



DRAINAGE NARRATIVE
#142 STEEP HILL ROAD
WESTON, CONNECTICUT
(August 4, 2020, 2020)
Revised 09/14/20

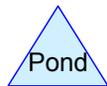
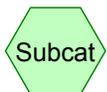
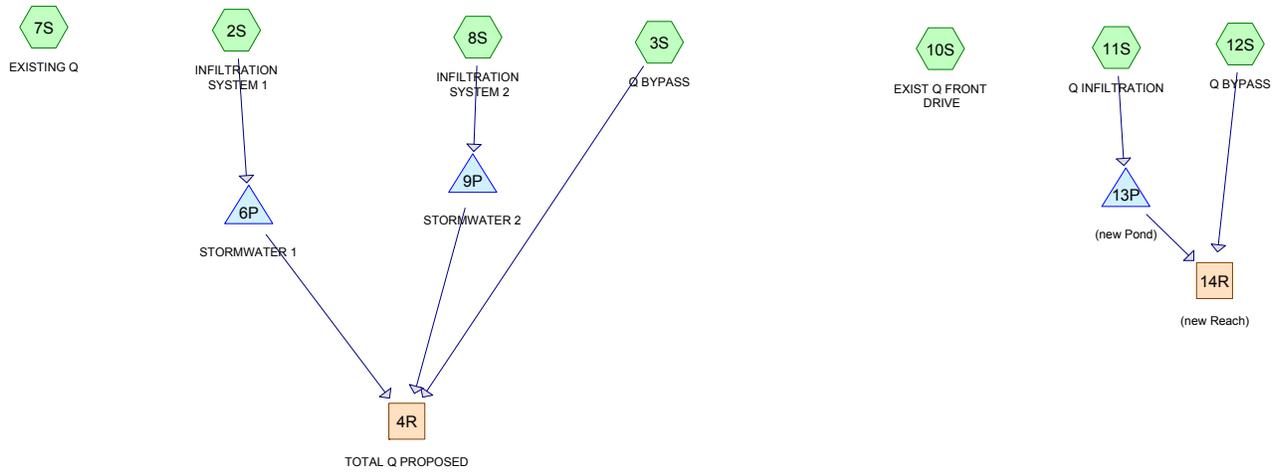
The property consists of 2.14 acres and is proposed for the construction of a new single family home. Based on the NRCS web soil survey the upland soils are classified in the B soil group. The site is a mix of woods and grass.

The site was evaluated using SCS TR20 methodology for a 50 year 24 hour rainfall amount of 6.4 inches. Runoff from an additional 0.73 acres of offsite area flows through the site and has been added to the study area. The project will include the construction of a house and driveway creating a total of 11,662sf of new impervious area. The runoff from the roof, pool and driveway will be directed to one of 2 infiltration systems

The system will provide adequate storage to handle the 50-year storm event. The pre-development Q for the site is computed to be 6.53 cfs. The total post development Q is computed to be 6.18 cfs.

The development of the lot will also include the widening of a portion of the common access driveway. This will create an additional 1750sf of impervious area. A third infiltration system will handle the runoff from this area. This system has been designed as a rain garden and will reduce the existing Q of 0.46cfs to a proposed Q of 0.39cfs

LARRY EDWARDS, P.E. #10937



Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
5.494	65	Woods/grass comb., Fair, HSG B (2S, 3S, 7S, 8S)
0.040	73	Woods/grass comb., Poor, HSG B (10S)
0.178	98	Paved parking, HSG B (10S, 11S, 12S)
0.268	98	Unconnected pavement, HSG B (2S, 8S)
5.980	68	TOTAL AREA

Time span=0.00-20.00 hrs, dt=0.05 hrs, 401 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 2S: INFILTRATION SYSTEM 1 Runoff Area=51,878 sf 9.13% Impervious Runoff Depth>2.61"
Flow Length=350' Tc=18.2 min UI Adjusted CN=67 Runoff=2.73 cfs 0.259 af

Subcatchment 3S: Q BYPASS Runoff Area=52,630 sf 0.00% Impervious Runoff Depth>2.43"
Tc=15.4 min CN=65 Runoff=2.74 cfs 0.245 af

Subcatchment 7S: EXISTING Q Runoff Area=125,500 sf 0.00% Impervious Runoff Depth>2.43"
Flow Length=500' Tc=15.4 min CN=65 Runoff=6.53 cfs 0.583 af

Subcatchment 8S: INFILTRATION SYSTEM Runoff Area=20,992 sf 32.99% Impervious Runoff Depth>3.48"
Flow Length=135' Slope=0.0700 '/' Tc=10.8 min CN=76 Runoff=1.78 cfs 0.140 af

Subcatchment 10S: EXIST Q FRONT DRIVE Runoff Area=4,752 sf 63.17% Impervious Runoff Depth>4.84"
Flow Length=225' Tc=16.1 min CN=89 Runoff=0.46 cfs 0.044 af

Subcatchment 11S: Q INFILTRATION Runoff Area=2,065 sf 100.00% Impervious Runoff Depth>5.88"
Tc=5.0 min CN=98 Runoff=0.30 cfs 0.023 af

Subcatchment 12S: Q BYPASS Runoff Area=2,687 sf 100.00% Impervious Runoff Depth>5.88"
Tc=5.0 min CN=98 Runoff=0.39 cfs 0.030 af

Reach 4R: TOTAL Q PROPOSED Inflow=6.34 cfs 0.564 af
Outflow=6.34 cfs 0.564 af

Reach 14R: (new Reach) Inflow=0.39 cfs 0.030 af
Outflow=0.39 cfs 0.030 af

Pond 6P: STORMWATER 1 Peak Elev=320.89' Storage=1,325 cf Inflow=2.73 cfs 0.259 af
Discarded=0.03 cfs 0.023 af Primary=2.41 cfs 0.223 af Outflow=2.44 cfs 0.246 af

