

STORMWATER ANALYSIS

***3 EDGEWATER PLACE
WINCHESTER, MA***



JULY 30, 2020

3 Edgewater Place Project Summary

The Owner/Applicant is proposing to demolish the existing dwelling and garage and construct a new single family dwelling at 3 Edgewater Place. Rainfall data for this analysis was based on the Cornell University Northeast Regional Climate Center Atlas for Northeast United States.

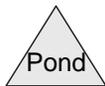
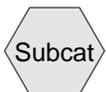
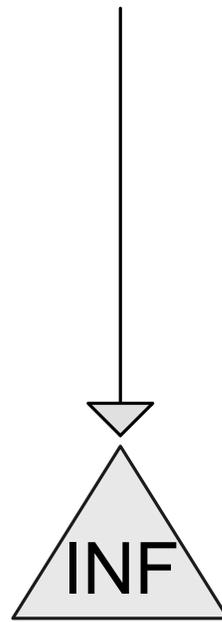
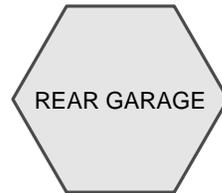
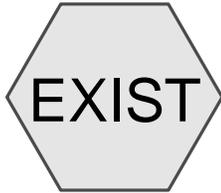
The existing dwelling, driveway, walks, patios and steps currently make up approximately 9,255+/-sf of impervious cover. The proposed dwelling, driveway, walks, patios and steps will create approximately 9,540+/- sf of impervious cover. In order to offset the proposed increase of 285 sf of impervious cover, downspouts and roof drains for a portion of the proposed dwelling (550 sf) will connect to a subsurface infiltration system adequately designed for the 100-year storm event, using a 8.90" inch rainfall.

Soils investigations, including one deep-hole observation to establish the estimated annual high water table and soil texture was conducted on-site. Based on this investigation a "coarse sand" soil was observed. The Natural Resources Conservation Service Web Soil Survey was also referenced and classifies on-site soils conditions as Hydrologic Group "A" soils. As a result, a Rawls exfiltration rate of 8.27 inches per hour was used for the design of the proposed infiltration system. (*Note: bottom area only of proposed infiltration system used for exfiltration rate design*).

In summary by utilizing the proposed subsurface infiltration system to mitigate stormwater runoff generated by a portion of the proposed dwelling, peak rates and volume of runoff will be maintained or reduced for post development conditions.

Pre-Development vs. Post-Development Drainage Summary Table

	Pre-Development		Post-Development	
Storm Event	Rate (cfs)	Volume (cf)	Rate (cfs)	Volume (cf)
2	0.02	441	0.02	435
10	0.37	2,236	0.37	2,206
25	0.96	4,261	0.95	4,204
100	2.56	9,663	2.52	9,534



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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2 year storm	Type III 24-hr		Default	24.00	1	3.20	2
2	10 year storm	Type III 24-hr		Default	24.00	1	4.90	2
3	25 year storm	Type III 24-hr		Default	24.00	1	6.20	2
4	100 year storm	Type III 24-hr		Default	24.00	1	8.90	2

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Type III 24-hr 2 year storm Rainfall=3.20"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 EXIST: Runoff Area=41,160 sf 22.49% Impervious Runoff Depth=0.13"
Tc=10.0 min CN=50 Runoff=0.02 cfs 441 cf

Pond INF: Peak Elev=10.54' Storage=16 cf Inflow=0.04 cfs 136 cf
Outflow=0.02 cfs 136 cf

Subcatchment PROP: Runoff Area=40,610 sf 22.14% Impervious Runoff Depth=0.13"
Tc=10.0 min CN=50 Runoff=0.02 cfs 435 cf

Subcatchment REAR GARAGE: Runoff Area=550 sf 100.00% Impervious Runoff Depth=2.97"
Tc=5.0 min CN=98 Runoff=0.04 cfs 136 cf

Total Runoff Area = 82,320 sf Runoff Volume = 1,012 cf Average Runoff Depth = 0.15"
77.17% Pervious = 63,525 sf 22.83% Impervious = 18,795 sf

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Type III 24-hr 2 year storm Rainfall=3.20"

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Summary for Subcatchment EXIST:

Runoff = 0.02 cfs @ 12.54 hrs, Volume= 441 cf, Depth= 0.13"

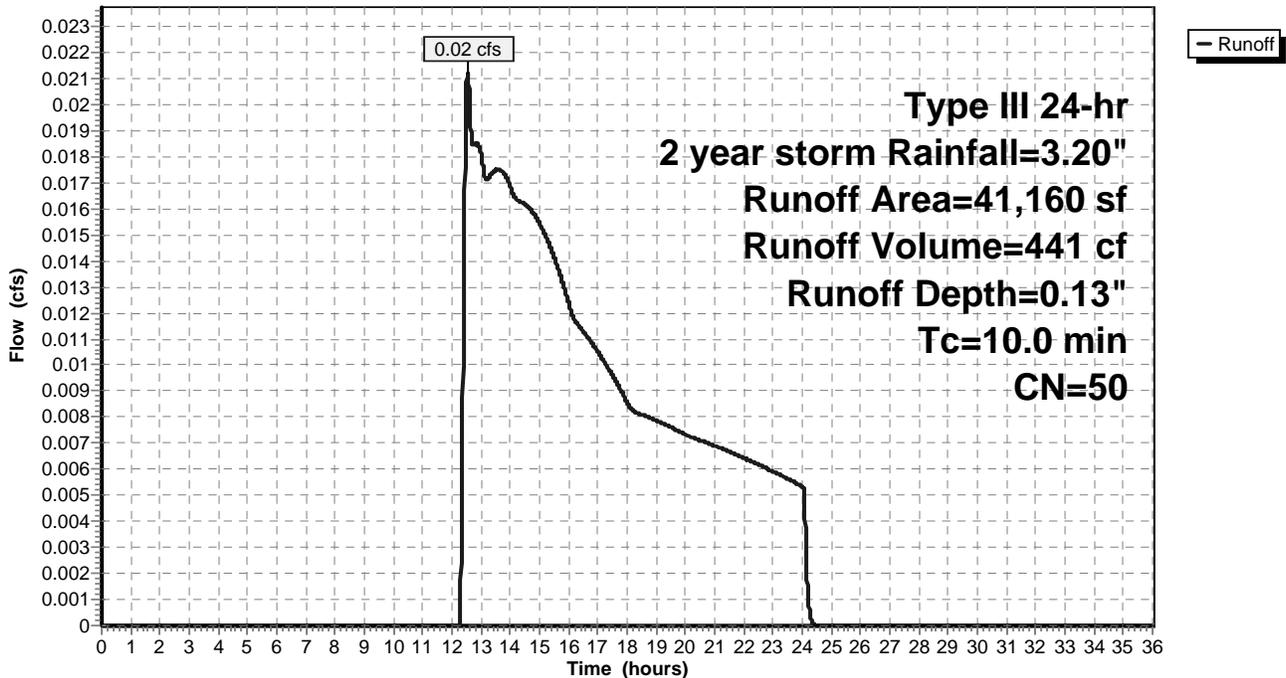
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
4,110	98	Roofs, HSG A
3,495	98	Paved parking, HSG A
* 1,650	98	Patio/walks/steps, HSG A
11,370	30	Woods, Good, HSG A
20,535	39	>75% Grass cover, Good, HSG A
41,160	50	Weighted Average
31,905		77.51% Pervious Area
9,255		22.49% Impervious Area

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

Subcatchment EXIST:

Hydrograph



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Type III 24-hr 2 year storm Rainfall=3.20"

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Summary for Pond INF:

Inflow Area = 550 sf, 100.00% Impervious, Inflow Depth = 2.97" for 2 year storm event
Inflow = 0.04 cfs @ 12.07 hrs, Volume= 136 cf
Outflow = 0.02 cfs @ 11.90 hrs, Volume= 136 cf, Atten= 63%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.90 hrs, Volume= 136 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 10.54' @ 12.29 hrs Surf.Area= 79 sf Storage= 16 cf

Plug-Flow detention time= 4.6 min calculated for 136 cf (100% of inflow)
Center-of-Mass det. time= 4.6 min (760.1 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1A	10.00'	81 cf	6.92'W x 11.40'L x 3.50'H Field A 276 cf Overall - 46 cf Embedded = 230 cf x 35.0% Voids
#2A	10.50'	46 cf	ADS_StormTech SC-740 +Cap Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		126 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.02 cfs @ 11.90 hrs HW=10.04' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond INF: - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +16.0" End Stone x 2 = 11.40' Base Length

1 Rows x 51.0" Wide + 16.0" Side Stone x 2 = 6.92' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

1 Chambers x 45.9 cf = 45.9 cf Chamber Storage

276.1 cf Field - 45.9 cf Chambers = 230.1 cf Stone x 35.0% Voids = 80.5 cf Stone Storage

Chamber Storage + Stone Storage = 126.5 cf = 0.003 af

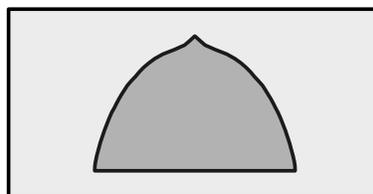
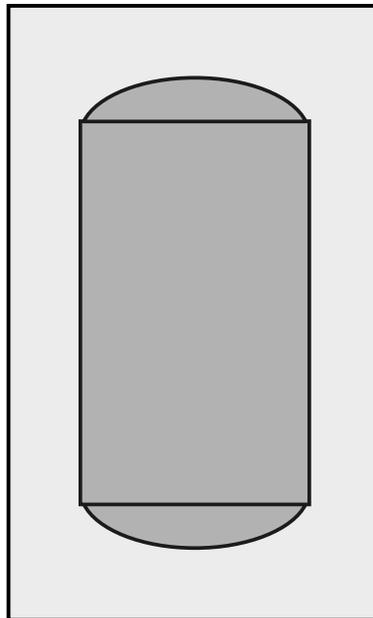
Overall Storage Efficiency = 45.8%

Overall System Size = 11.40' x 6.92' x 3.50'

