

Routing Diagram for ME153504hyd
 Prepared by SEH, Printed 12/19/2019
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Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.658	39	>75% Grass cover, Good, HSG A (7S, 13S)
0.629	80	>75% Grass cover, Good, HSG D (8S, 9S, 10S)
2.738	98	Paved parking, HSG A (7S)
13.351	98	Paved parking, HSG D (8S, 9S, 10S)
17.375	95	TOTAL AREA

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
3.396	HSG A	7S, 13S
0.000	HSG B	
0.000	HSG C	
13.979	HSG D	8S, 9S, 10S
0.000	Other	
17.375		TOTAL AREA

ME153504hyd

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Ground Covers (selected nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.658	0.000	0.000	0.629	0.000	1.287	>75% Grass cover, Good	7S, 8S, 9S, 10S, 13S
2.738	0.000	0.000	13.351	0.000	16.089	Paved parking	7S, 8S, 9S, 10S
3.396	0.000	0.000	13.979	0.000	17.375	TOTAL AREA	

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Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	5P	869.75	869.50	50.0	0.0050	0.013	15.0	0.0	0.0
2	7P	862.50	862.45	50.0	0.0010	0.013	15.0	0.0	0.0
3	7P	863.25	863.05	20.0	0.0100	0.013	18.0	0.0	0.0
4	11P	863.00	862.50	250.0	0.0020	0.013	18.0	0.0	0.0

Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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 7S: SE Pond Runoff Area=138,549 sf 86.09% Impervious Runoff Depth=1.80"
Tc=10.0 min CN=90 Runoff=8.23 cfs 0.477 af

Subcatchment 8S: West Pond Runoff Area=2.591 ac 82.67% Impervious Runoff Depth=2.25"
Tc=10.0 min CN=95 Runoff=8.15 cfs 0.487 af

Subcatchment 9S: Off Site N Runoff Area=156,310 sf 95.80% Impervious Runoff Depth=2.46"
Tc=10.0 min CN=97 Runoff=11.94 cfs 0.736 af

Subcatchment 10S: Underground Runoff Area=339,768 sf 99.63% Impervious Runoff Depth=2.57"
Tc=10.0 min CN=98 Runoff=26.53 cfs 1.670 af

Subcatchment 13S: Off-site S Runoff Area=9,377 sf 0.00% Impervious Runoff Depth=0.00"
Tc=10.0 min CN=39 Runoff=0.00 cfs 0.000 af

Reach 12R: Proposed Runoff Total Inflow=17.06 cfs 2.876 af
Outflow=17.06 cfs 2.876 af

Pond 5P: SE Pond Peak Elev=869.17' Storage=14,342 cf Inflow=8.23 cfs 0.477 af
Discarded=0.22 cfs 0.477 af Primary=0.00 cfs 0.000 af Outflow=0.22 cfs 0.477 af

Pond 7P: W Pond Peak Elev=864.30' Storage=30,033 cf Inflow=12.84 cfs 2.148 af
Primary=8.44 cfs 2.140 af Secondary=0.00 cfs 0.000 af Outflow=8.44 cfs 2.140 af

Pond 11P: Underground Peak Elev=865.12' Storage=82,472 cf Inflow=26.53 cfs 1.670 af
18.0" Round Culvert n=0.013 L=250.0' S=0.0020 '/' Outflow=6.09 cfs 1.661 af

Total Runoff Area = 17.375 ac Runoff Volume = 3.370 af Average Runoff Depth = 2.33"
7.40% Pervious = 1.287 ac 92.60% Impervious = 16.089 ac

Summary for Subcatchment 7S: SE Pond

Runoff = 8.23 cfs @ 12.09 hrs, Volume= 0.477 af, Depth= 1.80"

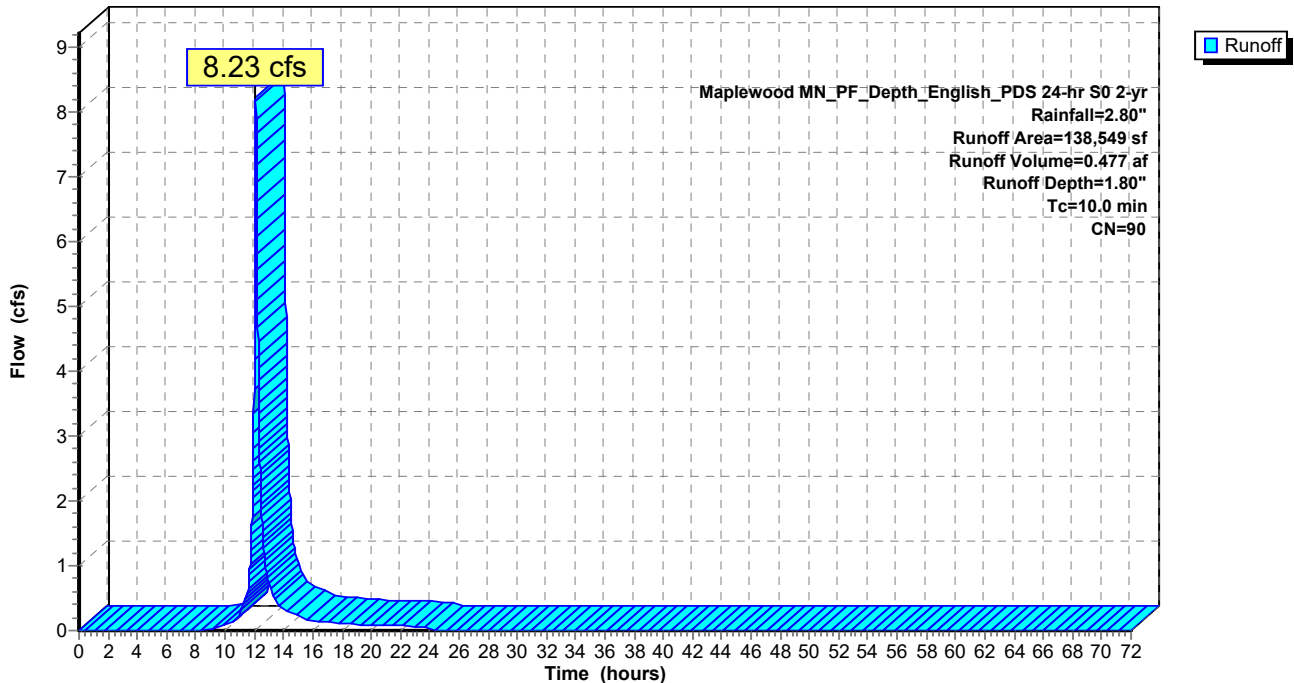
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 2-yr Rainfall=2.80"

Area (sf)	CN	Description
119,272	98	Paved parking, HSG A
19,277	39	>75% Grass cover, Good, HSG A
138,549	90	Weighted Average
19,277		13.91% Pervious Area
119,272		86.09% Impervious Area

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

Subcatchment 7S: SE Pond

Hydrograph



Summary for Subcatchment 8S: West Pond

Runoff = 8.15 cfs @ 12.09 hrs, Volume= 0.487 af, Depth= 2.25"

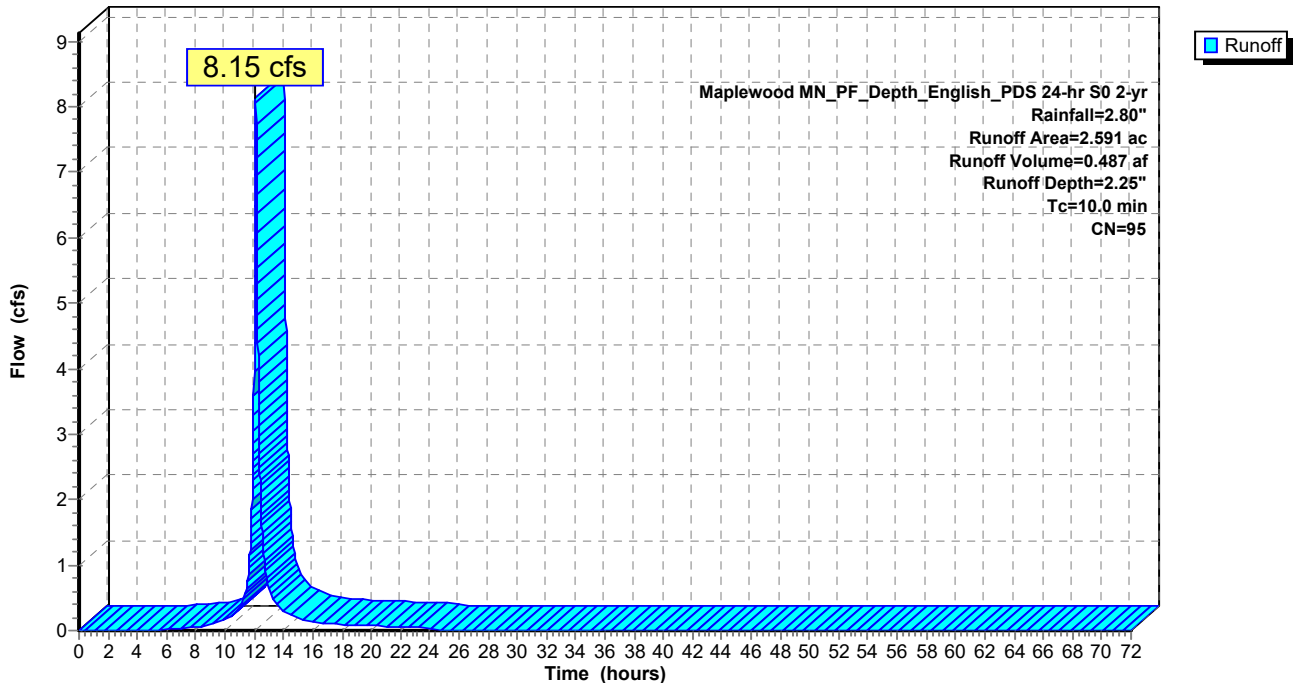
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 2-yr Rainfall=2.80"

Area (ac)	CN	Description
2.142	98	Paved parking, HSG D
0.449	80	>75% Grass cover, Good, HSG D
2.591	95	Weighted Average
0.449		17.33% Pervious Area
2.142		82.67% Impervious Area

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

Subcatchment 8S: West Pond

Hydrograph



Summary for Subcatchment 9S: Off Site N

Runoff = 11.94 cfs @ 12.09 hrs, Volume= 0.736 af, Depth= 2.46"

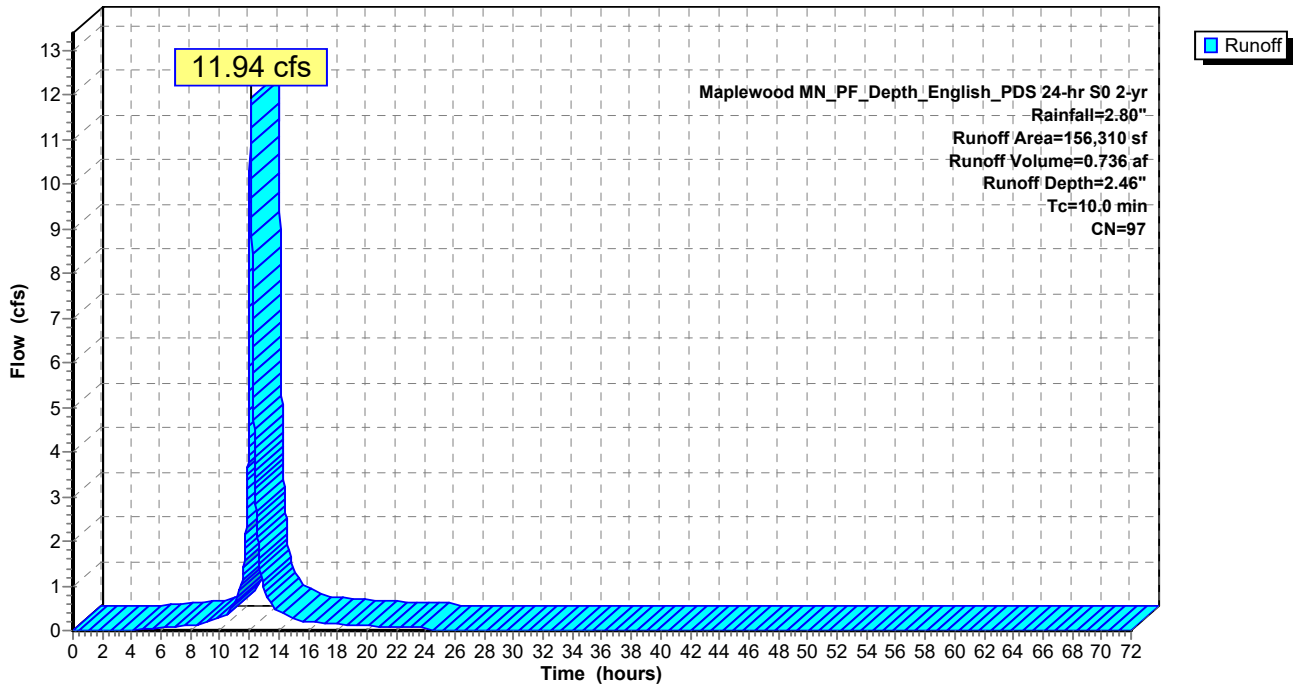
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 2-yr Rainfall=2.80"