Pond 9P: STORMWATER 2 Peak Elev=314.19' Storage=1,155 cf Inflow=1.78 cfs 0.140 af
Discarded=0.03 cfs 0.026 af Primary=1.55 cfs 0.096 af Outflow=1.58 cfs 0.122 af

Pond 13P: (new Pond) Peak Elev=323.51' Storage=482 cf Inflow=0.30 cfs 0.023 af
Discarded=0.02 cfs 0.018 af Primary=0.00 cfs 0.000 af Outflow=0.02 cfs 0.018 af

Total Runoff Area = 5.980 ac Runoff Volume = 1.324 af Average Runoff Depth = 2.66"
92.55% Pervious = 5.535 ac 7.45% Impervious = 0.446 ac

Summary for Subcatchment 2S: INFILTRATION SYSTEM 1

Runoff = 2.73 cfs @ 12.26 hrs, Volume= 0.259 af, Depth> 2.61"

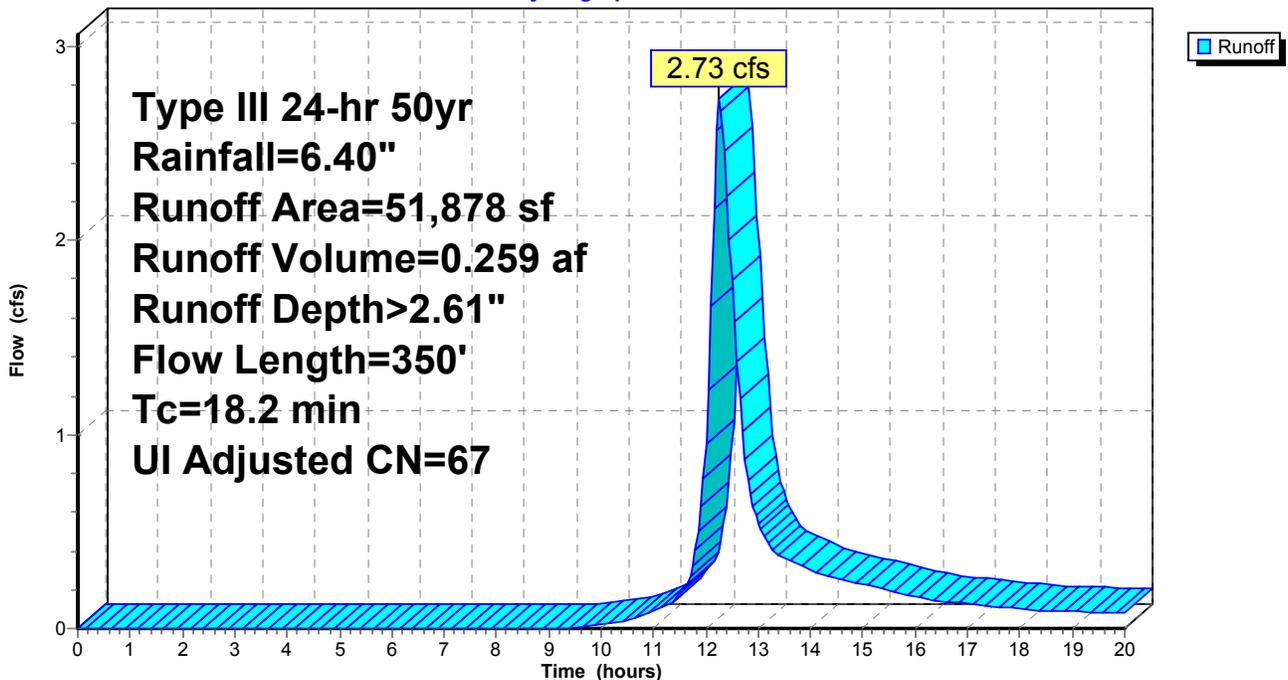
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50yr Rainfall=6.40"

Area (sf)	CN	Description
4,736	98	Unconnected pavement, HSG B
47,142	65	Woods/grass comb., Fair, HSG B
51,878	68	Weighted Average, UI Adjusted CN = 67
47,142		90.87% Pervious Area
4,736		9.13% Impervious Area
4,736		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.4	200	0.1500	0.20		Sheet Flow, LAWN Woods: Light underbrush n= 0.400 P2= 3.30"
1.8	150	0.0800	1.41		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
18.2	350	Total			

Subcatchment 2S: INFILTRATION SYSTEM 1

Hydrograph



Summary for Subcatchment 3S: Q BYPASS

Runoff = 2.74 cfs @ 12.22 hrs, Volume= 0.245 af, Depth> 2.43"

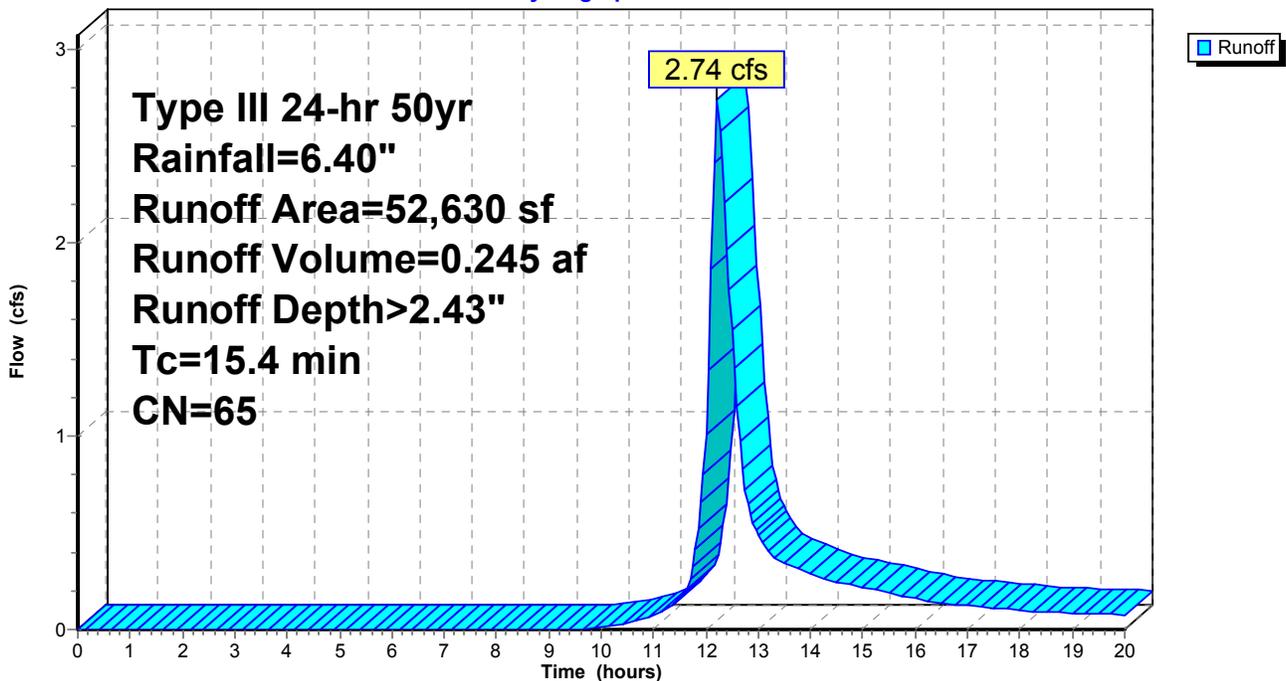
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50yr Rainfall=6.40"