1 Chambers

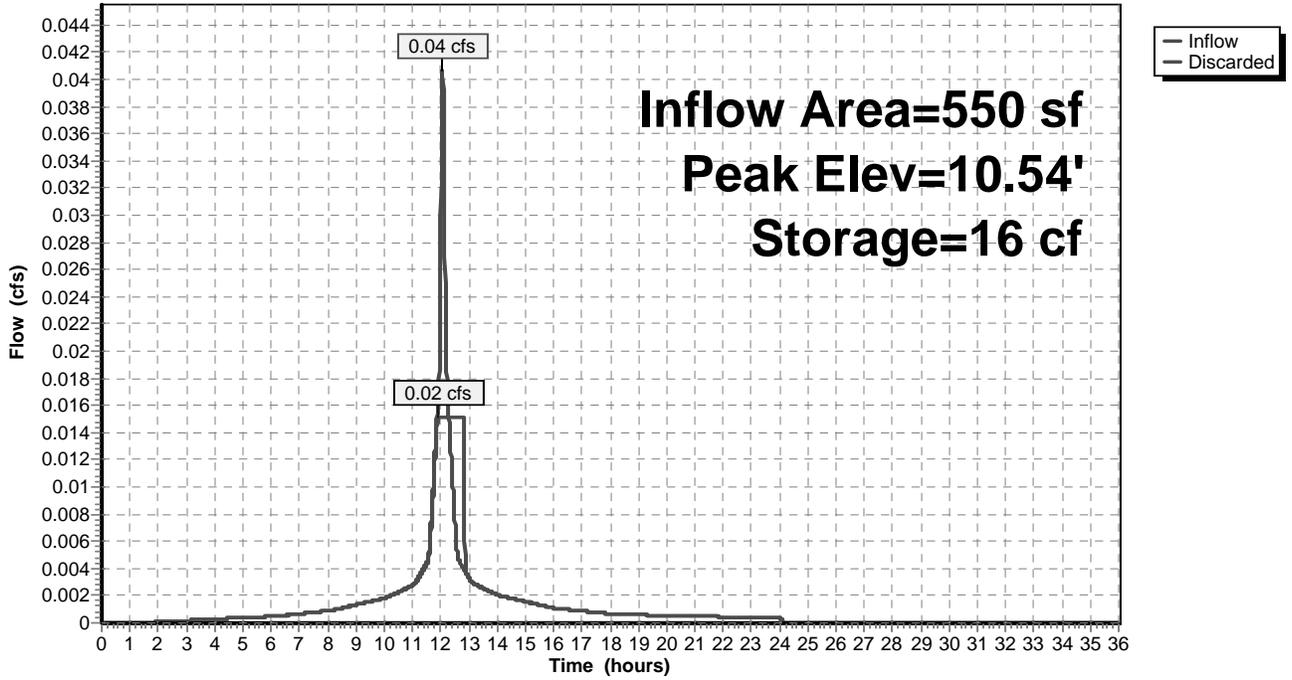
10.2 cy Field

8.5 cy Stone



Pond INF:

Hydrograph



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Type III 24-hr 2 year storm Rainfall=3.20"

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Summary for Subcatchment PROP:

Runoff = 0.02 cfs @ 12.54 hrs, Volume= 435 cf, Depth= 0.13"

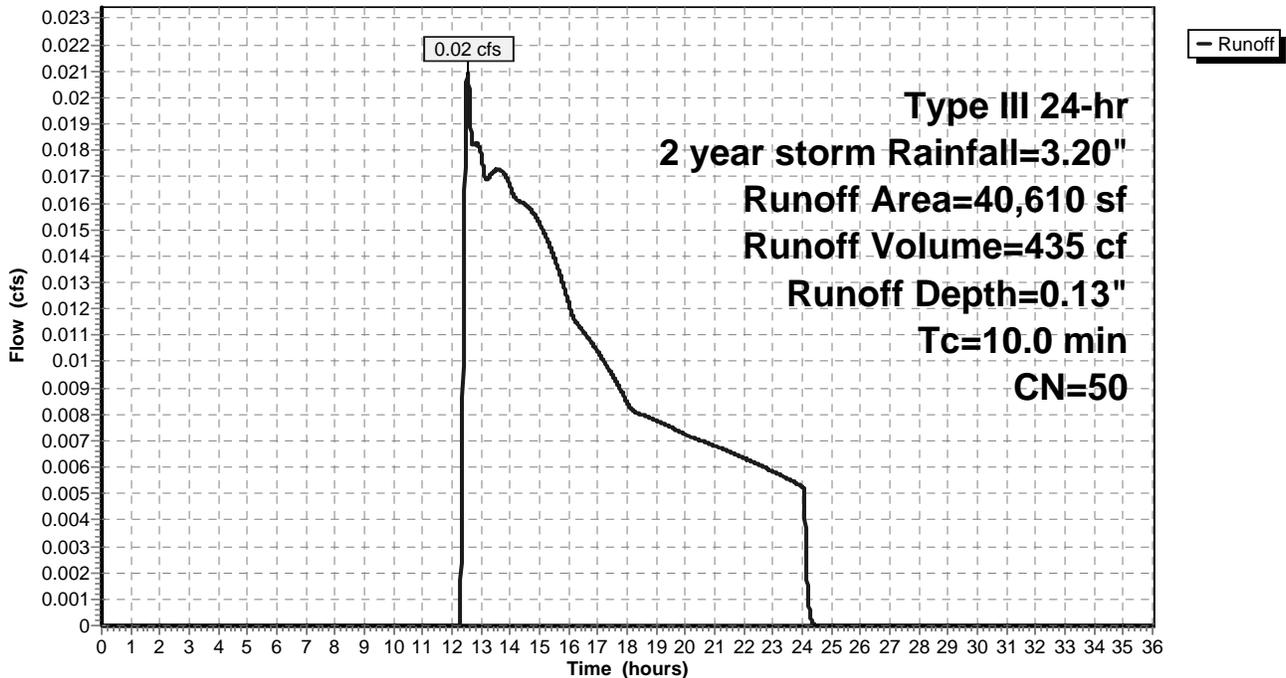
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
3,395	98	Roofs, HSG A
3,050	98	Paved parking, HSG A
* 2,545	98	Patio/walks/steps, HSG A
11,370	30	Woods, Good, HSG A
20,250	39	>75% Grass cover, Good, HSG A
40,610	50	Weighted Average
31,620		77.86% Pervious Area
8,990		22.14% Impervious Area

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

Subcatchment PROP:

Hydrograph



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Type III 24-hr 2 year storm Rainfall=3.20"

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Summary for Subcatchment REAR GARAGE:

Runoff = 0.04 cfs @ 12.07 hrs, Volume= 136 cf, Depth= 2.97"

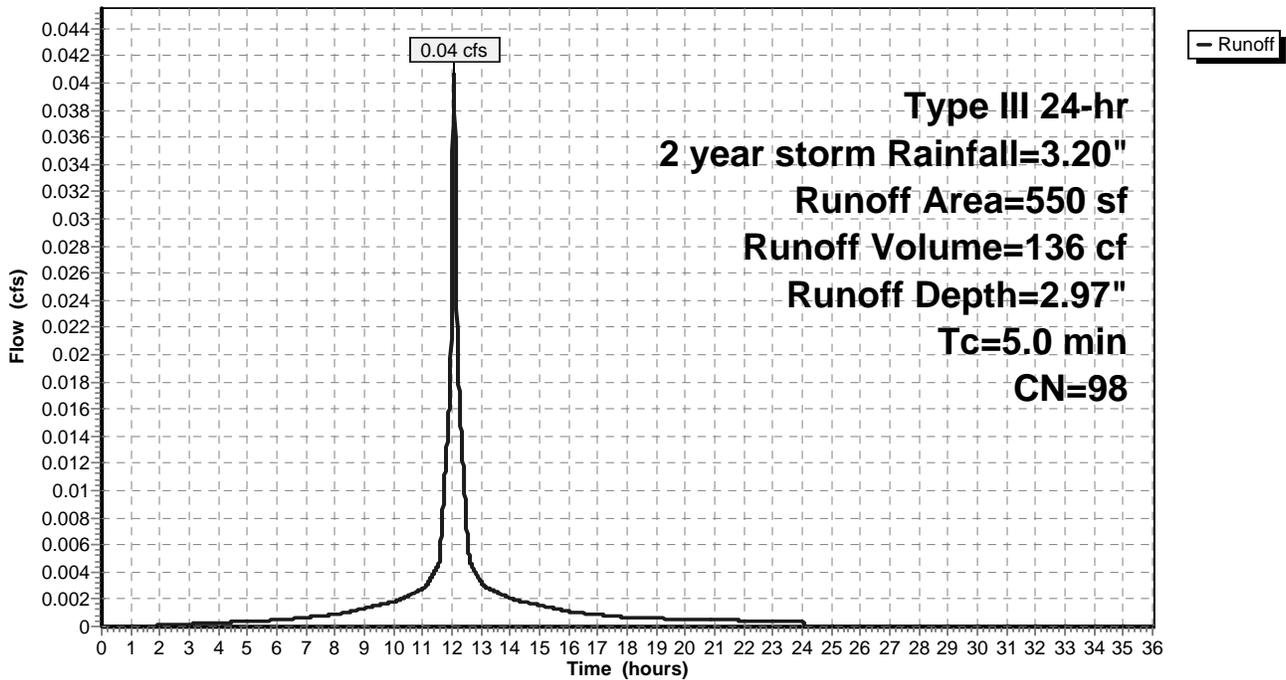
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 year storm Rainfall=3.20"

Area (sf)	CN	Description
550	98	Roofs, HSG C
550		100.00% Impervious Area

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

Subcatchment REAR GARAGE:

Hydrograph



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Type III 24-hr 10 year storm Rainfall=4.90"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 EXIST: Runoff Area=41,160 sf 22.49% Impervious Runoff Depth=0.65"
Tc=10.0 min CN=50 Runoff=0.37 cfs 2,236 cf

Pond INF: Peak Elev=11.10' Storage=40 cf Inflow=0.06 cfs 214 cf
Outflow=0.02 cfs 214 cf

