
485+ - Cellar Floor #1 under Carriage House Living Area
476+ - Invert at Drain Point #4 (near begin of Lot 9)
474+ - Grade at boundary of site (Lot 9/Lot 10A)
466+ - Dye Test – Pipe within Intermittent Stream (Outfall #E1)

Along Outfall Pipe #2 – Isolated Wetlands/Wall Garden Area to Stream
497+ – Rim in mansion driveway
496+ - Area drains within wall garden enclosure
495+ - Isolated wetlands north of wall garden (POTENTIAL AREA DRAIN)
490+ - Rim of Drop Inlet drain at driveway (C2 - Outfall #E2)
488+ - Cellar Floor under Stable Area of Carriage House-(?)
486+ - pipe invert out under driveway (C2)
483+ - 100-foot Buffer Zone to BVW prior to Lot 9
482+ - 200-foot setback to intermittent stream
482+ - Begin Lot 9.
480+ - Adjusted BVW by LEC Environmental, INC. (C2)
474+ - Grade at boundary of site (Lot 9/Lot 10A)
472+ - Dye Test – Pipe Below Intermittent Stream Bed (Outfall #E2)

1.6 Stormwater Modeling

The Stormwater Report contains calculations which have been prepared utilizing HydroCAD. HydroCAD is a Computer Aided Design program used form modeling the hydrology and hydraulics (H&H) of stormwater runoff. HydroCAD uses procedures developed by the Natural Resources Conservation Service (NRCS), plus a wide range of other standard H&H calculations.

HydroCAD is commonly used to generate hydrographs for a given watershed and to study their flow through a drainage system consisting of natural and/or artificial components. This allows the designer and approving authority to verify the adequacy of the drainage system proposed, or to predict where flooding or erosion problems are likely to occur.

To illustrate compliance with the Massachusetts Stormwater Management Standards, calculations have been prepared for varying rainfall intensity that will occur at each return period or return period.

The (2-yr, 10-yr, 25-yr & 100-yr), verify the behavior of the drainage system under varying environmental conditions, utilizing rainfall data obtained from NRCS as follows:

Appendix B Synthetic Rainfall Distributions and Rainfall Data Sources
TR-55 (210-VI-TR-55, Second Ed., June 1986)

Synthetic Rainfall Distribution – To represent various regions of the United States, NRCS developed four synthetic 24-hour rainfall distributions (I, IA, II AND III) from available National Weather Service (NWS) duration-frequency data or local storm data. Type III represents Gulf of Mexico and Atlantic Coastal area where tropical storms bring large 24-hour storm events.

Project Selection	**Referenced Source**	
(Type III)	Figure B-1	SCS 24-hour rainfall distributions
(Type III)	Figure B-2	Approx. geographic boundaries for NRCS (SCS) rainfall distributions

Rainfall Data Source – The 24-hour rainfall data published by the National Weather Service (NWS) Technical Paper 40 (TP-40) are provided on Figures B-3 through B-8; Interpolated values are as follows:

(3.1 inches)	Figure B-3	2-year 24-hr rainfall
(4.5 inches)	Figure B-5	10-year, 24-hr rainfall
(5.4 inches)	Figure B-6	25-year, 24-hr rainfall
(6.6 inches)	Figure B-8	100-year, 24-hr rainfall

1.7 Pre-Development Watershed

The pre-development watershed area is separated into four watersheds resulting from the existing topography and general location of existing on-site area drains for comparison with the post-development condition.

E1 – Carriage House Area Drain Connections
E2 – Area drains to Drop Inlet Structure Along Driveway
- E2A – One Area drain within mansion driveway
- E2B – Six Area drains within wall garden area
- E2C – To Isolated Wetland drain line (rim unknown)
- E2D – Direct to Drop Inlet

E3 – Overland Flow within site across former Lot 8 & current Lot 9
E4 – To Hill Top Road R.O.W with discharge onto Lot 9
- E4A – Access driveway areas to Carriage House along frontage
- E4B – Pavement and shoulders within right-of-way
- E4C - Abutting front-yards into R.O.W.

1L represents flow towards the Outfall No. E1

2L represents flow to the Drop Inlet along driveway to mansion; prior to point source discharge into Intermittent Stream at Outfall No. E2.

3L represents the combined flow as runoff eventually concentrates within the stream bed.

Using the methods described in the stormwater modeling methodology above, runoff curve numbers and times of concentration are generated for each watershed for the pre-development condition to be used for comparison with the post-development condition described below. A schematic of the mathematical model is provided within the analysis for discussion with the Conservation Commission.

1.8 Post-Development Watershed

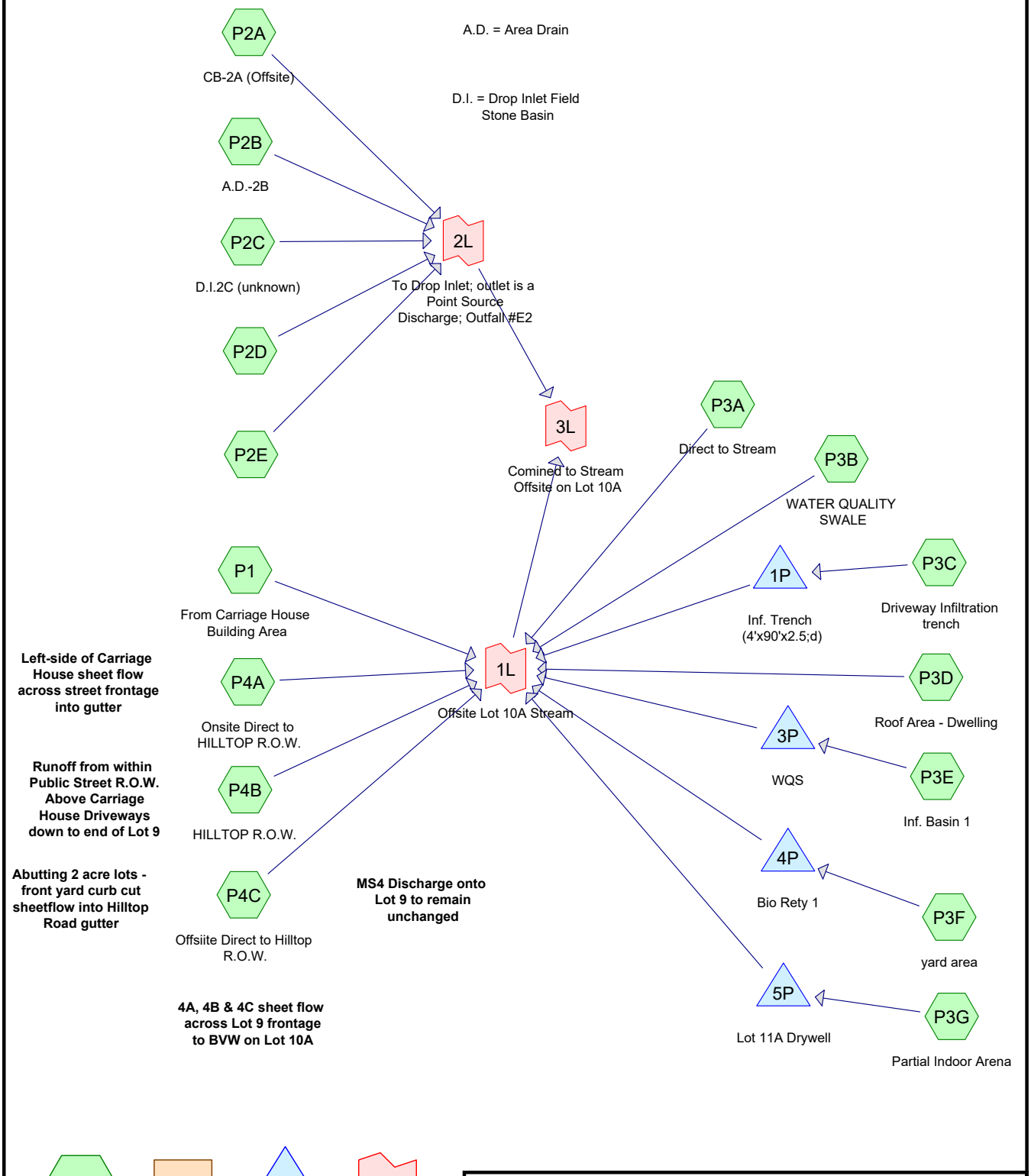
The post-development watershed is also separated into four distinct watershed groups. Many LID approaches are incorporated to decentralize runoff and maximize recharge per local requirements.

The selected Comparison Edge 1L represents flow tributary towards the wetland resource areas closer to Hill Top Road.

The selected Comparison Edge 2L represents flow tributary towards the intermittent stream channel within the middle of Lot 9.

The selected Comparison Edge 3L represents combined flow from 1L and 2L.

LEGEND



Routing Diagram for Hilltop-Post
Prepared by Harrington Associates, LLC, Printed 12/6/2021
HydroCAD® 10.10-6a s/n M17845 © 2020 HydroCAD Software Solutions LLC

1.9 Pastures/Paddocks- (Lot 11A)

The care and maintenance of the land, and how the health of the land effects horses, is a win-win situation.

Prior to August 10, 2021, the Applicant, Kathryn O'Hearn Loring, met with the Conservation Agent, to introduce herself at which time some details were provided relating to her background associated with the ownership and proper care of horses.

This is a standard horse seed forage mix. The word FORAGE is what the horses are eating in the pasture. Conservation will know this word, regarding horse properties. They will want to know what the seed mix is. Horse forage seed mixes are complex. Conservation will want to know the species of the perennial grasses, and if they have an issue with them.

The positioning of the indoor close to the road, and the sand riding ring, abutting the indoor, will separate the lower wetland resource areas from the upper horse forage grass mix.

Pasture – A minimum area of pasture is necessary for the horses which will be cared for within the stable portion of the Carriage House. The area of pasture is based upon information provided to us by the Applicant. The location of the fences for the individual paddocks is not a requirement of the Stormwater Control Bylaw. The location will be determined by the Applicant in the field.

Paddocks – The pasture will be broken into smaller pastures called Paddocks. In between the paddocks will be human and horse passageways, which will be part of a safety plan associated with leading the horses to and from the paddocks.

Healthy Environment – Managing the health of land that the horses are grazing on, is instrumental in managing the health of the horses. Since horses can become sick, if the pasture is over-eaten, and trampled on, a rotation system of the paddocks will be implemented. Some paddocks may become unusable after rainy weather, since they could be more delicate. The horses will utilize stronger paddocks, after rain storms.

Operation & Maintenance Schedule – To maintain the health of the horses and the surface cover within the pasture, it is necessary to rotate the horses to another paddock to graze, otherwise they can over eat, and damage the land, making it hard, for the perennial, forage to regrow. Mud would then have the potential to develop which can create; thrush, laminitis, white line disease, rain rot, fungus and many other illnesses and conditions. These conditions require time consuming treatment plans, and health maintenance procedures which are then needed daily.

Manure Management - A couple times a week, the manure will be removed within these paddocks. Since horses tend to not eat forage, close to where they go to the bathroom, this maintenance item is essential.

Manure Maintenance Plan - Manure will be kept within areas which exceed the minimum linear setbacks to the property lot lines, along with setbacks to private water supply wells and private on-site septic system locations. To address the attraction of flies to manure, organic feed supplements that we can be given to the horses, which will deter, fly larva from developing. Hens and chickens also eat larva, and are good to have in the paddocks. They also help to keep the tick population down.

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

Private Irrigation Well - An irrigation well, will need to be positioned, to hydrate the forage paddocks and to also supply water to inside the barn for the horses to drink and bathe with. The bathe water is considered an illicit discharge and drains within the stable cannot be connected to the septic system or discharged directly into and public streets our pipe into onsite watercourses.

Daily Water Supply Demands – Horses will be encouraged to drink 8 to 10 gallons of water a day, so that they can reduce the 14-16 gallons of acid in their stomach a day. This acid is so powerful, that it creates debilitating ulcers in the Squamous portion of their stomach, as well as the hind stomach. To prevent this, we go back to the paddocks. Horses need to eat and nibble about 16 hours a day, to sop up the acid. It's the combination of nibbling outside, and feeding hay, hay cubes, grains, and supplements is a daily regime.

Vegetation Maintenance Plan – A forage seed mix will be provided within the paddocks to maintain the option to rotate horses in well-cared for paddocks. This is a key component in preventing Ulcers which are ultra-serious, since the horses can hardly be brushed. Ulcer come on fast, and it can take 3+/- months to heal. You can't ride, many times. The alternative plan of giving medication to treat the ulcer, is not the preferred alternative to a applying a forage seed mixture with irrigation. Heavy doses of Omeprazole, Sulfurate, and Misopostol are given, which cost up to 4,000K, not to mention the cost of a few Gastric Endoscopes performed by a vet.

Forage Seed Mixture – The Barenburg-equinemaster pasture seed mix (or equal), is suitable for horses, and is proposed to be applied within the paddocks, following a soils analysis. To ensure that the mineral base, in the soils, will produce healthy forage for the horses to graze on, a soil balancing product may need to be applied prior to seeding.

https://www.tractorsupply.com/tsc/grass-seed/barenbrug-equinemaster-pasture-mix-north-25-lb-23094

1.10 MassDEP Stormwater Management Standards

The Stormwater Management Standards – (MA Stormwater Handbook Vol. 1: Ch. 1; Page 1)

1996 - Issued the Stormwater Policy which established the Stormwater Management Standards.

1997 – Published the Stormwater Handbook as guidance on the Stormwater Policy.

Application

MassDEP applies the Revised Stormwater Management Standards pursuant to its authority under:

the Wetlands Protection Act, M.G.L. c. 131, § 40, and

the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53.

Managed Prevention

Stormwater runoff results from rainfall and snow melt;

New and Existing development typically adds impervious surfaces and,

if not properly managed,

May alter natural drainage features

May increase peak discharge rates and volumes

May reduce recharge to wetlands and streams

May increase the discharge of pollutants to wetlands and water bodies.

The Standards address:

water quality (pollutants)

water quantity (flooding, low base flow and recharge)

The Standards implement a wide variety of stormwater management strategies which include:

Environmentally Sensitive Site Design

LID (low-impact-development) Techniques to:

Minimize Impervious Surface and Land Disturbance

Source Control

Pollution Control

Construction Period Erosion and Sedimentation Control

Long-Term Operation and Maintenance of Stormwater Management Systems.

1.11 Compliance with Stormwater Management Standards

Standard 1
No new stormwater conveyances (e.g. outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

At this moment, we have identified a minimum of two (2) existing known outfalls into the stream from the carriage house building (Outfall #E1) and from the closed drainage system along the driveway (#E2) leading past the Carriage House to the Mansion.

Outfall #E1 – (Carriage House Building) this drain will have the illicit discharges disconnected from the septic tank effluent originating from the building sewer and from the potential for animal waste from a second line into the septic tank originating from the floor drains within the interior stable area of the carriage house. It is our belief that this drain line outfall is primarily dedicated to the foundation drain and garage floor drain under the stable areas, along with downspout connections from the roof gutters and yard area drains adjacent to carriage house walkways.

Outfall #E2 – (along secondary driveway over Lot 11A to mansion from Hilltop Road. A BMP will be provided (if deemed necessary) prior to area drains collecting runoff from proposed pasture areas on Lot 11A. Continuance of the closed drainage system is critical to preventing flooding upgradient of the driveway.

Standard 2
Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

The LID techniques to be provided adjacent to the proposed impervious areas which implements a decentralized system consisting of the placement of a number of small treatment and infiltration devices located close to the various impervious surfaces that generate runoff as follows:

Roof Drywells –	indoor riding arena and single-family dwelling.
Infiltration Basin –	outdoor riding arena surface.
Infiltration Trench –	private residential driveway.
Water Quality Swale –	Intercept overland flow of MS4 runoff prior to resource area.
Suitable Ground cover-	Revegetate disturbed areas to slow runoff within buffer areas.

Standard 3
Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development siteshall approximate the annual recharge from the pre-development conditions based on soil type. This Standard is metwhen the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

The surface runoff rates and runoff volumes for the project site are analyzed using Hydrologic Soil Group

C and Group D. Groundwater recharge is provided by techniques identified within Standard 2.

MassDEP recognizes that it may be difficult to infiltrate the required recharge volume on certain sites because of soil conditions. For sites comprised solely of C and D soils. A lower exfiltration rate of 0.27 inches per hour (for sandy loam, based upon historic test holes, confirms the absence of loamy sand within the parent material, thus limiting recharge potetential.

Table 2-1 of the Hydrology Handbook of Conservation Commissioners, March 2002 using Rawls, Brakensiek and Saxton, 1982.

Any unsuitable material encountered during construction of the subsurface infiltration pipe network will be removed and replaced with either on-site parent material or imported granular material. Should refusal/ledge be encountered during construction it shall be removed to a depth of four feet below infiltration system and backfilled with clean blasted rock fragments.

Standard 4
Stormwater management systems shall be designed to remove 80% of the average annual post-construction load ofTotal Suspended Solids (TSS). This Standard is met when:
a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
b. Structural stormwater best management practices are sized to capture the required water quality volumedetermined in accordance with the Massachusetts Stormwater Handbook; and
c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook

The project site is not considered a LUHPPL, within a Zone II or Interim Wellhead Protection Area or Critical Area. Given the stormwater management systems lie within an area of rapid infiltration water quality volume is based on a runoff of one inch.

Standard 5
For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runofffrom such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow melt, and stormwater runoff, the proponent shall use specific structural stormwater BMPs determined by the Departmentto be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated there under at 314 CMR 3.00, 314 CMR 4.00and 314 CMR 5.00.

This project is not being considered a LUHPPL.

Standard 6
Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of

a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and bestpractical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2) (a) (1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00.
Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of public water supply.

Stormwater discharge from this property are not within a Zone II, Interim Wellhead Protection Area of a public water supply or a critical area.

Standard 7
A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 onlyto the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Existing stormwater discharges – There are currently two existing stormwater discharges originating within the 'Project Site" which have been addressed.