Area (sf)	CN	Description
52,630	65	Woods/grass comb., Fair, HSG B
52,630		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4					Direct Entry, SAME AS EXISTING

Subcatchment 3S: Q BYPASS

Hydrograph



Summary for Subcatchment 7S: EXISTING Q

Runoff = 6.53 cfs @ 12.22 hrs, Volume= 0.583 af, Depth> 2.43"

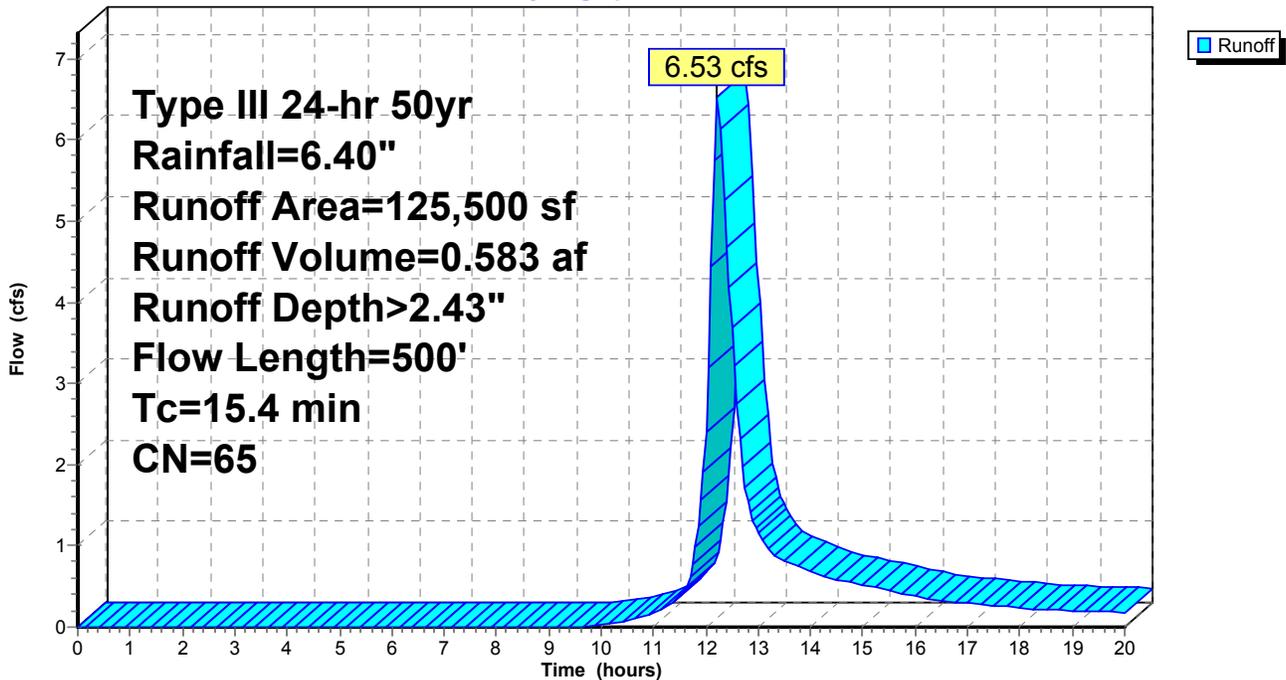
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50yr Rainfall=6.40"

Area (sf)	CN	Description
125,500	65	Woods/grass comb., Fair, HSG B
125,500		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.9	200	0.1500	0.31		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"
4.5	300	0.0500	1.12		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
15.4	500	Total			

Subcatchment 7S: EXISTING Q

Hydrograph



Summary for Subcatchment 8S: INFILTRATION SYSTEM 2

Runoff = 1.78 cfs @ 12.15 hrs, Volume= 0.140 af, Depth> 3.48"