Subcatchment PROP: Runoff Area=40,610 sf 22.14% Impervious Runoff Depth=0.65"
Tc=10.0 min CN=50 Runoff=0.37 cfs 2,206 cf

Subcatchment REAR GARAGE: Runoff Area=550 sf 100.00% Impervious Runoff Depth=4.66"
Tc=5.0 min CN=98 Runoff=0.06 cfs 214 cf

Total Runoff Area = 82,320 sf Runoff Volume = 4,656 cf Average Runoff Depth = 0.68"
77.17% Pervious = 63,525 sf 22.83% Impervious = 18,795 sf

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Type III 24-hr 10 year storm Rainfall=4.90"

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Summary for Subcatchment EXIST:

Runoff = 0.37 cfs @ 12.19 hrs, Volume= 2,236 cf, Depth= 0.65"

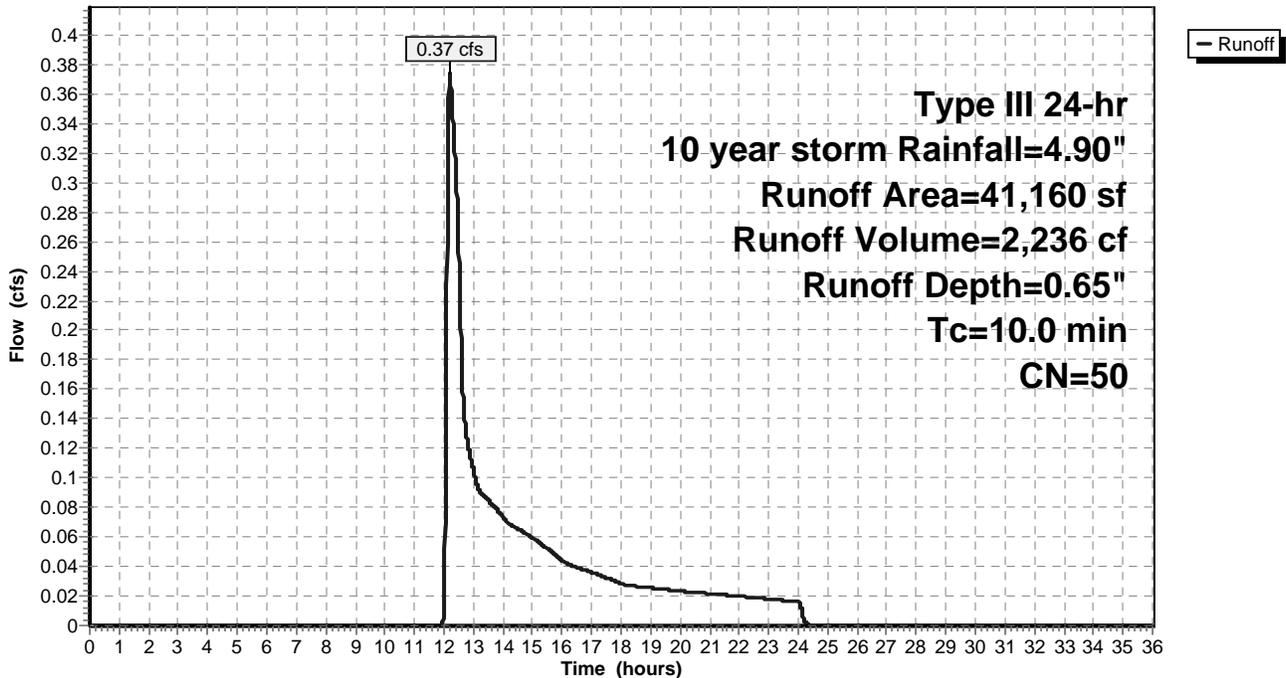
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
4,110	98	Roofs, HSG A
3,495	98	Paved parking, HSG A
* 1,650	98	Patio/walks/steps, HSG A
11,370	30	Woods, Good, HSG A
20,535	39	>75% Grass cover, Good, HSG A
41,160	50	Weighted Average
31,905		77.51% Pervious Area
9,255		22.49% Impervious Area

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

Subcatchment EXIST:

Hydrograph



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Type III 24-hr 10 year storm Rainfall=4.90"

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Summary for Pond INF:

Inflow Area = 550 sf, 100.00% Impervious, Inflow Depth = 4.66" for 10 year storm event
Inflow = 0.06 cfs @ 12.07 hrs, Volume= 214 cf
Outflow = 0.02 cfs @ 11.74 hrs, Volume= 214 cf, Atten= 76%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.74 hrs, Volume= 214 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 11.10' @ 12.44 hrs Surf.Area= 79 sf Storage= 40 cf

Plug-Flow detention time= 12.4 min calculated for 214 cf (100% of inflow)
Center-of-Mass det. time= 12.3 min (759.8 - 747.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	10.00'	81 cf	6.92'W x 11.40'L x 3.50'H Field A 276 cf Overall - 46 cf Embedded = 230 cf x 35.0% Voids
#2A	10.50'	46 cf	ADS_StormTech SC-740 +Cap Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		126 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.02 cfs @ 11.74 hrs HW=10.04' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Pond INF: - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +16.0" End Stone x 2 = 11.40' Base Length

1 Rows x 51.0" Wide + 16.0" Side Stone x 2 = 6.92' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

1 Chambers x 45.9 cf = 45.9 cf Chamber Storage

276.1 cf Field - 45.9 cf Chambers = 230.1 cf Stone x 35.0% Voids = 80.5 cf Stone Storage

Chamber Storage + Stone Storage = 126.5 cf = 0.003 af

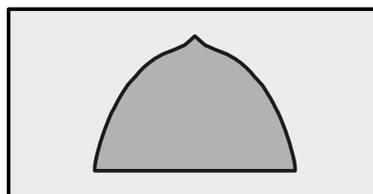
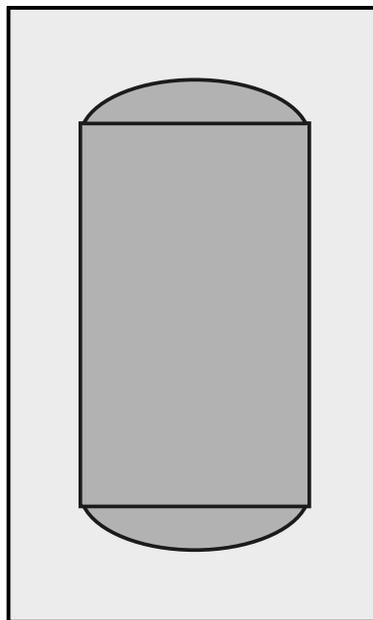
Overall Storage Efficiency = 45.8%

Overall System Size = 11.40' x 6.92' x 3.50'

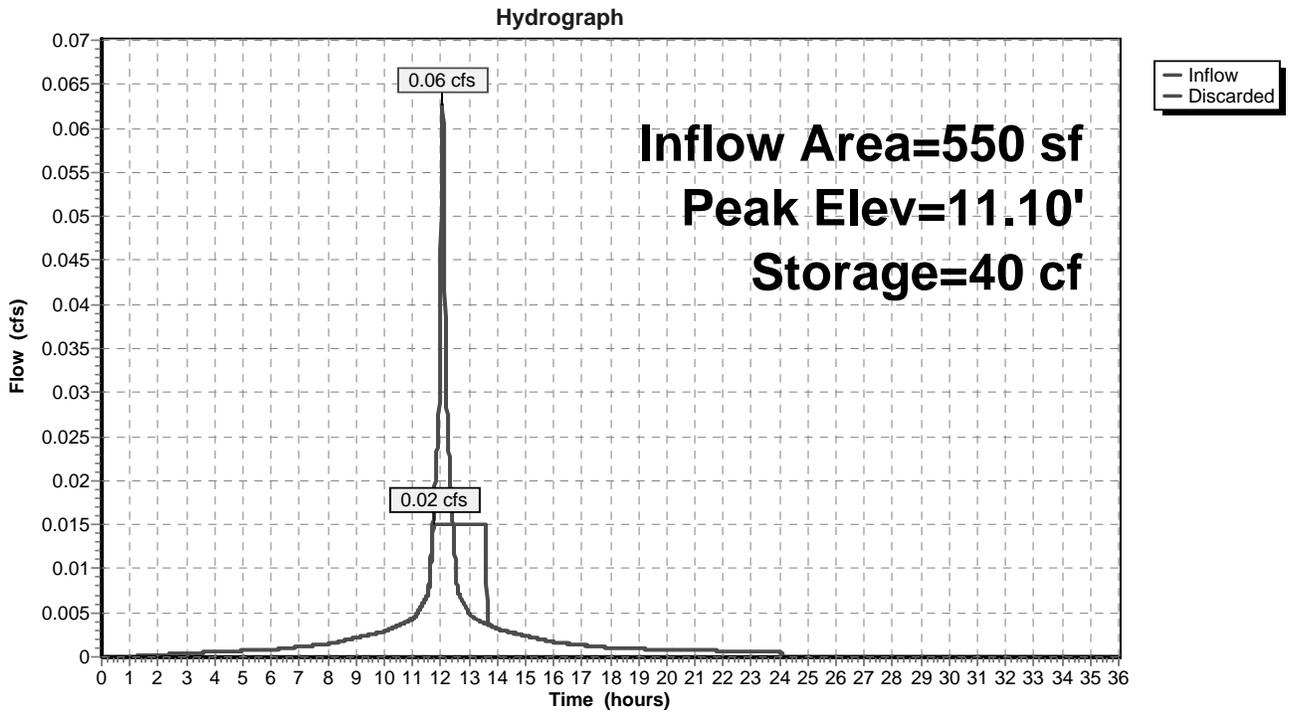
1 Chambers

10.2 cy Field

8.5 cy Stone



Pond INF:



3 Edgewater Place 07-30-20

Type III 24-hr 10 year storm Rainfall=4.90"

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Summary for Subcatchment PROP:

Runoff = 0.37 cfs @ 12.19 hrs, Volume= 2,206 cf, Depth= 0.65"