Area (sf)	CN	Description
149,745	98	Paved parking, HSG D
6,565	80	>75% Grass cover, Good, HSG D
156,310	97	Weighted Average
6,565		4.20% Pervious Area
149,745		95.80% Impervious Area

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

Subcatchment 9S: Off Site N

Hydrograph



Summary for Subcatchment 10S: Underground

Runoff = 26.53 cfs @ 12.08 hrs, Volume= 1.670 af, Depth= 2.57"

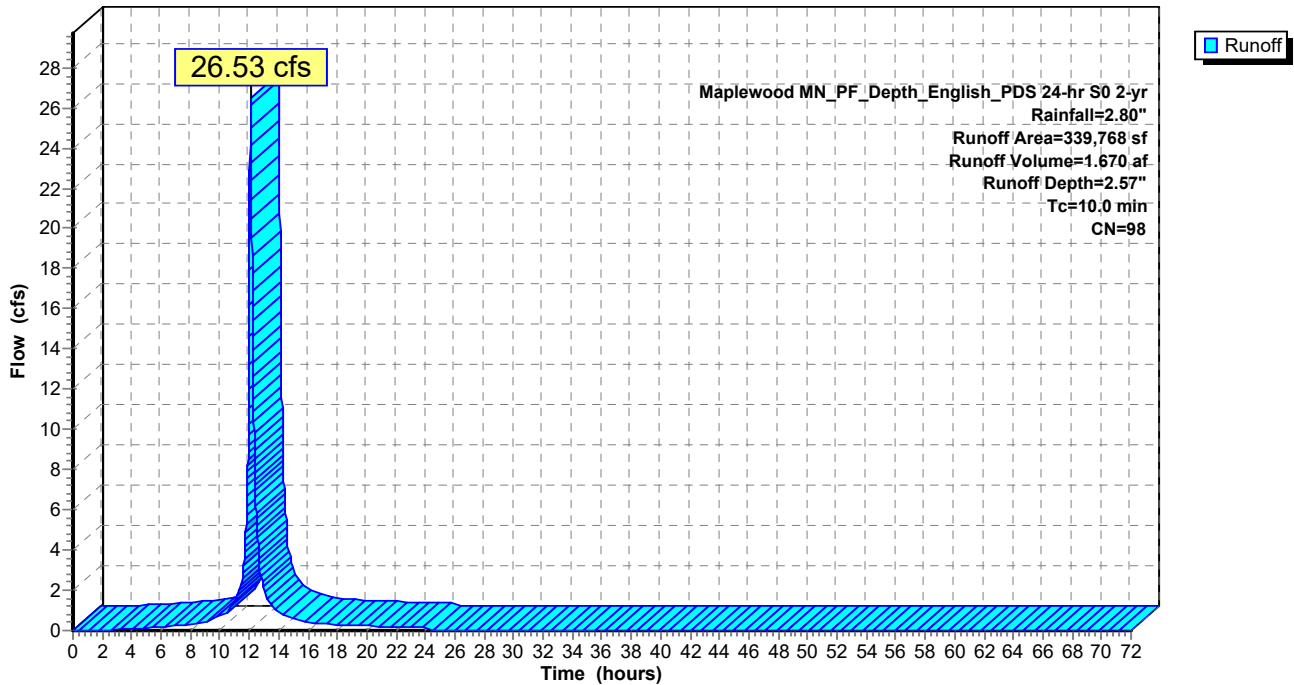
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 2-yr Rainfall=2.80"

Area (sf)	CN	Description
338,505	98	Paved parking, HSG D
1,263	80	>75% Grass cover, Good, HSG D
339,768	98	Weighted Average
1,263		0.37% Pervious Area
338,505		99.63% Impervious Area

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

Subcatchment 10S: Underground

Hydrograph



Summary for Subcatchment 13S: Off-site S

[45] Hint: Runoff=Zero

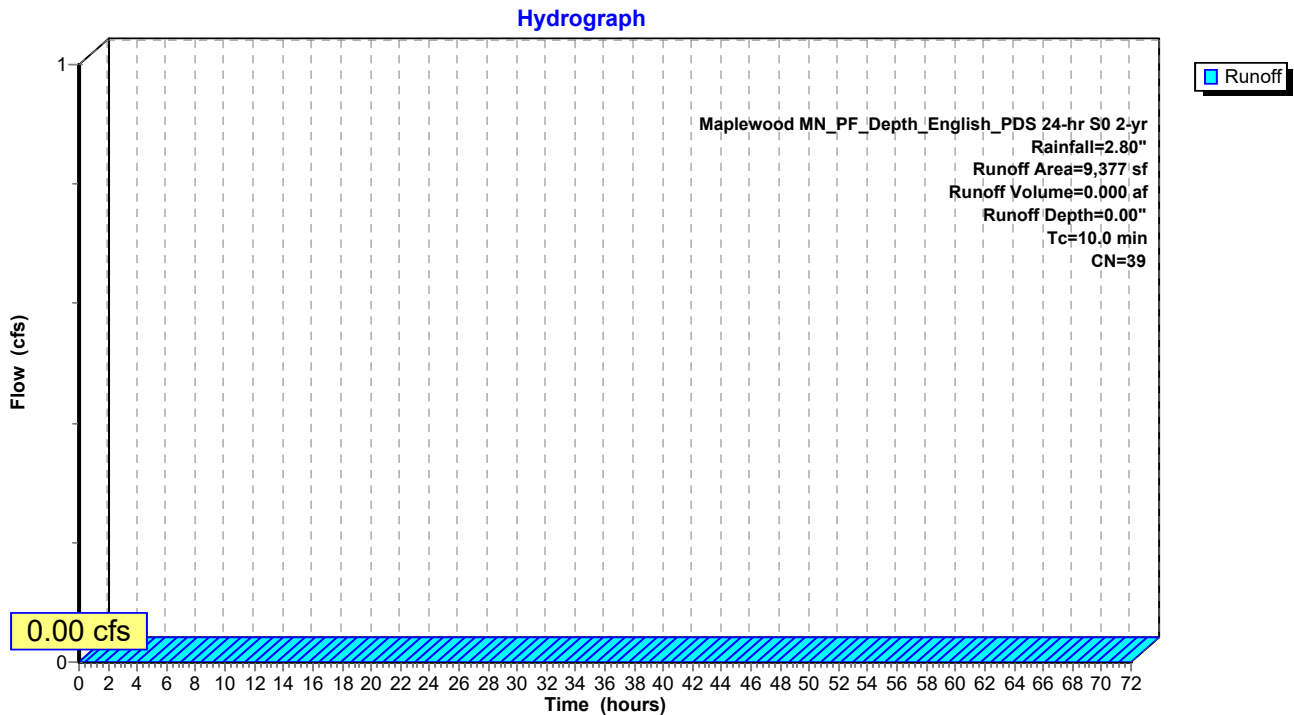
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 2-yr Rainfall=2.80"

Area (sf)	CN	Description
9,377	39	>75% Grass cover, Good, HSG A
9,377		100.00% Pervious Area

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

Subcatchment 13S: Off-site S



Summary for Reach 12R: Proposed Runoff Total

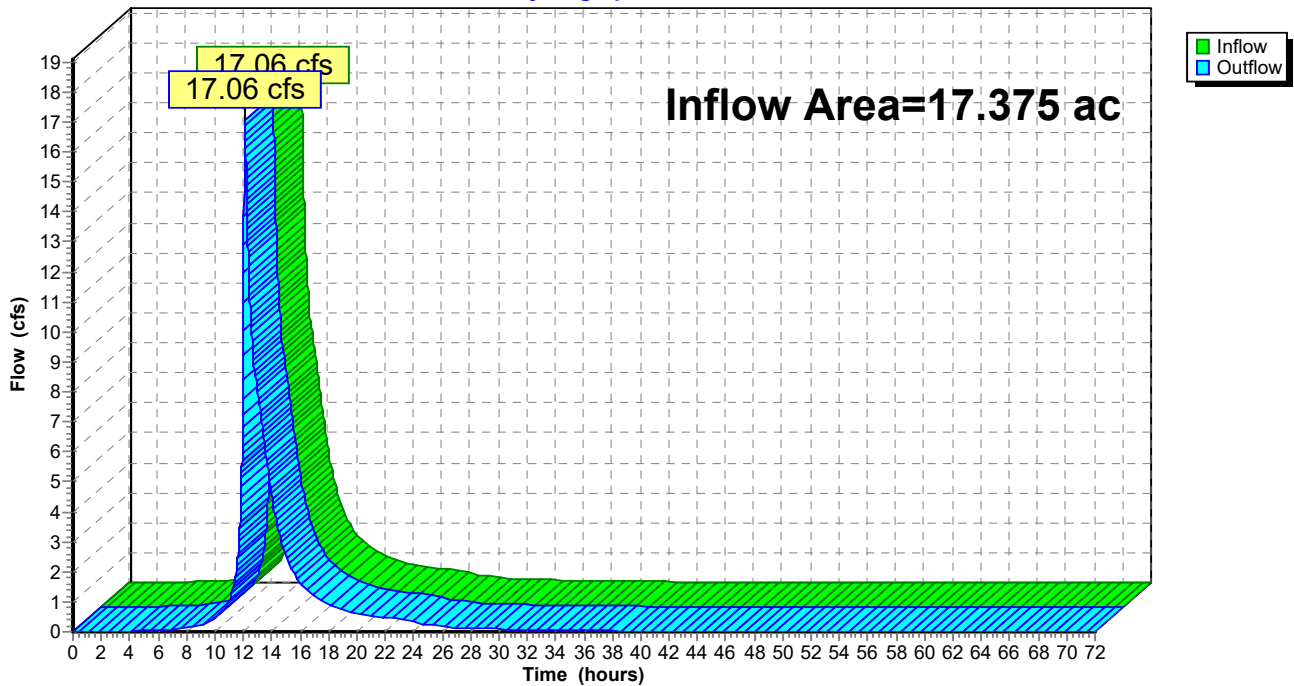
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 17.375 ac, 92.60% Impervious, Inflow Depth > 1.99" for 2-yr event
Inflow = 17.06 cfs @ 12.11 hrs, Volume= 2.876 af
Outflow = 17.06 cfs @ 12.11 hrs, Volume= 2.876 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach 12R: Proposed Runoff Total

Hydrograph



Summary for Pond 5P: SE Pond

Inflow Area = 3.181 ac, 86.09% Impervious, Inflow Depth = 1.80" for 2-yr event
 Inflow = 8.23 cfs @ 12.09 hrs, Volume= 0.477 af
 Outflow = 0.22 cfs @ 15.10 hrs, Volume= 0.477 af, Atten= 97%, Lag= 180.7 min
 Discarded = 0.22 cfs @ 15.10 hrs, Volume= 0.477 af
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 869.17' @ 15.10 hrs Surf.Area= 5,899 sf Storage= 14,342 cf

Plug-Flow detention time= 729.2 min calculated for 0.477 af (100% of inflow)
 Center-of-Mass det. time= 729.3 min (1,529.8 - 800.6)

Volume	Invert	Avail.Storage	Storage Description
#1	865.75'	54,182 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.75	2,489	0	0
869.75	6,477	17,932	17,932
873.75	11,648	36,250	54,182

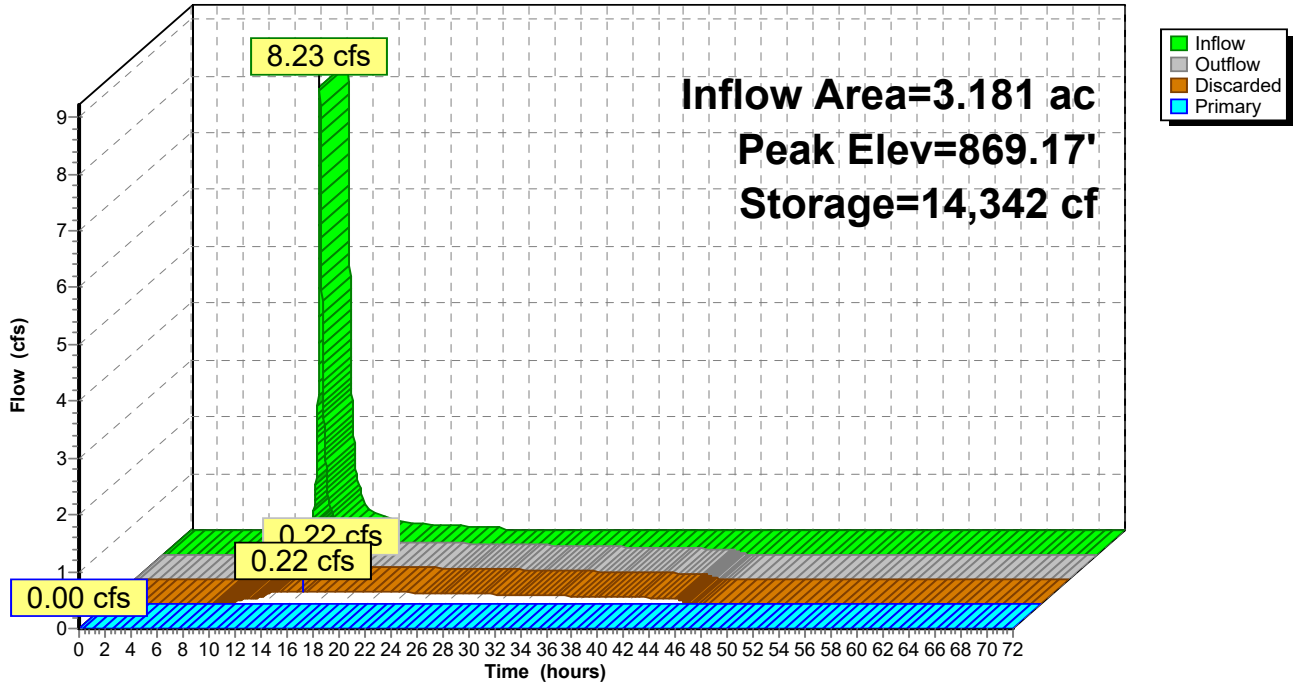
Device	Routing	Invert	Outlet Devices
#1	Discarded	865.75'	1.630 in/hr Exfiltration over Surface area
#2	Primary	869.75'	15.0" Round RCP_Round 15" L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 869.75' / 869.50' S= 0.0050 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.22 cfs @ 15.10 hrs HW=869.17' (Free Discharge)
 ↳1=Exfiltration (Exfiltration Controls 0.22 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=865.75' (Free Discharge)
 ↳2=RCP_Round 15" (Controls 0.00 cfs)