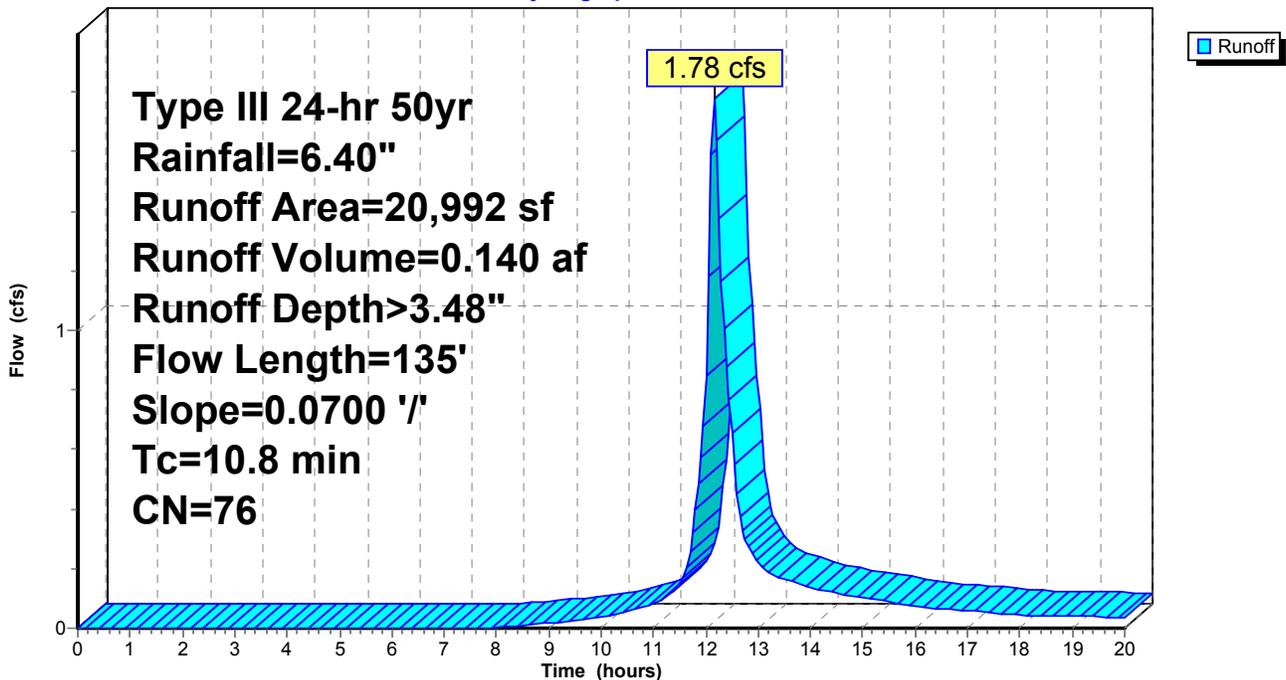
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50yr Rainfall=6.40"

Area (sf)	CN	Description
14,066	65	Woods/grass comb., Fair, HSG B
6,926	98	Unconnected pavement, HSG B
20,992	76	Weighted Average
14,066		67.01% Pervious Area
6,926		32.99% Impervious Area
6,926		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.8	135	0.0700	0.21		Sheet Flow, Grass: Dense n= 0.240 P2= 3.30"

Subcatchment 8S: INFILTRATION SYSTEM 2

Hydrograph



Summary for Subcatchment 10S: EXIST Q FRONT DRIVE

Runoff = 0.46 cfs @ 12.21 hrs, Volume= 0.044 af, Depth> 4.84"

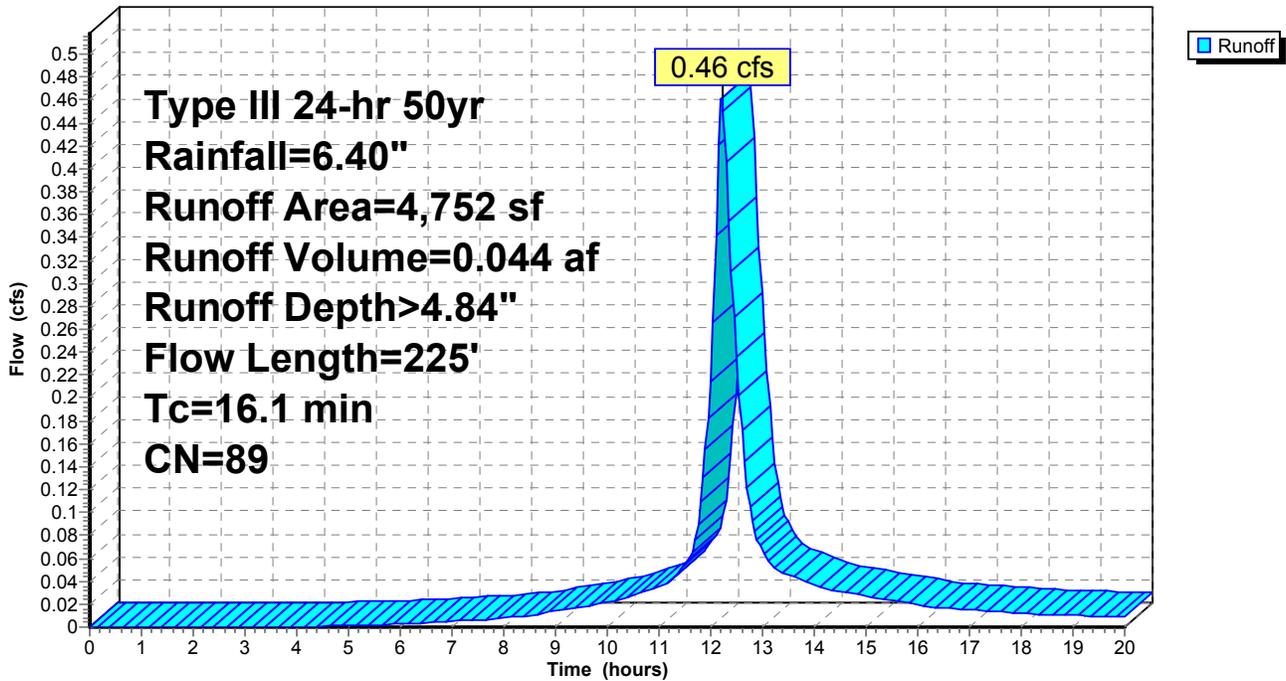
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50yr Rainfall=6.40"

Area (sf)	CN	Description
3,002	98	Paved parking, HSG B
1,750	73	Woods/grass comb., Poor, HSG B
4,752	89	Weighted Average
1,750		36.83% Pervious Area
3,002		63.17% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	150	0.1200	0.18		Sheet Flow, Woods: Light underbrush n= 0.400 P2= 3.30"
1.8	75	0.0200	0.71		Shallow Concentrated Flow, Woodland Kv= 5.0 fps
16.1	225	Total			