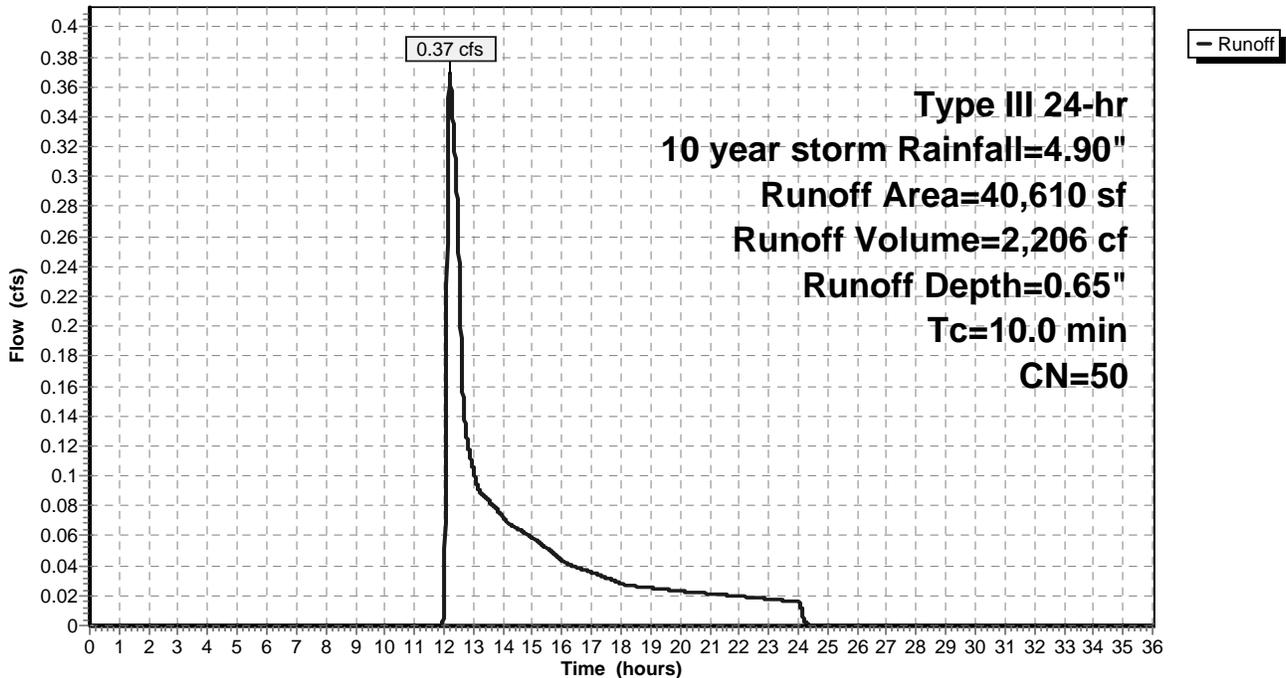
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
3,395	98	Roofs, HSG A
3,050	98	Paved parking, HSG A
* 2,545	98	Patio/walks/steps, HSG A
11,370	30	Woods, Good, HSG A
20,250	39	>75% Grass cover, Good, HSG A
40,610	50	Weighted Average
31,620		77.86% Pervious Area
8,990		22.14% Impervious Area

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

Subcatchment PROP:

Hydrograph



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Type III 24-hr 10 year storm Rainfall=4.90"

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Summary for Subcatchment REAR GARAGE:

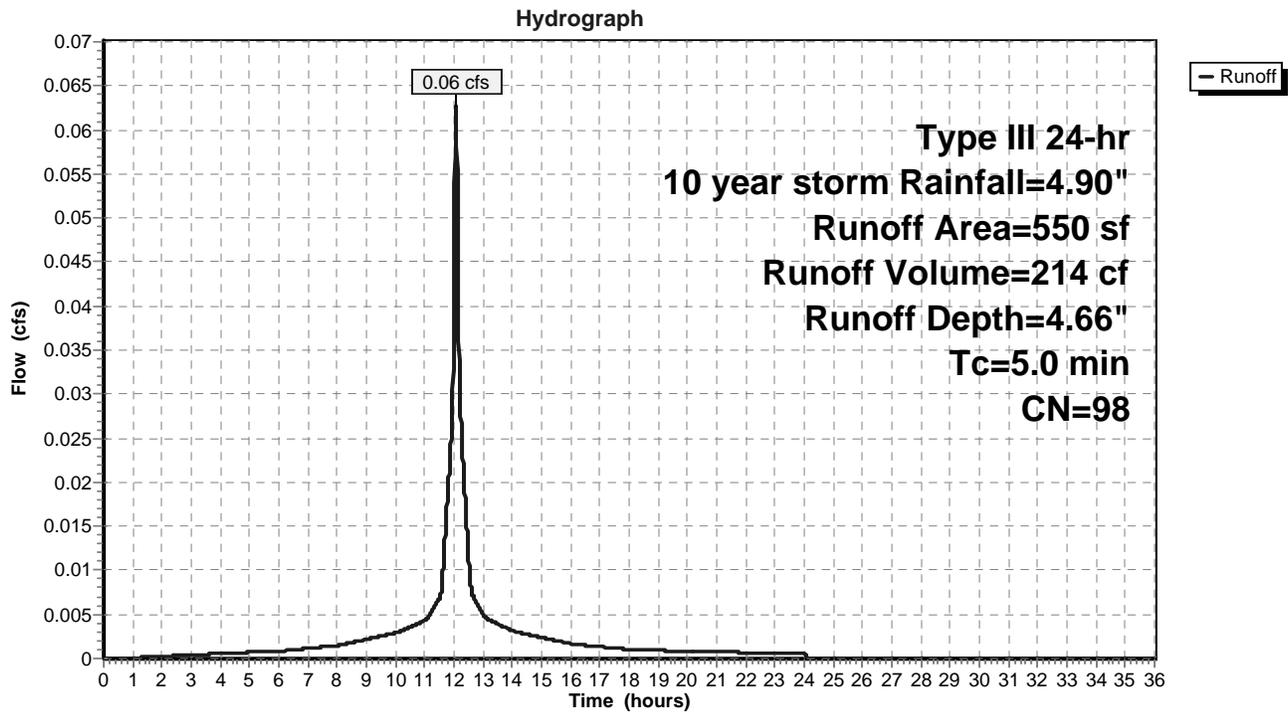
Runoff = 0.06 cfs @ 12.07 hrs, Volume= 214 cf, Depth= 4.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 year storm Rainfall=4.90"

Area (sf)	CN	Description
550	98	Roofs, HSG C
550		100.00% Impervious Area

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

Subcatchment REAR GARAGE:



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Type III 24-hr 25 year storm Rainfall=6.20"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 EXIST: Runoff Area=41,160 sf 22.49% Impervious Runoff Depth=1.24"
Tc=10.0 min CN=50 Runoff=0.96 cfs 4,261 cf

Pond INF: Peak Elev=11.61' Storage=62 cf Inflow=0.08 cfs 273 cf
Outflow=0.02 cfs 273 cf

Subcatchment PROP: Runoff Area=40,610 sf 22.14% Impervious Runoff Depth=1.24"
Tc=10.0 min CN=50 Runoff=0.95 cfs 4,204 cf

Subcatchment REAR GARAGE: Runoff Area=550 sf 100.00% Impervious Runoff Depth=5.96"
Tc=5.0 min CN=98 Runoff=0.08 cfs 273 cf

Total Runoff Area = 82,320 sf Runoff Volume = 8,738 cf Average Runoff Depth = 1.27"
77.17% Pervious = 63,525 sf 22.83% Impervious = 18,795 sf

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Type III 24-hr 25 year storm Rainfall=6.20"

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Summary for Subcatchment EXIST:

Runoff = 0.96 cfs @ 12.16 hrs, Volume= 4,261 cf, Depth= 1.24"

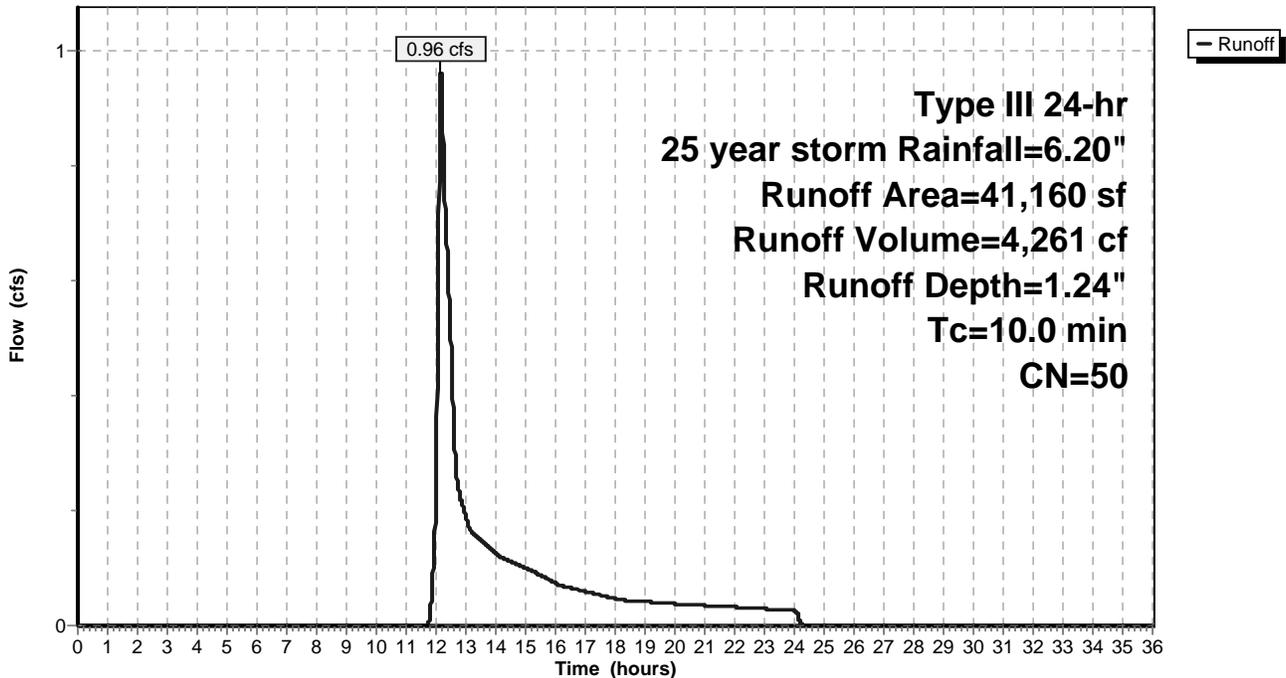
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
4,110	98	Roofs, HSG A
3,495	98	Paved parking, HSG A
* 1,650	98	Patio/walks/steps, HSG A
11,370	30	Woods, Good, HSG A
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry,