Existing Discharge Pipe #E1 – originating from Carriage House Structure.
Existing Discharge Pipe #E2 - originating from Drop-Inlet Drainage Structure within pasture area.

Structural Integrity –	Upgrade of pipe materials from 3-foot sections of 8-inch clay pipes Is recommended based upon video evidence of broken pipes due to sagging and root damage.
Illicit Discharges-	Effluent discharge connection, from the siphon chamber, to the drain line serving the carriage house (identified by a dye test) will be disconnected and discontinued until such time as the replacement on-site sewage disposal system has been approved, installed and certified for use by the Nashoba Associate Boards of Health.

Standard 8
A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources duringconstruction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

A Construction Period Pollution Plan (under separate cover) will be prepared in addition to the Stormwater Pollution Prevention Plan (SWPPP) within the plan set.

Standard 9
A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

A Long-Term Operation and Maintenance Plan (O&M) (under separate cover) has been prepared.

Standard 10
All illicit discharges to the stormwater management system are prohibited.

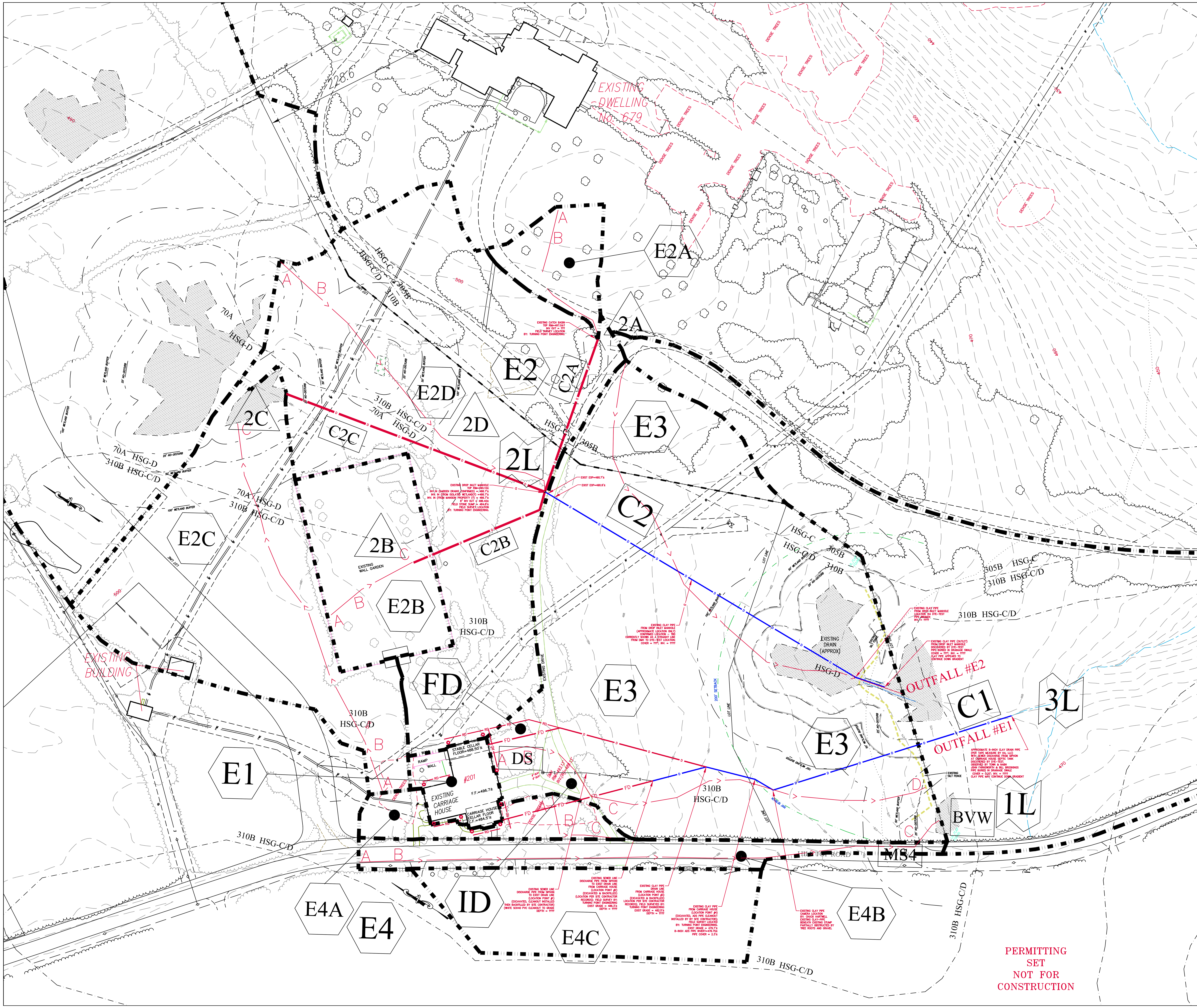
Illicit Discharge Compliance Statement
The water service has been disconnected and the septic tank effluent will be disconnected.

A formal statement will be discussed with the Town to ensure nothing is overlooked, given the design dates back to the early 1900s.

1.12 Conclusion

The proponent will be working with the Conservation Commission and the Board of Health; which typically will impact the results of the proposed current design. Ultimately, the final stormwater management system will be effective for mitigating the peak flow rates and volume of runoff from the limit of the watershed analysis for the 2, 10, 25 and 100-year storm events.

Appendix A - Existing and Proposed Watershed Maps



NOTES:
1. PROPERTY LINE, TOPOGRAPHY AND EXISTING CONDITIONS INFORMATION PROVIDED BY DILLIS & ROY CIVIL DESIGN GROUP, INC.
2. WETLAND DELINEATION BY B&C ASSOCIATES, INC. ON JUNE 17, 2021.
3. STUMP AND WETLAND FLAG LOCATION BY TURNING POINT ENGINEERING ON JUNE 17, 2021 & SEPTEMBER 1, 2021. LEC WETLAND FLAG SURVEY LOCATION PERFORMED ON 10/5/21.
4. BASE SURVEY INFORMATION, WETLAND DELINEATIONS, BUFFER ZONES; PROVIDED BY TURNING POINT ENGINIEERING; SUTTON, MA.; www.tpecivildesign.com

REVISIONS		
REV.	DATE	DESCRIPTION
1.	12.3.21	WATERSHED UPDATES
2.	12.6.21	STORMWATER CONTROL BYLAW – 60 SCALE

TITLE

EXISTING WATERSHED MAP

201 HILL TOP ROAD, LANCASTER, MA

PREPARED FOR: LORING
DATE: 11.9.2021 (INTERIM)
SCALE: 1" = 60'

HARRINGTON ASSOCIATES, LLC
ENGINEERING | PLANNING | DEVELOPMENT
20 MAIN STREET; WEDGEWOOD OFFICES SUITE 9
ACTON, MA 01720; TEL: (978) 989-1373
EMAIL: rjharrington4@gmail.com

COMMONWEALTH OF MASSACHUSETTS
RICHARD J. HARRINGTON
CIVIL
No. 41298
REGISTERED PROFESSIONAL ENGINEER
12.6.2021
LANCASTER

60 0 30 60 120
(IN FEET)

NOI–PRE.dwg

HA–95

NOTES:
1. PROPERTY LINE, TOPOGRAPHY AND EXISTING CONDITIONS INFORMATION PROVIDED BY DILLIS & ROY CIVIL DESIGN GROUP, INC.
2. WETLAND DELINEATION BY B&C ASSOCIATES, INC. ON JUNE 17, 2021.
3. STUMP AND WETLAND FLAG LOCATION BY TURNING POINT ENGINEERING ON JUNE 17, 2021 & SEPTEMBER 1, 2021. LEC WETLAND FLAG SURVEY LOCATION PERFORMED ON 10/5/21.
4. BASE SURVEY INFORMATION, WETLAND DELINEATIONS, BUFFER ZONES; PROVIDED BY TURNING POINT ENGINIEERING; SUTTON, MA.; www.tpecivildesign.com

LEGEND

I.R.	IRON ROD
S.F.	SQUARE FEET
	STUMP
478	EXISTING INTERMEDIATE CONTOUR
480	EXISTING INDEX CONTOUR
480	PROPOSED CONTOUR
D	PROPOSED DRAIN LINE
A.D.	AREA DRAIN
C.F.	CELLAR FLOOR
DI	DROP INLET CATCH BASIN
DMH	DRAIN MANHOLE
F.D.	FOUNDATION DRAIN
FE	FLARED END
F.F.	FIRST FLOOR
G.F.	GARAGE FLOOR
INV	INVERT
L-1	DRAIN LINE NAME
R.D.	ROOF DRAIN
T.F.	TOP FOUNDATION

REVISIONS		
REV.	DATE	DESCRIPTION
1.	12.6.21	STORMWATER CONTROL BYLAW

TITLE

PROPOSED WATERSHED PLAN
201 HILL TOP ROAD, LANCASTER, MA

PREPARED FOR: LORING
DATE: OCTOBER 25, 2021
SCALE: 1" = 60'

HARRINGTON ASSOCIATES, LLC
ENGINEERING | PLANNING | DEVELOPMENT
20 MAIN STREET; WEDGEWOOD OFFICES SUITE 9
ACTON, MA 01720; TEL: (978) 989-1373
EMAIL: rjharrington4@gmail.com

COMMONWEALTH OF MASSACHUSETTS
RICHARD J. HARRINGTON
CIVIL
No. 41298
REGISTERED PROFESSIONAL ENGINEER
12/6/21
LANCASTER

60 0 15 30 60
(IN FEET)

NOI-POST.dwg HA-95

Appendix B – Operation & Maintenance Plan

Stormwater Control and Source Control BMPs

Implementation of these measures can help the owner of the facility prevent the pollutants generated by the runoff from impervious surfaces from entering surface waters or groundwater.

Potential Pollutant Generating Sources: The primary sources of pollution include stormwater runoff in contact the carriage house roof, paved vehicular access to garage pedestrian and d walkways to means of egress and ac, the existing impervious surfaces of the carriage house which consists of the roof, access driveways and egress walkways for the pedestrians and horses.animal manure, wash waters, waste products from animal treatment, runoff from pastures where horses are allowed to roam, and associated accessory vehicle maintenance and repair areas. Pastures may border streams and direct access to the stream may occur. Both surface water and groundwater may be contaminated. Potential stormwater contaminants include fecal coliform, oil and grease, suspended solids, BOD, and nutrients.

Pollutant Control Approach: To prevent, to the maximum extent practicable, the discharge of contaminated stormwater from animal handling and keeping areas.

BMPs Animal Care Areas within Facility

- **Horses located on Private Property**

Facility Description: The Carriage House, at 201 Hill Top Road (Lot 11A), required additional analysis and time to observe and gather and understanding of the specific and unique property features associated with the former part of a larger estate for seasonal use by the original owners, associated animal activities in proximity to the stable area will include the use of a proposed in-door riding arena, a proposed out-door riding arena and conversion of open land and woodland to pasture. The pasture will be fenced off into paddocks.

Operational BMPs: - Animal Care

• Stable Floor Drains – Prior to keeping the horses on property, disconnect all existing s

Animal Care and Source Control BMPs

Implementation of these measures can help the owner of the facility prevent the pollutants generated by the private keeping of animals from entering surface waters or groundwater.

Potential Pollutant Generating Sources: The primary sources of pollution include animal manure, wash waters, waste products from animal treatment, runoff from pastures where horses are allowed to roam, and associated accessory vehicle maintenance and repair areas. Pastures may border streams and direct access to the stream may occur. Both surface water and groundwater may be contaminated. Potential stormwater contaminants include fecal coliform, oil and grease, suspended solids, BOD, and nutrients.

Pollutant Control Approach: To prevent, to the maximum extent practicable, the discharge of contaminated stormwater from animal handling and keeping areas.

BMPs Animal Care Areas within Facility

- **Horses located on Private Property**

Facility Description: An existing stable area within an early 1900s carriage house is to be revitalized by the owner for the keeping and care of horses. Associated animal activities in proximity to the stable area will include the use of a proposed in-door riding arena, a proposed out-door riding arena and conversion of open land and woodland to pasture. The pasture will be fenced off into paddocks.

Operational BMPs: - Animal Care

• Stable Floor Drains – Prior to keeping the horses on property, disconnect all existing stable floor drains currently draining into the existing septic tank. Plug floor drains that are connected to storm drains or to surface water. Confirm absence of or redirect any other sources of runoff connecting to the exterior line to the septic tank such as roof down spouts and/or surface area drains.

• Stable Sweeping - Regularly sweep and clean animal keeping areas to collect and properly dispose of droppings, uneaten food, and other potential stormwater contaminants

• Stable Washing - Do not hose down to storm drains or to receiving water those areas that contain potential stormwater contaminants

• Manure Management – Animal manure swept and collected shall be stored in a designated location for disposal offsite to an approved facility.

• Wash Water Disposition - Do not allow any wash waters to be discharged to storm drains. Wash water is wastewater that must not be discharged to the stormwater management system.

• Arenas & Paddock Areas - If horses are kept in unpaved and uncovered areas, the ground should either have vegetative cover or some other type of ground cover such as mulch

• Vegetative Cover – During growing seasons, application of an approved seed mixture shall be applied with paddock areas.

• Irrigation – A private water supply well is recommend for use in supplying water to the horses and to also irrigate the paddock areas to maintain vegetation for grazing.

• Fencing – Areas where animals are kept outside shall be surrounded with a fence or other means that prevents animals from moving away from the controlled area where BMPs are used.

Hill Top Road and Stormwater BMPs

Since Hill Top Road does not have curbing, it is generally considered a road with country drainage which disconnects roadway runoff. However, due to the varying vertical and horizontal layout of the roadway centerline, the roadway runoff can remain connected to the pavement gutter. Shoulder erosion has been observed within the pubic way.

Pollutant Control Approach: To prevent, to the maximum extent practicable, the discharge of contaminated stormwater from animal handling and keeping areas.

A portion of the front-yard of Lot 9, accepts concentrated stormwater runoff from the gutter of Hill Top Road.

Like owners of private land with frontage and access along Hill Top Road, a municipality when working within wetlands jurisdictional areas and adjacent buffer zones must design and implement structural stormwater best management practices in accordance with the Stormwater Management Standards and the Stormwater Management Handbook.

In addition, there may also could be “good housekeeping” requirements within the municipality’s MS4 permit.

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

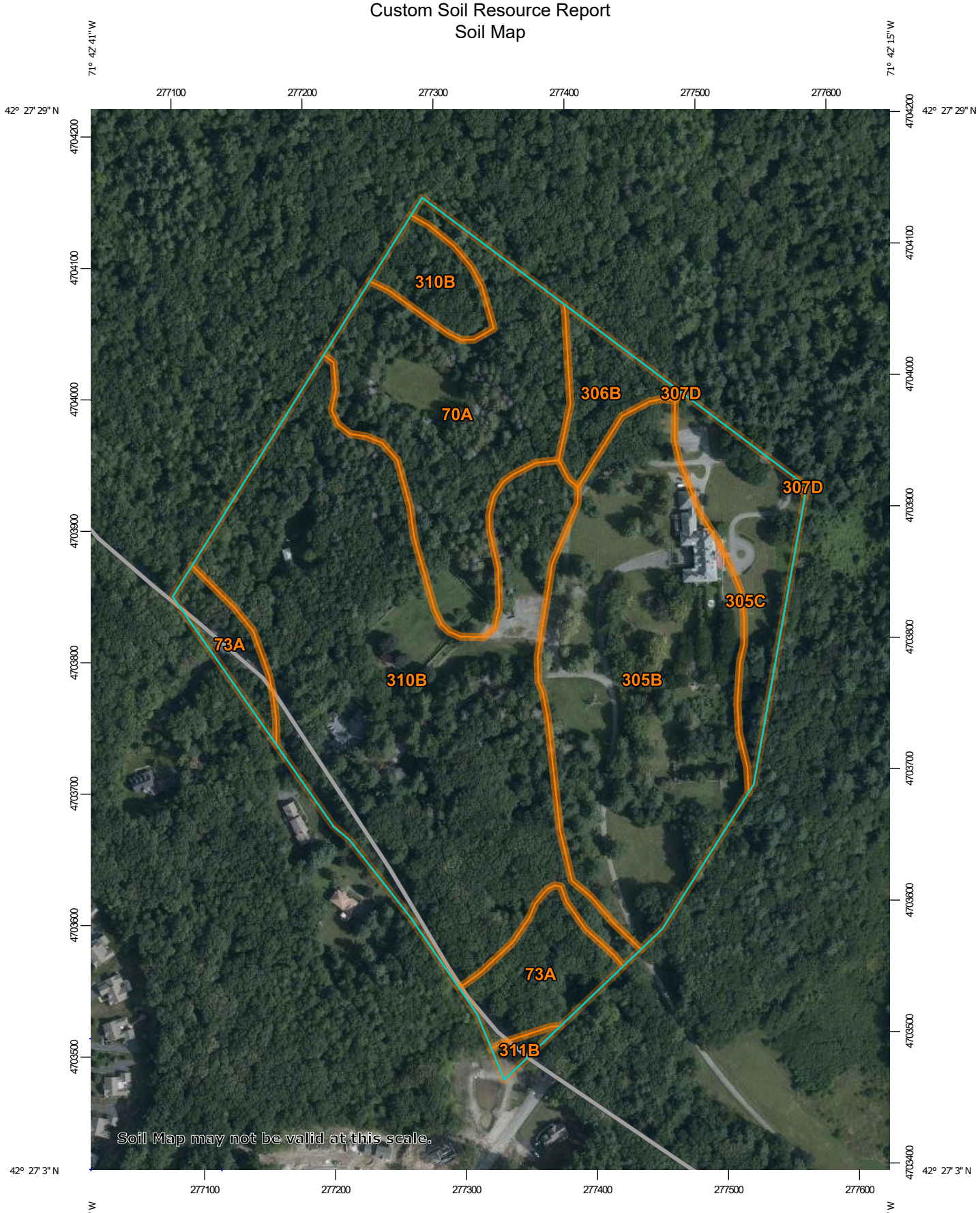
A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Worcester County, Massachusetts, Northeastern Part

August 6, 2021

Contents

Custom Soil Resource Report
Soil Map



Map Scale: 1:3,930 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 50 100 200 300

Feet
0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

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 1:20,000.