Subcatchment 10S: EXIST Q FRONT DRIVE

Hydrograph



Summary for Subcatchment 11S: Q INFILTRATION

Runoff = 0.30 cfs @ 12.07 hrs, Volume= 0.023 af, Depth> 5.88"

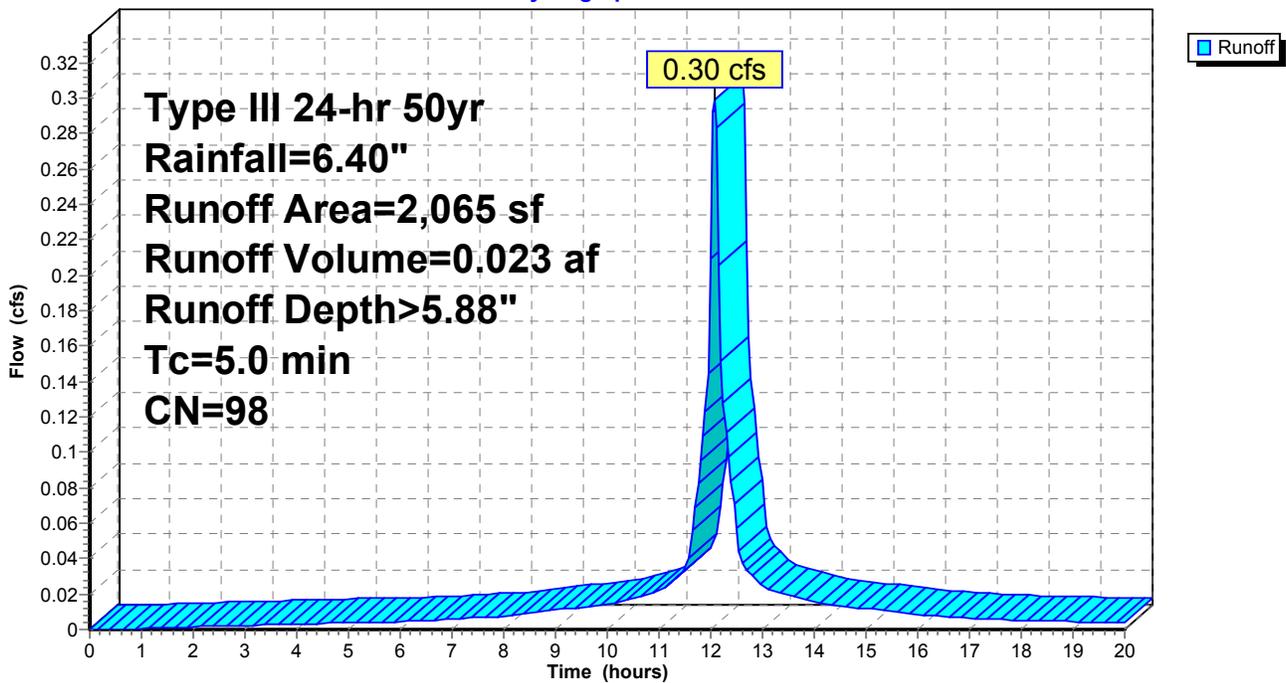
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50yr Rainfall=6.40"

Area (sf)	CN	Description
2,065	98	Paved parking, HSG B
2,065		100.00% Impervious Area

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

Subcatchment 11S: Q INFILTRATION

Hydrograph



Summary for Subcatchment 12S: Q BYPASS

Runoff = 0.39 cfs @ 12.07 hrs, Volume= 0.030 af, Depth> 5.88"

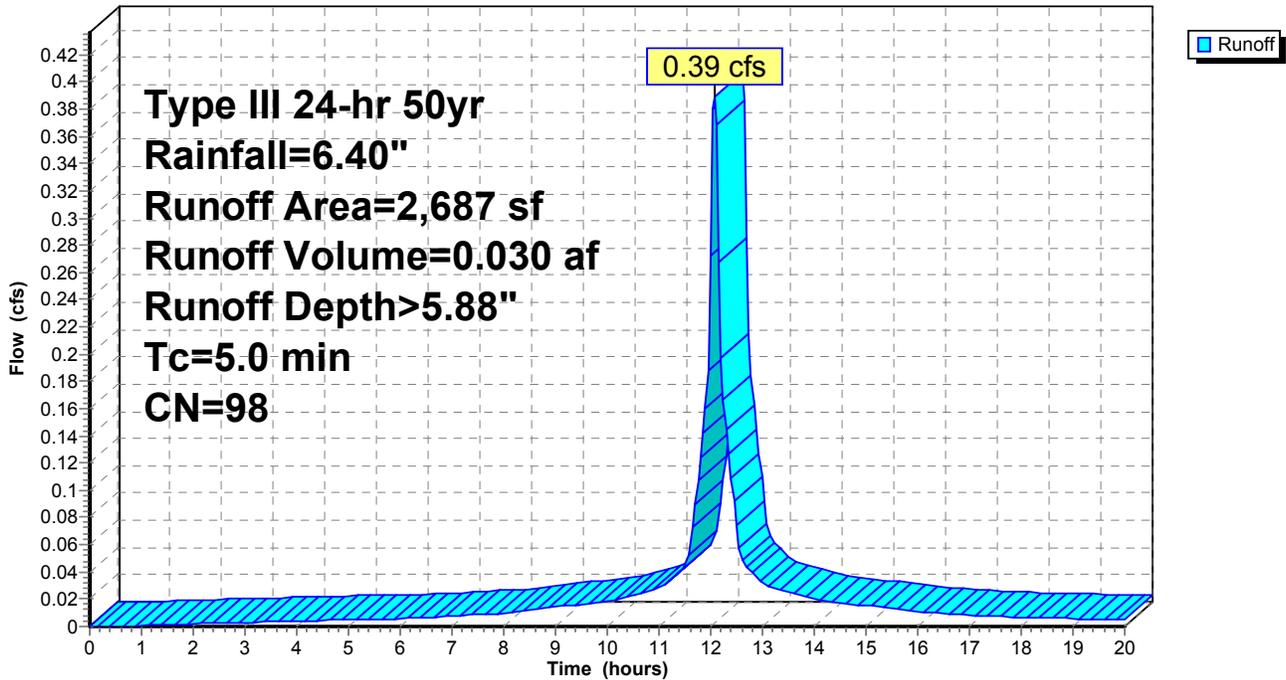
Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50yr Rainfall=6.40"