Pond 5P: SE Pond

Hydrograph



Summary for Pond 7P: W Pond

[79] Warning: Submerged Pond 11P Primary device # 1 INLET by 1.30'

Inflow Area = 10.391 ac, 95.40% Impervious, Inflow Depth > 2.48" for 2-yr event
 Inflow = 12.84 cfs @ 12.11 hrs, Volume= 2.148 af
 Outflow = 8.44 cfs @ 12.38 hrs, Volume= 2.140 af, Atten= 34%, Lag= 16.2 min
 Primary = 8.44 cfs @ 12.38 hrs, Volume= 2.140 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Starting Elev= 862.50' Surf.Area= 6,038 sf Storage= 17,374 cf
 Peak Elev= 864.30' @ 12.38 hrs Surf.Area= 8,025 sf Storage= 30,033 cf (12,659 cf above start)

Plug-Flow detention time= 214.5 min calculated for 1.741 af (81% of inflow)
 Center-of-Mass det. time= 52.5 min (940.2 - 887.6)

Volume	Invert	Avail.Storage	Storage Description
#1	858.50'	170,920 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
858.50	2,649	0	0
862.50	6,038	17,374	17,374
866.50	10,452	32,980	50,354
877.00	12,513	120,566	170,920

Device	Routing	Invert	Outlet Devices
#1	Primary	862.50'	15.0" Round CMP_Round 15" L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 862.50' / 862.45' S= 0.0010 1/1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	866.00'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	863.25'	18.0" Round RCP_Round 18" L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 863.25' / 863.05' S= 0.0100 1/1' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=8.45 cfs @ 12.38 hrs HW=864.30' (Free Discharge)

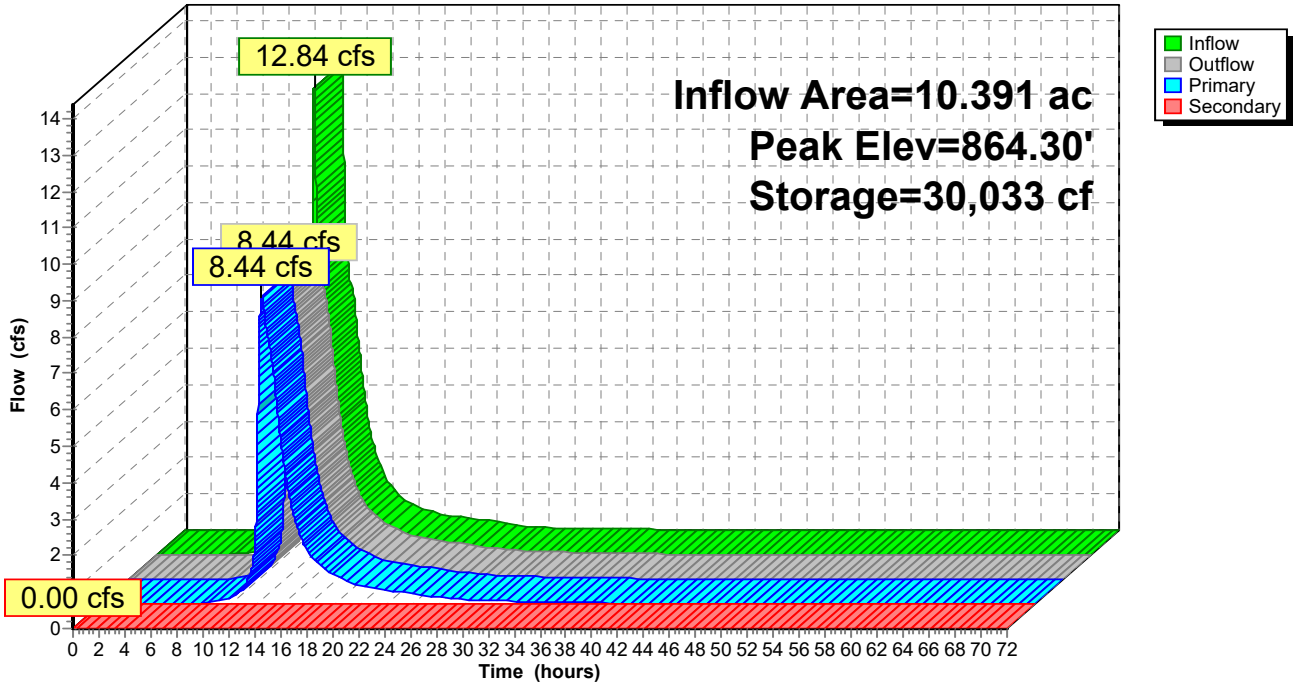
- ↑1=CMP_Round 15" (Barrel Controls 4.67 cfs @ 3.81 fps)
- ↑3=RCP_Round 18" (Barrel Controls 3.77 cfs @ 4.01 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=862.50' (Free Discharge)

- ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: W Pond

Hydrograph



Summary for Pond 11P: Underground

Inflow Area = 7.800 ac, 99.63% Impervious, Inflow Depth = 2.57" for 2-yr event
 Inflow = 26.53 cfs @ 12.08 hrs, Volume= 1.670 af
 Outflow = 6.09 cfs @ 12.44 hrs, Volume= 1.661 af, Atten= 77%, Lag= 21.4 min
 Primary = 6.09 cfs @ 12.44 hrs, Volume= 1.661 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Starting Elev= 863.00' Surf.Area= 18,200 sf Storage= 48,324 cf
 Peak Elev= 865.12' @ 12.44 hrs Surf.Area= 18,200 sf Storage= 82,472 cf (34,148 cf above start)

Plug-Flow detention time= 593.6 min calculated for 0.551 af (33% of inflow)
 Center-of-Mass det. time= 160.6 min (919.2 - 758.7)

Volume	Invert	Avail.Storage	Storage Description
#1	859.00'	42,703 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 200,200 cf Overall - 93,444 cf Embedded = 106,756 cf x 40.0% Voids
#2	860.00'	93,444 cf	96.0" Round Pipe Storage x 11 Inside #1 L= 169.0'
		136,146 cf	Total Available Storage

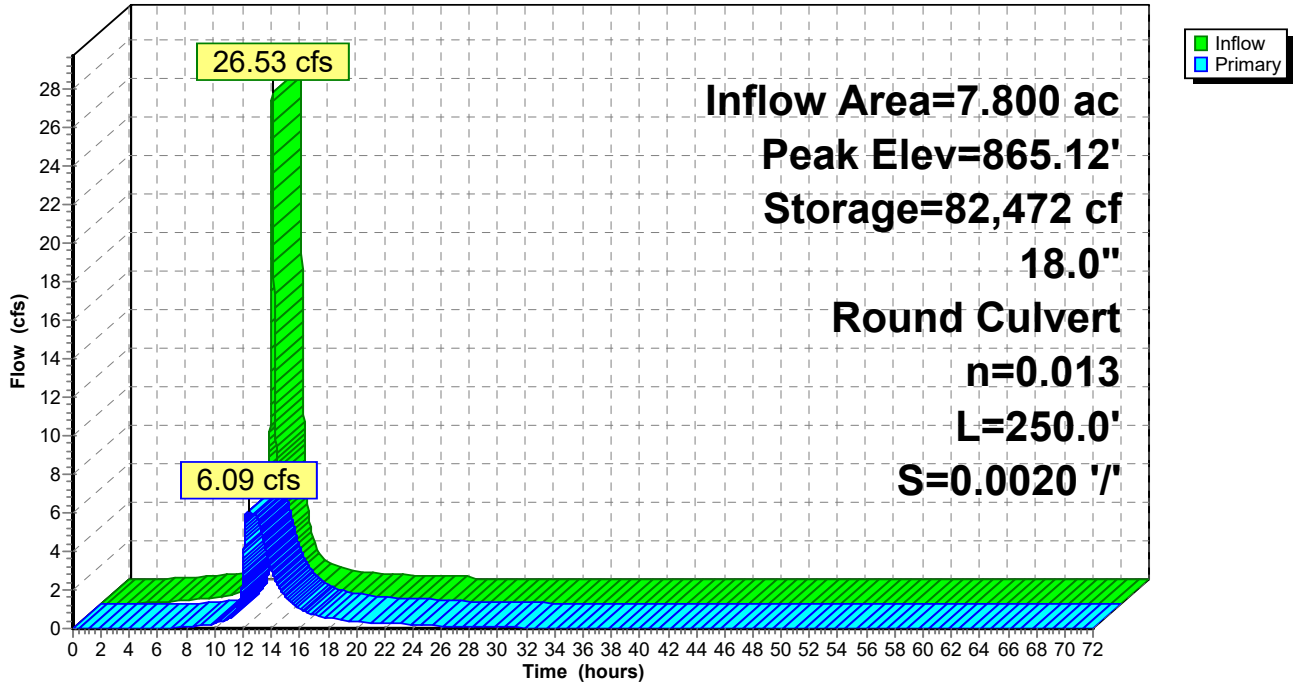
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
859.00	18,200	0	0
870.00	18,200	200,200	200,200

Device	Routing	Invert	Outlet Devices
#1	Primary	863.00'	18.0" Round CMP_Round 18" L= 250.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 863.00' / 862.50' S= 0.0020 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=6.09 cfs @ 12.44 hrs HW=865.12' (Free Discharge)
 ←1=CMP_Round 18" (Barrel Controls 6.09 cfs @ 3.45 fps)

Pond 11P: Underground

Hydrograph



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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 7S: SE Pond Runoff Area=138,549 sf 86.09% Impervious Runoff Depth=3.09"
Tc=10.0 min CN=90 Runoff=13.84 cfs 0.819 af

Subcatchment 8S: West Pond Runoff Area=2,591 ac 82.67% Impervious Runoff Depth=3.61"
Tc=10.0 min CN=95 Runoff=12.65 cfs 0.779 af

Subcatchment 9S: Off Site N Runoff Area=156,310 sf 95.80% Impervious Runoff Depth=3.83"
Tc=10.0 min CN=97 Runoff=18.07 cfs 1.145 af

Subcatchment 10S: Underground Runoff Area=339,768 sf 99.63% Impervious Runoff Depth=3.94"
Tc=10.0 min CN=98 Runoff=39.70 cfs 2.564 af

Subcatchment 13S: Off-site S Runoff Area=9,377 sf 0.00% Impervious Runoff Depth=0.07"
Tc=10.0 min CN=39 Runoff=0.00 cfs 0.001 af

Reach 12R: Proposed Runoff Total Inflow=27.37 cfs 4.666 af
Outflow=27.37 cfs 4.666 af

Pond 5P: SE Pond Peak Elev=870.35' Storage=22,017 cf Inflow=13.84 cfs 0.819 af
Discarded=0.27 cfs 0.626 af Primary=1.13 cfs 0.193 af Outflow=1.41 cfs 0.819 af

Pond 7P: W Pond Peak Elev=864.80' Storage=34,191 cf Inflow=18.82 cfs 3.334 af
Primary=13.10 cfs 3.327 af Secondary=0.00 cfs 0.000 af Outflow=13.10 cfs 3.327 af

Pond 11P: Underground Peak Elev=866.26' Storage=99,878 cf Inflow=39.70 cfs 2.564 af
18.0" Round Culvert n=0.013 L=250.0' S=0.0020 '/' Outflow=8.65 cfs 2.555 af

Total Runoff Area = 17.375 ac Runoff Volume = 5.309 af Average Runoff Depth = 3.67"
7.40% Pervious = 1.287 ac 92.60% Impervious = 16.089 ac

Summary for Subcatchment 7S: SE Pond

Runoff = 13.84 cfs @ 12.09 hrs, Volume= 0.819 af, Depth= 3.09"