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: Worcester County, Massachusetts, Northeastern Part
Survey Area Data: Version 15, Jun 10, 2020

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

Date(s) aerial images were photographed: Aug 12, 2019—Sep 29, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
70A	Ridgebury fine sandy loam, 0 to 3 percent slopes	7.4	16.4%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	2.8	6.2%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	11.5	25.4%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	2.9	6.5%
306B	Paxton fine sandy loam, 0 to 8 percent slopes, very stony	1.3	3.0%
307D	Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony	0.0	0.0%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	19.1	42.1%
311B	Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony	0.2	0.4%
Totals for Area of Interest		**45.3**	**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

Worcester County, Massachusetts, Northeastern Part

70A—Ridgebury fine sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2w69f
Elevation: 0 to 1,480 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: Not prime farmland

Map Unit Composition

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

Description of Ridgebury

Setting

Landform: Hills, ground moraines, drumlins, drainageways, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
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: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Footslope, summit
Landform position (three-dimensional): Crest, base slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Whitman

Percent of map unit: 5 percent
Landform: Depressions, hills, ground moraines, drumlins, drainageways
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Leicester

Percent of map unit: 1 percent
Landform: Ground moraines, drainageways, depressions, hills
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

73A—Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w695
Elevation: 0 to 1,580 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: Not prime farmland

Map Unit Composition

Whitman, extremely stony, and similar soils: 81 percent
Minor components: 19 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Whitman, Extremely Stony

Setting

Landform: Drumlins, drainageways, depressions, hills, ground moraines
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Base slope

Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 1 inches: peat
A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
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: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY041MA - Very Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Ridgebury, extremely stony

Percent of map unit: 10 percent
Landform: Depressions, hills, ground moraines, drumlins, drainageways
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Scarboro

Percent of map unit: 5 percent
Landform: Outwash deltas, outwash terraces, drainageways, depressions
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Swansea

Percent of map unit: 3 percent
Landform: Swamps, bogs, marshes
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Woodbridge, extremely stony

Percent of map unit: 1 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

305B—Paxton fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2qp
Elevation: 0 to 1,570 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: All areas are prime farmland

Map Unit Composition

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

Description of Paxton

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 18 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
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: About 18 to 37 inches
Frequency of flooding: None

Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge

Percent of map unit: 9 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury

Percent of map unit: 6 percent
Landform: Depressions, hills, ground moraines, drainageways
Landform position (two-dimensional): Toeslope, backslope, footslope
Landform position (three-dimensional): Base slope, head slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton

Percent of map unit: 5 percent
Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

305C—Paxton fine sandy loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w66y
Elevation: 0 to 1,320 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 statewide importance

Map Unit Composition

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

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 8 inches: fine sandy loam
Bw1 - 8 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: fine sandy loam
Cd - 26 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Well drained
Runoff class: Medium
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: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge

Percent of map unit: 6 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear

Hydric soil rating: No

Ridgebury

Percent of map unit: 2 percent
Landform: Drumlins, drainageways, depressions, hills, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Hydric soil rating: Yes

306B—Paxton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w673
Elevation: 0 to 1,340 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 statewide importance

Map Unit Composition

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

Description of Paxton, Very Stony

Setting

Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Linear, convex
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: Medium

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: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Woodbridge, very stony

Percent of map unit: 8 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, very stony

Percent of map unit: 4 percent
Landform: Drainageways, depressions, hills, ground moraines, drumlins
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Charlton, very stony

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

307D—Paxton fine sandy loam, 15 to 25 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w67l
Elevation: 0 to 1,570 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Paxton, Extremely Stony

Setting

Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex, linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 10 inches: fine sandy loam
Bw1 - 10 to 17 inches: fine sandy loam
Bw2 - 17 to 28 inches: fine sandy loam
Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Well drained
Runoff class: High
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: About 18 to 37 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Ecological site: F144AY007CT - Well Drained Dense Till Uplands
Hydric soil rating: No

Minor Components

Charlton, extremely stony

Percent of map unit: 9 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Woodbridge, extremely stony

Percent of map unit: 5 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 1 percent
Landform: Drumlins, drainageways, depressions, hills, ground moraines
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope, head slope
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

310B—Woodbridge fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2t2ql
Elevation: 0 to 1,470 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: All areas are prime farmland

Map Unit Composition

Woodbridge, fine sandy loam, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Fine Sandy Loam

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 18 inches: fine sandy loam
Bw2 - 18 to 30 inches: fine sandy loam
Cd - 30 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 20 to 39 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
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: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 3.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton

Percent of map unit: 10 percent
Landform: Hills, ground moraines, drumlins
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Hydric soil rating: No

Ridgebury

Percent of map unit: 8 percent
Landform: Drainageways, depressions, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, toeslope
Landform position (three-dimensional): Head slope, base slope, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

311B—Woodbridge fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2t2qr
Elevation: 0 to 1,440 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 statewide importance

Map Unit Composition

Woodbridge, very stony, and similar soils: 82 percent
Minor components: 18 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Woodbridge, Very Stony

Setting

Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Backslope, footslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 9 inches: fine sandy loam
Bw1 - 9 to 20 inches: fine sandy loam
Bw2 - 20 to 32 inches: fine sandy loam
Cd - 32 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 43 inches to densic material
Drainage class: Moderately well drained
Runoff class: Medium
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: About 19 to 27 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: C/D
Ecological site: F144AY037MA - Moist Dense Till Uplands
Hydric soil rating: No

Minor Components

Paxton, very stony

Percent of map unit: 10 percent
Landform: Ground moraines, drumlins, hills
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Appendix C - Historic Soil Logs – Nashoba Associated Boards of Health

HARRINGTON ASSOCIATES, LLC

HA-95B 8/25/2021

NASH "BSF" 2.55

Research copies of soil testing

201 Hilltop Road Lancaster, MA

HARRINGTON ASSOCIATES, LLC

NASHOBA ASSOCIATED BOARDS OF HEALTH 7225

30 CENTRAL AVENUE
AYER, MA 01432 HA 95B
(978) 772-3335

94573

DATE 8/25/21

RECEIVED FROM Harrington Assoc's

$ 2.55

Two and 55/100

DOLLARS

FOR Research copies: 201 Hilltop Lancaster

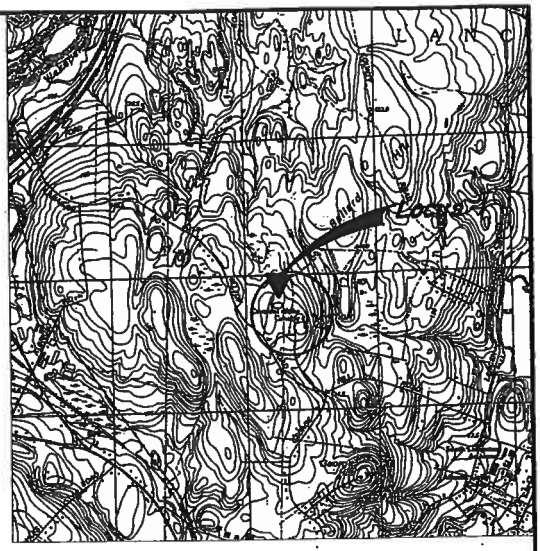
Thank You

AMOUNT OF ACCOUNT	2	55
THIS PAYMENT	2	55
BALANCE DUE		

☐ CASH
☑ CHECK #1010
☐ CREDIT CARD
☐ MONEY ORDER

BY GS

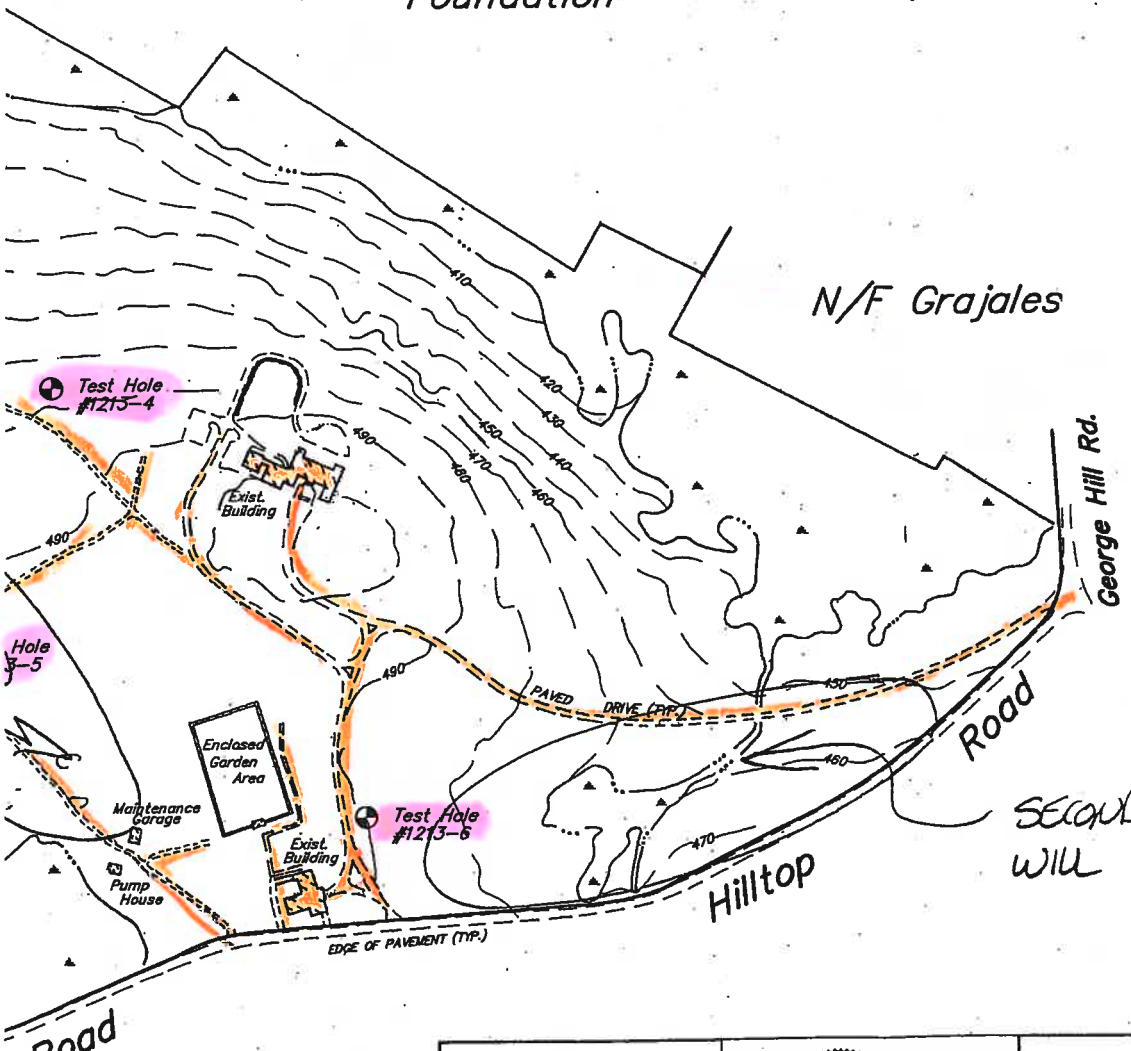
Ross 2014



"Locus Map"

N/F New England
Forestry
Foundation

N/F Grajales



RECEIVED
APR - 9 2013
BY:.....

SECOND DAY OF TESTING WILL FOCUS HERE.

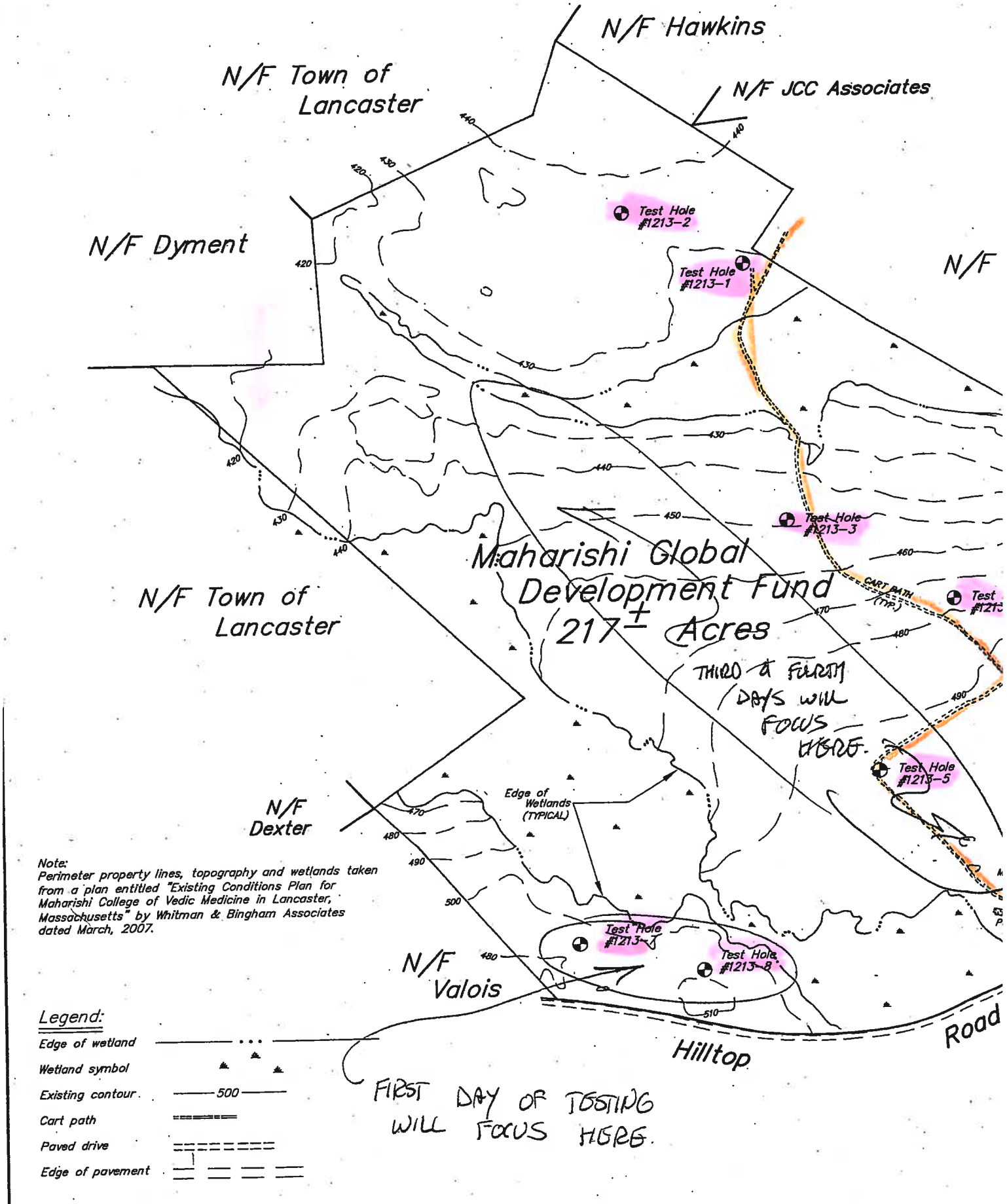
COMMONWEALTH OF MASSACHUSETTS
DANIEL B. WOLFE
No. 35523
CIVIL
REGISTERED PROFESSIONAL ENGINEER
1-14-14

REVISIONS

TEST HOLE LOCATIONS IN
Lancaster, Mass.
PREPARED FOR
Maharishi Global Development Fund
SCALE: 1" = 200'
JANUARY, 2014

DAVID E. ROSS ASSOCIATES, INC.
CIVIL ENGINEERS – LAND SURVEYORS – ENVIRONMENTAL CONSULTANTS
111 FITCHBURG ROAD, P.O. BOX 368, AYER, MASS. 01432-0368
978-772-6232 368-1065 448-3916 FAX 978-772-6258

JOB NO. 22817 PLAN NO. L-12245



Note:
Perimeter property lines, topography and wetlands taken from a plan entitled "Existing Conditions Plan for Maharishi College of Vedic Medicine in Lancaster, Massachusetts" by Whitman & Bingham Associates dated March, 2007.