Subcatchment EXIST:

Hydrograph



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Type III 24-hr 25 year storm Rainfall=6.20"

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Summary for Pond INF:

Inflow Area = 550 sf, 100.00% Impervious, Inflow Depth = 5.96" for 25 year storm event
Inflow = 0.08 cfs @ 12.07 hrs, Volume= 273 cf
Outflow = 0.02 cfs @ 11.68 hrs, Volume= 273 cf, Atten= 81%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.68 hrs, Volume= 273 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 11.61' @ 12.49 hrs Surf.Area= 79 sf Storage= 62 cf

Plug-Flow detention time= 20.4 min calculated for 273 cf (100% of inflow)
Center-of-Mass det. time= 20.4 min (764.1 - 743.7)

Volume	Invert	Avail.Storage	Storage Description
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↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

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Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +16.0" End Stone x 2 = 11.40' Base Length

1 Rows x 51.0" Wide + 16.0" Side Stone x 2 = 6.92' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

1 Chambers x 45.9 cf = 45.9 cf Chamber Storage

276.1 cf Field - 45.9 cf Chambers = 230.1 cf Stone x 35.0% Voids = 80.5 cf Stone Storage

Chamber Storage + Stone Storage = 126.5 cf = 0.003 af

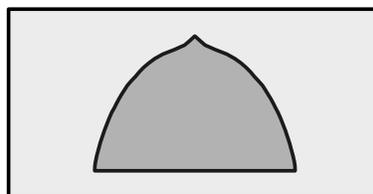
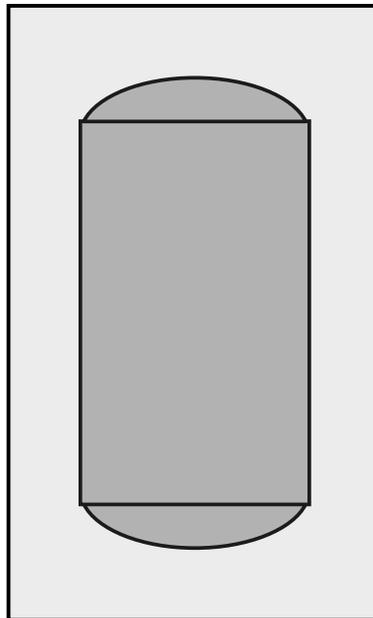
Overall Storage Efficiency = 45.8%

Overall System Size = 11.40' x 6.92' x 3.50'

1 Chambers

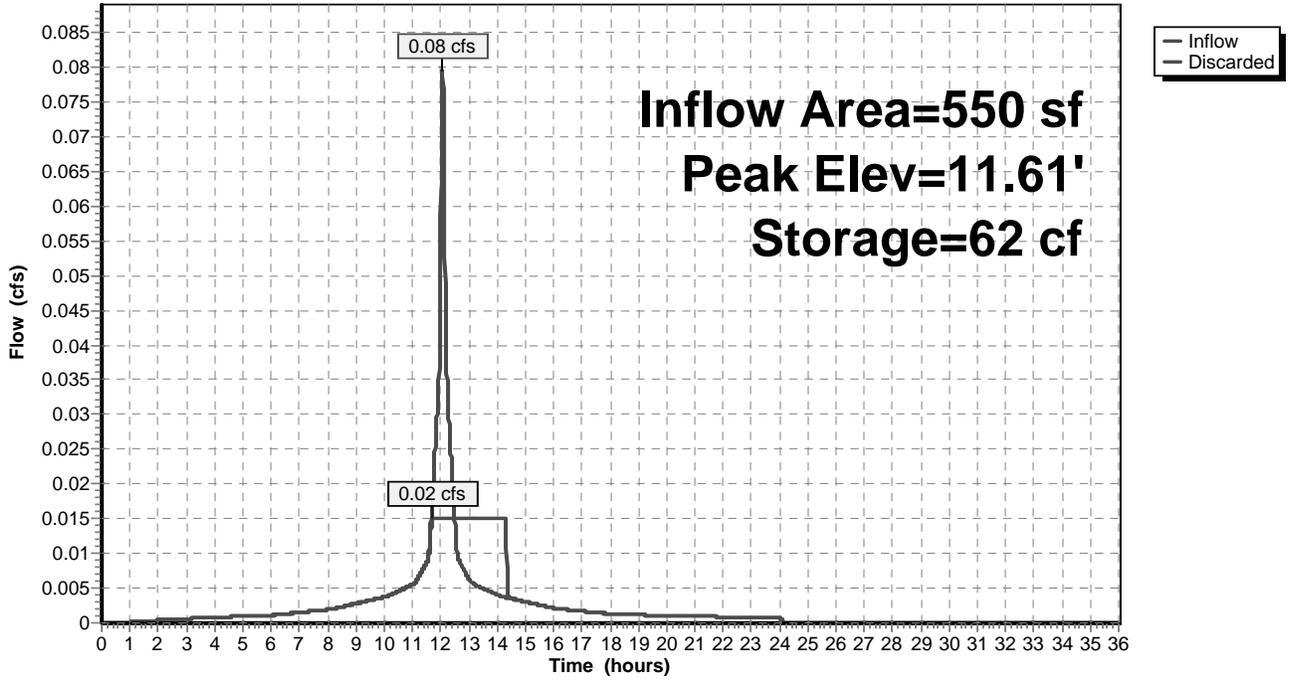
10.2 cy Field

8.5 cy Stone



Pond INF:

Hydrograph



3 Edgewater Place 07-30-20

Type III 24-hr 25 year storm Rainfall=6.20"

Prepared by Frederick W. Russell, PE

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Summary for Subcatchment PROP:

Runoff = 0.95 cfs @ 12.16 hrs, Volume= 4,204 cf, Depth= 1.24"

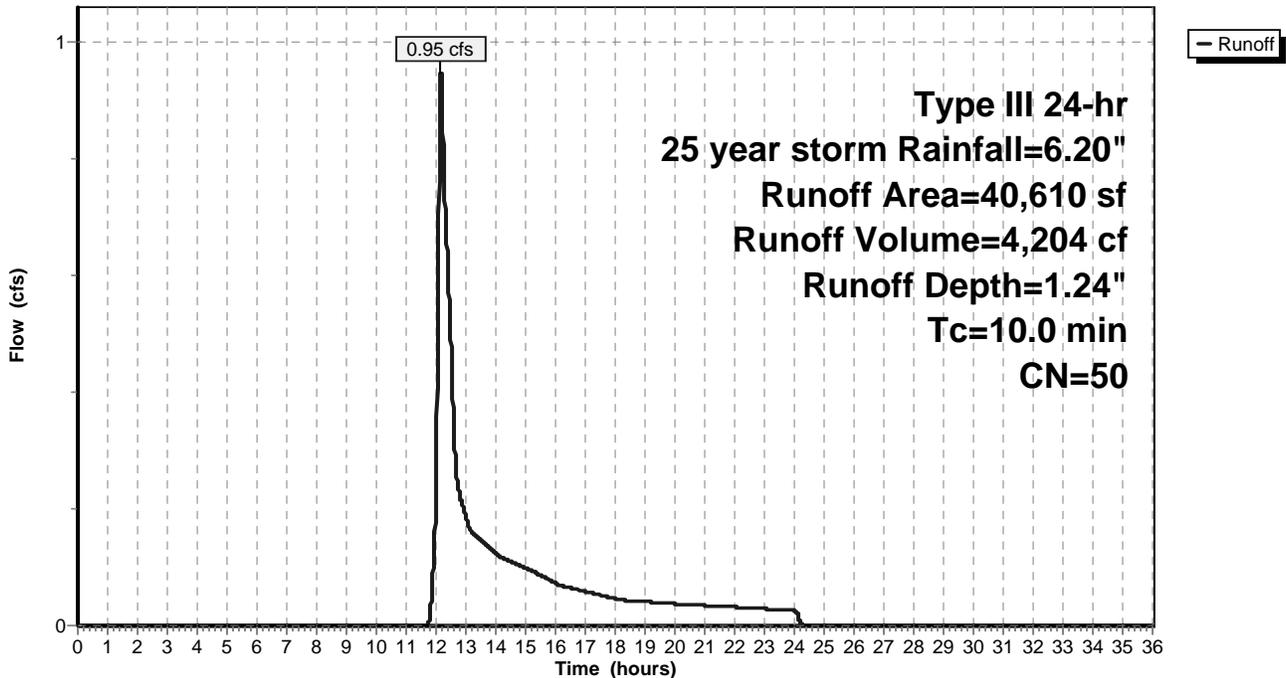
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
3,395	98	Roofs, HSG A
3,050	98	Paved parking, HSG A
* 2,545	98	Patio/walks/steps, HSG A
11,370	30	Woods, Good, HSG A
20,250	39	>75% Grass cover, Good, HSG A
40,610	50	Weighted Average
31,620		77.86% Pervious Area
8,990		22.14% Impervious Area

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

Subcatchment PROP:

Hydrograph



3 Edgewater Place 07-30-20

Type III 24-hr 25 year storm Rainfall=6.20"

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Summary for Subcatchment REAR GARAGE:

Runoff = 0.08 cfs @ 12.07 hrs, Volume= 273 cf, Depth= 5.96"

