

603 Salem Street
Wakefield, MA 01880
Tel: (781) 246-2800
Fax: (781) 246-7596

Nantucket, MA 02554
Tel: (508) 228-7909

Refer to File No. MEL-01.50H

March 16, 2022

Melrose Conservation Commission
City Hall
Melrose, MA 02176

RE: Slayton Road

Dear Commissioners,

Accompanying this letter, please find calculations based on the presumptive soil characteristics and Rawls infiltration rates for the 10-year storm and revised house on Slayton Road. I have also added the proposed refueling area indicating a length long enough to have a piece of equipment and a fuel truck pull off of Slayton Rd to refuel. I am hoping that we can bring this filing to a conclusion on Thursday night, March 17th.

Very truly yours,

A handwritten signature in blue ink that reads "Peter J. Ogren - PE PLS".

Peter J. Ogren, P.E., P.L.S.

ao

cc:

Enclosure

lot2R

Type III 24-hr 100 Year Rainfall=6.50"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Pond 1P: cultec c-100 - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)

Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf

Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap

Row Length Adjustment= +0.50' x 1.86 sf x 2 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

4 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 30.50' Row Length +12.0" End Stone x 2 = 32.50' Base Length

2 Rows x 36.0" Wide + 4.0" Spacing x 1 + 12.0" Side Stone x 2 = 8.33' Base Width

6.0" Stone Base + 12.5" Chamber Height + 6.0" Stone Cover = 2.04' Field Height

8 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 2 Rows = 113.6 cf Chamber Storage

553.0 cf Field - 113.6 cf Chambers = 439.4 cf Stone x 30.0% Voids = 131.8 cf Stone Storage

Chamber Storage + Stone Storage = 245.4 cf = 0.006 af

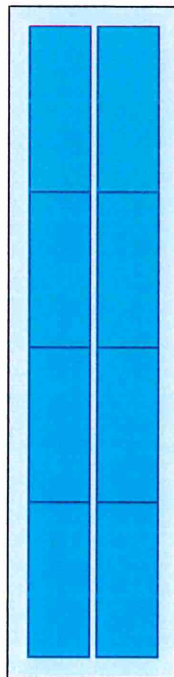
Overall Storage Efficiency = 44.4%

Overall System Size = 32.50' x 8.33' x 2.04'

8 Chambers

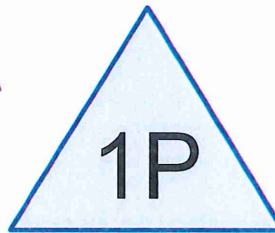
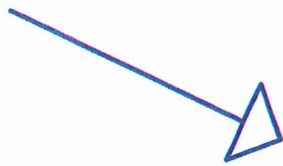
20.5 cy Field

16.3 cy Stone





roof lot 2



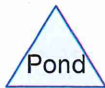
cultec c-100



Subcat



Reach



Pond



Link

Routing Diagram for lot2R

Prepared by Hayes Engineering, Inc., Printed 3/16/2022
HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

lot2R

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.063	98	Roofs, HSG A (2S)
0.063	98	TOTAL AREA

lot2R

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.063	HSG A	2S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.063		TOTAL AREA

lot2R

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.063	0.000	0.000	0.000	0.000	0.063	Roofs	2S
0.063	0.000	0.000	0.000	0.000	0.063	TOTAL AREA	

lot2R

Type III 24-hr 1 Year Rainfall=2.50"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Page 5

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 2S: roof lot 2

Runoff Area=2,744 sf 100.00% Impervious Runoff Depth=2.27"
Tc=6.0 min CN=98 Runoff=0.15 cfs 0.012 af

Pond 1P: cultec c-100

Peak Elev=105.71' Storage=0.002 af Inflow=0.15 cfs 0.012 af
Discarded=0.05 cfs 0.012 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.012 af

Total Runoff Area = 0.063 ac Runoff Volume = 0.012 af Average Runoff Depth = 2.27"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.063 ac

lot2R

Type III 24-hr 1 Year Rainfall=2.50"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Page 6

Summary for Subcatchment 2S: roof lot 2

Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.012 af, Depth= 2.27"
 Routed to Pond 1P : cultec c-100

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type III 24-hr 1 Year Rainfall=2.50"

Area (sf)	CN	Description
2,744	98	Roofs, HSG A
2,744		100.00% Impervious Area

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

Summary for Pond 1P: cultec c-100

Inflow Area = 0.063 ac, 100.00% Impervious, Inflow Depth = 2.27" for 1 Year event
 Inflow = 0.15 cfs @ 12.09 hrs, Volume= 0.012 af
 Outflow = 0.05 cfs @ 11.95 hrs, Volume= 0.012 af, Atten= 65%, Lag= 0.0 min
 Discarded = 0.05 cfs @ 11.95 hrs, Volume= 0.012 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 105.71' @ 12.35 hrs Surf.Area= 0.006 ac Storage= 0.002 af

Plug-Flow detention time= 10.0 min calculated for 0.012 af (100% of inflow)
 Center-of-Mass det. time= 10.0 min (771.9 - 761.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	105.00'	0.003 af	8.33'W x 32.50'L x 2.04'H Field A 0.013 af Overall - 0.003 af Embedded = 0.010 af x 30.0% Voids
#2A	105.50'	0.003 af	Cultec C-100HD x 8 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 2 rows
#3	105.00'	0.000 af	1.00'D x 20.00'H Vertical Cone/Cylinder
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	110.00'	4.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#2	Discarded	105.00'	8.270 in/hr Exfiltration over Surface area

lot2R

Type III 24-hr 1 Year Rainfall=2.50"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Page 7