Legend:

- Edge of wetland
- Wetland symbol
- Existing contour — 500 —
- Cart path
- Paved drive
- Edge of pavement

Quinn
Hilltop Rd
Lancaster

6/26/14

cont'd
Mike - Chiodo - mill excav
G. Sheppard } ROSS
S. Sears } ASSOC
B. Brookings - NAGH

614-12 0 - 12" - A - SL - 10YR 3/3
12 - 25" - B - LS - 10YR 6/6
25 - 96" - C - SL - 2.5Y 5/6
No gwd, No ref
mottling @ 25" 7.5YR 5/6
2.5Y 6/1

614-11 0 - 13" - A - SL - 10YR 3/3
13 - 28" - B - LS - 10YR 6/6
28 - 36" - C1 - LS - 2.5Y 6/4
36" - 108" - C2 - SL - 2.5Y 5/4
No gwd, No ref
mottling @ 28"
7.5YR 5/8
2.5Y 6/2

614-10 0 - 10" A - SL - 10YR 3/3
10" 25" - B - LS - 10YR 6/6
25" - 118" C - SL - 2.5Y 5/3
mottling @ 25" No gwd
7.5YR 5/6 No ref
2.5Y 6/2

614-9 0 - 12" - A - SL 10YR 3/3
12" - 30" - B - LS - 10YR 5/4
30" - 106" C - SL - 2.5Y 5/3
No gwd, No
mottling @ 30"
7.5YR 5/8
2.5Y 5/1

6/27/14

614-16 0 - 8" A - SL 10YR 2/1
8 - 28" B - LS - 10YR 5/6
28" - 86" C - SL 2.5Y 5/3
mottling @ 28"
No ref 7.5YR 5/6
2.5Y 5/1

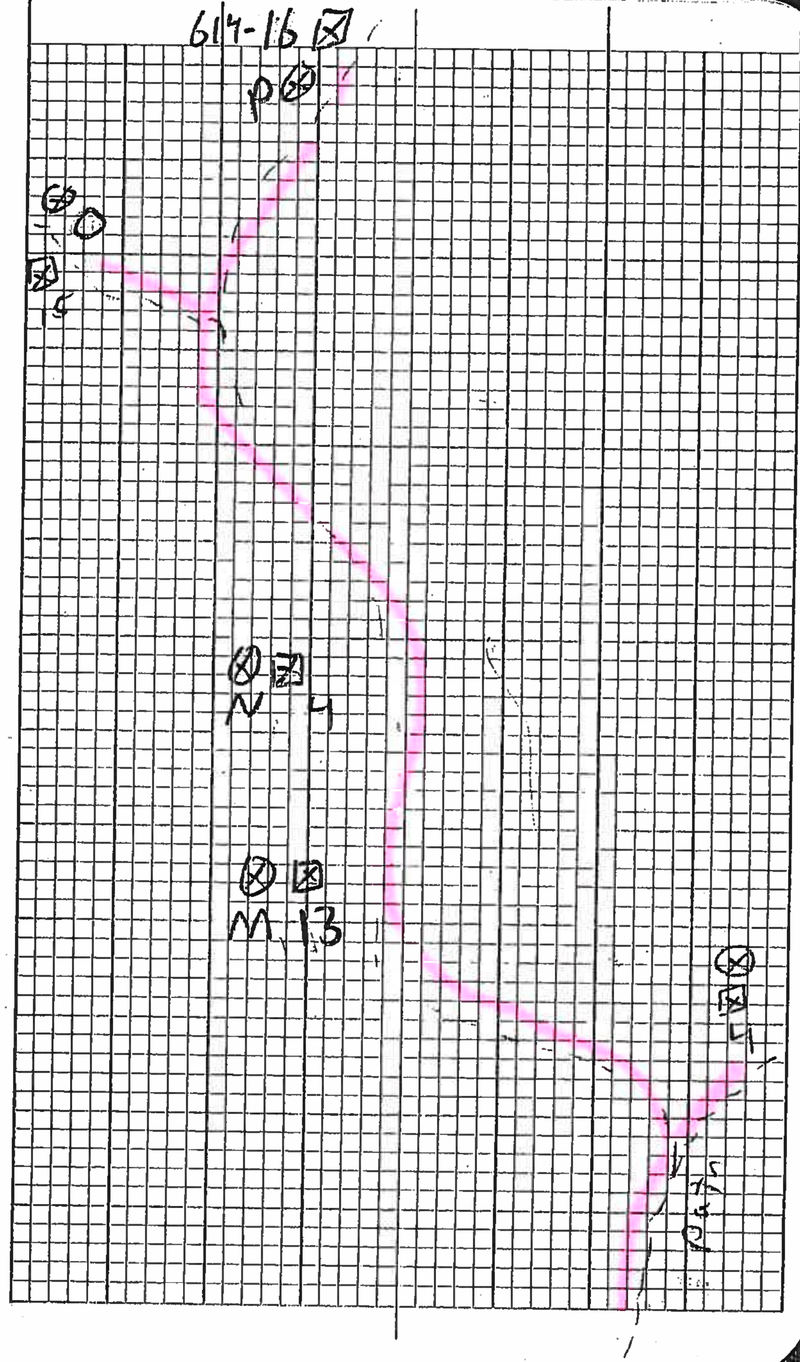
Quinn
Hilltop Rd.
Lancaster

6/27/14
cont'd.
Frank Jr. Chiodo - excav.
B. Brookings - NABH
S. Sears St. G. Shepard - Rois Assoc.

perc.	soak	12"	9"	6"	rate
O - 48"	10:30	10:45	11:06	12:06	
				4" 12:25	
M - 48"	8:56	9:11	9:20	9:45	
N - 50"	9:30	9:48	12:40	3:36	
P - 48"	11:20	11:39	12:34	2:24	

614-15 0-12" A - SL - 10YR 2/1
12"-26" B - LS - 10YR 5/6
26-80" C - SL - 2.5Y 5/2
Mugno No ref
mottling @ 28"
2.5Y 5/1 2.5Y 7.5YR 5/2

614-14 0-10" A - SL - 10YR 2/1
10-25" B LS - 10YR 5/6
25-101" C SL - 2.5Y 5/2
SW @ 75" No ref
mottling @ 25"
7.5YR 5/8
2.5Y 5/1



Dukes
Hilltop Rd
Lancaster
Cont'd

6/27/14

0-12" - A - SL 10YR 3/4
12" - 25" B - LS - 10YR 5/3
25" - 100" C - SL - 2.5Y 5/2
gw @ 67" [illegible]
mottling @ 25"
7.5YR 5/8
2.5Y 5/1

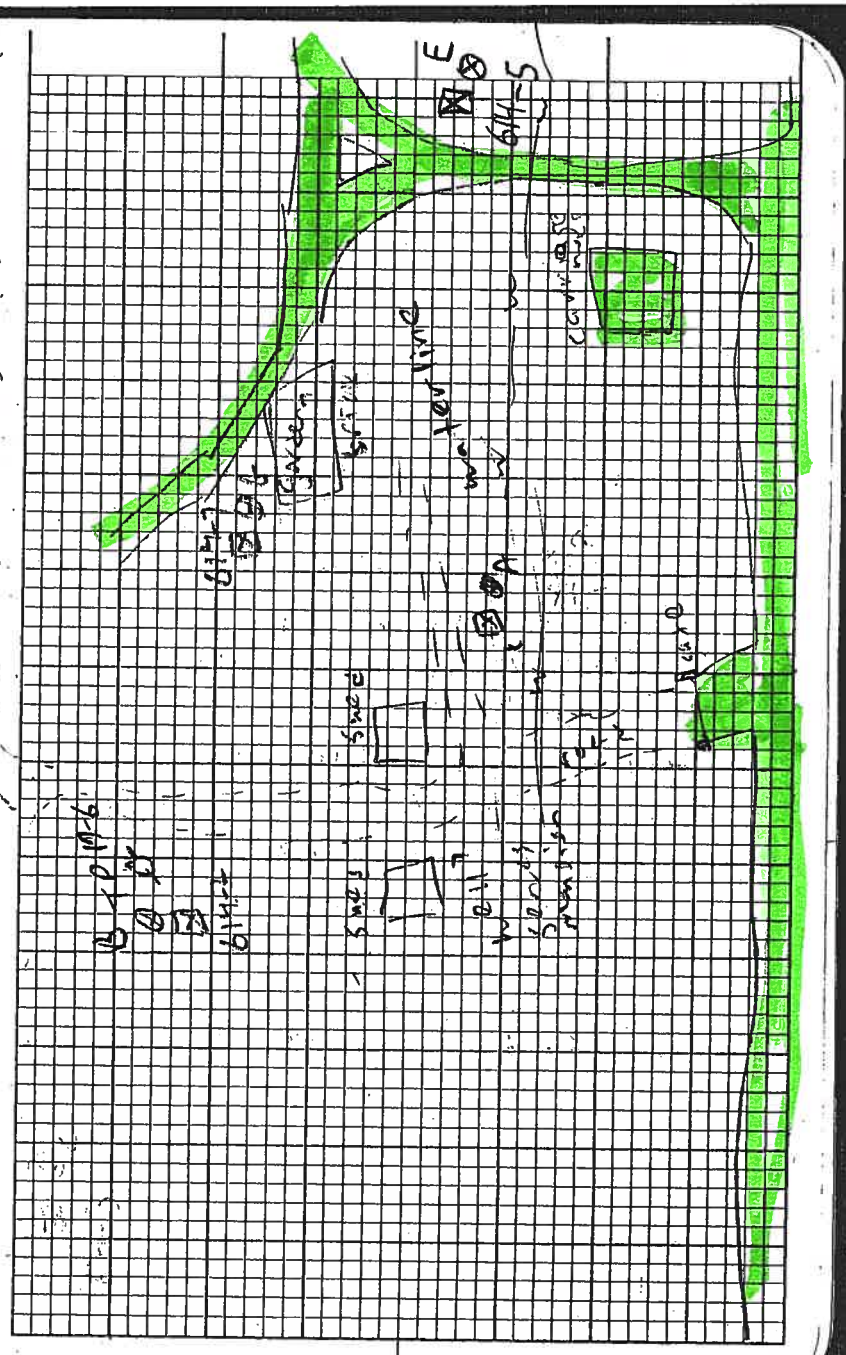
Quinn
Maharishi
Hilltop Rd
George Hill Rd
Lancaster

6/24/14 G. Shepard - Ross 55
B. Brookings - NRCS
Larry Green - NRCS
Mike Childs - m.h. ex-cav.

614-1 O - 7" - A - SL - 10YR 2/2
7" - 15" : B - SL - 2.5Y 4/4
15" : 25" C1 - SL - 2.5Y 4/3
25" - 60+" C2 - firm SL 2.5Y 4/3
mottling @ 25" 2.5Y 5/1
10YR 4/4
No roots
Swell 4"

614-2 O - 7" - A - SL - 10YR 2/2
7" - 16" - B - SL - 2.5Y 4/4
16" - 26" - C1 - SL - 2.5Y 4/3
26" - 123" - C2 - firm SL 2.5Y 4/3
Swell @ 81"
No roots
Mottling @ 26" 2.5Y 2.5/1
10YR 4/4

614-3 O - 7" - A - SL - 10YR 2/2
7" - 14" - B - SL - 2.5Y 4/4
14" - 25" - C1 - SL - 2.5Y 4/3
25" - 112" C2 - firm SL 2.5Y 4/3
Swell 85
mottling @ 25" 2.5Y 5/1
10YR 4/4



Quinn
Hilltop Rd
Lancaster

6/26/14 cont'd
Mike - Chiodo - mill excav
G. Sheppard, Ross
S. Sears Assoc
B. Brookings - NMCH

614-12 0 - 12" - A - SL - 10YR 3/3
12 - 25" - B - LS - 10YR 6/6
25 - 96" - C - SL - 2.5Y 5/6
No gnd, No ref
mottling @ 25" 7.5YR 5/8
2.5Y 6/1

614-11 0 - 13" - A - SL - 10YR 3/3
13 - 28" - B - LS - 10YR 6/6
28 - 36" - C_1 LS - 2.5Y 6/4
36" - 108" - C_2 - SL - 2.5Y 5/4
No gnd, No ref
mottling @ 28"
7.5YR 5/8
2.5Y 6/2

614-10 0 - 10" A - SL - 10YR 3/3
10" 25" - B - LS - 10YR 6/6
25" - 118" C - SL - 2.5Y 5/3
mottling @ 25" No gnd
7.5YR 5/6 No ref
2.5Y 6/2

614-9 0 - 12" - A - SL 10YR 3/3
12" - 30" - B - LS - 10YR 5/4
30" - 106" C - SL - 2.5Y 5/3
No Gnd, No
mottling @ 30"
7.5YR 5/8
2.5Y 5/1

6/27/14

614-16 0 - 8" A - SL 10YR 2/1
8 - 28" B - LS - 10YR 5/6
28" - 88" C - SL 2.5Y 5/3
mottling @ 28"
No ref 7.5YR 5/6
2.5Y 5/1

Quinn
Hilltop Rd.
Lancaster

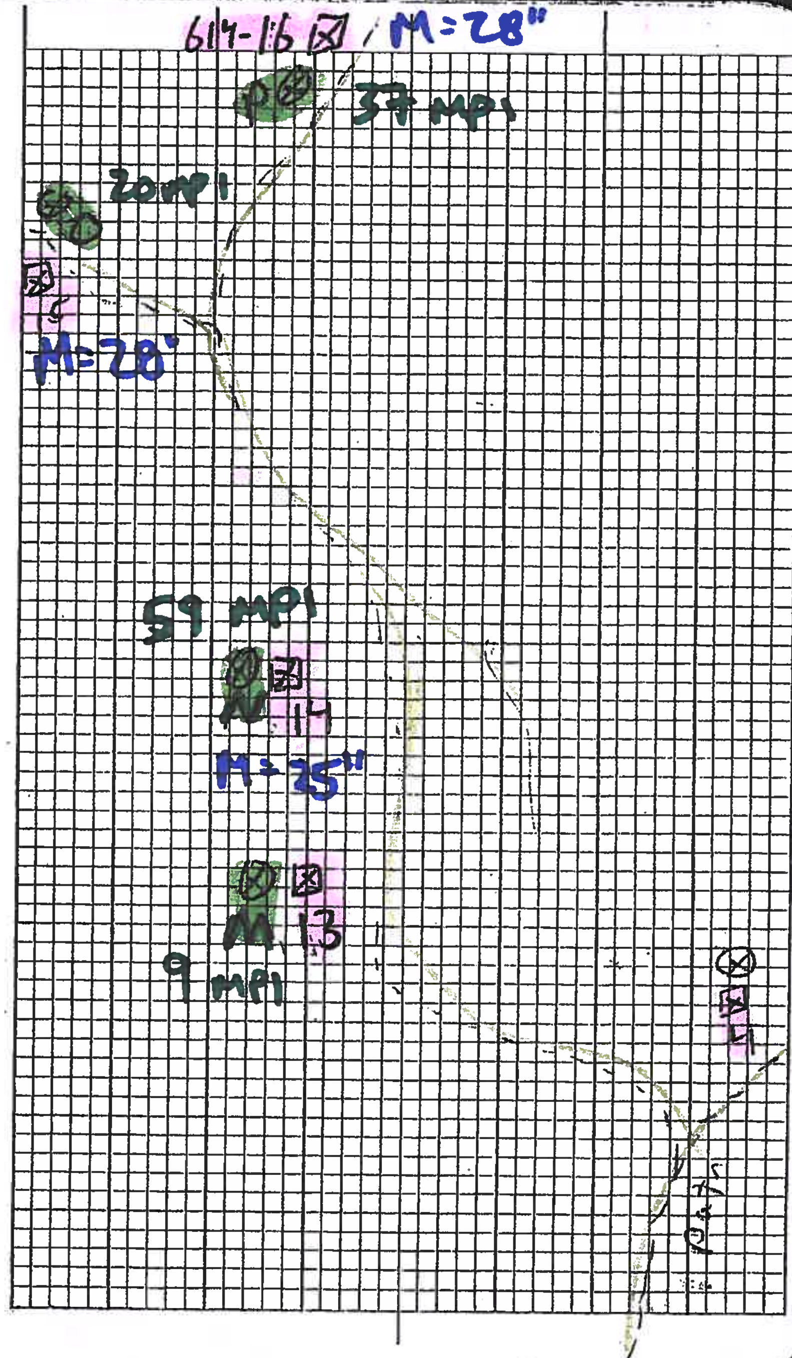
6/27/14

cont'd.
Frank Jr. Chiodo – mini excav.
B. Brookings – NABH
S. Sears St G. Shepard – Ross Assoc.

perc.	Soak	12"	9"	6"	rate
O – 48"	10:30	10:45	11:06	12:06 4" 12:23	20 MPI
M – 48"	8:56	9:11	9:20	9:45	9 MPI
N – 50"	9:30	9:48	12:40	3:36	59 MPI
P – 48"	11:20	11:39	12:34	2:24	37 MPI

614-15 0 – 12" A – SL – 10YR 2/1
12" – 26" B – LS – 10YR 5/6
26 – 80" C – SL – 2.5Y 5/2
Mushro No ref.
mottling @ 28"
2.5Y 5/1 2.5Y 7.5YR 5/2

614-14 0 – 10" A – SL – 10YR 2/1
10 – 25" B LS – 10YR 5/6
25 – 101" C SL – 2.5Y 5/2
SW @ 75" No ref
mottling @ 25"
7.5YR 5/8
2.5Y 5/1



Ruhn
Hilltop Rd
Lancaster
contd

6/27/14

0-12" A-SL 10YR3/1
12"-25" B-LS 10YR5/3
25"-100" C-SL 2.5Y5/2
gw @ 67" ...

mottling @ 25"
7.5YR5/8
2.5Y5/1

Quinn
George Hill Rd
Hilltop Rd
Lancaster cont'd

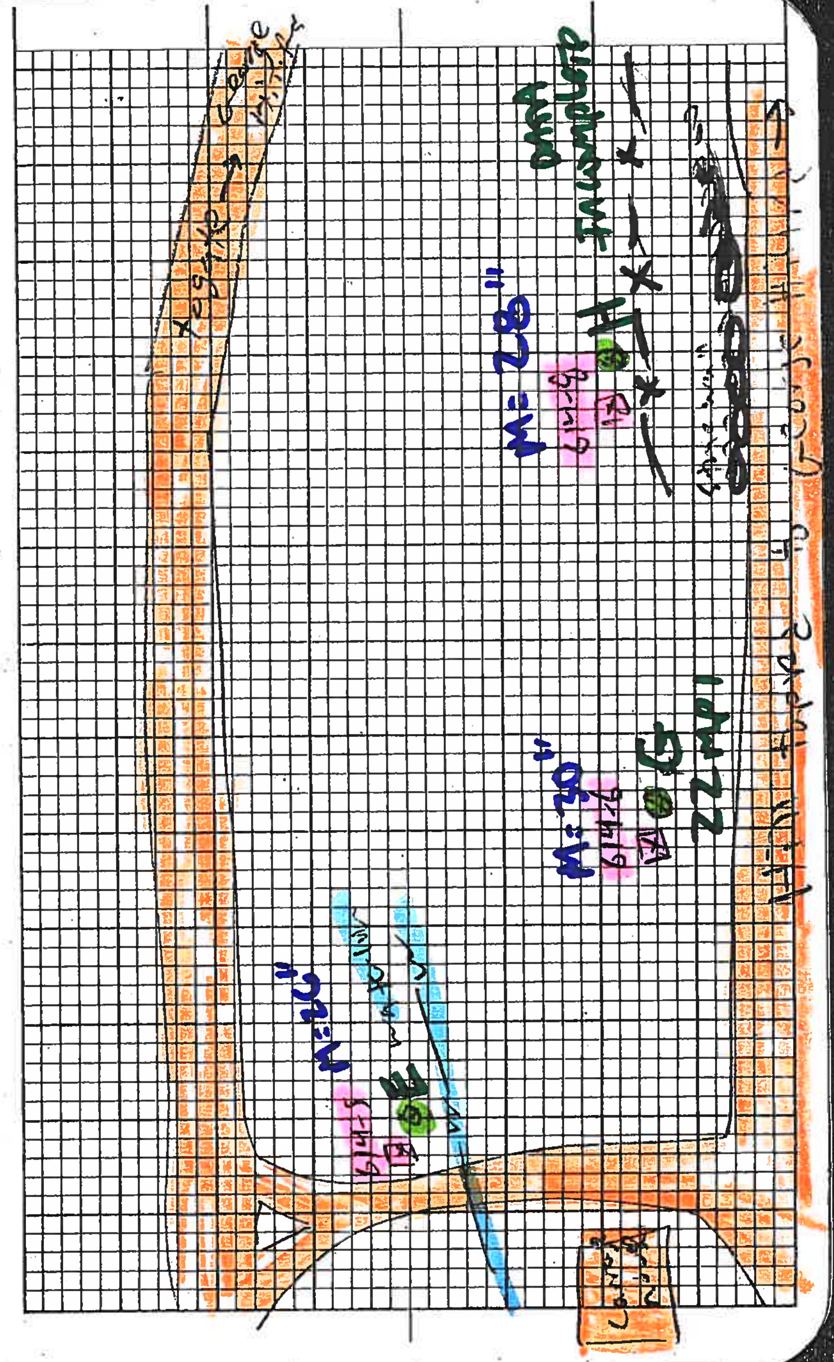
B. Brookings - NABH
S. Sears } Ross
C. Shepard } Assoc.
Frank Jr. - Chiddo - mini excav