Area (sf)	CN	Description
2,687	98	Paved parking, HSG B
2,687		100.00% Impervious Area

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

Subcatchment 12S: Q BYPASS

Hydrograph

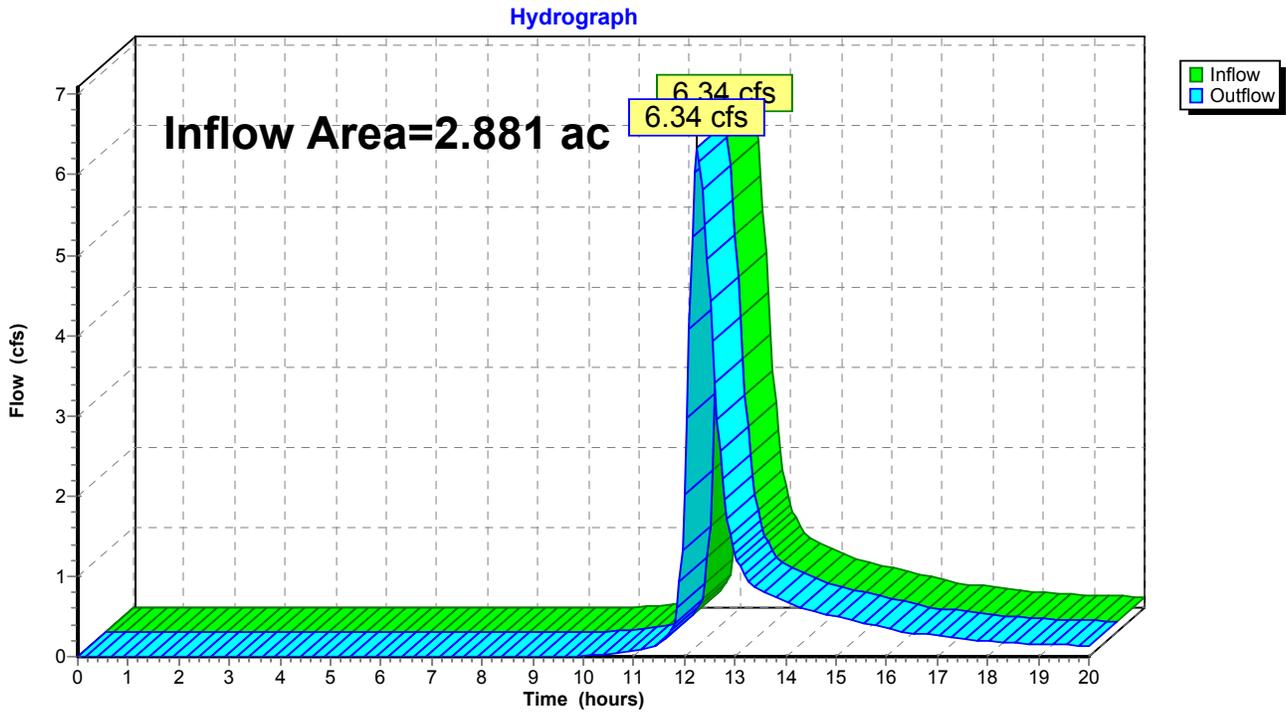


Summary for Reach 4R: TOTAL Q PROPOSED

Inflow Area = 2.881 ac, 9.29% Impervious, Inflow Depth > 2.35" for 50yr event
Inflow = 6.34 cfs @ 12.26 hrs, Volume= 0.564 af
Outflow = 6.34 cfs @ 12.26 hrs, Volume= 0.564 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Reach 4R: TOTAL Q PROPOSED



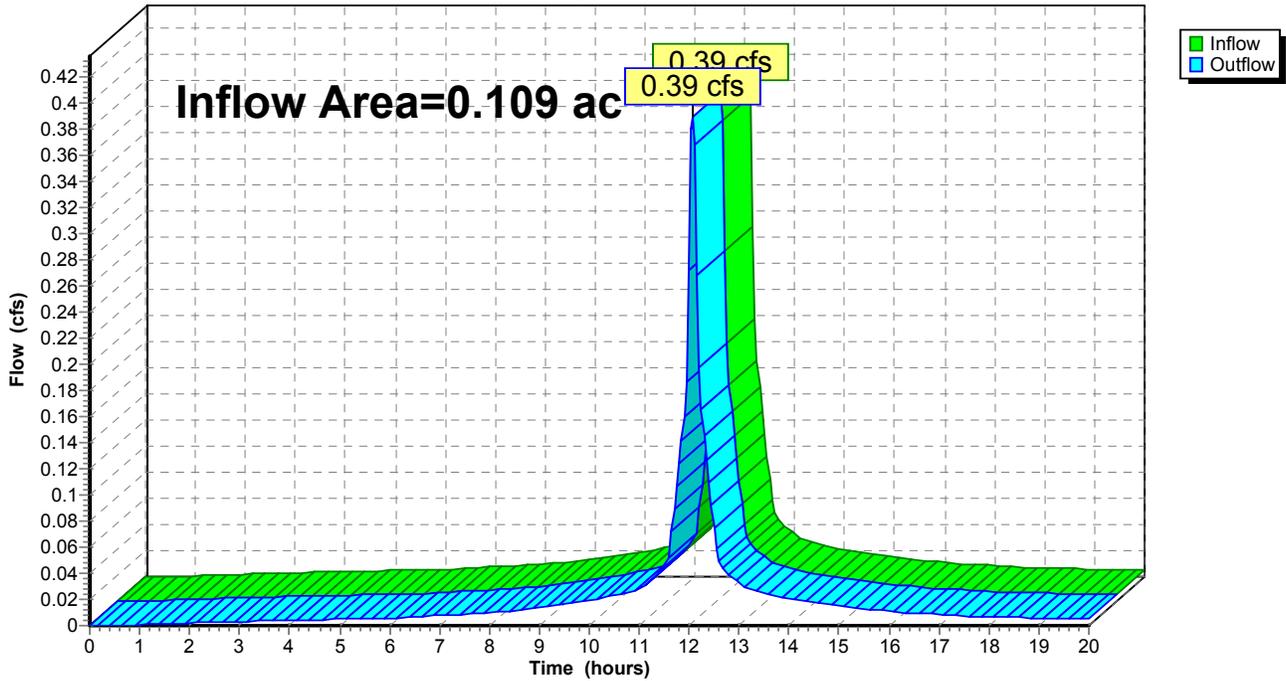
Summary for Reach 14R: (new Reach)