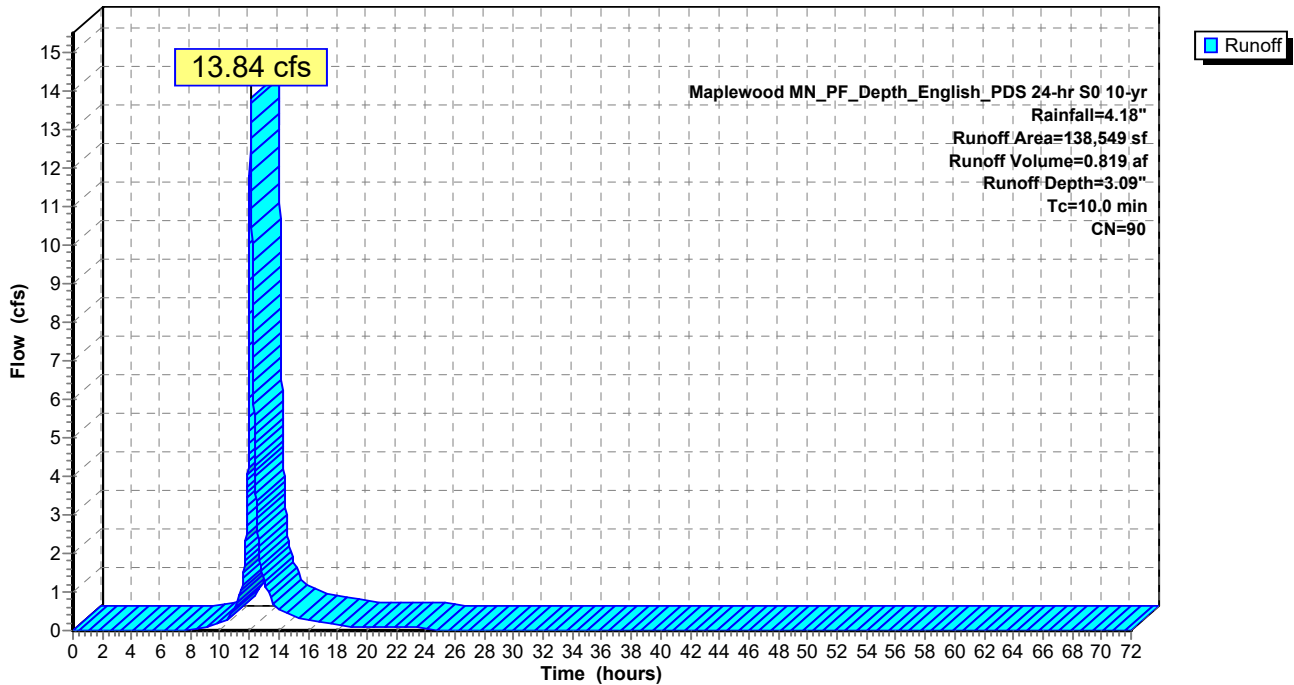
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 10-yr Rainfall=4.18"

Area (sf)	CN	Description
119,272	98	Paved parking, HSG A
19,277	39	>75% Grass cover, Good, HSG A
138,549	90	Weighted Average
19,277		13.91% Pervious Area
119,272		86.09% Impervious Area

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

Subcatchment 7S: SE Pond

Hydrograph



Summary for Subcatchment 8S: West Pond

Runoff = 12.65 cfs @ 12.08 hrs, Volume= 0.779 af, Depth= 3.61"

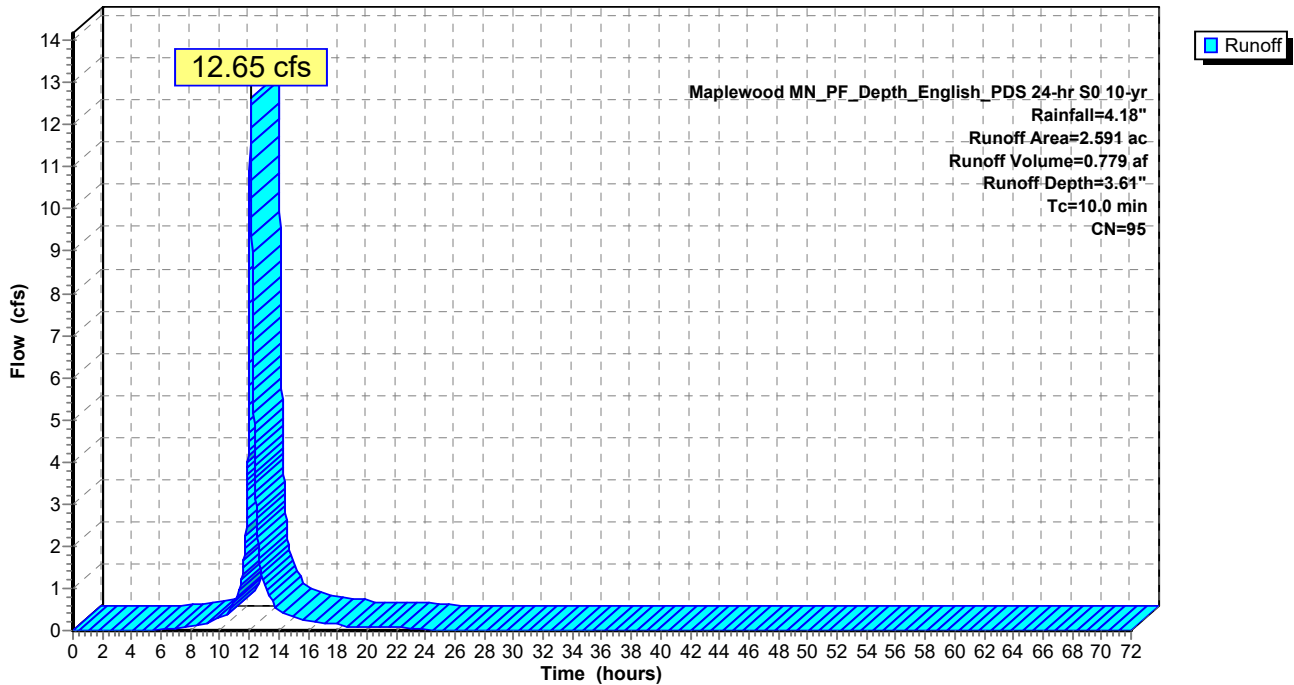
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 10-yr Rainfall=4.18"

Area (ac)	CN	Description
2.142	98	Paved parking, HSG D
0.449	80	>75% Grass cover, Good, HSG D
2.591	95	Weighted Average
0.449		17.33% Pervious Area
2.142		82.67% Impervious Area

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

Subcatchment 8S: West Pond

Hydrograph



Summary for Subcatchment 9S: Off Site N

Runoff = 18.07 cfs @ 12.08 hrs, Volume= 1.145 af, Depth= 3.83"

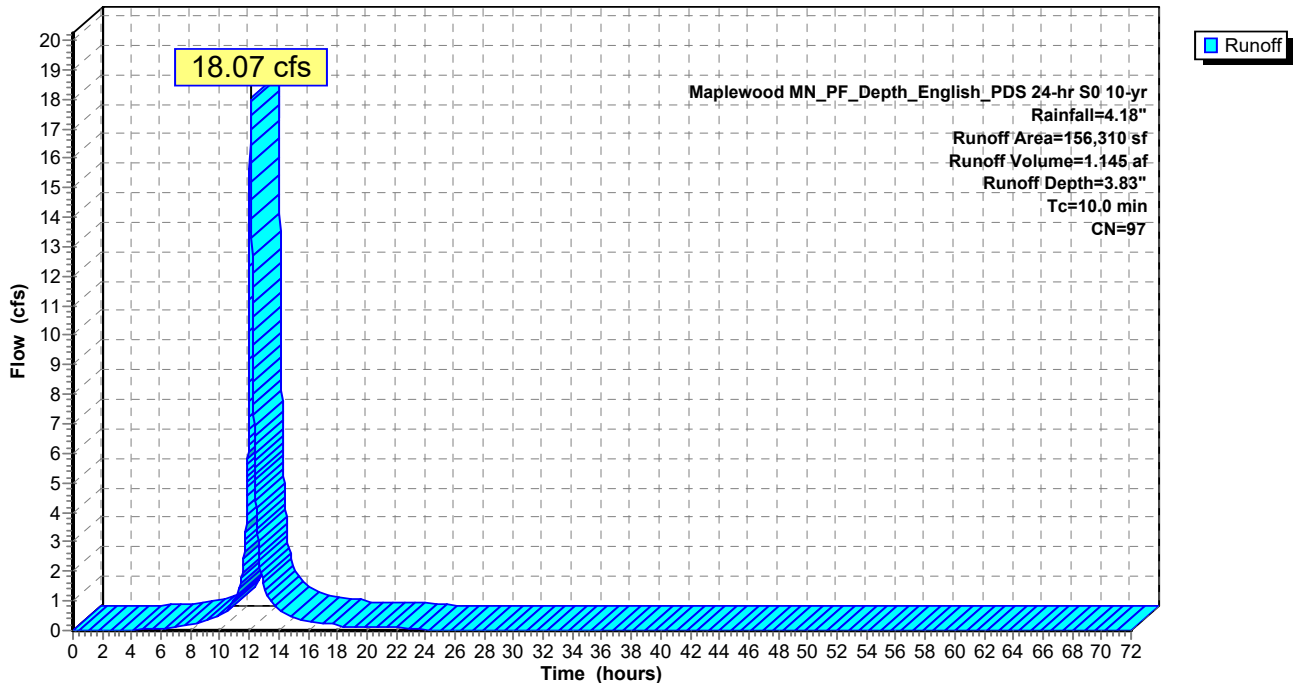
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 10-yr Rainfall=4.18"

Area (sf)	CN	Description
149,745	98	Paved parking, HSG D
6,565	80	>75% Grass cover, Good, HSG D
156,310	97	Weighted Average
6,565		4.20% Pervious Area
149,745		95.80% Impervious Area

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

Subcatchment 9S: Off Site N

Hydrograph



Summary for Subcatchment 10S: Underground

Runoff = 39.70 cfs @ 12.08 hrs, Volume= 2.564 af, Depth= 3.94"

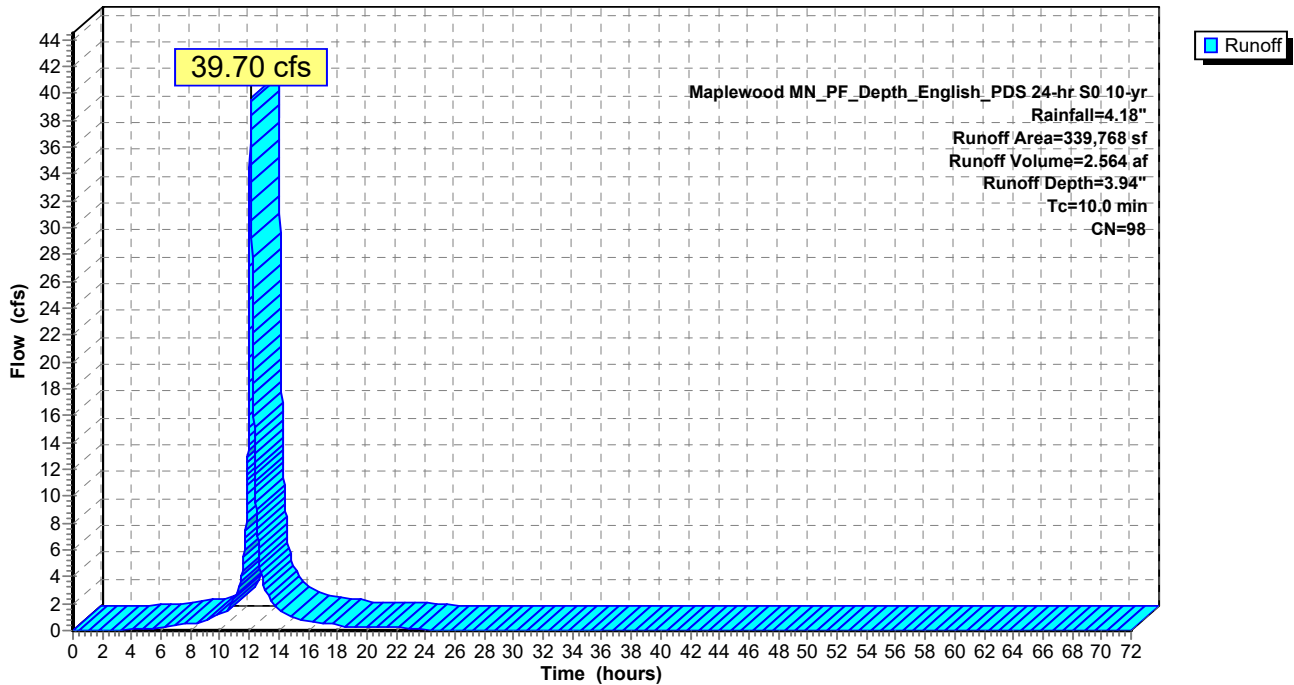
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 10-yr Rainfall=4.18"

Area (sf)	CN	Description
338,505	98	Paved parking, HSG D
1,263	80	>75% Grass cover, Good, HSG D
339,768	98	Weighted Average
1,263		0.37% Pervious Area
338,505		99.63% Impervious Area

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

Subcatchment 10S: Underground

Hydrograph



Summary for Subcatchment 13S: Off-site S

Runoff = 0.00 cfs @ 13.54 hrs, Volume= 0.001 af, Depth= 0.07"