6/25/14

614-5 0-6" - A - SL - 10YR 3/1
6-12" - Bw1 - LS - 10YR 4/6
12-26" - Bw2 - LS - 10YR 5/6
26-96" - C - SL - firm 2.5Y 5/3
gw @ 80" mottling @ 26"
no ref 7.5YR 5/8
2.5Y 6/0

614-6 0-20" - HTM - fill
20"-26" - Ab - SL - 10YR 3/1
26"-38" - B - LS - 10YR 5/6
38"-100" - C - SL - firm 2.5Y 5/2
gw @ 92"
no ref mottling @ 30"
7.5YR 5/8
2.5Y 6/1

614-7 0-14" - A - HTM/A
14"-25" - B - LS - 10YR 5/4
25"-85" - C - SL firm 2.5Y 5/2
mottling @ 25" 7.5YR 5/8 2.5Y 6/2 gw @ 83"
no ref



Quinn
Marharishi
Hilltop Rd /
George Hill Rd
Lancaster

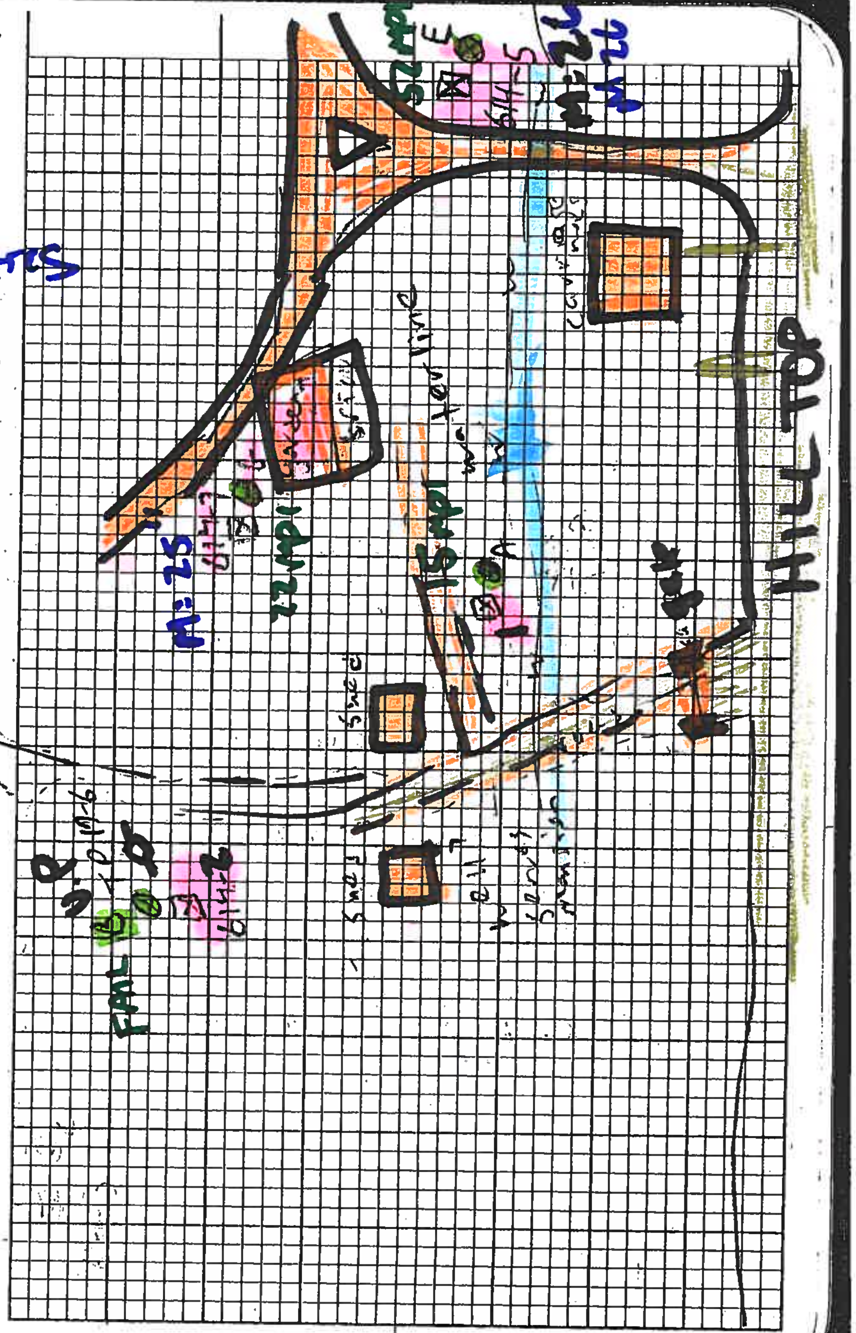
ROSS ASSOCIATES

6/24/14 — G. Shepard - Ross Assoc.
B. Brookings - MABH
Larry Green - MABH
Mike Chiodo - m.h. excav.

614-1 0-7" - A - SL - 10YR 2/2
7"-15" : B - SL - 2.5Y 4/4
15"-25" C1 - SL - 2.5Y 4/3
25"-109" Cd2 - Firm SL 2.5Y 4/3
mottling e 25" 2.5Y 2.5/1
North 10YR 4/4
SWE 84"

614-2 0-7" A - SL - 10YR 2/2
7"-16" B - SL - 2.5Y 4/4
16-26" - C1 - SL - 2.5Y 4/3
26"-123" - Cd2 - firm SL 2.5Y 4/3
GW seep e 81" NOSE
mottling e 26" 2.5Y 2.5/1
10YR 4/4

614-3 0-7" A - SL - 10YR 2/2
7"-14" - B - SL - 2.5Y 4/4
14"-25" - C1 - SL - 2.5Y 4/3
25"-112" Cd - firm SL 2.5Y 4/3
SWE 85 mottling e 25" 2.5Y 5/1
10YR 4/4



Quinn
Marharishi
George Hill Rd
Hilltop Rd
Lancaster

6/24/14 cont'd

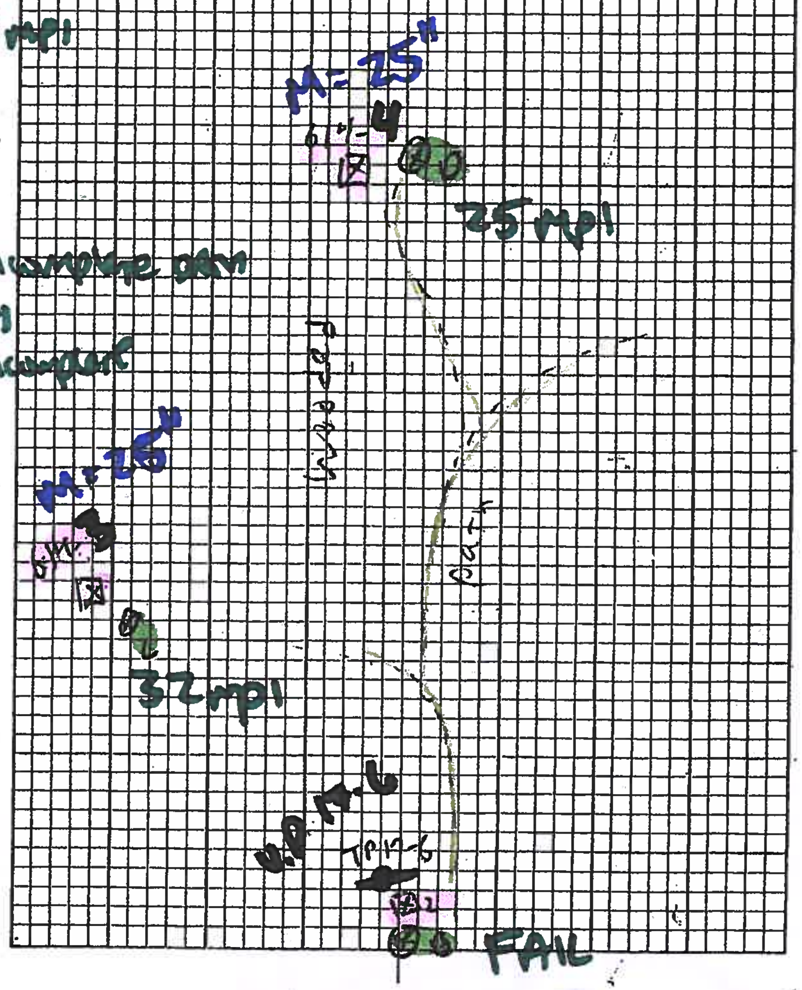
percs	soak	12"	9"	6"	rate	
614-A - 46"	9:44	10:00	10:21	11:05		15 mpi
614-B - 47"	10:44	11:05	1:45	7 3/4" 3:20	fail 760 mpi	
614-C - 42"	11:45	12:04	12:44	2:18	32 mpi	
614-D - 43"	12:55	1:10	1:56	3:10	25 mpi	
614-E - 48"	8:45	9:00	10:42	1:18	52 mpi	
614-F - 50"	9:20	9:37	11:43	6 3/4" - 2:43	fail 280 mpi	Incomplete dam
614-G - 52"	10:15	10:30	11:40	12:45	22 mpi	
614-H - 48"	11:00	11:15	1:41	7 1/4" 3:41	fail 760 mpi	Incomplete

(614-E through 614-H: 6/25/14)

614-4	0-6" - A - SL	- 10YR 2/2	
	6"-14" - B - SL	- 10YR 4/4	
	14"-25" C1 - SL	- 2.5Y 4/3	
	25"-92" C2 - firm SL	- 2.5Y 4/3	
	mottling @ 25"		
Noted	gwe 62"	10YR 4/4	
		2.5Y 5/1	

infiltr readings

F 6 3/4" 12:47
E 9" 12:30
G 6" 12:45 silted
H 10" 12:40



Lot 10A

2003

Manawisla
Georgetown
Lancaster

4/7/403

G. Sh... GPR
C. Co... B...
B. Bro... ...
Mark M...

403-2 0-10"-A-loam- 2.5...
10"-22"-B-SL-10YR 5/5
22"-120"-C-LS/SL-5Y 5/2

No ref.
gw @ 48"
chem mottling at time of perc
54"

403-1 0-8"-A-loam 2.5Y 3/3
8"-24"-B-SL-10Y 5/5
24"-120"-C-LS/SL 5Y 5/2
gw @ 46"
No ref.
mottling @ 32" ...

Lot 10A

Maharishi
George H'll Rd.
Lancaster

Brian [illegible] GPR
D. Boss - Bhoe
B. Brockings - NABH

9/10/03

See 4/24/03 deeps

	Soake	12"	9"	6"	rate
903-A	48" - 12:25	12:40	10 3/4" 1:10	ONS	
903 B	53" - 12:38	12:43	10½" 1:13	ONS	
903-C	48" - 12:37	12:52	1:06	1:27	7
903 D	52" - 12:51	1:06	9½ 1:36	ONS	

9/11/03

903-A	9:18	9:33	10:21	12:10	37
903-B	9:13	9:28	10:43	12:50	43
903-D	9:26	9:41	10:22	11:31	23

903-1 0-8" A - SL - 2.5Y4/3
8"-24" B - SL - 10YR5/5
24"-126" C - LS/SL - 5Y5/2
No gw, no ref
no mottling @ 32"

903-2 0-8" A - SL 2.5Y4/3
8"-23" B - SL 10YR5/5
23"-104" C - LS/SL 5Y5/2
No gw no ref
mottling @ 36"

403-1 mottling @ 32"
Redog for mottling
↓
403-2 no mottling @ 32"

9/11/03

903-A 12" - 9:33
9" - 10:21
6 3/4" - 11:43
6" - 12:10

10:21 > 60
11:21 > 49
12:10
109/3 = 37

903-B 12" - 9:28
9" - 10:43
7½" - 11:43
6 3/4" - 12:10

10:43 > 60
11:43
~~12:50~~ > 60
12:43
12:50 > 7
43

Nashoba Associated Boards of Health

74 West Main Street
Ayer, Massachusetts 01432
(508)772-3338 (508)345-0260

Inspection for Groundwater
(Usually March - April)
Appointment date 4/[illegible]/1990
Appointment time 1:00

Inspection for Percs & Additional Testhole
(Percolation Tests Conducted After June 1)
Appointment date _____
Appointment time _____

Request for Lot Testing Must be Submitted Jan. 18 - March 16 Only

Type of Testing
1. [ ] New lot
2. [ ] Retest of a New Lot
3. [ ] Exisiting Building
4. [ ] Renewal of Permit
5. [ ] Repair to an existing system
6. [X] Expansion of an existing system

There is a 15 % processing charge on all refunds

PAID
MAR 14 1990
$1,000.00

Town in which located Lancaster Assessors Parcel # _____ (Map # _____)
Street Location 679 George Hill Road Lot number 32-001
Directions to property Route 2 West to Route 70 South (Main Street); Right onto George Hill Road at Atlantic Union College; jog right then left on George Hill, then drive aboout 1 mile to entrance on right; sign reads: Maharishi Ayur-Veda Health Center

********** This Application Must Be Accompained by a Plan of the Lot **********

New	Existing			
[ ]	[ ]	Dwelling	Number of Bedrooms _____	
[ ]	[ ]	Business	Number of Employees _____	Square Foot Floor Space _____
[ ]	[ ]	Industrial	Describe _____	Food Service [ ] Yes [ ] No
[X]	[X]	Other	Describe School with dining service	Food Service [X] Yes [ ] No
[ ]	[ ]	Restaurant	Number of seats _____	

Owner's Name World Plan Executive Council Telephone 508-365-4549
Address 679 George Hill Road, Lancaster, MA 01451
Name of Engineer David Ross & Associates Telephone 508-772-6232
Lot information: Lot size 218 acres Has the Property been surveyed? [X] Yes [ ] No
Was the lot previously tested [X] Yes [ ] No
If the answer is yes, Please give dates, and by whom: Sept., 1986 - Charles A. Perkins Company April, 1984 - Charles A. Perkins; 5/8/87, 4/88, 6/88, 8/24 & 25/88, 10/5 & 6/88 - Stamski & McNary (Acton)
Water Supply: [X] Town [ ] Well on property

Applicants Name: (must be owner or prospective owner) World Plan Executive Council - Don Stieg
Address 679 George Hill Road, Lancaster, MA 01451
Daytime Telephone Number 508-365-4549 [X] Business [ ] Residence

The information given above is, to the best of my knowledge and belief, true and correct. I have read the accompanying information sheet.