Inflow Area = 0.109 ac, 100.00% Impervious, Inflow Depth > 3.33" for 50yr event
Inflow = 0.39 cfs @ 12.07 hrs, Volume= 0.030 af
Outflow = 0.39 cfs @ 12.07 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

Reach 14R: (new Reach)

Hydrograph



Summary for Pond 6P: STORMWATER 1

Inflow Area = 1.191 ac, 9.13% Impervious, Inflow Depth > 2.61" for 50yr event
 Inflow = 2.73 cfs @ 12.26 hrs, Volume= 0.259 af
 Outflow = 2.44 cfs @ 12.36 hrs, Volume= 0.246 af, Atten= 11%, Lag= 5.9 min
 Discarded = 0.03 cfs @ 10.40 hrs, Volume= 0.023 af
 Primary = 2.41 cfs @ 12.36 hrs, Volume= 0.223 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 320.89' @ 12.36 hrs Surf.Area= 609 sf Storage= 1,325 cf

Plug-Flow detention time= 28.1 min calculated for 0.245 af (95% of inflow)
 Center-of-Mass det. time= 11.0 min (823.5 - 812.6)

Volume	Invert	Avail.Storage	Storage Description
#1	317.50'	519 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 2,132 cf Overall - 835 cf Embedded = 1,297 cf x 40.0% Voids
#2	317.50'	835 cf	Cultec R-330XL x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
		1,353 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
317.50	609	0	0
321.00	609	2,132	2,132

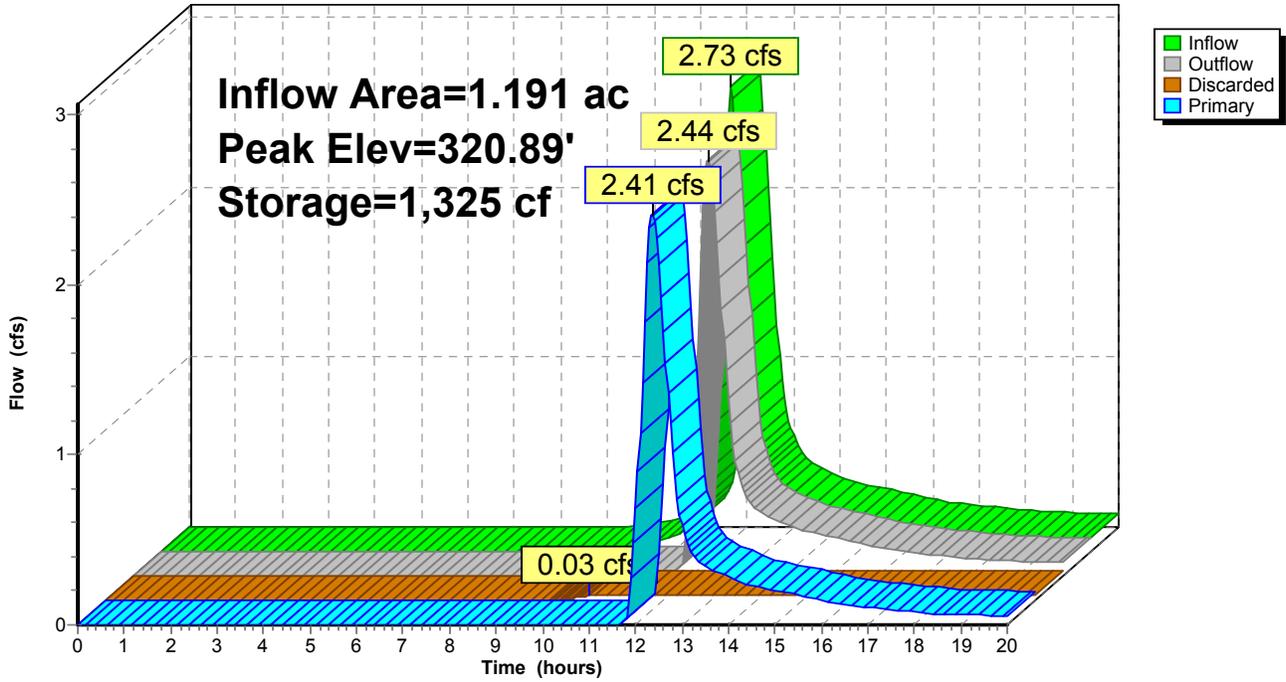
Device	Routing	Invert	Outlet Devices
#1	Discarded	317.50'	2.000 in/hr Exfiltration over Surface area
#2	Primary	318.50'	8.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=0.03 cfs @ 10.40 hrs HW=317.54' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=2.40 cfs @ 12.36 hrs HW=320.87' (Free Discharge)
 ↑2=Orifice/Grate (Orifice Controls 2.40 cfs @ 6.88 fps)