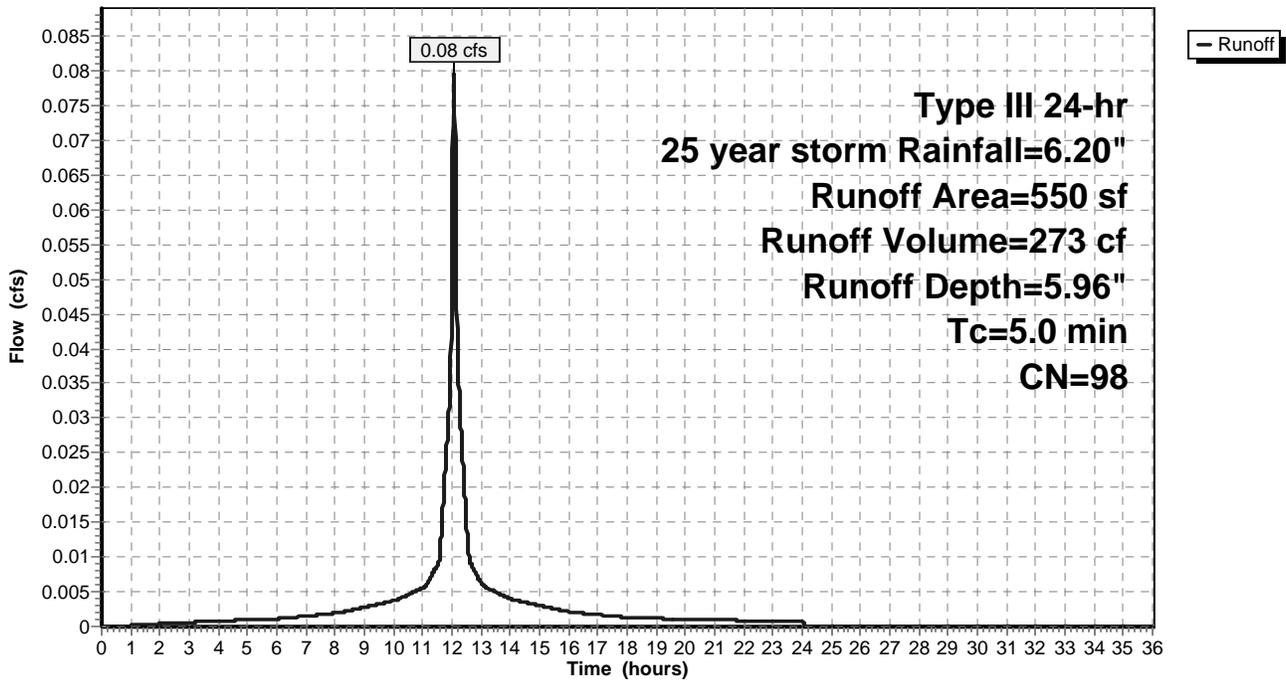
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 year storm Rainfall=6.20"

Area (sf)	CN	Description
550	98	Roofs, HSG C
550		100.00% Impervious Area

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

Subcatchment REAR GARAGE:

Hydrograph



3 Edgewater Place 07-30-20

Type III 24-hr 100 year storm Rainfall=8.90"

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Time span=0.00-36.00 hrs, dt=0.01 hrs, 3601 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 EXIST: Runoff Area=41,160 sf 22.49% Impervious Runoff Depth=2.82"
Tc=10.0 min CN=50 Runoff=2.56 cfs 9,663 cf

Pond INF: Peak Elev=12.93' Storage=111 cf Inflow=0.11 cfs 397 cf
Outflow=0.02 cfs 397 cf

Subcatchment PROP: Runoff Area=40,610 sf 22.14% Impervious Runoff Depth=2.82"
Tc=10.0 min CN=50 Runoff=2.52 cfs 9,534 cf

Subcatchment REAR GARAGE: Runoff Area=550 sf 100.00% Impervious Runoff Depth=8.66"
Tc=5.0 min CN=98 Runoff=0.11 cfs 397 cf

Total Runoff Area = 82,320 sf Runoff Volume = 19,593 cf Average Runoff Depth = 2.86"
77.17% Pervious = 63,525 sf 22.83% Impervious = 18,795 sf

3 Edgewater Place 07-30-20

Type III 24-hr 100 year storm Rainfall=8.90"

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Summary for Subcatchment EXIST:

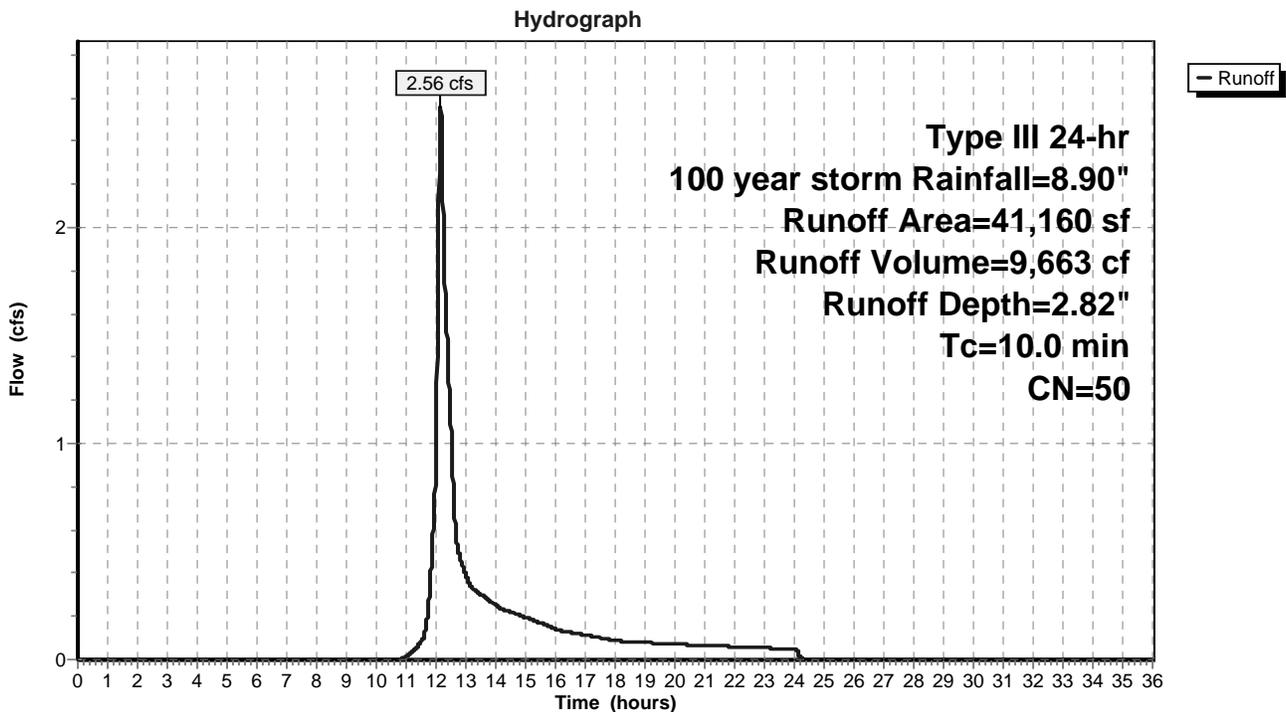
Runoff = 2.56 cfs @ 12.15 hrs, Volume= 9,663 cf, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
4,110	98	Roofs, HSG A
3,495	98	Paved parking, HSG A
* 1,650	98	Patio/walks/steps, HSG A
11,370	30	Woods, Good, HSG A
20,535	39	>75% Grass cover, Good, HSG A
41,160	50	Weighted Average
31,905		77.51% Pervious Area
9,255		22.49% Impervious Area

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

Subcatchment EXIST:



3 Edgewater Place 07-30-20

Type III 24-hr 100 year storm Rainfall=8.90"

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Summary for Pond INF:

Inflow Area = 550 sf, 100.00% Impervious, Inflow Depth = 8.66" for 100 year storm event
Inflow = 0.11 cfs @ 12.07 hrs, Volume= 397 cf
Outflow = 0.02 cfs @ 11.60 hrs, Volume= 397 cf, Atten= 87%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.60 hrs, Volume= 397 cf

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Peak Elev= 12.93' @ 12.57 hrs Surf.Area= 79 sf Storage= 111 cf

Plug-Flow detention time= 41.5 min calculated for 397 cf (100% of inflow)
Center-of-Mass det. time= 41.5 min (780.5 - 739.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	10.00'	81 cf	6.92'W x 11.40'L x 3.50'H Field A 276 cf Overall - 46 cf Embedded = 230 cf x 35.0% Voids
#2A	10.50'	46 cf	ADS_StormTech SC-740 +Cap Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap
		126 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.00'	8.270 in/hr Exfiltration over Horizontal area

Discarded OutFlow Max=0.02 cfs @ 11.60 hrs HW=10.04' (Free Discharge)
↑1=Exfiltration (Exfiltration Controls 0.02 cfs)

Pond INF: - Chamber Wizard Field A

Chamber Model = ADS_StormTech SC-740 +Cap (ADS StormTech® SC-740 with cap length)

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

1 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 8.74' Row Length +16.0" End Stone x 2 = 11.40' Base Length

1 Rows x 51.0" Wide + 16.0" Side Stone x 2 = 6.92' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

1 Chambers x 45.9 cf = 45.9 cf Chamber Storage

276.1 cf Field - 45.9 cf Chambers = 230.1 cf Stone x 35.0% Voids = 80.5 cf Stone Storage

Chamber Storage + Stone Storage = 126.5 cf = 0.003 af

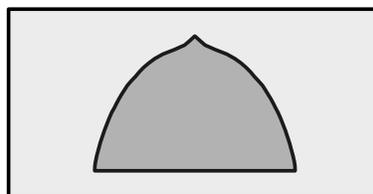
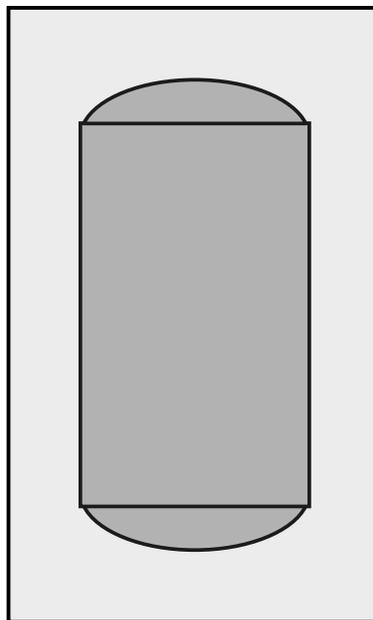
Overall Storage Efficiency = 45.8%