AGE of ENGLIGHTENMENT

10-5-88 KEVIN + STANISKI + LENNAY
DANIEL
ANDERSON

OVER 30 MIN IN — 10-6-88
AFTER SOAK

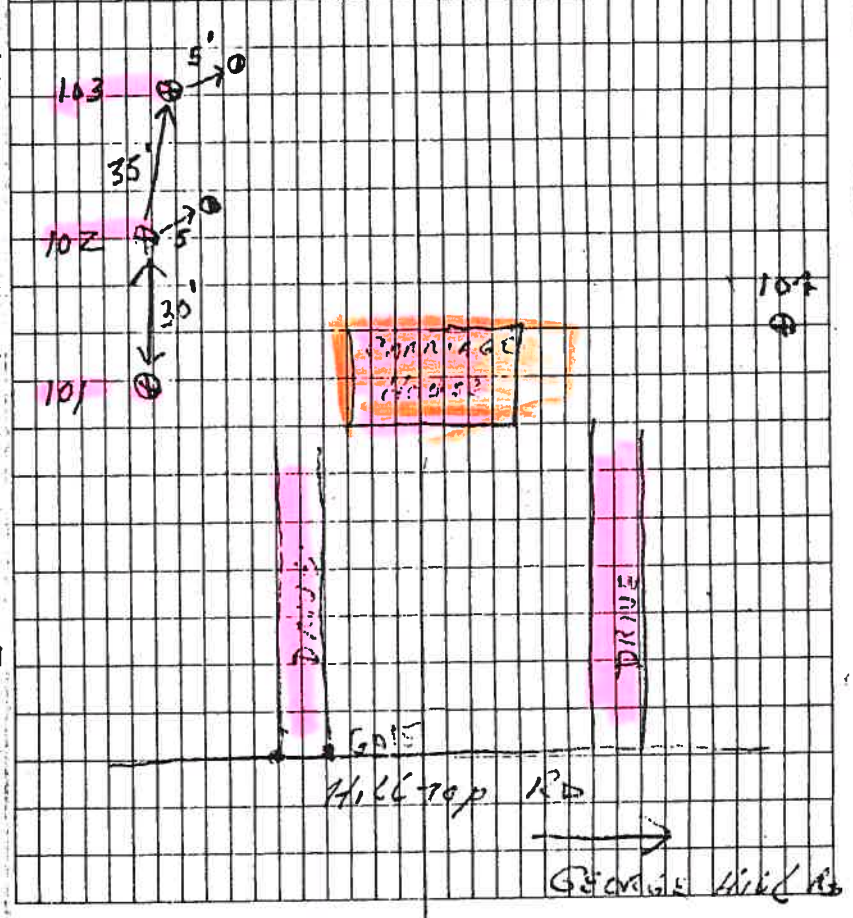
PERC 101 @ 56" ONS	SOAK @ 11:40	
	6¼" @ 11:55	
	6¾ @ 12:05	
	Incomplete DATA	
PERC 102 @ 57" ONS	SOAK @ 11:45	
	5½" @ 12:00	
	6" @ 12:10	
	Incomplete DATA	
PERC 103 @ 56" ONS	SOAK @ 11:48	
	5½" @ 12:03	
	5¾" @ 12:13	
	Incomplete DATA	
PERC 104 @ 54" ONS	SOAK @ 12:20	
	5¼" @ 12:35	
	6" @ 12:45	
	Incomplete DATA	

HILLTOP RD LANE

BY CARRIAGE HOUSE

TEST HOLES
-1- 102 103

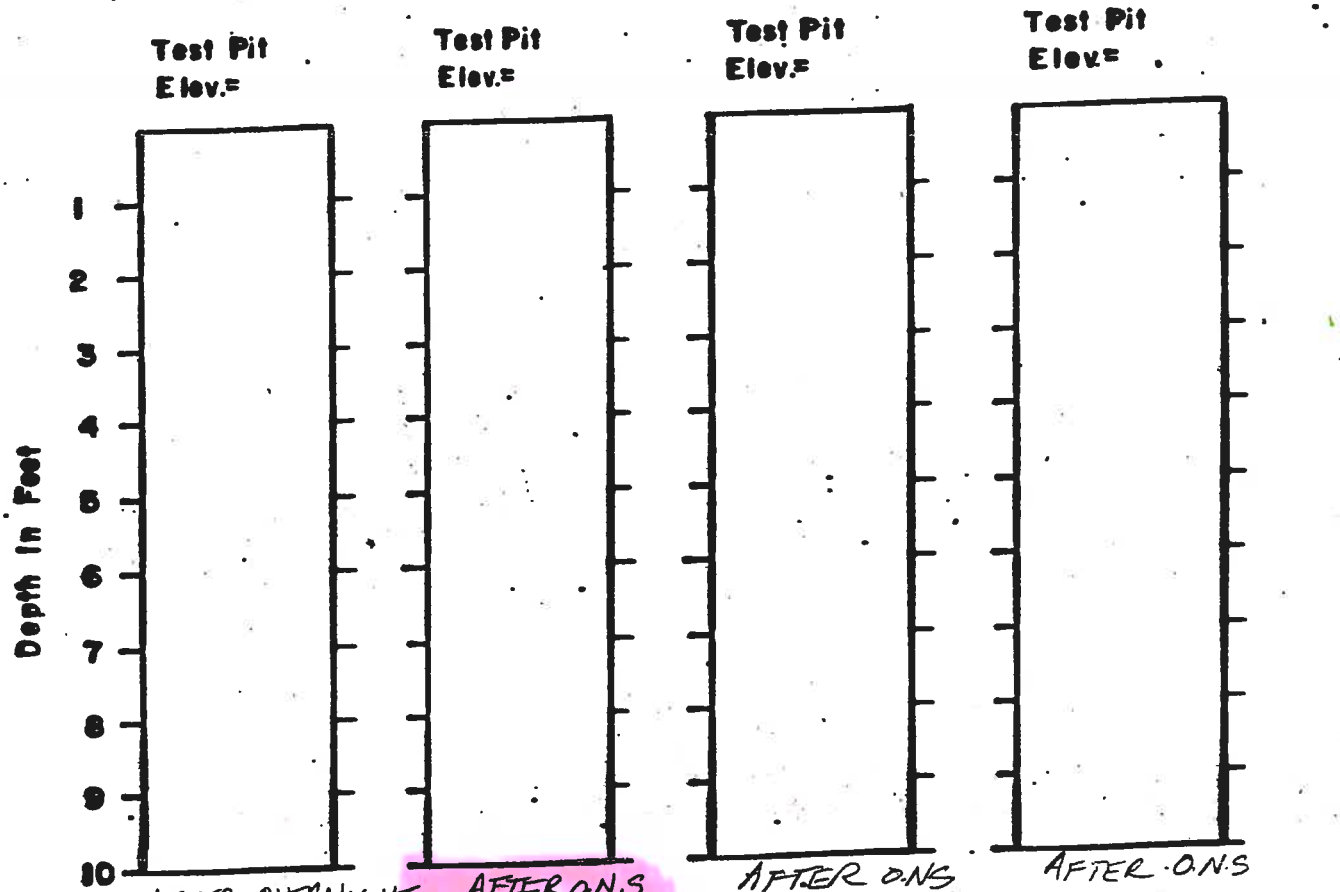
0-15" 7 1/5 SILTY
15"- 9" SANDY
NO GW



RECEIVED

SOIL TEST INFORMATION

Client : C.A.E.	Inspector : KEVIN JOHNSTON	STAMSKI AND MCNARY INC.
Lot No. :	Weather : OVERCAST	80 HARRIS STREET
Street : GEORGE HILL RD	Date : 08/25/88	ACTON, MA. 01720
Town : LANCASTER		
Party : MLR		
Job No. : SM-553		



	AFTER OVERNIGHT SOAK Perc. SM-13	AFTER O.N.S Perc. SM-14	AFTER O.N.S Perc. SM-16	AFTER O.N.S Perc. SM-17
Start Presoak	8:49	8:44	9:11	9:15
Start Test	9:04	8:59	9:26	9:31
1st 5" Drop	9:42 (11")	9:43 (9")	11½" in 40min	1¾ in 60min
2nd 5" Drop		10:58 (6")	40 min/in	34.3 min/in
Elapsed Time	38 min/in	75 min	FAILED	FAILED
Rate : Min./Inch	FAILED	25 min/in	9:46 11"	9:52 11"
	Incomplete DATA	7¾ @ 10:10 PASS RJK	10:13 10¾	10:15 10½
			10:26 10½	10:31 10¼
			Incomplete DATA	Incomplete DATA

NOTE: Indicate Watertable

Structure size	
No. of Bedrooms	
Preferred System Location	
Water Supply	
Garbage Disposal	
Washing Machine Pit	
Sketch	

Field Sheet 1 of 2 Sheets

IV

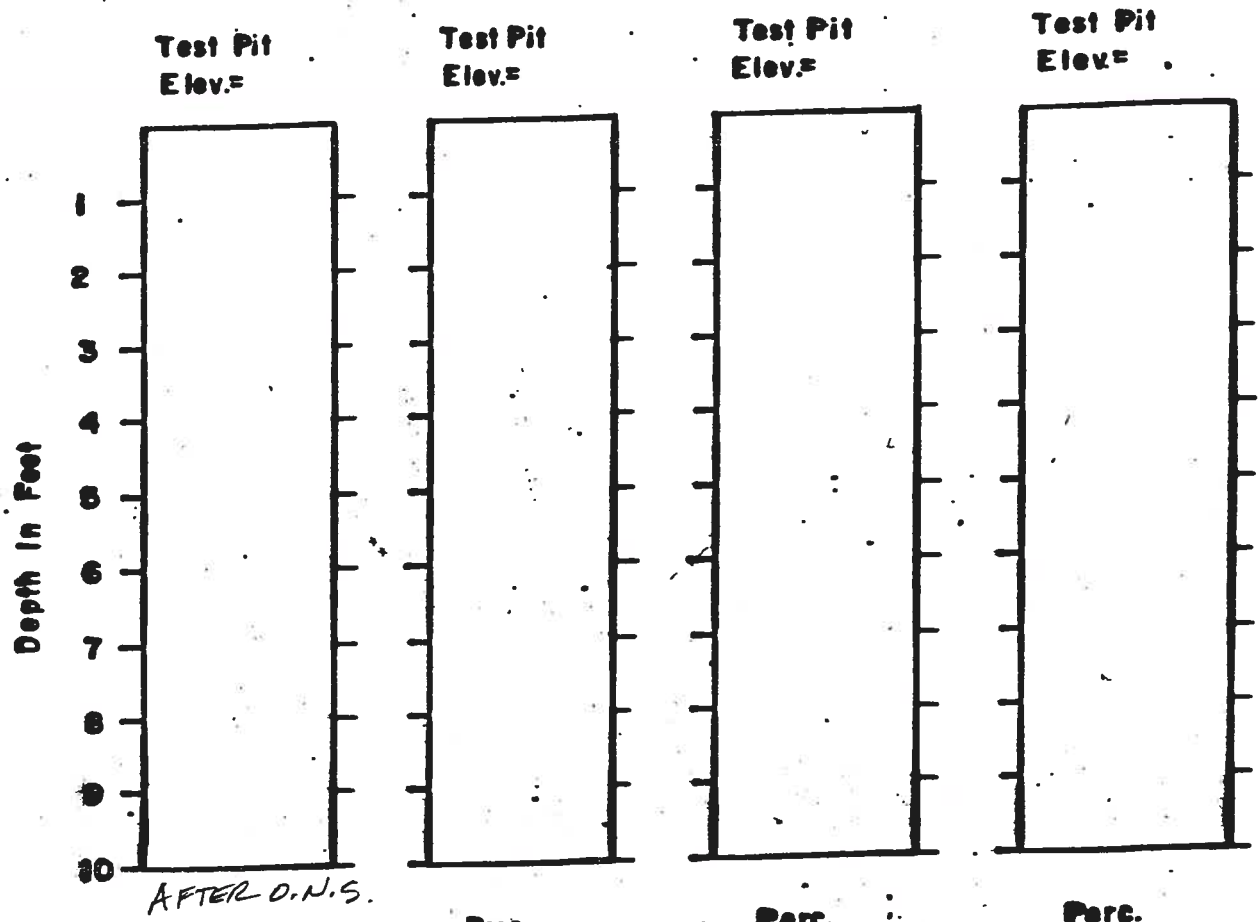
AUG 29

SOIL TEST INFORMATION

Client : C.A.E.
Lot No. :
Street : GEORGE HILL RD
Town : LANCASTER
Party : MLR / F
Job No. : SM-553

Inspector : KEVIN JOHNSTON
Weather : OVERCAST
Date : 08/25/88

STAMSKI AND MCNARY INC.
80 HARRIS STREET
ACTON, MA. 01720



AFTER O.N.S.

	Perc. SM-18	Perc.	Perc.	Perc.
Start Presoak	9:23			
Start Test	9:38			
1st 5" Drop	1 3/4 in 60 min			
2nd 5"-Drop				
Elapsed Time	34 min/in			
Rate : Min./inch	FAILED			
	11 1/4 9:54			
	10 3/4 10 5/16			
	10 1/4 10 38			

12"

Structure size :
No. of Bedrooms :
Preferred System Location :
Water Supply :
Garbage Disposal :
Washing Machine Pit :
Sketch :

NOTE: Indicate Watertable

Field Sheet 2 of 2 Sheets

Age of Enlightenment

8-25-88 Kevin Spaulding McNarry

X **Perc 13**

Soak @ 8:49

X 12" @ 9:04

11" @ 9:42

Over 30 min/in

Incomplete data

Perc 14

Pass

Soak @ 8:44

12" @ 8:59

9" @ 9:43

7 3/4 @ 10:10

6" 10:58

Should be over 30 min/in

1/4 in 27 min

~~Incomplete data~~

Passed @ 25 min/in

Lang

* After 2nd — Soils

X **Perc 16**

Soak @ 9:11

12" @ 9:26

11" @ 9:46

10 3/4" @ 10:13

1/4" in 27 min

Over 30 min/in

X Incomplete data

X **Perc 17**

Soak @ 9:15

12" @ 9:31

11" @ 9:52

10 1/2 @ 10:15

1/2" in 23 min

Over 30 min/in

Incomplete data

X **Perc 18**

Soak @ 9:23

12" @ 9:38

11 1/4 @ 9:54

10 3/4 @ 10:16

1/2" in 22 min

Over 30 min/in

Incomplete data

AGE of ENLIGHTENMENT

8-24-88 Kelly + Stanski + McAleavy Manon

Perc # 13 — By T.H 13 @ 60"

Soak @ 1:13
12" @ 1:28
11½ @ 1:49

ONS

Perc 14 — By T.H 14 @ 62"

Soak @ 1:18
12" @ 1:33
10¾ 1:52

ONS

Perc 15 — By T.H 15 @ 58"

Soak @ 1:21
12" @ 1:36
11⅞ @ 1:53

ONS

OVER 30 MIN/IN

Hill Top Rd Lane

Perc 17 — Soak @ 1:41
8¼ @ 1:58
9¼ @ 2:17

T.H 17 0-1' T+S
1-8' Tight Silty Sand

ONS

Perc 16 — Soak @ 1:43
12" @ 2:00
11¼ @ 2:17

T.H 16 0-1' T+S
1-10' Silty Clayey Mix
No G.W.

ONS

Perc 18 — Soak @ 1:45
7" @ 2:00
8½ @ 2:15

T.H 18
0-1 T+S
1-9 Tight Silty Sand

ONS

AGE of ENLIGHTENMENT

8-4-88 KEVIN + STAMSEL + MCNARY

ALL PERCS AFTER O.S.

P-8 SOAK @ 7:58

12" @ 8:14

9" @ 8:48

6" @ 9:43

PASS 19 MIN/IN

P-9 SOAK @ 8:07

12" @ 8:22

9" @ 9:28

Incomplete data

P-10 WATER IN HOLE OVER 30 MIN/IN

Incomplete DATA

HILLTOP RD LANCASTER

PERC 12 OVER 30 MIN/IN

Incomplete DATA

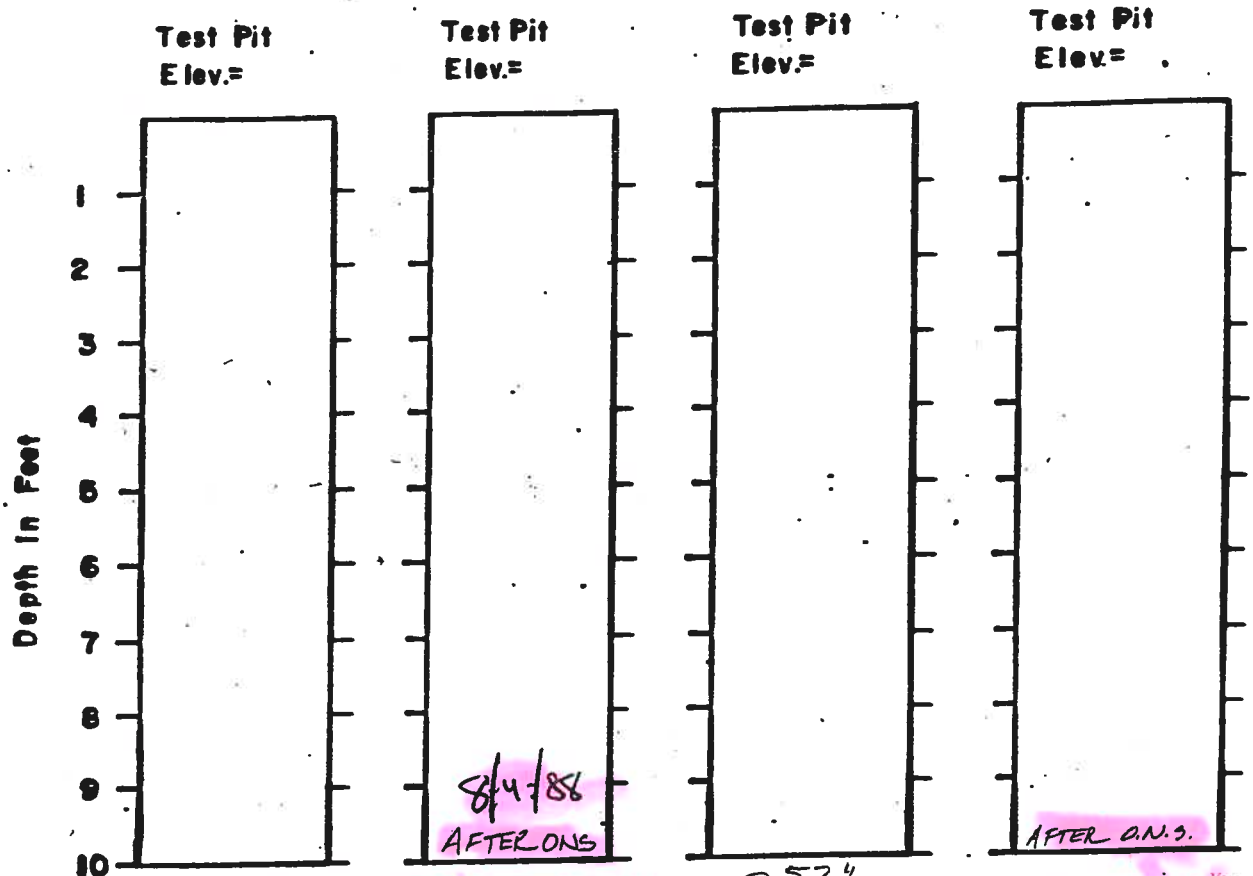
RECEIVED
AUG - 5 1988

SOIL TEST INFORMATION

Client : C A E
Lot No. : 179 Granger Hill Road
Street :
Town : Lancaster
Party : Mr. Dana
Job No. : 6M-553