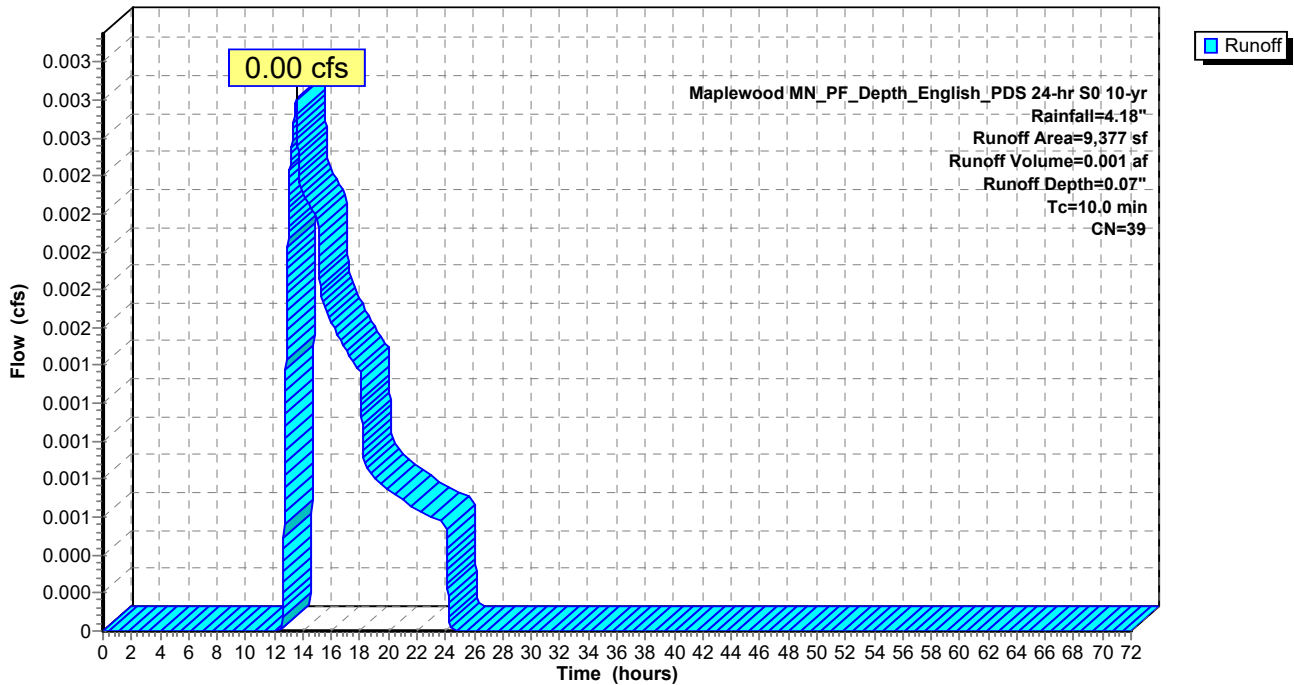
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 10-yr Rainfall=4.18"

Area (sf)	CN	Description
9,377	39	>75% Grass cover, Good, HSG A
9,377		100.00% Pervious Area

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

Subcatchment 13S: Off-site S

Hydrograph



Summary for Reach 12R: Proposed Runoff Total

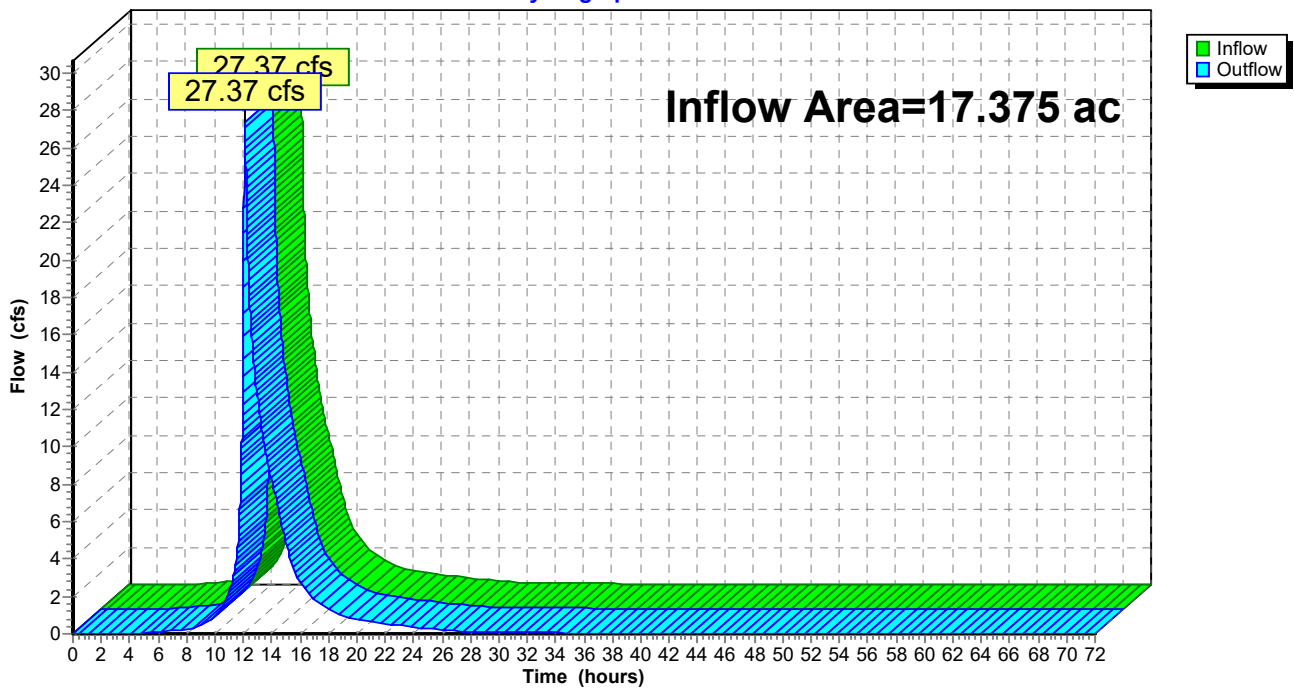
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 17.375 ac, 92.60% Impervious, Inflow Depth > 3.22" for 10-yr event
Inflow = 27.37 cfs @ 12.10 hrs, Volume= 4.666 af
Outflow = 27.37 cfs @ 12.10 hrs, Volume= 4.666 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach 12R: Proposed Runoff Total

Hydrograph



Summary for Pond 5P: SE Pond

Inflow Area = 3.181 ac, 86.09% Impervious, Inflow Depth = 3.09" for 10-yr event
 Inflow = 13.84 cfs @ 12.09 hrs, Volume= 0.819 af
 Outflow = 1.41 cfs @ 12.91 hrs, Volume= 0.819 af, Atten= 90%, Lag= 49.1 min
 Discarded = 0.27 cfs @ 12.91 hrs, Volume= 0.626 af
 Primary = 1.13 cfs @ 12.91 hrs, Volume= 0.193 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 870.35' @ 12.91 hrs Surf.Area= 7,247 sf Storage= 22,017 cf

Plug-Flow detention time= 667.2 min calculated for 0.819 af (100% of inflow)
 Center-of-Mass det. time= 667.3 min (1,448.7 - 781.4)

Volume	Invert	Avail.Storage	Storage Description
#1	865.75'	54,182 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.75	2,489	0	0
869.75	6,477	17,932	17,932
873.75	11,648	36,250	54,182

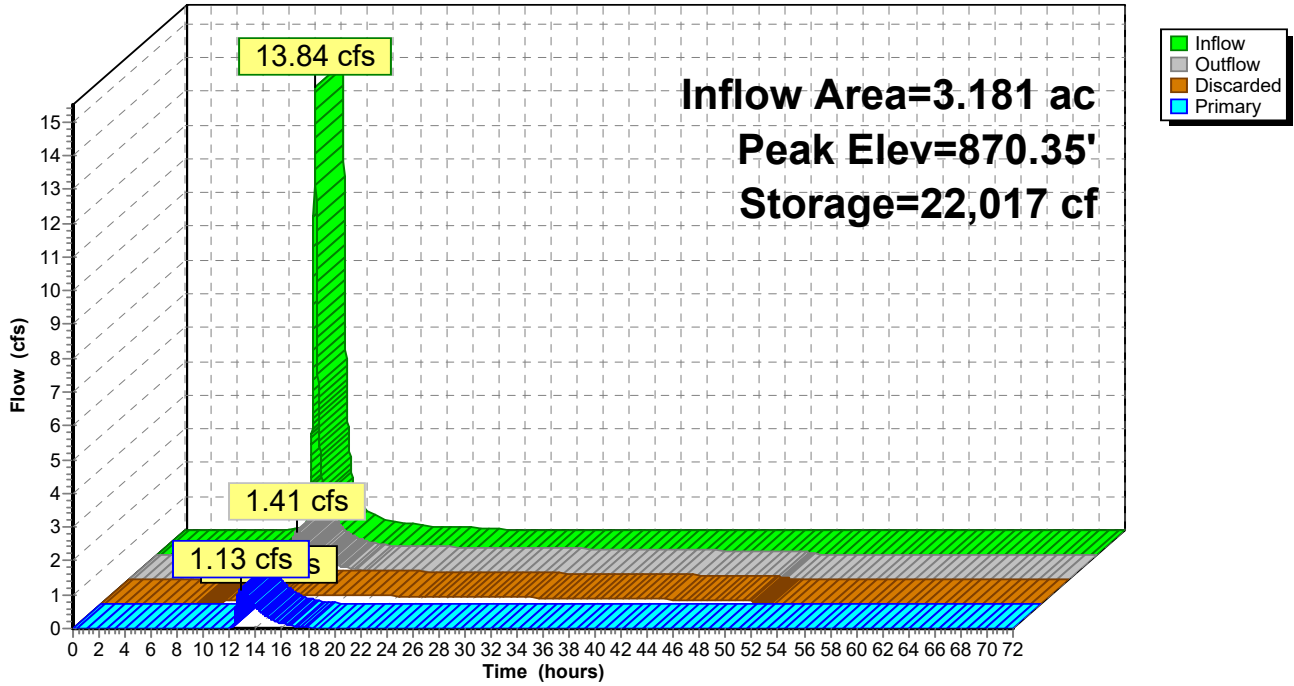
Device	Routing	Invert	Outlet Devices
#1	Discarded	865.75'	1.630 in/hr Exfiltration over Surface area
#2	Primary	869.75'	15.0" Round RCP_Round 15" L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 869.75' / 869.50' S= 0.0050 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.27 cfs @ 12.91 hrs HW=870.35' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.27 cfs)

Primary OutFlow Max=1.13 cfs @ 12.91 hrs HW=870.35' (Free Discharge)
 ↑2=RCP_Round 15" (Barrel Controls 1.13 cfs @ 2.88 fps)

Pond 5P: SE Pond

Hydrograph



Summary for Pond 7P: W Pond

[79] Warning: Submerged Pond 11P Primary device # 1 INLET by 1.80'

Inflow Area = 10.391 ac, 95.40% Impervious, Inflow Depth > 3.85" for 10-yr event
 Inflow = 18.82 cfs @ 12.10 hrs, Volume= 3.334 af
 Outflow = 13.10 cfs @ 12.33 hrs, Volume= 3.327 af, Atten= 30%, Lag= 14.0 min
 Primary = 13.10 cfs @ 12.33 hrs, Volume= 3.327 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Starting Elev= 862.50' Surf.Area= 6,038 sf Storage= 17,374 cf
 Peak Elev= 864.80' @ 12.33 hrs Surf.Area= 8,577 sf Storage= 34,191 cf (16,817 cf above start)

Plug-Flow detention time= 145.7 min calculated for 2.927 af (88% of inflow)
 Center-of-Mass det. time= 42.1 min (900.9 - 858.9)

Volume	Invert	Avail.Storage	Storage Description
#1	858.50'	170,920 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
858.50	2,649	0	0
862.50	6,038	17,374	17,374
866.50	10,452	32,980	50,354
877.00	12,513	120,566	170,920

Device	Routing	Invert	Outlet Devices
#1	Primary	862.50'	15.0" Round CMP_Round 15" L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 862.50' / 862.45' S= 0.0010 1/1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	866.00'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	863.25'	18.0" Round RCP_Round 18" L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 863.25' / 863.05' S= 0.0100 1/1' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=13.11 cfs @ 12.33 hrs HW=864.80' (Free Discharge)