Discarded OutFlow Max=0.05 cfs @ 11.95 hrs HW=105.22' (Free Discharge)
↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' (Free Discharge)
↑**1=Orifice/Grate** (Controls 0.00 cfs)

lot2R

Type III 24-hr 2 Year Rainfall=3.10"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Page 8

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 2S: roof lot 2

Runoff Area=2,744 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=0.18 cfs 0.015 af

Pond 1P: cultec c-100

Peak Elev=105.95' Storage=0.003 af Inflow=0.18 cfs 0.015 af
Discarded=0.05 cfs 0.015 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.015 af

Total Runoff Area = 0.063 ac Runoff Volume = 0.015 af Average Runoff Depth = 2.87"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.063 ac

lot2R

Type III 24-hr 2 Year Rainfall=3.10"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Page 9

Summary for Subcatchment 2S: roof lot 2

Runoff = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af, Depth= 2.87"
 Routed to Pond 1P : cultec c-100

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2 Year Rainfall=3.10"

Area (sf)	CN	Description
2,744	98	Roofs, HSG A
2,744		100.00% Impervious Area

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

Summary for Pond 1P: cultec c-100

Inflow Area = 0.063 ac, 100.00% Impervious, Inflow Depth = 2.87" for 2 Year event
 Inflow = 0.18 cfs @ 12.09 hrs, Volume= 0.015 af
 Outflow = 0.05 cfs @ 11.85 hrs, Volume= 0.015 af, Atten= 72%, Lag= 0.0 min
 Discarded = 0.05 cfs @ 11.85 hrs, Volume= 0.015 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
 Peak Elev= 105.95' @ 12.43 hrs Surf.Area= 0.006 ac Storage= 0.003 af

Plug-Flow detention time= 14.0 min calculated for 0.015 af (100% of inflow)
 Center-of-Mass det. time= 14.0 min (771.1 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	105.00'	0.003 af	8.33'W x 32.50'L x 2.04'H Field A 0.013 af Overall - 0.003 af Embedded = 0.010 af x 30.0% Voids
#2A	105.50'	0.003 af	Cultec C-100HD x 8 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 2 rows
#3	105.00'	0.000 af	1.00'D x 20.00'H Vertical Cone/Cylinder
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	110.00'	4.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#2	Discarded	105.00'	8.270 in/hr Exfiltration over Surface area

lot2R

Type III 24-hr 2 Year Rainfall=3.10"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Page 10

Discarded OutFlow Max=0.05 cfs @ 11.85 hrs HW=105.20' (Free Discharge)

↑**2=Exfiltration** (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' (Free Discharge)

↑**1=Orifice/Grate** (Controls 0.00 cfs)

lot2R

Type III 24-hr 10 Year Rainfall=4.50"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Page 11

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 2S: roof lot 2 Runoff Area=2,744 sf 100.00% Impervious Runoff Depth=4.26"
Tc=6.0 min CN=98 Runoff=0.27 cfs 0.022 af

Pond 1P: cultec c-100 Peak Elev=106.98' Storage=0.006 af Inflow=0.27 cfs 0.022 af
Discarded=0.05 cfs 0.022 af Primary=0.00 cfs 0.000 af Outflow=0.05 cfs 0.022 af

Total Runoff Area = 0.063 ac Runoff Volume = 0.022 af Average Runoff Depth = 4.26"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.063 ac

lot2R

Type III 24-hr 10 Year Rainfall=4.50"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Page 12

Summary for Subcatchment 2S: roof lot 2

Runoff = 0.27 cfs @ 12.09 hrs, Volume= 0.022 af, Depth= 4.26"
Routed to Pond 1P : cultec c-100

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 Year Rainfall=4.50"

Table with 3 columns: Area (sf), CN, Description. Row 1: 2,744, 98, Roofs, HSG A. Row 2: 2,744, 100.00% Impervious Area.

Table with 6 columns: Tc (min), Length (feet), Slope (ft/ft), Velocity (ft/sec), Capacity (cfs), Description. Row 1: 6.0, Direct Entry,

Summary for Pond 1P: cultec c-100

Inflow Area = 0.063 ac, 100.00% Impervious, Inflow Depth = 4.26" for 10 Year event
Inflow = 0.27 cfs @ 12.09 hrs, Volume= 0.022 af
Outflow = 0.05 cfs @ 11.75 hrs, Volume= 0.022 af, Atten= 81%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.75 hrs, Volume= 0.022 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 106.98' @ 12.52 hrs Surf.Area= 0.006 ac Storage= 0.006 af

Plug-Flow detention time= 26.5 min calculated for 0.022 af (100% of inflow)
Center-of-Mass det. time= 26.5 min (776.3 - 749.8)

Table with 4 columns: Volume, Invert, Avail.Storage, Storage Description. Rows #1A, #2A, #3, and Total Available Storage.

Storage Group A created with Chamber Wizard

Table with 4 columns: Device, Routing, Invert, Outlet Devices. Rows #1 and #2.

lot2R

Type III 24-hr 10 Year Rainfall=4.50"

Prepared by Hayes Engineering, Inc.

Printed 3/16/2022

HydroCAD® 10.10-6a s/n 03206 © 2020 HydroCAD Software Solutions LLC

Page 13

Discarded OutFlow Max=0.05 cfs @ 11.75 hrs HW=105.21' (Free Discharge)
↑2=Exfiltration (Exfiltration Controls 0.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=105.00' (Free Discharge)
↑1=Orifice/Grate (Controls 0.00 cfs)