Inspector : Kevin Johnston
Weather : sunny 95°
Date : 08/03/88

STAMSKI AND MCNARY INC.
80 HARRIS STREET
ACTON, MA. 01720



	@54" Perc. (6)	Perc. (8)	@52" Perc. (10)	Perc. (10)
Start Presoak	1:18	7:58 12"	1:46	WATER LEFT
Start Test	1:33 12"	8:14 12"	2:02 12"	IN HOLE
1st 5" Drop	2:04 9¾"	8:48 9"	2:32 11"	
2nd 5" Drop	O.S. Required	9:43 6"	1" in 90 min	FAILED
Elapsed Time	2¼" in 31 min	55 min	O.N.S	16 IN / 17 HRS
Rate : Min./Inch		19 min/in	Required	64 min/in

Structure size :
No. of Bedrooms :
Preferred System Location :
Water Supply :
Garbage Disposal :
Washing Machine Pit :
Sketch :

NOTE: Indicate Watertable

Field Sheet 1 of 2 Sheets

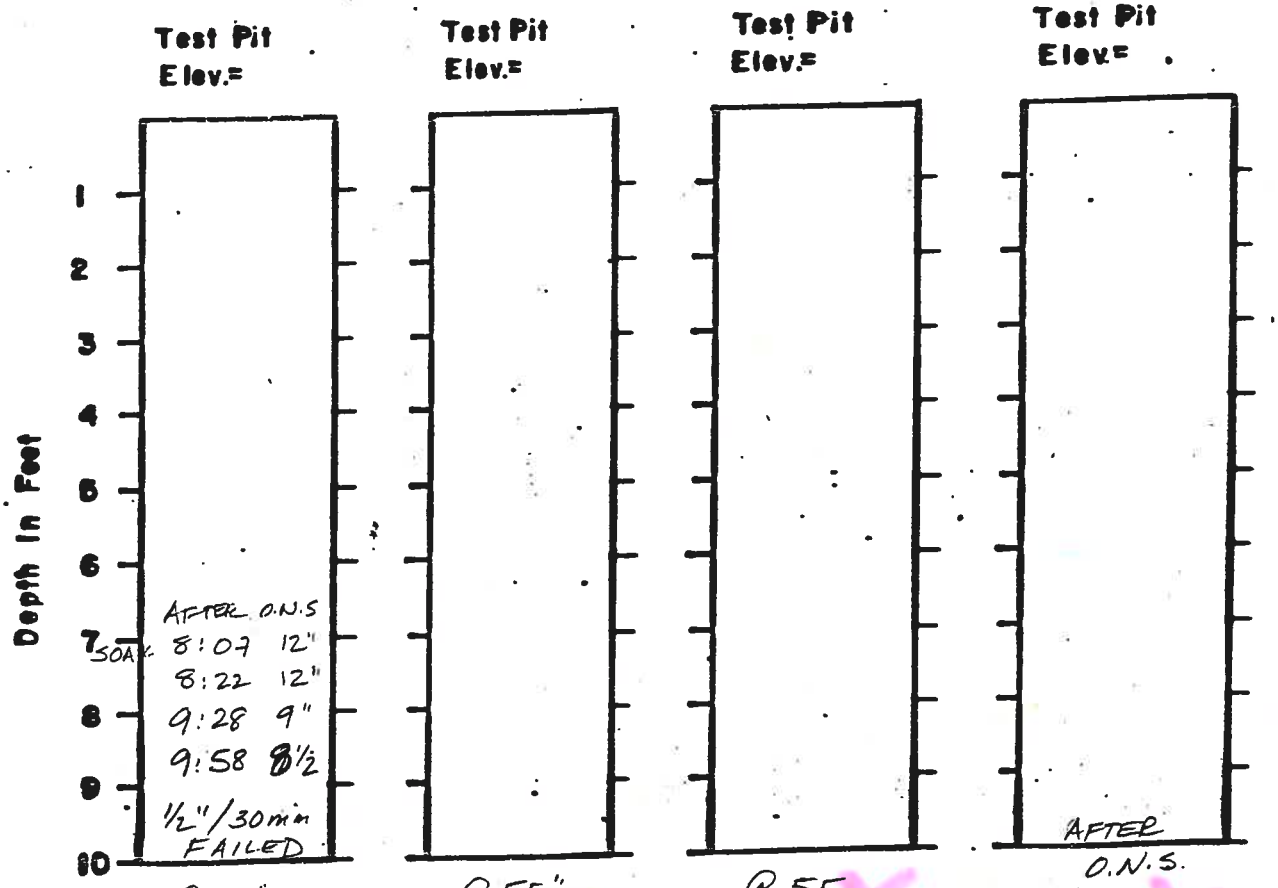
RECEIVED
5 ICRC

SOIL TEST INFORMATION

Client : CAPITAL AGE ENLIGHT
Lot No. : CARRIA
Street : 679 GEORGE HILLRD
Town : LANCASTER
Party : MLR · D.A
Job No. : SM-553

Inspector : KEVIN JOHNSTON
Weather : 85-90° SUNNY
Date : 3-AUG-88

STAMSKI AND MCNARY INC.
80 HARRIS STREET
ACTON, MA. 01720



	@ 54" Perc. (9)	@ 55" Perc. (11)	@ 55 Perc. (12)	Perc. (12)
Start Presoak	1:19	1:45	2:05	WATER
Start Test	1:34	2:00	2:20	IN HOLE
1st 5" Drop	2:04	2:15	2:40	
2nd 5" Drop		2:37		FAILED
Elapsed Time		0:22		15 IN/17 HRS
Rate : Min./Inch	30/2½"	(5 min/1")	30/1"	68 min/in
	12" 9½"	11" 8" 5"	12½" 13	
	OVERNIGHT		OVERNIGHT	

Structure size :
No. of Bedrooms :
Preferred System Location :
Water Supply :
Garbage Disposal :
Washing Machine Pit :
Sketch :

NOTE: Indicate Watertable

Field Sheet 2 of 2 Sheets

C.A.E
4-6-88

Kevin + Stanski
+ McNany
Manon Rodrigue

OLD CARRIAGE HOUSE

T.H #8
0-1' T+S
1-7' SILTY SAND
H_2O @ 6'

T.H #9
0-18" T+S
18"-4½
H_2O @ 3½'

2 BEDROOMS EXISTING DWELLING

T.H #10
0-1 T+S
1-7' SILTY SAND
H_2O @ 5'

T.H #11
0-1½ T+S
1½-7 SILTY
H_2O @ 2½

T.H 12
0-1½
1½-7'
H_2O @ 5'

HILLTOP RD LANC.

T.H 13
0-1½
1½-7' SILTY SAND
H_2O @ 5'

T.H #14
0-1½
1½-6½
H_2O @ 5'

T.H #15
0-1½
1½-6½
H_2O @ 4'

* HOLES LOCATED @ RIGHT HAND SIDE of DRIVE by CARRIAGE HOUSE

8 May 87

Capital
Age of Enlightenment

NAEH J. Fitzgerald
Swanson + Hillary
John Shaffer
STAMSKI
AND McNAMY

TP 1
0 - 18" T+S
18 - 7½' claye silty sand
5' G.W

TP 2
0 - 18" T+S
18 - 7½" Clay silty sand
4½' Gray silty layer
5' G.W

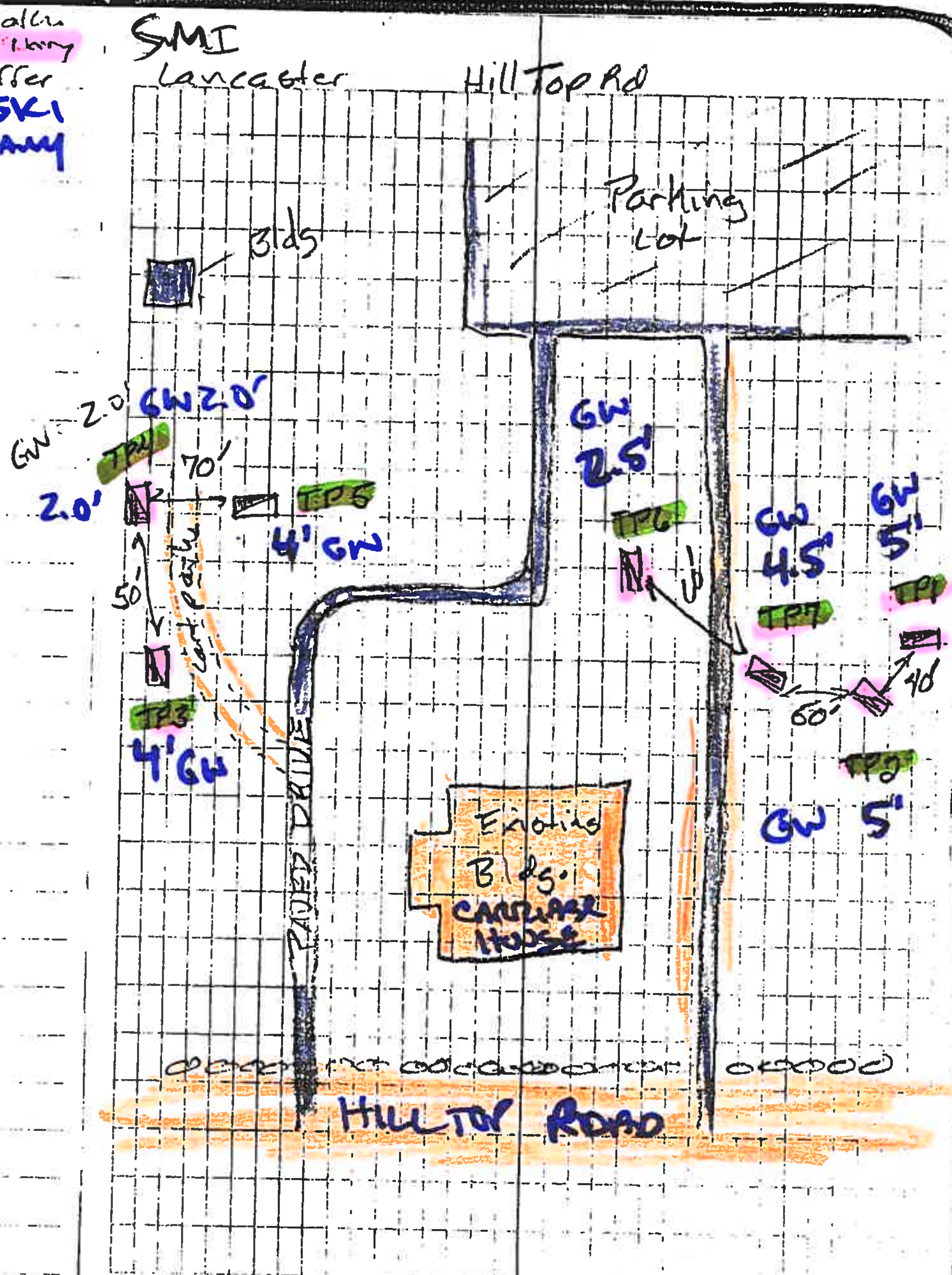
TP 3
0 - 18" T+S
18" - 6½' silty gravel
4' G.W

TP 4
0 - 1½' T+S
1½ - 6' silty gravel
2' G.W

TP 5
0 - 18" T+S
18 - 7' Claye gravel
4' G.W

TP 6
0 - 18" T+S
18" - 7' Claye silty sand
2½' G.W

TP 7
0 - 18" T+S
18" - 9½' Claye silty sand
4½' G.W



Gulliver | | 11/20/86 Engineer CAP-PMS
BOH Lynda
Backhoe - Nat Hawkins

Cloudy 20's Check for gw
Snowcover ~6"

1186 P-1 0-1½ T 3/3
1½-5 silty sandy mix
5-10 silty till mix
no gw no ref

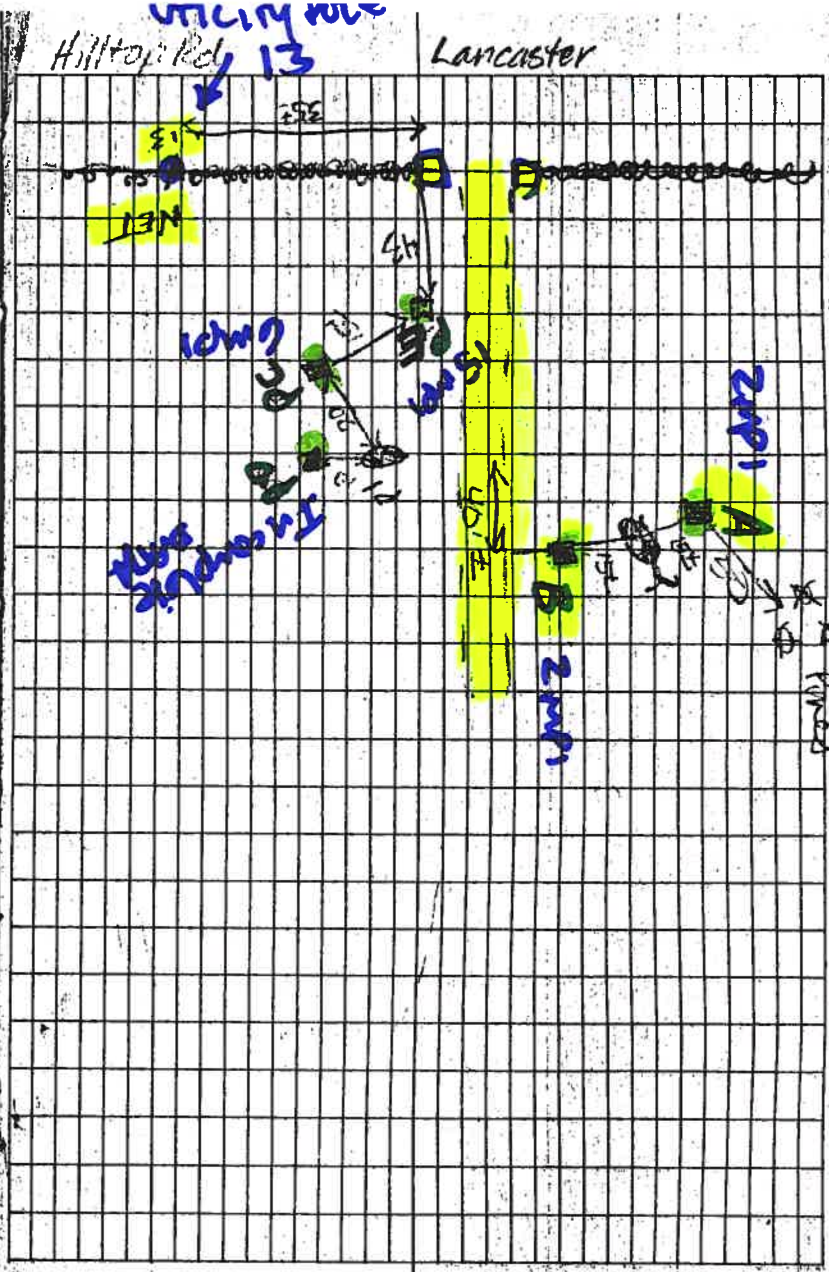
1186 P-2 0-1½ T 3/3
1½-5 compact silt till
5-13 gravelly till
no gw no ref

Perc C soak @ 11:32 | Perc E soak @ 11:50
66" 61 @ 11:45 | 1" @ 12:06
58 @ 11:56 | 3 @ 12:25
55 @ 12:12 > 6 mpi | 4 @ 12:33
| 7 @ 1:17

Perc D soak @ 11:25
75" 13 @ 11:40 5 min
Incomplete 12½ @ 11:52
12 12:22

15 mpi

Perc A soak @ 12:20 | Perc B soak 12:10
113 24 12:23 | 132 24 12:27
2 min | 2 min



CHARLES A. PERKINS CO., INC.
Registered Engineers & Land Surveyors
POST OFFICE BOX 234, CLINTON, MASSACHUSETTS 01510

PHONE: (617) 368-8773
(617) 365-3262

SUMMARY OF SUBSURFACE EXPLORATIONS PERFORMED FOR MARC GULLIVER ON HILLTOP ROAD IN LANCASTER, MASSACHUSETTS

Date: April 23, 1984

April 25, 1984
Ref: NB575-D-36

HOLES EXCAVATED APRIL 23, 1984;

Hole #1

0'-1' topsoil
1'-2' loose sandy fill
2'-3' subsoil
3'-10' silty till
Seepage @ 3'

Hole #2

0'-3' top and subsoil
3'-4½' silty till with clay lenses
4½'-10' silty till
Seepage @ 4½'

Hole #3

0'-1½' top and subsoil
1½'-3' silty till with clay lenses
3'-10' silty till
Seepage @ 1½'

Hole #4

0'-1' top and subsoil
1'-10' sandy silty till
Seepage @ 1'

Hole #5

0'-1½' top and subsoil
1½'-8' silty till
Seepage @ 2½'

MAY 1 0 1984

APRIL 23 & 25, 1984.
SUMMARY OF SUBSURFACE EXPLORATIONS
PERFORMED FOR MARC GULLIVER IN LANCASTER, MA.
PAGE TWO

Hole #6

0'-1½' top and subsoil
1½'-9' silty till
Seepage @ 3'

Hole #7

0'-1½' top and subsoil
1½'-9' silty till
Sand lense @ 5'
Seepage @ 5'

Hole #8

0'-2' top and subsoil
2'-8' silty till
Seepage @ 5'

Hole #9

0'-2' top and subsoil
2'-10' silty till
Seepage @ 6'

Hole #10

0'-2' top and subsoil
2'-10' silty till
Seepage @ 4½'

Hole #11

0'-2' top and subsoil
2'-10' silty till
Seepage @ 2'

Hole #12

0'-2' top and subsoil
2'-10' silty till
Seepage @ 2'

Hole #13

0'-2' top and subsoil
2'-10' silty till
Seepage @ 2'

HOLES EXCAVATED APRIL 25, 1984:

Hole #14

0'-2½' top and subsoil
2½'-10' clayey silty till
Seepage @ 2½'

Hole #15

0'-2½' top and subsoil
2½'-10' clayey silty till
Seepage @ 2½'

Hole #16

0'-2½' top and subsoil
2½'-10' clayey silty till
Seepage @ 2½'

Hole #17

0'-2½' top and subsoil
2½'-8' stoney clay silty till
No Ground Water Observed

Hole #18

0'-2½' top and subsoil
2½'-7½' compact silty till
No Ground Water Observed

Hole #19

0'-2' top and subsoil
2'-8' compact silty till
Seepage @ 2'

Hole #20

0'-2' top and subsoil
2'-8' compact silty till
Seepage @ 2'

Hole #21

0'-2' top and subsoil
2'-9' compact silty till
Seepage @ 2'

APRIL 23 & 25, 198[illegible]
SUMMARY OF SUBSURFACE EXPLORATIONS
PERFORMED FOR MARC GULLIVER IN LANCASTER, MA.
PAGE FOUR

Hole #22

0'-2' top and subsoil
2'-7½' compact silty till with boulders
Seepage @ 5½'

Hole #23

0'-2½' top and subsoil
2½'-8' compact silty till
Seepage @ 2½'

Hole #24

0'-2½' top and subsoil
2½'-8' compact silty till
Seepage @ 2½'

Hole #25

0'-2' top and subsoil
2'-8' compact silty till
Seepage @ 4½'

Hole #26

0'-2' top and subsoil
2'-8' compact silty till
No Ground Water Observed

Hole #27

0'-2' top and subsoil
2'-8' compact silty till
Seepage @ 5'

Hole #28

0'-2' top and subsoil
2'-8½' compact silty till
No Ground Water Observed

Hole #29

Seepage @ 1½'-dug by hand

CHARLES A. PERKINS CO., INC.