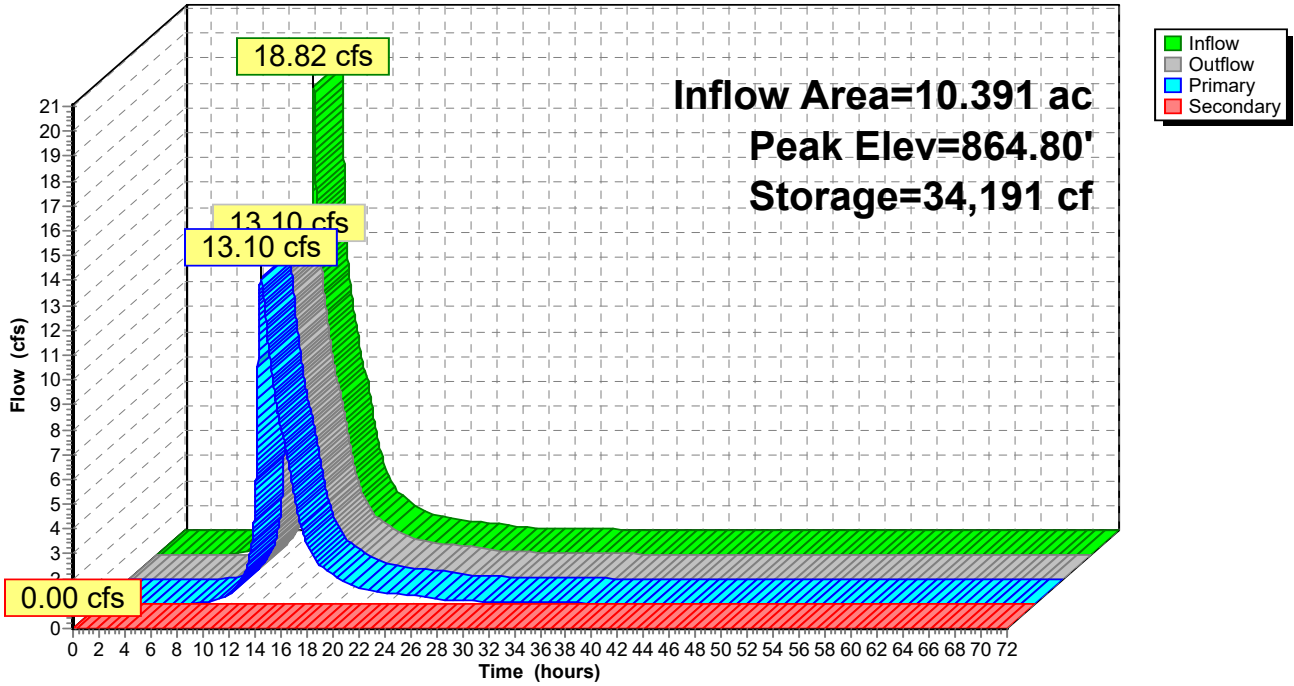
- ↑1=CMP_Round 15" (Barrel Controls 6.33 cfs @ 5.16 fps)
- ↑3=RCP_Round 18" (Barrel Controls 6.78 cfs @ 4.61 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=862.50' (Free Discharge)

- ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: W Pond

Hydrograph



Summary for Pond 11P: Underground

Inflow Area = 7.800 ac, 99.63% Impervious, Inflow Depth = 3.94" for 10-yr event
 Inflow = 39.70 cfs @ 12.08 hrs, Volume= 2.564 af
 Outflow = 8.65 cfs @ 12.47 hrs, Volume= 2.555 af, Atten= 78%, Lag= 23.2 min
 Primary = 8.65 cfs @ 12.47 hrs, Volume= 2.555 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Starting Elev= 863.00' Surf.Area= 18,200 sf Storage= 48,324 cf
 Peak Elev= 866.26' @ 12.47 hrs Surf.Area= 18,200 sf Storage= 99,878 cf (51,554 cf above start)

Plug-Flow detention time= 339.7 min calculated for 1.445 af (56% of inflow)
 Center-of-Mass det. time= 138.0 min (887.4 - 749.5)

Volume	Invert	Avail.Storage	Storage Description
#1	859.00'	42,703 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 200,200 cf Overall - 93,444 cf Embedded = 106,756 cf x 40.0% Voids
#2	860.00'	93,444 cf	96.0" Round Pipe Storage x 11 Inside #1 L= 169.0'
		136,146 cf	Total Available Storage

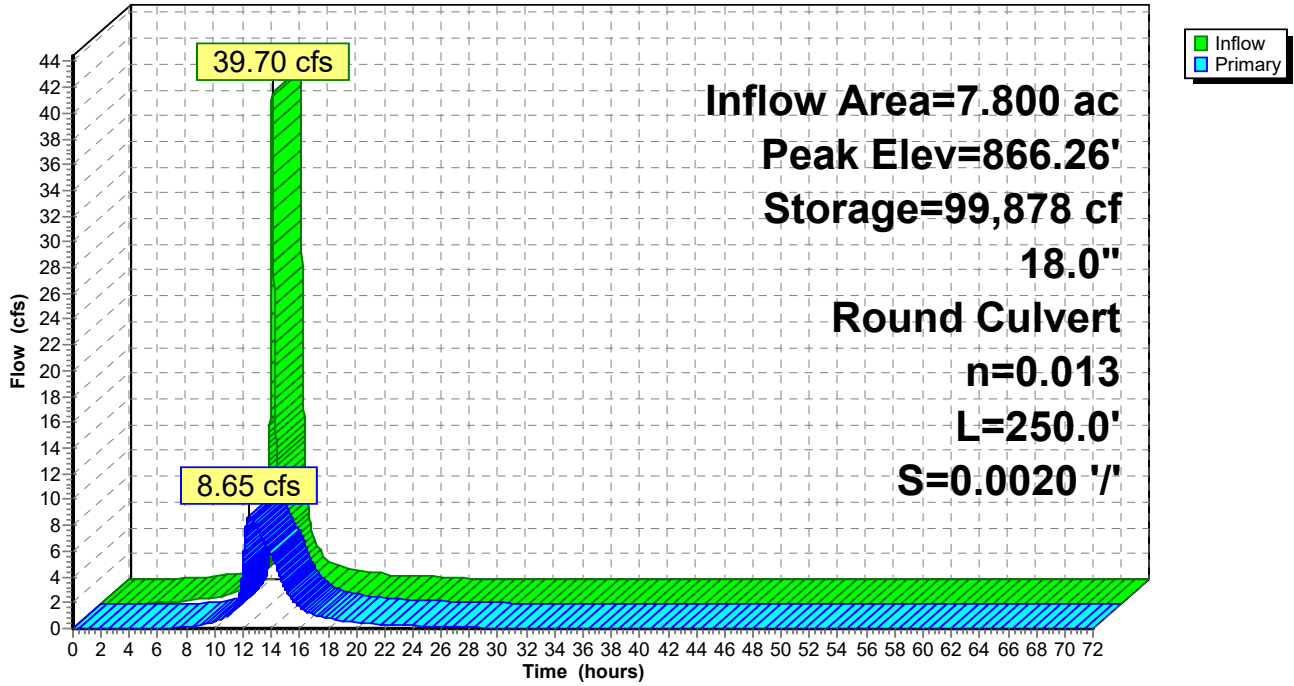
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
859.00	18,200	0	0
870.00	18,200	200,200	200,200

Device	Routing	Invert	Outlet Devices
#1	Primary	863.00'	18.0" Round CMP_Round 18" L= 250.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 863.00' / 862.50' S= 0.0020 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=8.65 cfs @ 12.47 hrs HW=866.26' (Free Discharge)
 ←1=CMP_Round 18" (Barrel Controls 8.65 cfs @ 4.89 fps)

Pond 11P: Underground

Hydrograph



Time span=0.00-72.00 hrs, dt=0.01 hrs, 7201 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 7S: SE Pond Runoff Area=138,549 sf 86.09% Impervious Runoff Depth=6.17"
Tc=10.0 min CN=90 Runoff=23.77 cfs 1.634 af

Subcatchment 8S: West Pond Runoff Area=2,591 ac 82.67% Impervious Runoff Depth=6.75"
Tc=10.0 min CN=95 Runoff=20.36 cfs 1.458 af

Subcatchment 9S: Off Site N Runoff Area=156,310 sf 95.80% Impervious Runoff Depth=6.99"
Tc=10.0 min CN=97 Runoff=28.53 cfs 2.091 af

Subcatchment 10S: Underground Runoff Area=339,768 sf 99.63% Impervious Runoff Depth=7.11"
Tc=10.0 min CN=98 Runoff=62.25 cfs 4.622 af

Subcatchment 13S: Off-site S Runoff Area=9,377 sf 0.00% Impervious Runoff Depth=0.90"
Tc=10.0 min CN=39 Runoff=0.13 cfs 0.016 af

Reach 12R: Proposed Runoff Total Inflow=47.57 cfs 9.128 af
Outflow=47.57 cfs 9.128 af

Pond 5P: SE Pond Peak Elev=871.91' Storage=34,919 cf Inflow=23.77 cfs 1.634 af
Discarded=0.35 cfs 0.677 af Primary=6.49 cfs 0.958 af Outflow=6.84 cfs 1.634 af

Pond 7P: W Pond Peak Elev=865.78' Storage=43,095 cf Inflow=29.81 cfs 6.071 af
Primary=20.03 cfs 6.063 af Secondary=0.00 cfs 0.000 af Outflow=20.03 cfs 6.063 af

Pond 11P: Underground Peak Elev=869.92' Storage=135,577 cf Inflow=62.25 cfs 4.622 af
18.0" Round Culvert n=0.013 L=250.0' S=0.0020 '/' Outflow=14.00 cfs 4.613 af

Total Runoff Area = 17.375 ac Runoff Volume = 9.821 af Average Runoff Depth = 6.78"
7.40% Pervious = 1.287 ac 92.60% Impervious = 16.089 ac

Summary for Subcatchment 7S: SE Pond

Runoff = 23.77 cfs @ 12.09 hrs, Volume= 1.634 af, Depth= 6.17"

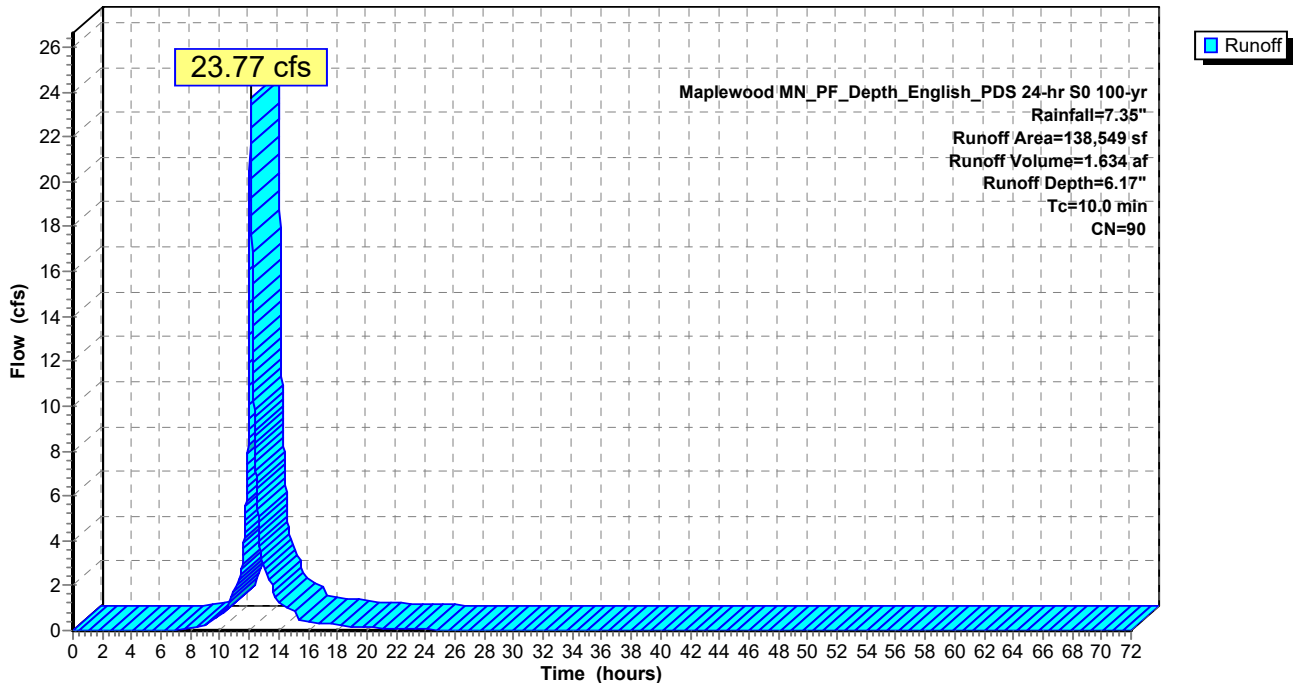
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 100-yr Rainfall=7.35"

Area (sf)	CN	Description
119,272	98	Paved parking, HSG A
19,277	39	>75% Grass cover, Good, HSG A
138,549	90	Weighted Average
19,277		13.91% Pervious Area
119,272		86.09% Impervious Area

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

Subcatchment 7S: SE Pond

Hydrograph



Summary for Subcatchment 8S: West Pond

Runoff = 20.36 cfs @ 12.08 hrs, Volume= 1.458 af, Depth= 6.75"