Overall System Size = 11.40' x 6.92' x 3.50'

1 Chambers

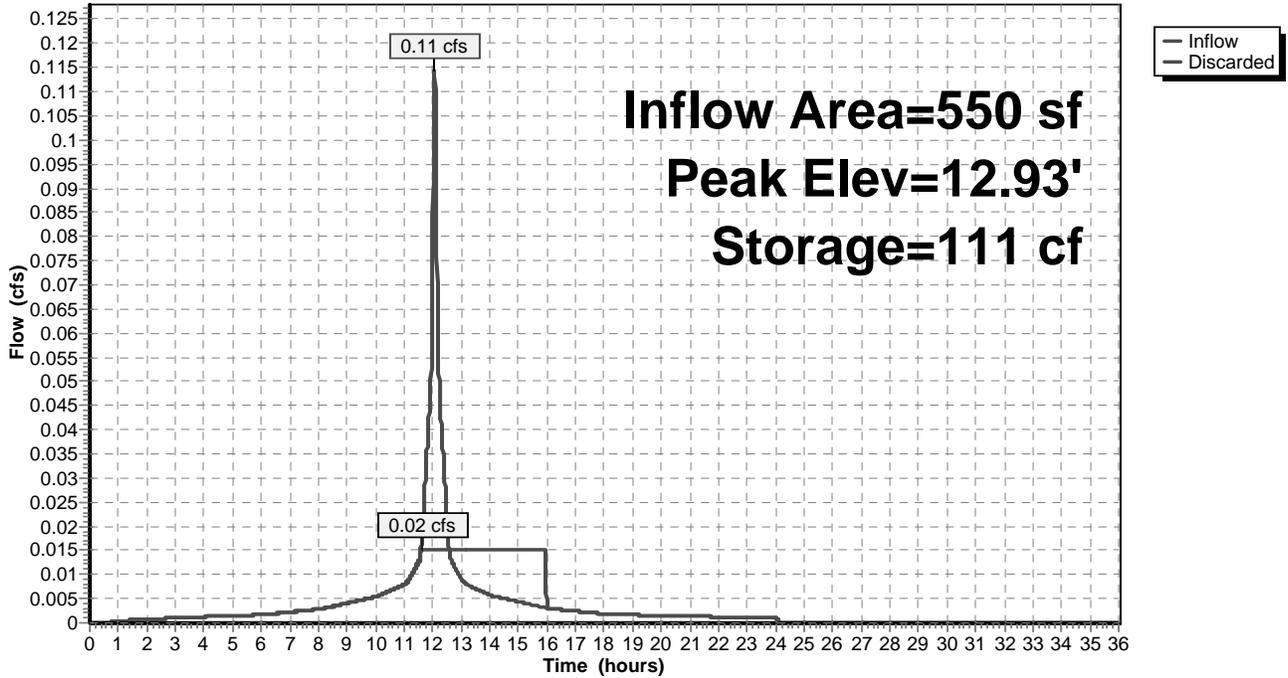
10.2 cy Field

8.5 cy Stone



Pond INF:

Hydrograph



3 Edgewater Place 07-30-20

Type III 24-hr 100 year storm Rainfall=8.90"

Prepared by Frederick W. Russell, PE

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Summary for Subcatchment PROP:

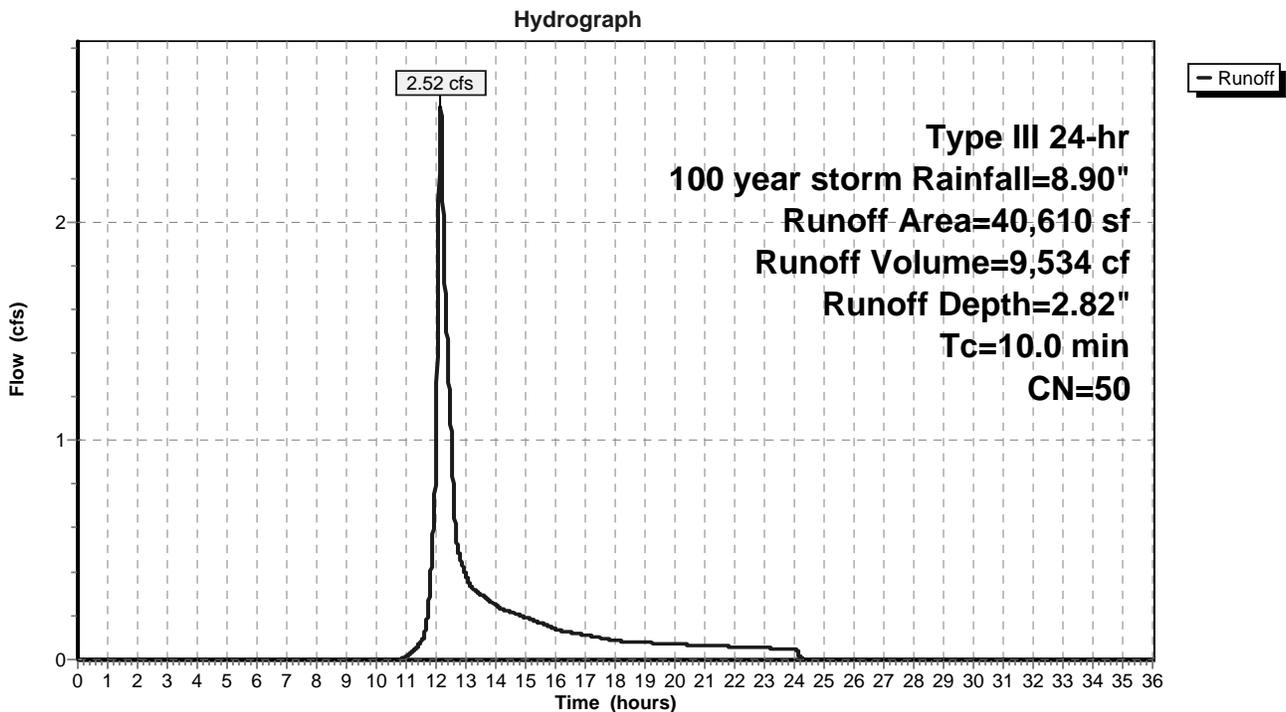
Runoff = 2.52 cfs @ 12.15 hrs, Volume= 9,534 cf, Depth= 2.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
3,395	98	Roofs, HSG A
3,050	98	Paved parking, HSG A
* 2,545	98	Patio/walks/steps, HSG A
11,370	30	Woods, Good, HSG A
20,250	39	>75% Grass cover, Good, HSG A
40,610	50	Weighted Average
31,620		77.86% Pervious Area
8,990		22.14% Impervious Area

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

Subcatchment PROP:



3 Edgewater Place 07-30-20

Type III 24-hr 100 year storm Rainfall=8.90"

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Summary for Subcatchment REAR GARAGE:

Runoff = 0.11 cfs @ 12.07 hrs, Volume= 397 cf, Depth= 8.66"

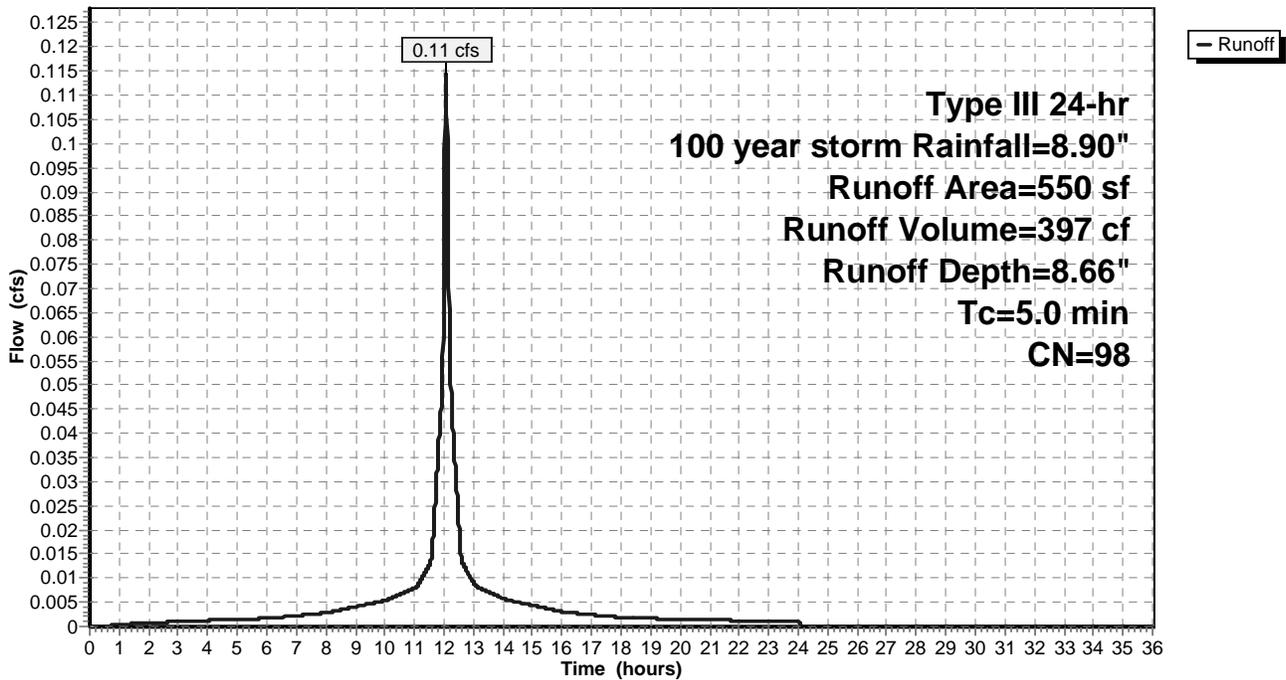
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 year storm Rainfall=8.90"

Area (sf)	CN	Description
550	98	Roofs, HSG C
550		100.00% Impervious Area

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

Subcatchment REAR GARAGE:

Hydrograph



3 EDGEWATER PLACE
STORMWATER OPERATION &
MAINTENANCE PLAN

Owner's & Applicant's Name(s) & Responsible for Maintenance:

Applicant/Owner:

Matthew & Jennifer Croatti
3 Edgewater Place
Winchester, MA 01890

Stormwater System Description:

The proposed drainage system consists of one subsurface infiltration system containing one (1) Stormtech SC-740© chamber. The proposed Infiltration System will recharge runoff generated by the rear portion of the proposed garage.