Gulliver [illegible] 4-23-84 Mockingbird [illegible]
Carriage [illegible] Site

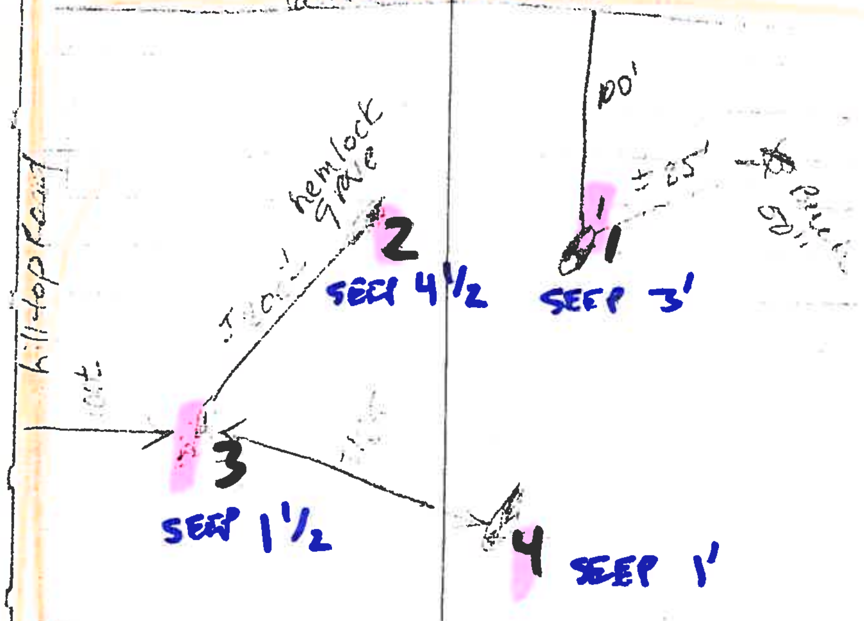
GW 1 0-1 T's 1-2 - base sand [illegible]
2-3 - subsoil 3-10
silty till
Seep @ 3'

GW 2 0-3 T's 3-4½ silty till
c clay. 4½-10 silty till
Seep @ 4½

GW 3 0-1½ T's 1½-3 silty till
clay [illegible] silty till
Seep @ 1½

GW4 0-1½ 1-10 silty silty till
g.w. Seep @ 1'

Hilltop Est [illegible] 4-23-1984
Lakeside
Path



GW [illegible] 4-23-84 McLaughlin [illegible] Dean and [illegible]

GW 5 [illegible]

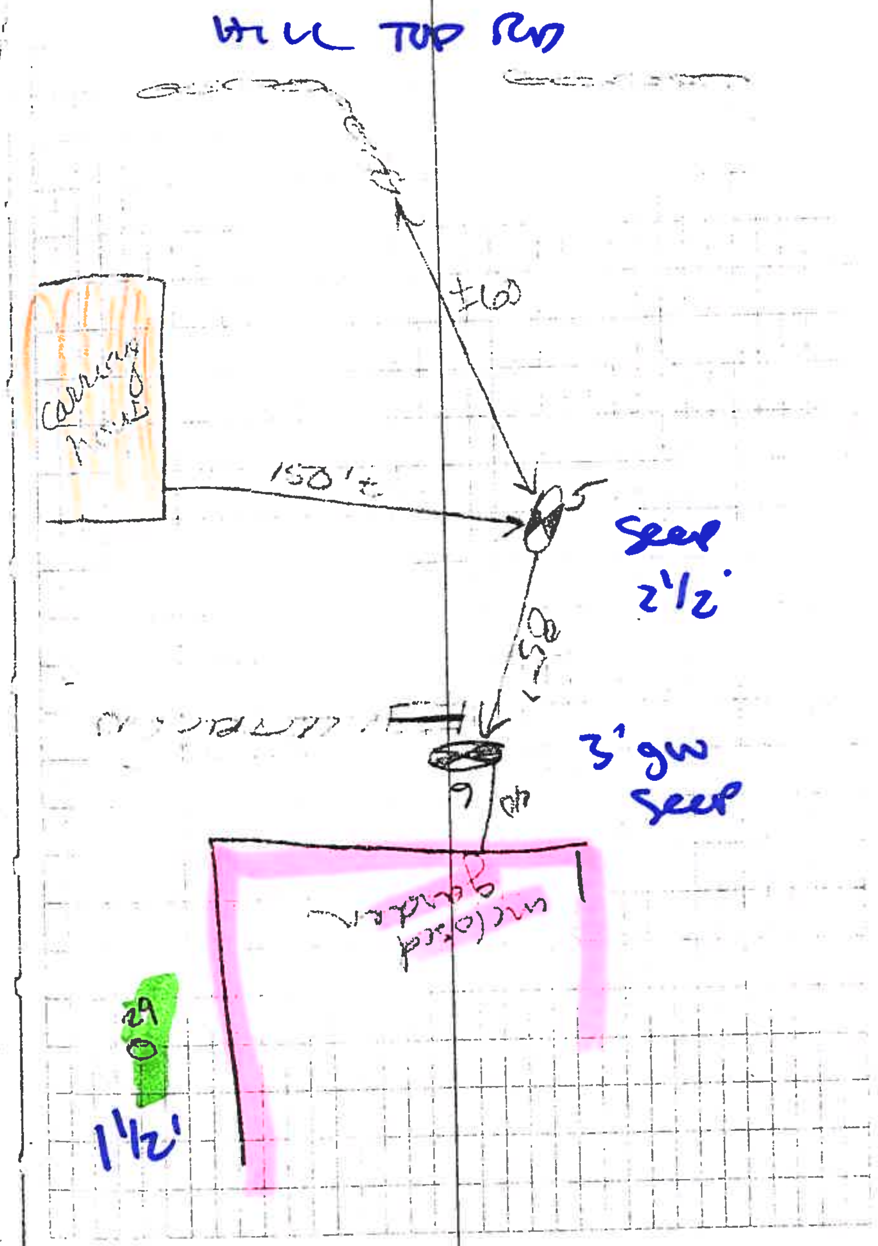
Seep @ 2½

GW 6 0-½ [illegible] 1½ 9 [illegible]

Seep @ 3'

4-25-84

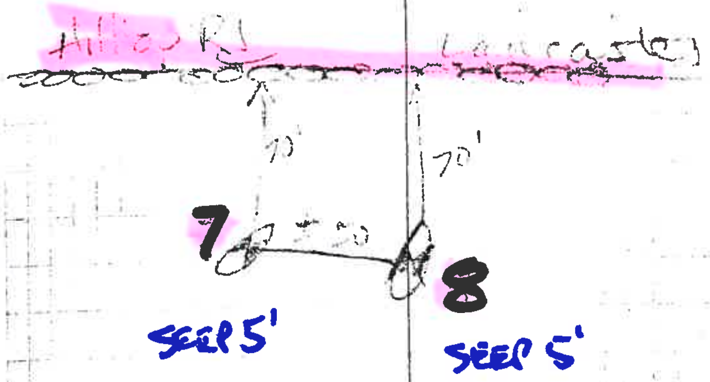
GW 29 Water 18" Dug by hand

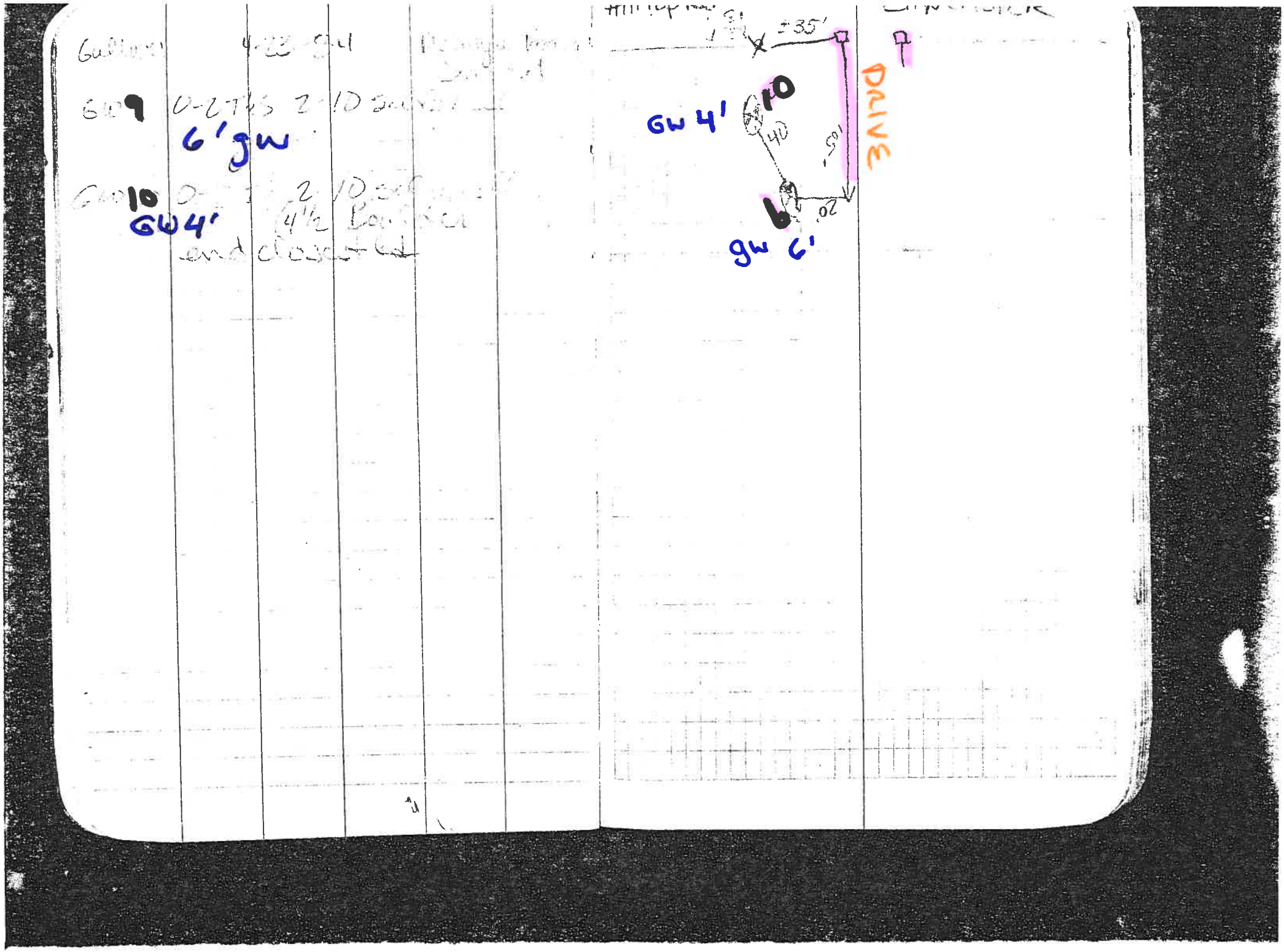


C[illegible] 4-23-54 [illegible] Diamond

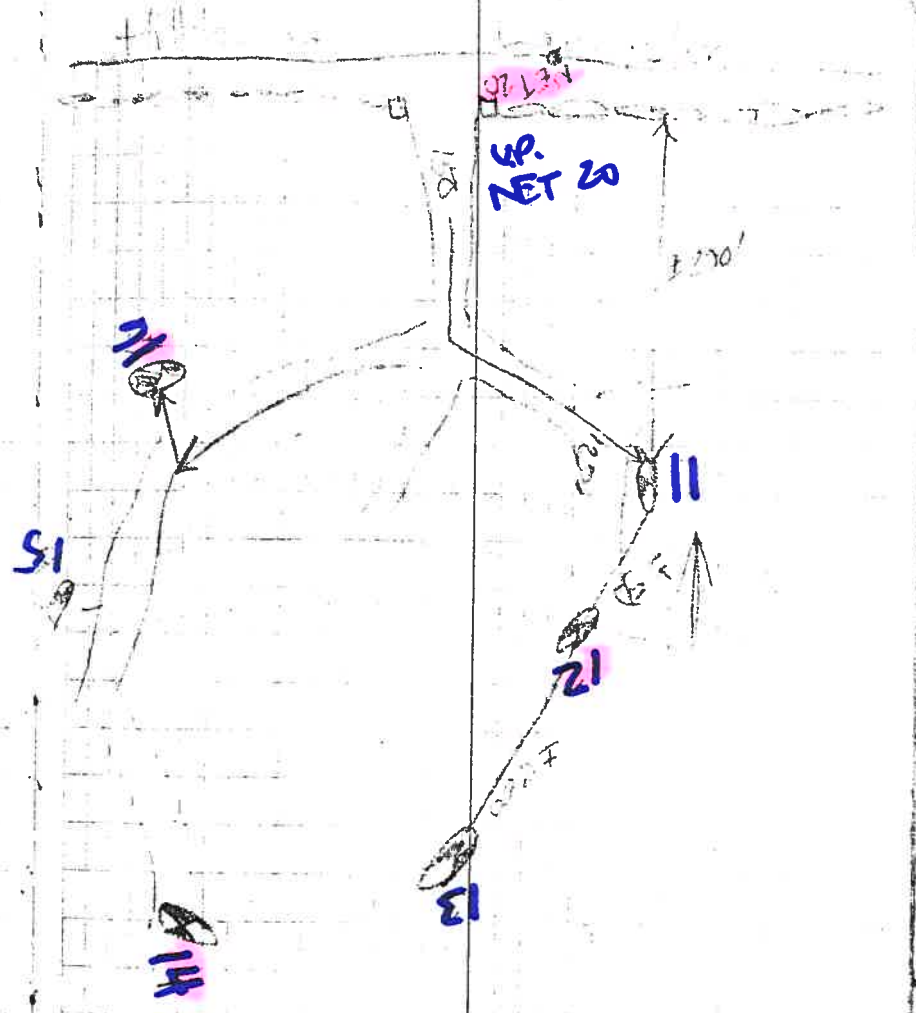
GW 7 [illegible] 1/4 9- [illegible]
Seep @ 5' [illegible]

GW 8 [illegible] 2.5 [illegible]
Seep @ 5'




GW 9
6' GW
GW 10
GW 4'
GW 4'
10
40
90'
35'
DRIVE
02
GW 6'

GW 11	GW @ 2	
GW 12	GW @ 2	
GW 13	GW @ 2	
GW 14	GW @ 2 1/2	
GW 15	GW @ 2 1/2	
GW 16	GW @ 2 1/2	



GW19 0-2½ 2½-8 silty till

GW20 0-2½ 2½-8 silty till

GW21 0-2½ 2½-8 silty till

GW22 0-2½ 2½-8 silty till

GW23 0-2½ 2½-8 silty till

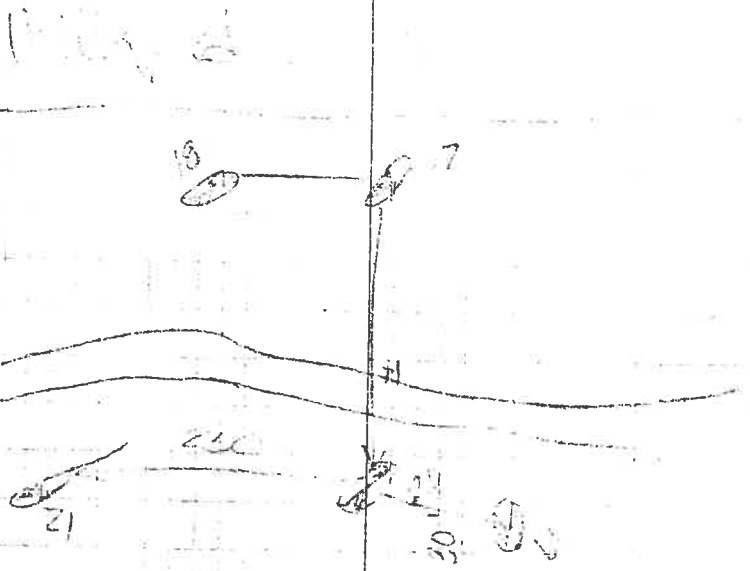
GW24 0-2½ 2½-8 silty till

GW25 0-2½ 2½-8 silty till

GW26 0-2½ 2½-8 silty till

GW27 0-2½ 2½-8 silty till

GW28 0-2½ 2½-8 silty till



AGE of ENLIGHTENMENT

10-6-80 KEVIN + STANISKY + McHENRY

PELC 104

SOAK @ 8:25

4 3/4" @ 8:45

7 1/2" @ 10:10

AFTER ONS

OVER 30 MIN.