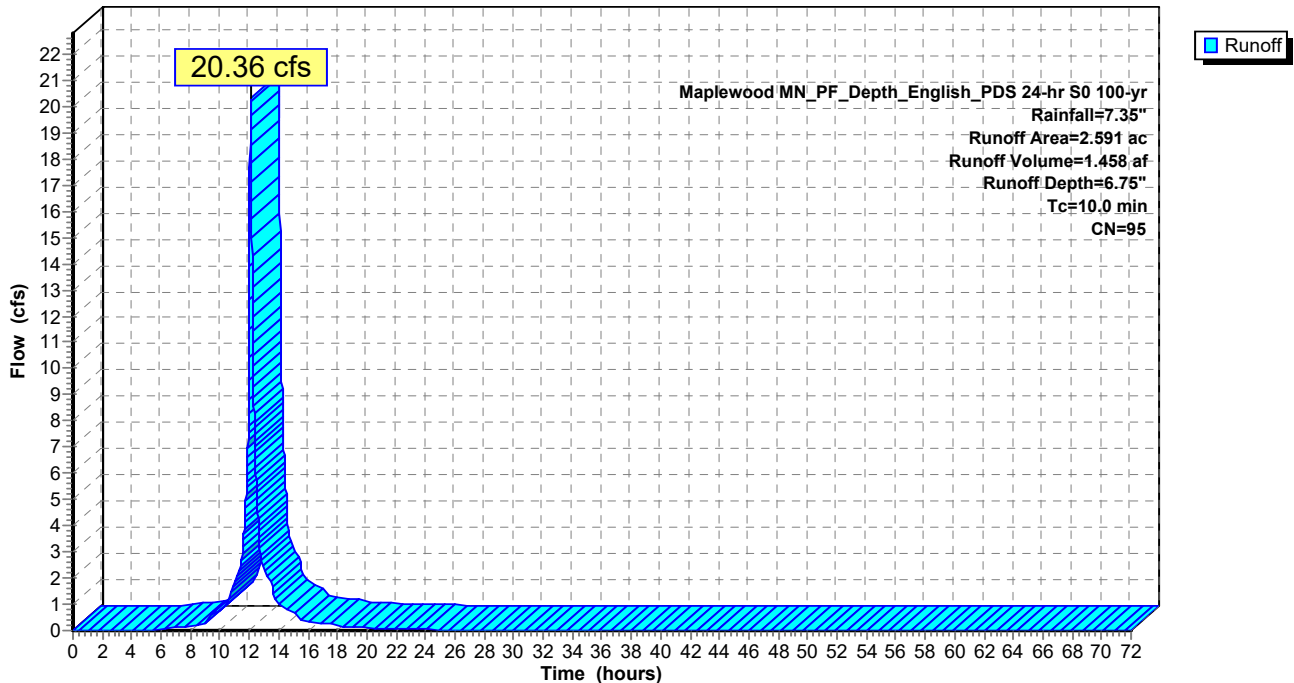
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 100-yr Rainfall=7.35"

Area (ac)	CN	Description
2.142	98	Paved parking, HSG D
0.449	80	>75% Grass cover, Good, HSG D
2.591	95	Weighted Average
0.449		17.33% Pervious Area
2.142		82.67% Impervious Area

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

Subcatchment 8S: West Pond

Hydrograph



Summary for Subcatchment 9S: Off Site N

Runoff = 28.53 cfs @ 12.08 hrs, Volume= 2.091 af, Depth= 6.99"

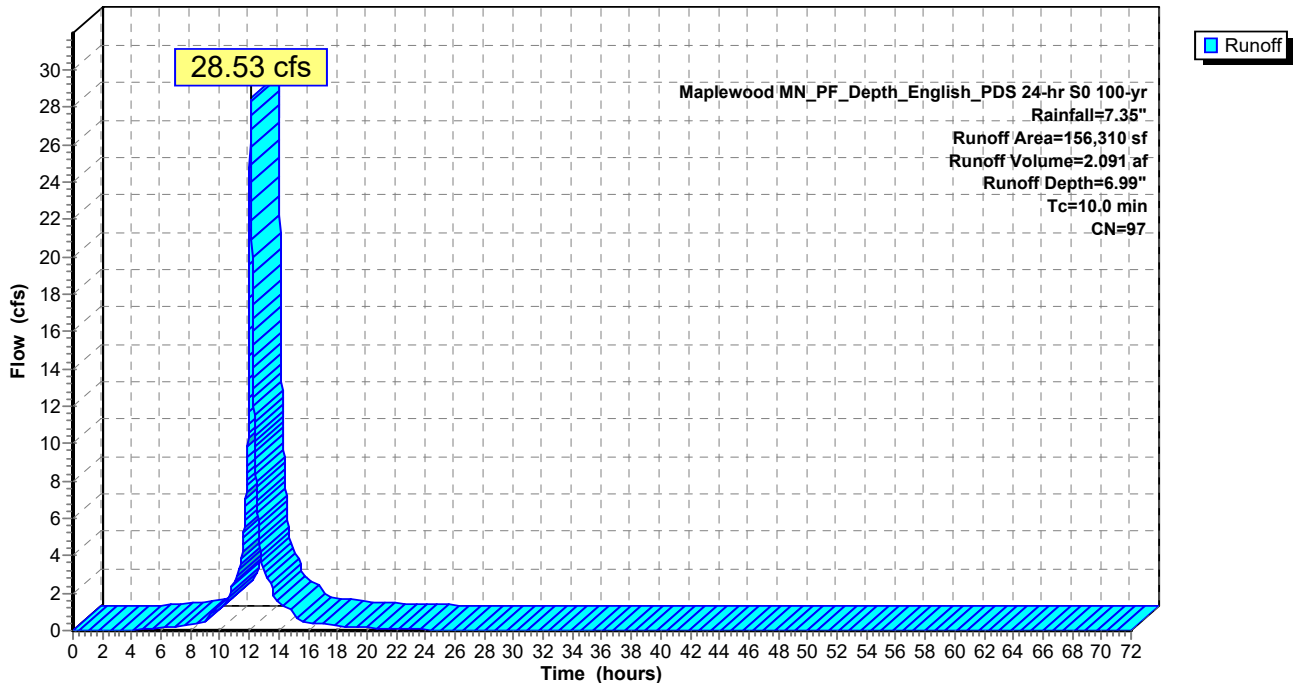
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 100-yr Rainfall=7.35"

Area (sf)	CN	Description
149,745	98	Paved parking, HSG D
6,565	80	>75% Grass cover, Good, HSG D
156,310	97	Weighted Average
6,565		4.20% Pervious Area
149,745		95.80% Impervious Area

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

Subcatchment 9S: Off Site N

Hydrograph



Summary for Subcatchment 10S: Underground

Runoff = 62.25 cfs @ 12.08 hrs, Volume= 4.622 af, Depth= 7.11"

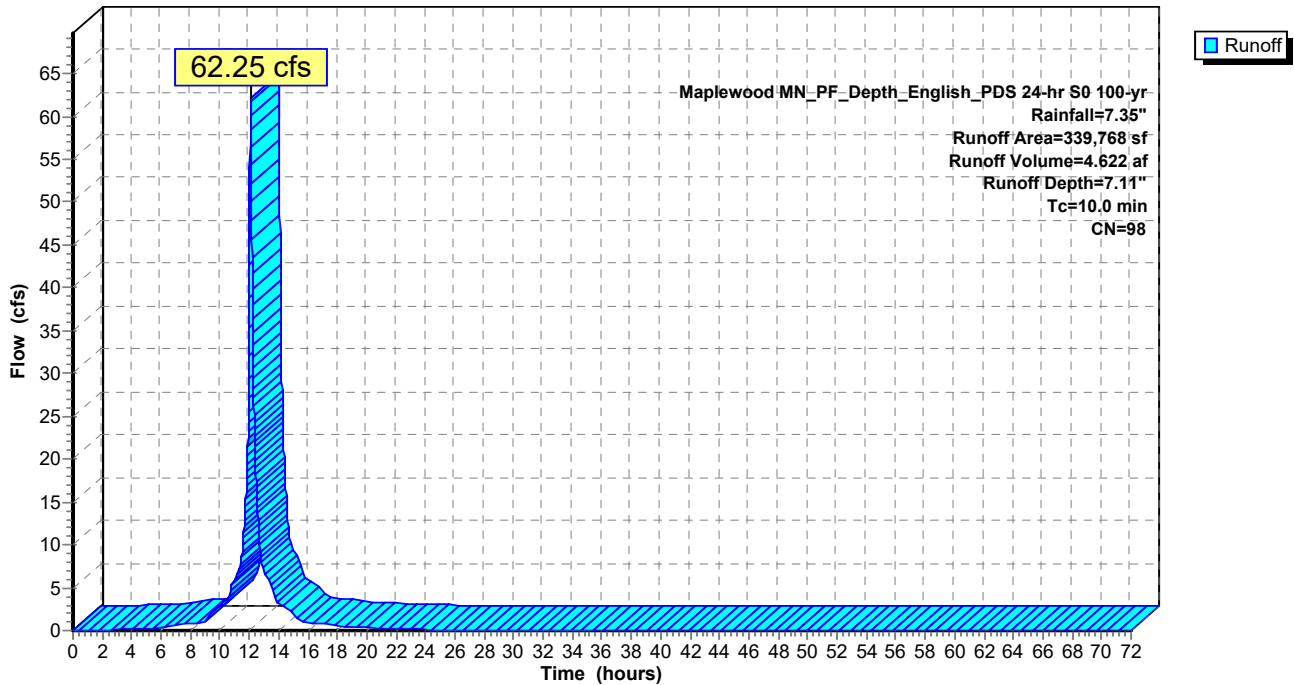
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 100-yr Rainfall=7.35"

Area (sf)	CN	Description
338,505	98	Paved parking, HSG D
1,263	80	>75% Grass cover, Good, HSG D
339,768	98	Weighted Average
1,263		0.37% Pervious Area
338,505		99.63% Impervious Area

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

Subcatchment 10S: Underground

Hydrograph



Summary for Subcatchment 13S: Off-site S

Runoff = 0.13 cfs @ 12.19 hrs, Volume= 0.016 af, Depth= 0.90"

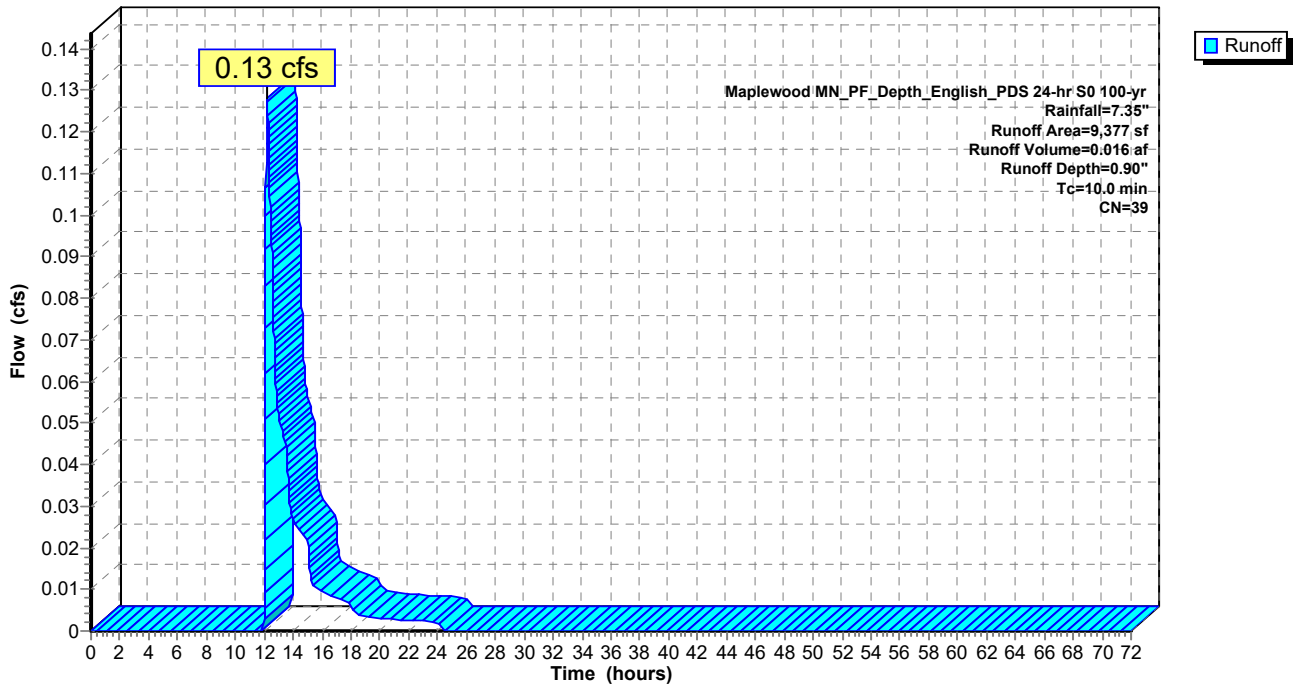
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Maplewood MN_PF_Depth_English_PDS 24-hr S0 100-yr Rainfall=7.35"

Area (sf)	CN	Description
9,377	39	>75% Grass cover, Good, HSG A
9,377		100.00% Pervious Area

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

Subcatchment 13S: Off-site S

Hydrograph



Summary for Reach 12R: Proposed Runoff Total

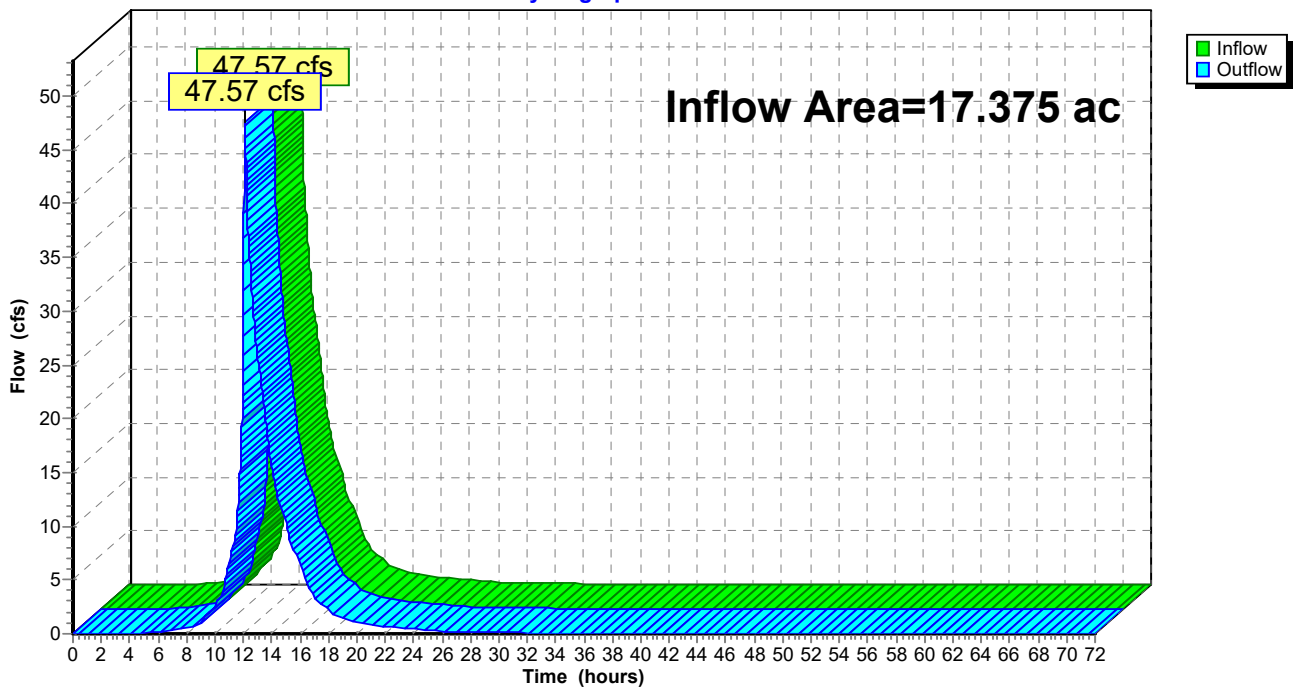
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 17.375 ac, 92.60% Impervious, Inflow Depth > 6.30" for 100-yr event
Inflow = 47.57 cfs @ 12.11 hrs, Volume= 9.128 af
Outflow = 47.57 cfs @ 12.11 hrs, Volume= 9.128 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Reach 12R: Proposed Runoff Total

Hydrograph



Summary for Pond 5P: SE Pond

Inflow Area = 3.181 ac, 86.09% Impervious, Inflow Depth = 6.17" for 100-yr event
 Inflow = 23.77 cfs @ 12.09 hrs, Volume= 1.634 af
 Outflow = 6.84 cfs @ 12.46 hrs, Volume= 1.634 af, Atten= 71%, Lag= 22.2 min
 Discarded = 0.35 cfs @ 12.46 hrs, Volume= 0.677 af
 Primary = 6.49 cfs @ 12.46 hrs, Volume= 0.958 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 871.91' @ 12.46 hrs Surf.Area= 9,267 sf Storage= 34,919 cf

Plug-Flow detention time= 379.3 min calculated for 1.634 af (100% of inflow)
 Center-of-Mass det. time= 379.5 min (1,143.3 - 763.8)

Volume	Invert	Avail.Storage	Storage Description
#1	865.75'	54,182 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
865.75	2,489	0	0
869.75	6,477	17,932	17,932
873.75	11,648	36,250	54,182

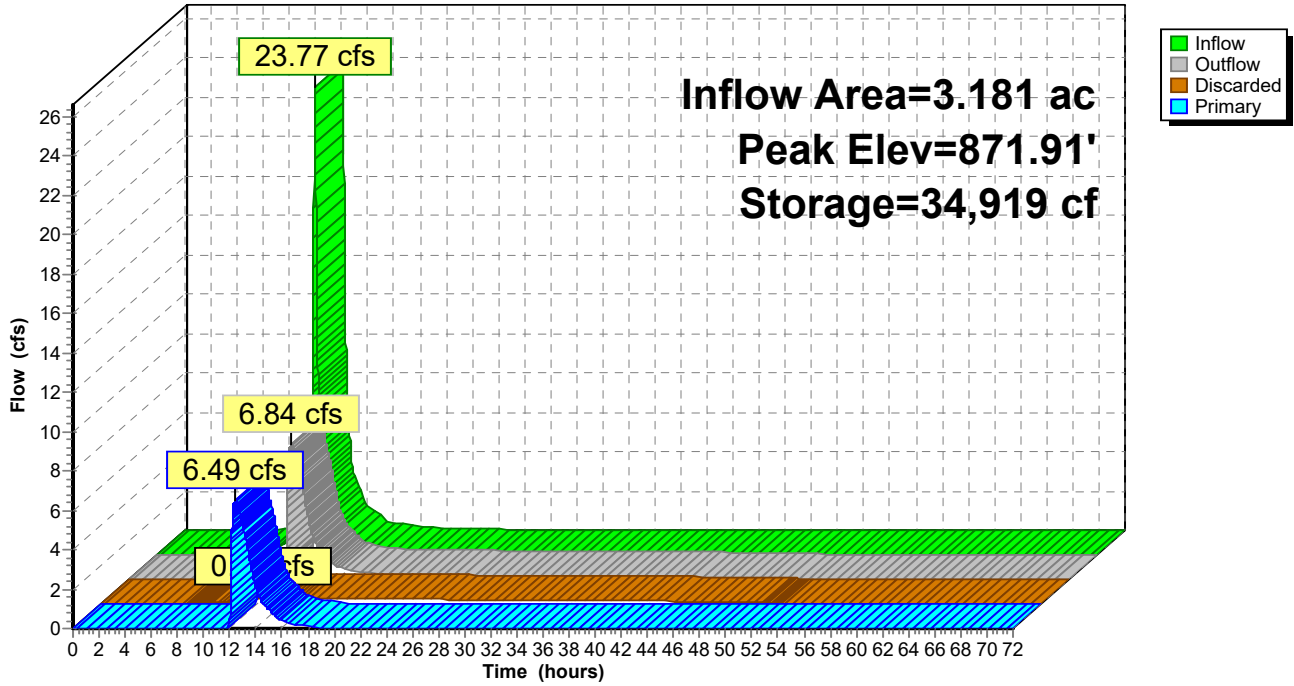
Device	Routing	Invert	Outlet Devices
#1	Discarded	865.75'	1.630 in/hr Exfiltration over Surface area
#2	Primary	869.75'	15.0" Round RCP_Round 15" L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 869.75' / 869.50' S= 0.0050 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf

Discarded OutFlow Max=0.35 cfs @ 12.46 hrs HW=871.91' (Free Discharge)
 ↑1=Exfiltration (Exfiltration Controls 0.35 cfs)

Primary OutFlow Max=6.49 cfs @ 12.46 hrs HW=871.91' (Free Discharge)
 ↑2=RCP_Round 15" (Barrel Controls 6.49 cfs @ 5.29 fps)

Pond 5P: SE Pond

Hydrograph



Summary for Pond 7P: W Pond

[79] Warning: Submerged Pond 11P Primary device # 1 INLET by 2.78'

Inflow Area = 10.391 ac, 95.40% Impervious, Inflow Depth > 7.01" for 100-yr event
 Inflow = 29.81 cfs @ 12.10 hrs, Volume= 6.071 af
 Outflow = 20.03 cfs @ 12.41 hrs, Volume= 6.063 af, Atten= 33%, Lag= 19.1 min
 Primary = 20.03 cfs @ 12.41 hrs, Volume= 6.063 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Starting Elev= 862.50' Surf.Area= 6,038 sf Storage= 17,374 cf
 Peak Elev= 865.78' @ 12.41 hrs Surf.Area= 9,655 sf Storage= 43,095 cf (25,721 cf above start)

Plug-Flow detention time= 93.5 min calculated for 5.664 af (93% of inflow)
 Center-of-Mass det. time= 32.6 min (868.7 - 836.1)

Volume	Invert	Avail.Storage	Storage Description
#1	858.50'	170,920 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
858.50	2,649	0	0
862.50	6,038	17,374	17,374
866.50	10,452	32,980	50,354
877.00	12,513	120,566	170,920

Device	Routing	Invert	Outlet Devices
#1	Primary	862.50'	15.0" Round CMP_Round 15" L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 862.50' / 862.45' S= 0.0010 1/1' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Secondary	866.00'	10.0' long x 10.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#3	Primary	863.25'	18.0" Round RCP_Round 18" L= 20.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 863.25' / 863.05' S= 0.0100 1/1' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 1.77 sf

Primary OutFlow Max=20.04 cfs @ 12.41 hrs HW=865.78' (Free Discharge)

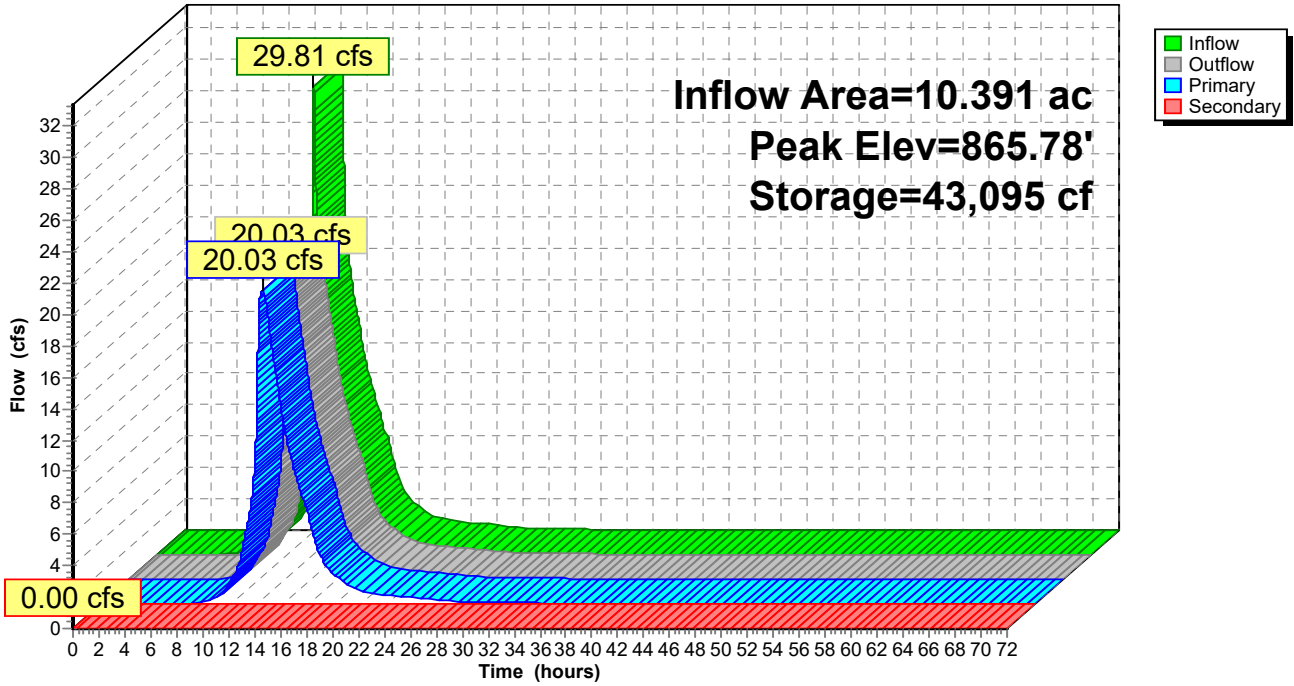
- ↑1=CMP_Round 15" (Barrel Controls 8.69 cfs @ 7.08 fps)
- ↑3=RCP_Round 18" (Inlet Controls 11.35 cfs @ 6.42 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=862.50' (Free Discharge)

- ↑2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 7P: W Pond

Hydrograph



Summary for Pond 11P: Underground

Inflow Area = 7.800 ac, 99.63% Impervious, Inflow Depth = 7.11" for 100-yr event
 Inflow = 62.25 cfs @ 12.08 hrs, Volume= 4.622 af
 Outflow = 14.00 cfs @ 12.57 hrs, Volume= 4.613 af, Atten= 78%, Lag= 29.4 min
 Primary = 14.00 cfs @ 12.57 hrs, Volume= 4.613 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Starting Elev= 863.00' Surf.Area= 18,200 sf Storage= 48,324 cf
 Peak Elev= 869.92' @ 12.57 hrs Surf.Area= 18,200 sf Storage= 135,577 cf (87,254 cf above start)

Plug-Flow detention time= 232.2 min calculated for 3.503 af (76% of inflow)
 Center-of-Mass det. time= 121.2 min (862.7 - 741.5)

Volume	Invert	Avail.Storage	Storage Description
#1	859.00'	42,703 cf	Custom Stage Data (Prismatic) Listed below (Recalc) 200,200 cf Overall - 93,444 cf Embedded = 106,756 cf x 40.0% Voids
#2	860.00'	93,444 cf	96.0" Round Pipe Storage x 11 Inside #1 L= 169.0'
		136,146 cf	Total Available Storage

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
859.00	18,200	0	0
870.00	18,200	200,200	200,200

Device	Routing	Invert	Outlet Devices
#1	Primary	863.00'	18.0" Round CMP_Round 18" L= 250.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 863.00' / 862.50' S= 0.0020 ' / ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Primary OutFlow Max=14.00 cfs @ 12.57 hrs HW=869.92' (Free Discharge)
 ←1=CMP_Round 18" (Barrel Controls 14.00 cfs @ 7.93 fps)

Pond 11P: Underground

Hydrograph