Pond 6P: STORMWATER 1

Hydrograph



Summary for Pond 9P: STORMWATER 2

Inflow Area = 0.482 ac, 32.99% Impervious, Inflow Depth > 3.48" for 50yr event
 Inflow = 1.78 cfs @ 12.15 hrs, Volume= 0.140 af
 Outflow = 1.58 cfs @ 12.22 hrs, Volume= 0.122 af, Atten= 11%, Lag= 3.8 min
 Discarded = 0.03 cfs @ 9.75 hrs, Volume= 0.026 af
 Primary = 1.55 cfs @ 12.22 hrs, Volume= 0.096 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 314.19' @ 12.22 hrs Surf.Area= 609 sf Storage= 1,155 cf

Plug-Flow detention time= 57.8 min calculated for 0.122 af (88% of inflow)
 Center-of-Mass det. time= 19.7 min (810.1 - 790.3)

Volume	Invert	Avail.Storage	Storage Description
#1	311.50'	519 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 2,132 cf Overall - 835 cf Embedded = 1,297 cf x 40.0% Voids
#2	311.50'	835 cf	Cultec R-330XL x 16 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap
		1,353 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
311.50	609	0	0
315.00	609	2,132	2,132

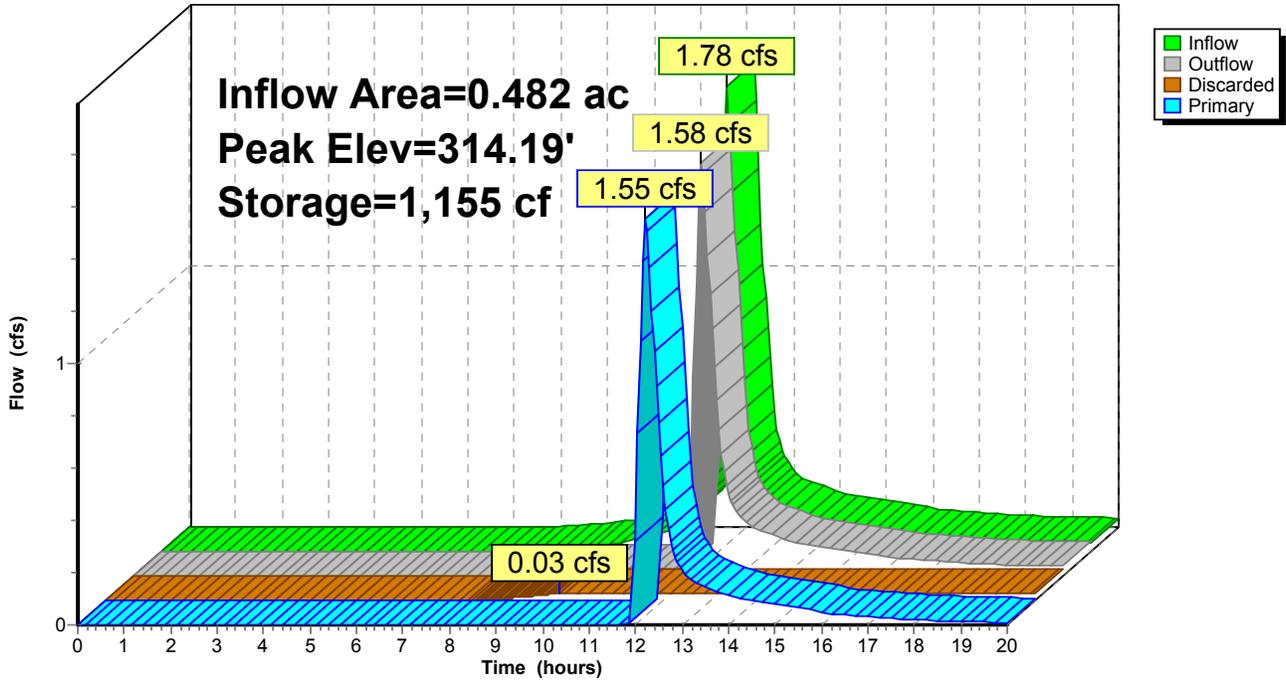
Device	Routing	Invert	Outlet Devices
#1	Primary	313.00'	8.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	311.50'	2.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.03 cfs @ 9.75 hrs HW=311.54' (Free Discharge)
 ↳2=Exfiltration (Exfiltration Controls 0.03 cfs)

Primary OutFlow Max=1.53 cfs @ 12.22 hrs HW=314.16' (Free Discharge)
 ↳1=Orifice/Grate (Orifice Controls 1.53 cfs @ 4.39 fps)

Pond 9P: STORMWATER 2

Hydrograph



Summary for Pond 13P: (new Pond)

Inflow Area = 0.047 ac, 100.00% Impervious, Inflow Depth > 5.88" for 50yr event
 Inflow = 0.30 cfs @ 12.07 hrs, Volume= 0.023 af
 Outflow = 0.02 cfs @ 13.14 hrs, Volume= 0.018 af, Atten= 93%, Lag= 64.2 min
 Discarded = 0.02 cfs @ 13.14 hrs, Volume= 0.018 af
 Primary = 0.00 cfs @ 13.14 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs
 Peak Elev= 323.51' @ 13.14 hrs Surf.Area= 459 sf Storage= 482 cf

Plug-Flow detention time= 168.8 min calculated for 0.018 af (77% of inflow)
 Center-of-Mass det. time= 106.2 min (822.4 - 716.2)

Volume	Invert	Avail.Storage	Storage Description
#1	322.00'	1,325 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
322.00	180	0	0
324.00	550	730	730
325.00	640	595	1,325

Device	Routing	Invert	Outlet Devices
#1	Primary	323.50'	4.0" Vert. Orifice/Grate C= 0.600
#2	Discarded	322.00'	2.000 in/hr Exfiltration over Surface area

Discarded OutFlow Max=0.02 cfs @ 13.14 hrs HW=323.51' (Free Discharge)
 ↳ **2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.00 cfs @ 13.14 hrs HW=323.51' (Free Discharge)
 ↳ **1=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.32 fps)

Pond 13P: (new Pond)

Hydrograph