Planned Erosion and Sedimentation Control Measures During construction Activities

Erosion Control

Tubular sediment control shall consist of a 12-inch minimum diameter, 100% organic hessian fabric (burlap), filled with compost. Sediment control shall be placed along the limit of work as indicated on the plan. 1-in by 1-in by 3-ft oak stakes shall be installed at 8-ft maximum intervals. Ends of sediment control should overlap a minimum of six inches as per detail.

Drain Inlet Protection

Temporary storm inlet protection, filter fabric or silt sack, shall be placed in the existing catch basin located in the cul-de-sac of 3 Edgewater Place during construction. The purpose of the filter fabric and silt sack is to prevent the inflow of sediments into the closed drainage system. The filter fabric and silt sack shall remain in place until the proposed driveway is paved and a permanent vegetative cover is established, so that the transport of sediment is no longer visibly apparent. The filter fabric and silt sacks shall be inspected and maintained on a weekly basis, while in place.

Surface Stabilization

The surface of all disturbed areas shall be stabilized during and after construction. Temporary measures shall be taken during construction to prevent erosion and siltation. No construction sediment shall be allowed to enter the infiltration system. All disturbed slopes will be stabilized with a permanent vegetative cover. Some or all of the following measures will be utilized on this project as conditions may warrant.

- a. Temporary Seeding
- b. Temporary Mulching
- c. Permanent Seeding
- d. Placement of Sod
- e. Hydroseeding
- f. Placement of Hay
- g. Placement of Jute Netting

Subsurface Infiltration System:

Erosion controls (such as haybales or silt fencing) and temporary swales should be installed around the perimeter of the excavation to collect and/or divert runoff containing fines and sediments from entering the infiltration system during construction. The existing subgrade under the system bed area shall not be compacted or subject to excessive construction equipment traffic. Once the site is stabilized and final grade over the system is established, ensure that proper signs and/or barricades around the system are installed to avoid compaction or vehicular traffic over the system. During construction, the Infiltration System should be inspected weekly and after every major storm event. Ponded water inside the system (as visible from the observation wells) after several days often indicates that the bottom of the system is clogged. If the system is found to be clogged, flushing and vacuuming of the system using a sewer vacuum truck will be required (search “sewer vacuum truck services”).

Long-Term Inspection and Maintenance Measures After Construction

Erosion Control

Eroded sediments can adversely affect the performance of the stormwater management system. Eroding or barren areas should be immediately re-vegetated.

Subsurface Infiltration System:

The subsurface infiltration system should be inspected after the first several rainfall events or a few months after construction, after all major storms (>3.1 inches), and on regular bi-annual (April and October) scheduled dates. Ponded water inside the system (as visible from the observation wells) after several days often indicates that the bottom of the system is clogged. If the system is found to be clogged, flushing and vacuuming of the system using a sewer vacuum truck will be required (search “sewer vacuum truck services”).

Debris and Leaf Removal:

Roof gutters should be inspected every April and October and cleaned of any debris and leaves. Installation of “gutter guards” or similar material is recommended.

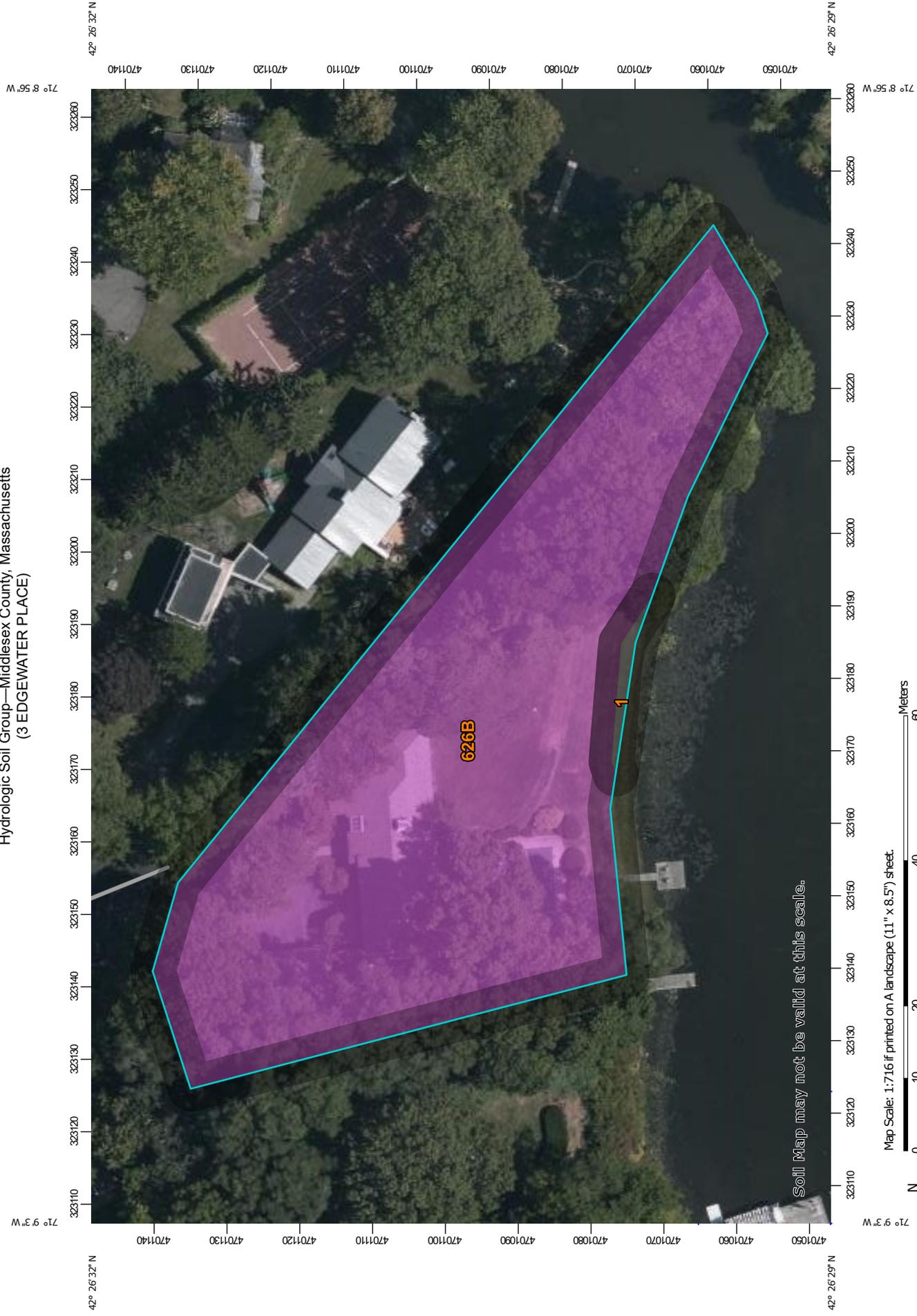
Erosion Control

Once all areas are stabilized, tubular sediment erosion control shall be cut and compost spread evenly. Burlap sock shall be removed and disposed of accordingly.

Other:

Additional maintenance specifications may also be referenced in the Order of Conditions issued by the Winchester Conservation Commission.

Hydrologic Soil Group—Middlesex County, Massachusetts
(3 EDGEWATER PLACE)

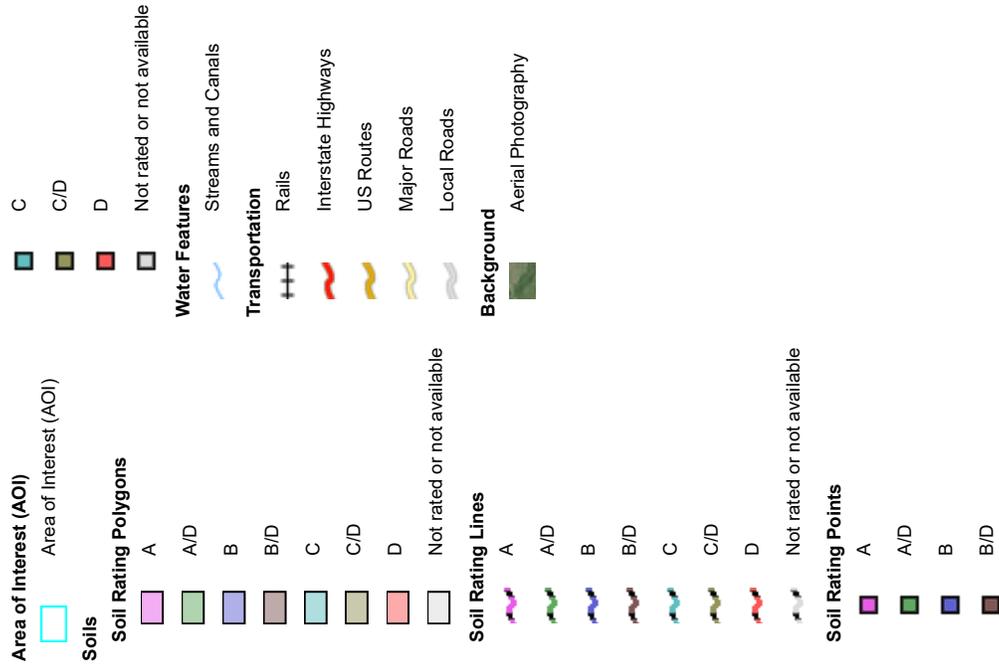


Soil Map may not be valid at this scale.

Map Scale: 1:7.16 if printed on A landscape (11" x 8.5") sheet.

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

MAP LEGEND



MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Middlesex County, Massachusetts
 Survey Area Data: Version 20, Jun 9, 2020

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

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

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Water		0.0	0.7%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	1.0	99.3%
Totals for Area of Interest			1.0	100.0%

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher