

DRAINAGE REPORT

November 19, 2023

Property Located at:

220 Pennsylvania Ave
East Lyme, CT

Applicant/Owner:

PETRIT MARKU
57 E. MAIN STREET
MYSTIC, CT 06355

Prepared By:

Timothy A. May, P.E.
May Engineering, LLC
1297 Route 163
Oakdale, CT 03670



The proposed resubdivision is located at 220 Pennsylvania Ave in the town of East Lyme, CT. The 4.27-acre parcel has a previously approved site plan for a single family residential lot. The site is partially developed with a residential home, pave driveway and associated utilities. The proposed site development plan is to resubdivide the 4.27-ac parcel into four parcels. The parcel is located in the RU-40/20 zone. The applicant/owner is Petrit Mark, 57 E. Main St. Mystic, CT 06355.

SITE DESCRIPTION:

The 4.27-acre parcel, which is described as a wooded lot with grass fields, is located on the west side of Pennsylvania Ave, in the Town of East Lyme, CT. There are no wetlands or water courses located on this parcel. The soil type is primarily a hydraulic soil group A, consisting of Merrimac, a fine sandy loam. The soil types were evaluated for their exceptional stormwater permeability, and have a high infiltration rate. The existing stormwater drainage flow path is across the parcel in a southeasterly direction toward Little Dodge Pond. No evidence of any channelized flow is observed. A majority of stormwater is typically retained onsite due to the physical topography of the parcel and the high infiltration rate of the soil type.

METHODOLOGY AND RESULTS:

Drainage Analysis:

The SCS TR-20 drainage analysis method is used to determine the peak stormwater runoff flow and runoff volume amounts. The storm frequency values used for the calculations herein include the 2-year, 5-year 10-year, 25-year, 50-year and 100-year storm rainfall event. The stormwater model software used for this analysis is HydroCAD 10.00-22 in which the SCS TR-20 method was used.

The proposed developed area has a drainage sub-catchment area of 4.92 ac.

Existing 214,315 sf 4.92 ac
-wooded 157,184 sf (73.3%)
-grass 48,010 sf (22.4%)
-Impervious 9,121sf (4.3%)
CN 64 Weighted Average

Proposed 214,315 sf 42.7 ac
-wooded 135,339 (63.1%)
-grass 57,135 sf (26.7%)
-Impervious 21,841 (10.2%)
roof 7,541 sf note: All roof drains will flow into rain gardens
driveway 14,300 sf
CN 62 Weighted Average

These percentages are used to develop the weighted CN values which determine the stormwater runoff amounts for each storm event. The proposed development has an overall increase in lawn (grassed) area. The roof downspouts are diverted to rain gardens and stormwater infiltration ditches along the common driveway slows stormwater velocities and allows greater time for stormwater infiltration. These design features are best management practices (BMPs) that slow the stormwater down and increase the grounds ability to infiltrate stormwater. In addition, the overall slope of the site is decreased slightly and the time of concentration for each storm event is increased, resulting in an

overall Stormwater Peak flow average reduction of 23% and reduction of stormwater runoff volumes of 10%.

The reduction of stormwater Water Quality Volumes (WQV) and Water Quality Flow (WQF) demonstrate good stormwater management. The stormwater peak flow and runoff volumes tabulated results for the existing and proposed development conditions are listed below:

4.92 ac Drainage Area

220 Pennsylvania Ave

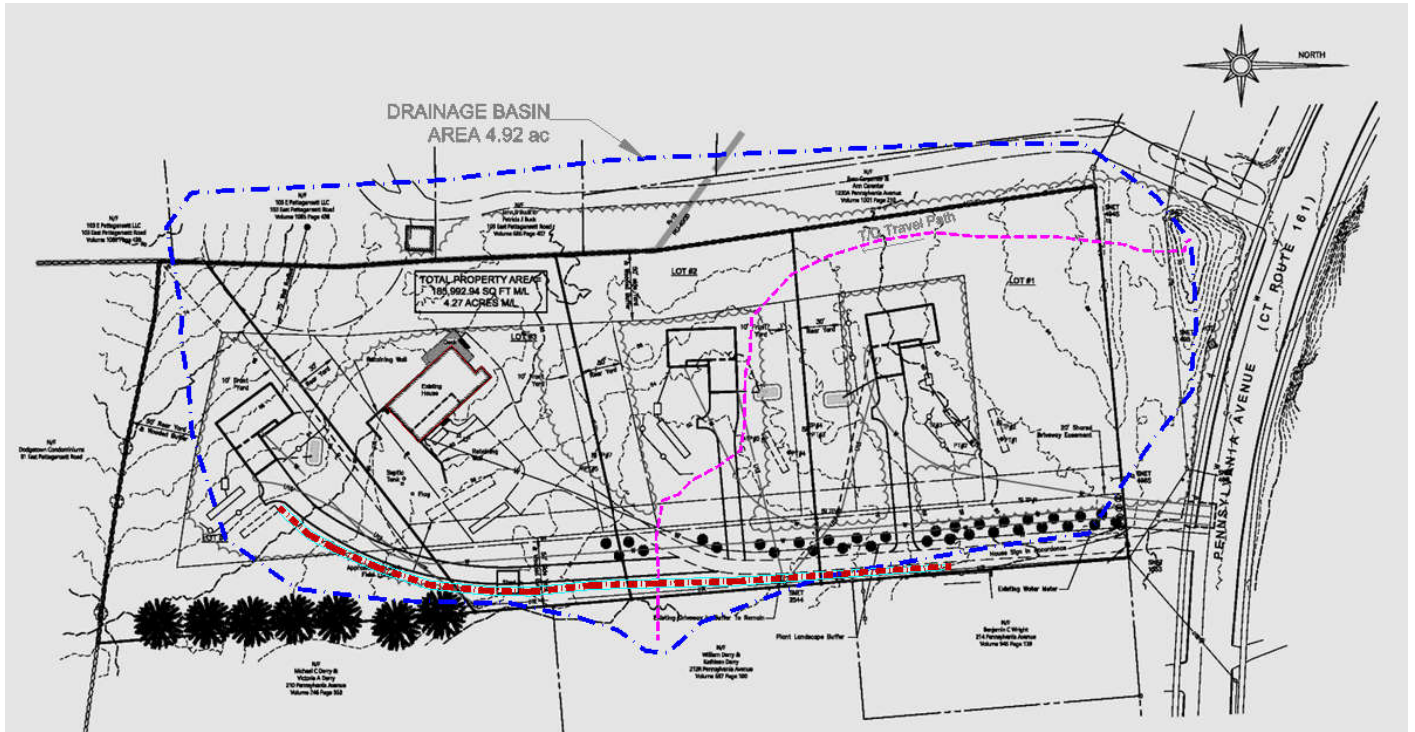
STORM EVENT

		2 yr	5 yr	10 yr	25 yr	50 yr	100 yr
<u>Existing Area</u>	Peak Flow (CFS)	2.10	4.15	5.47	8.01	9.81	12.31
	Runoff Volume (AF)	0.237	0.422	0.538	0.767	0.930	1.160
<u>Proposed Area Developed</u>	Peak Flow (CFS)	1.49	3.13	4.19	6.27	7.76	9.86
	Runoff Volume (AF)	0.204	0.375	0.484	0.701	0.857	1.077
<i>Peak Flow Reduction</i>		29%	25%	23%	22%	21%	20%
<i>Runoff vol.</i>		14%	11%	10%	9%	8%	7%

SUMMARY

The proposed resubdivision and site development plan for 220 Pennsylvania Ave. East Lyme, CT demonstrates that stormwater runoff is managed using BMPs that reduce and retain WQV, using rain gardens, increase grassed areas, and infiltration ditches along the paved driveways that provide an overall increase in stormwater infiltration. The WQF is reduced as well, by the use of rain gardens and infiltration trenches along paved drives. This provide, pollutant and stormwater velocity reductions.

Drainage Area



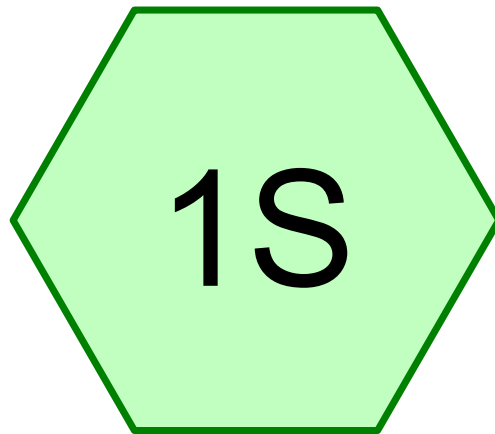
May
Engineering, LLC

Civil Engineering, Site Planning, and Consulting

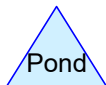
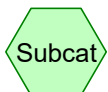
1297 RT 163 Oakdale, CT 06370 Cell: 860 884-9671 Email: mayengineering@sbcglobal.net

APPENDIX:

STORMWATER DRAINAGE MODEL – HydroCAD ANALYSIS



Existing



220 Penn Ave Marku Re_Sub Existing

Prepared by May Engineering, LLC Timothy May, PE

Printed 11/20/2023

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.102	49	50-75% Grass cover, Fair, HSG A (1S)
3.608	67	Brush, Poor, HSG B (1S)
0.210	98	Paved Drive & roofs, HSG A (1S)
4.920	64	TOTAL AREA

Summary for Subcatchment 1S: Existing

Runoff = 2.10 cfs @ 12.31 hrs, Volume= 0.237 af, Depth> 0.58"

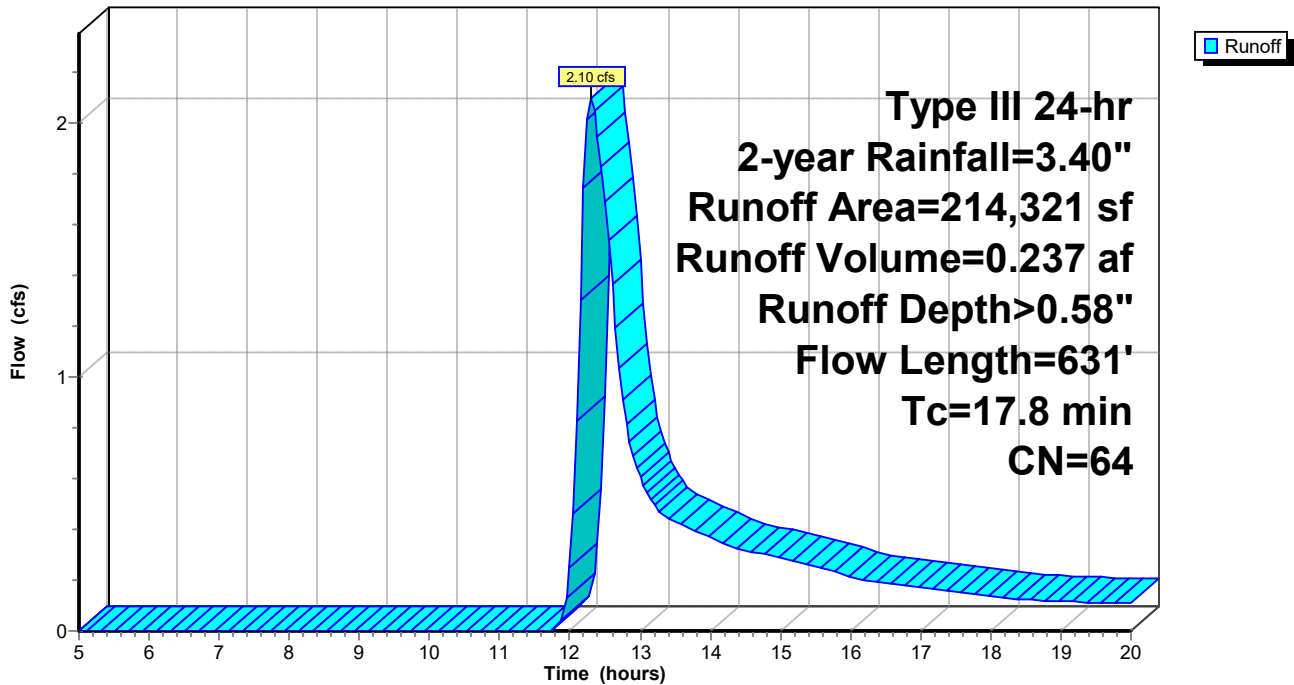
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 2-year Rainfall=3.40"

Area (sf)	CN	Description
157,184	67	Brush, Poor, HSG B
48,010	49	50-75% Grass cover, Fair, HSG A
* 9,127	98	Paved Drive & roofs, HSG A
214,321	64	Weighted Average
205,194		95.74% Pervious Area
9,127		4.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	20	0.0200	0.06		Sheet Flow, Sheet Flow
12.0	611	0.0290	0.85		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc Woodland Kv= 5.0 fps
17.8	631	Total			

Subcatchment 1S: Existing

Hydrograph



Summary for Subcatchment 1S: Existing

Runoff = 4.15 cfs @ 12.28 hrs, Volume= 0.422 af, Depth> 1.03"

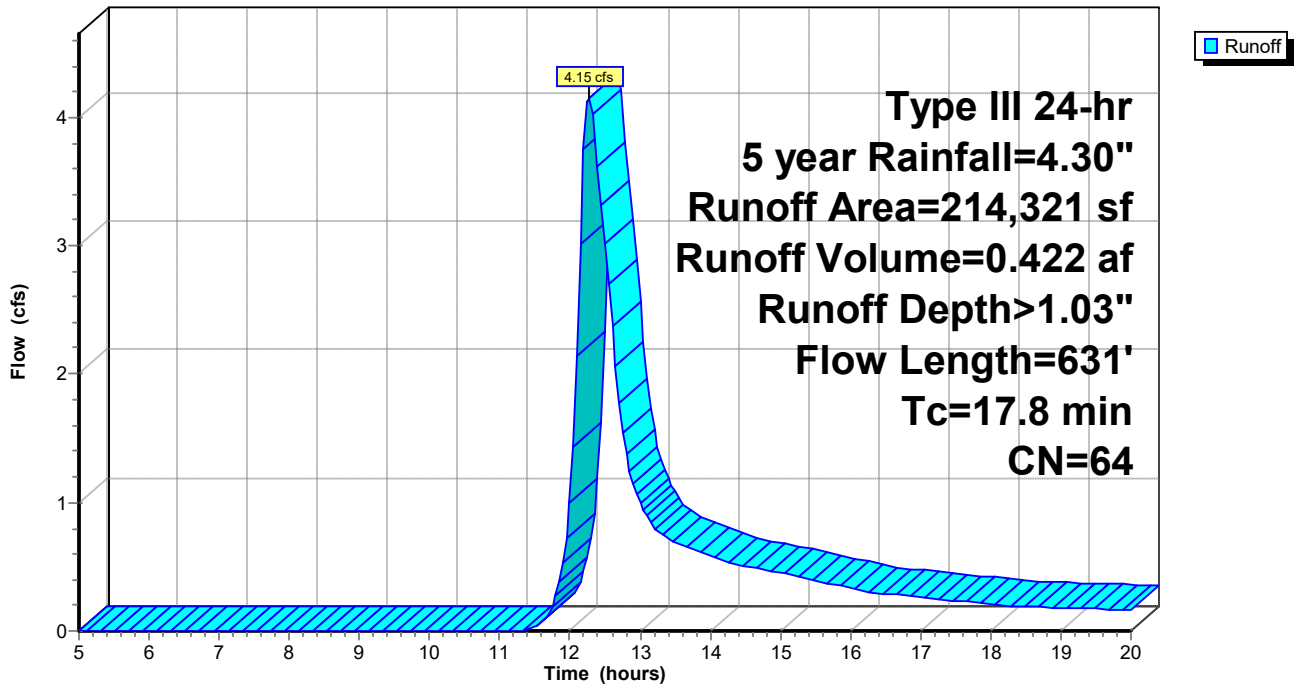
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 5 year Rainfall=4.30"

Area (sf)	CN	Description
157,184	67	Brush, Poor, HSG B
48,010	49	50-75% Grass cover, Fair, HSG A
* 9,127	98	Paved Drive & roofs, HSG A
214,321	64	Weighted Average
205,194		95.74% Pervious Area
9,127		4.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	20	0.0200	0.06		Sheet Flow, Sheet Flow
12.0	611	0.0290	0.85		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc Woodland Kv= 5.0 fps
17.8	631	Total			

Subcatchment 1S: Existing

Hydrograph



Summary for Subcatchment 1S: Existing

Runoff = 5.47 cfs @ 12.27 hrs, Volume= 0.538 af, Depth> 1.31"

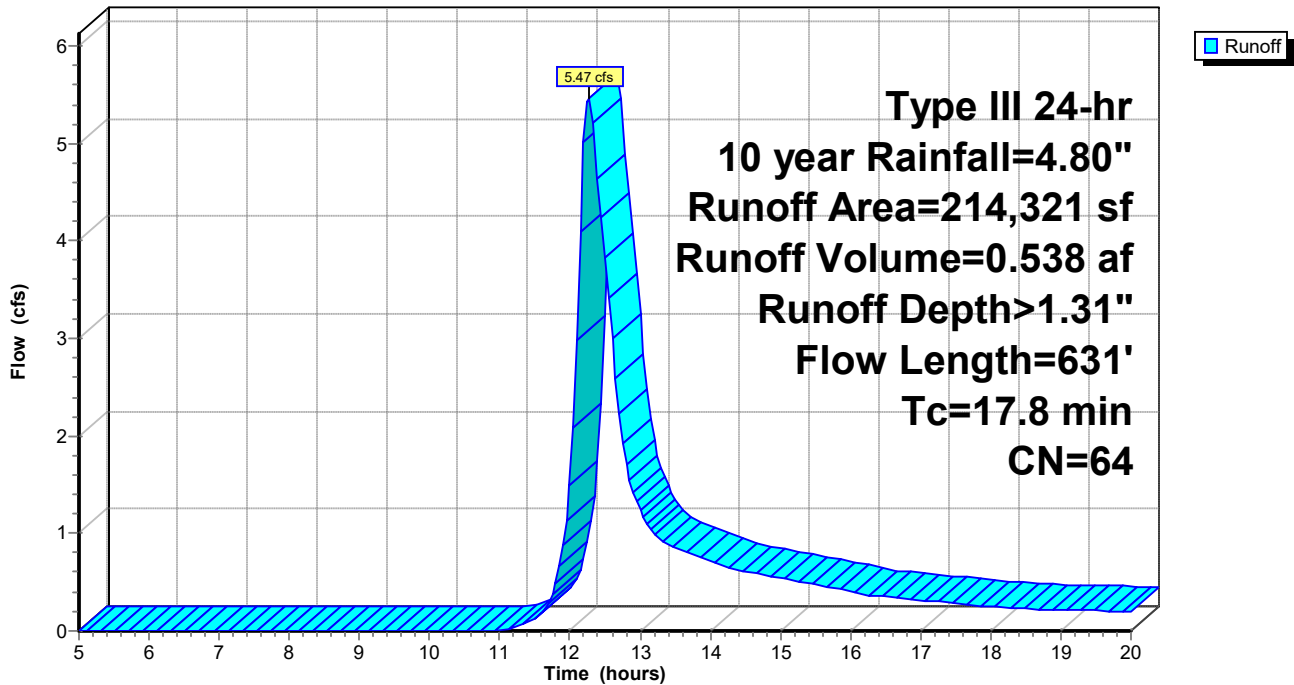
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
157,184	67	Brush, Poor, HSG B
48,010	49	50-75% Grass cover, Fair, HSG A
* 9,127	98	Paved Drive & roofs, HSG A
214,321	64	Weighted Average
205,194		95.74% Pervious Area
9,127		4.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	20	0.0200	0.06		Sheet Flow, Sheet Flow
12.0	611	0.0290	0.85		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc Woodland Kv= 5.0 fps
17.8	631	Total			

Subcatchment 1S: Existing

Hydrograph



Summary for Subcatchment 1S: Existing

Runoff = 8.01 cfs @ 12.26 hrs, Volume= 0.767 af, Depth> 1.87"

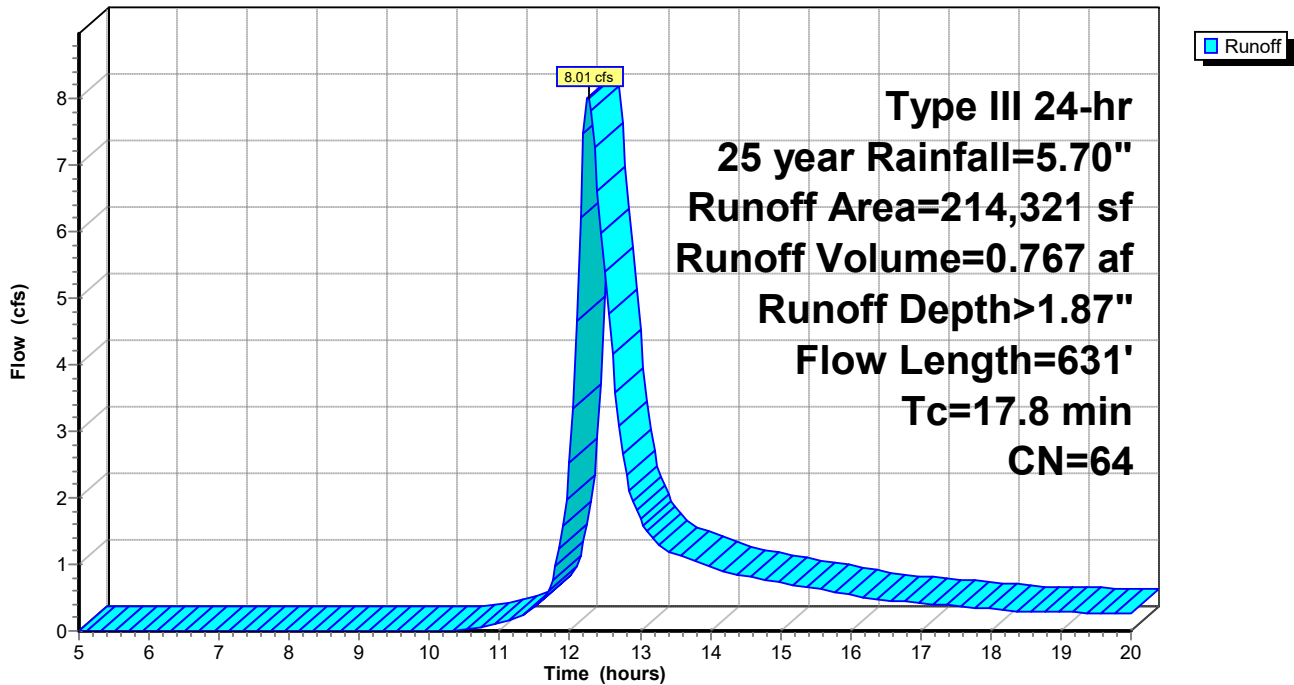
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25 year Rainfall=5.70"

Area (sf)	CN	Description
157,184	67	Brush, Poor, HSG B
48,010	49	50-75% Grass cover, Fair, HSG A
* 9,127	98	Paved Drive & roofs, HSG A
214,321	64	Weighted Average
205,194		95.74% Pervious Area
9,127		4.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	20	0.0200	0.06		Sheet Flow, Sheet Flow
12.0	611	0.0290	0.85		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc Woodland Kv= 5.0 fps
17.8	631	Total			

Subcatchment 1S: Existing

Hydrograph



Summary for Subcatchment 1S: Existing

Runoff = 9.81 cfs @ 12.26 hrs, Volume= 0.930 af, Depth> 2.27"

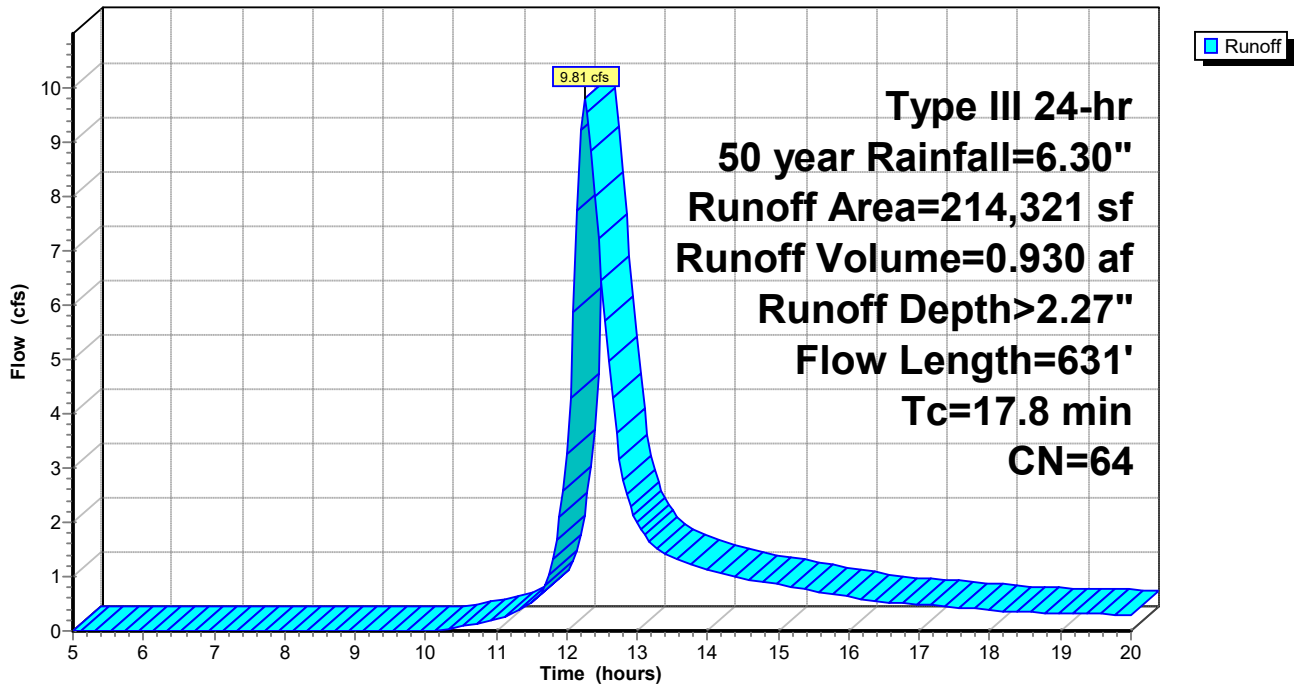
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 50 year Rainfall=6.30"

Area (sf)	CN	Description
157,184	67	Brush, Poor, HSG B
48,010	49	50-75% Grass cover, Fair, HSG A
* 9,127	98	Paved Drive & roofs, HSG A
214,321	64	Weighted Average
205,194		95.74% Pervious Area
9,127		4.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	20	0.0200	0.06		Sheet Flow, Sheet Flow
12.0	611	0.0290	0.85		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc Woodland Kv= 5.0 fps
17.8	631	Total			

Subcatchment 1S: Existing

Hydrograph



Summary for Subcatchment 1S: Existing

Runoff = 12.32 cfs @ 12.26 hrs, Volume= 1.160 af, Depth> 2.83"

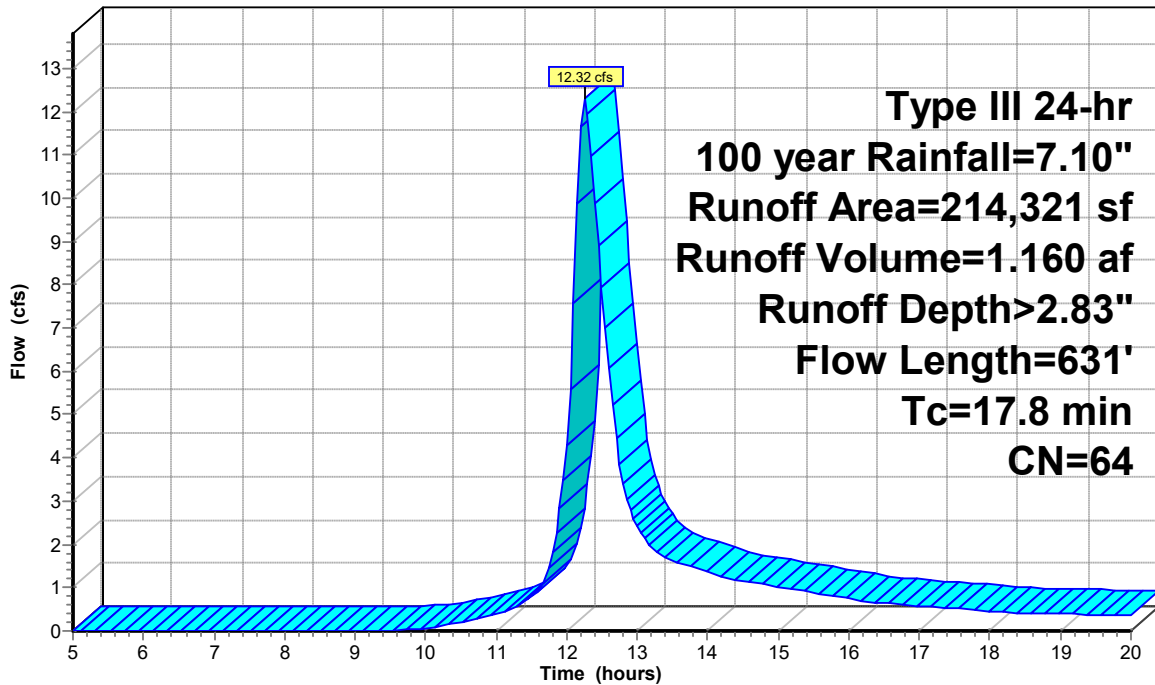
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100 year Rainfall=7.10"

Area (sf)	CN	Description
157,184	67	Brush, Poor, HSG B
48,010	49	50-75% Grass cover, Fair, HSG A
* 9,127	98	Paved Drive & roofs, HSG A
214,321	64	Weighted Average
205,194		95.74% Pervious Area
9,127		4.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.8	20	0.0200	0.06		Sheet Flow, Sheet Flow
12.0	611	0.0290	0.85		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc Woodland Kv= 5.0 fps
17.8	631	Total			

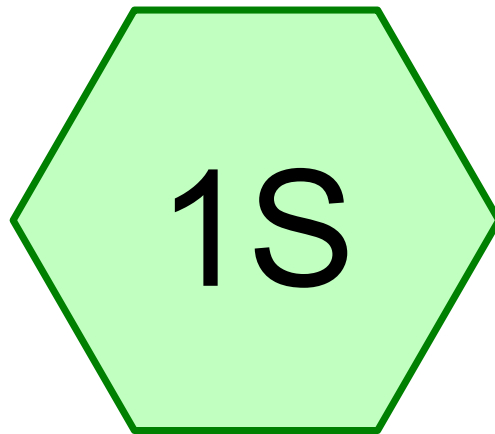
Subcatchment 1S: Existing

Hydrograph

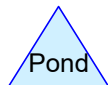
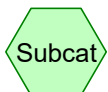


Runoff

**Type III 24-hr
 100 year Rainfall=7.10"
 Runoff Area=214,321 sf
 Runoff Volume=1.160 af
 Runoff Depth>2.83"
 Flow Length=631'
 Tc=17.8 min
 CN=64**



Proposed



220 Penn Ave Marku Re_Sub Proposed

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.312	49	50-75% Grass cover, Fair, HSG A (1S)
3.107	67	Brush, Poor, HSG B (1S)
0.173	25	Connected to Rain Garden Good, HSG A (1S)
0.328	83	Paved roads w/open ditches, 50% imp, HSG A (1S)
4.920	62	TOTAL AREA

Summary for Subcatchment 1S: Proposed

Runoff = 1.49 cfs @ 12.46 hrs, Volume= 0.204 af, Depth> 0.50"

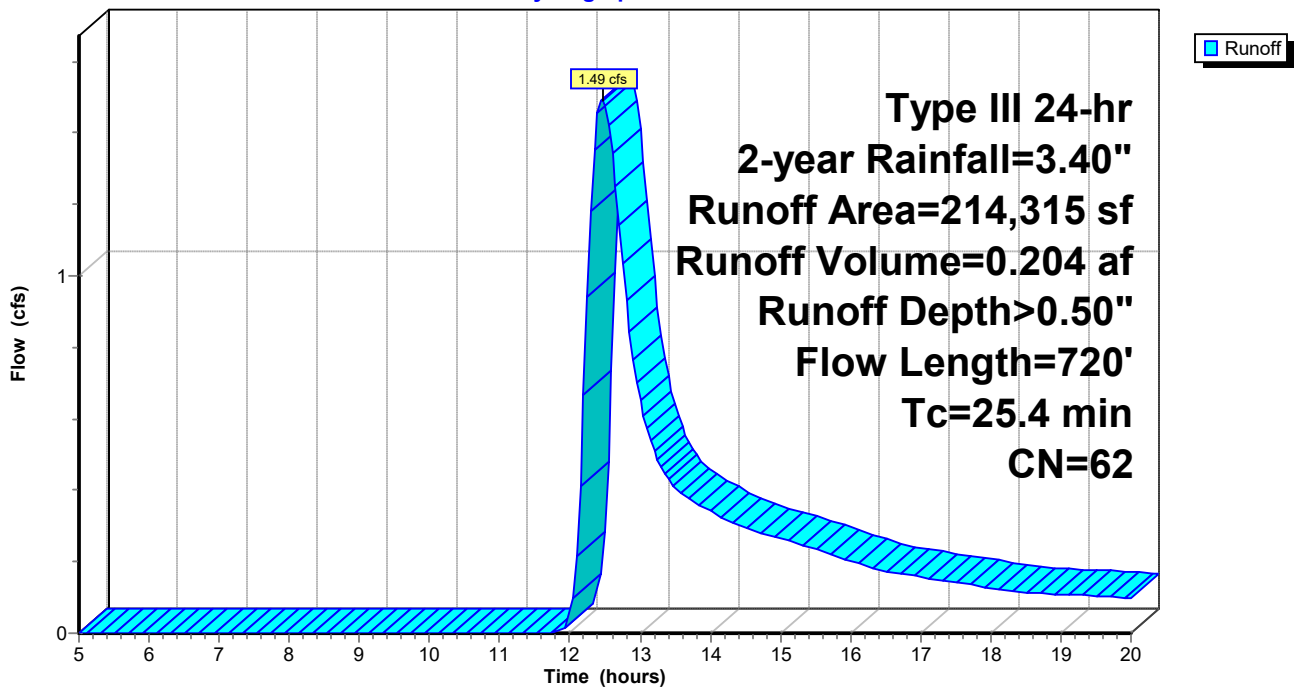
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.40"

Area (sf)	CN	Description
135,339	67	Brush, Poor, HSG B
57,135	49	50-75% Grass cover, Fair, HSG A
14,300	83	Paved roads w/open ditches, 50% imp, HSG A
* 7,541	25	Connected to Rain Garden Good, HSG A
214,315	62	Weighted Average
207,165		96.66% Pervious Area
7,150		3.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	45	0.0100	0.05		Sheet Flow, Sheet Flow
10.8	675	0.0220	1.04		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc
					Short Grass Pasture Kv= 7.0 fps
25.4	720	Total			

Subcatchment 1S: Proposed

Hydrograph



220 Penn Ave Marku Re_Sub Proposed

Type III 24-hr 5 year Rainfall=4.30"

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Summary for Subcatchment 1S: Proposed

Runoff = 3.13 cfs @ 12.41 hrs, Volume= 0.375 af, Depth> 0.91"

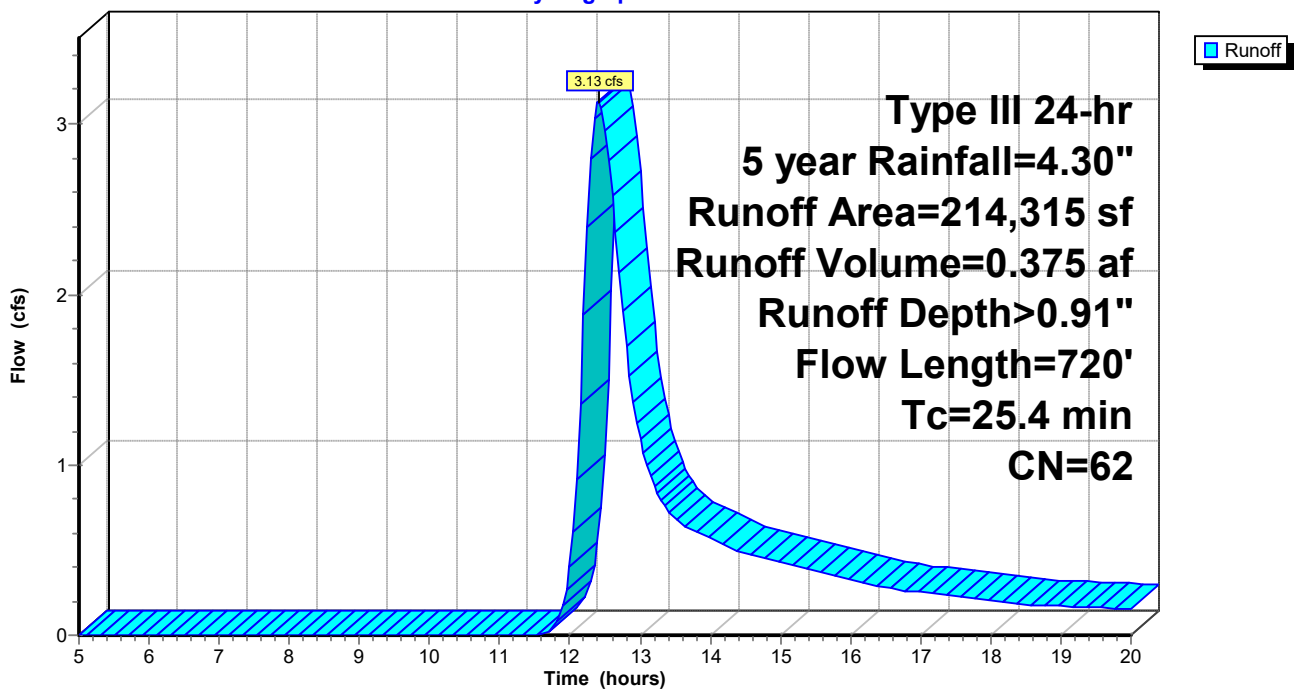
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 5 year Rainfall=4.30"

Area (sf)	CN	Description
135,339	67	Brush, Poor, HSG B
57,135	49	50-75% Grass cover, Fair, HSG A
14,300	83	Paved roads w/open ditches, 50% imp, HSG A
* 7,541	25	Connected to Rain Garden Good, HSG A
214,315	62	Weighted Average
207,165		96.66% Pervious Area
7,150		3.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	45	0.0100	0.05		Sheet Flow, Sheet Flow
					Woods: Light underbrush n= 0.400 P2= 3.35"
10.8	675	0.0220	1.04		Shallow Concentrated Flow, #1 Shallow conc
					Short Grass Pasture Kv= 7.0 fps
25.4	720	Total			

Subcatchment 1S: Proposed

Hydrograph



220 Penn Ave Marku Re_Sub Proposed

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Summary for Subcatchment 1S: Proposed

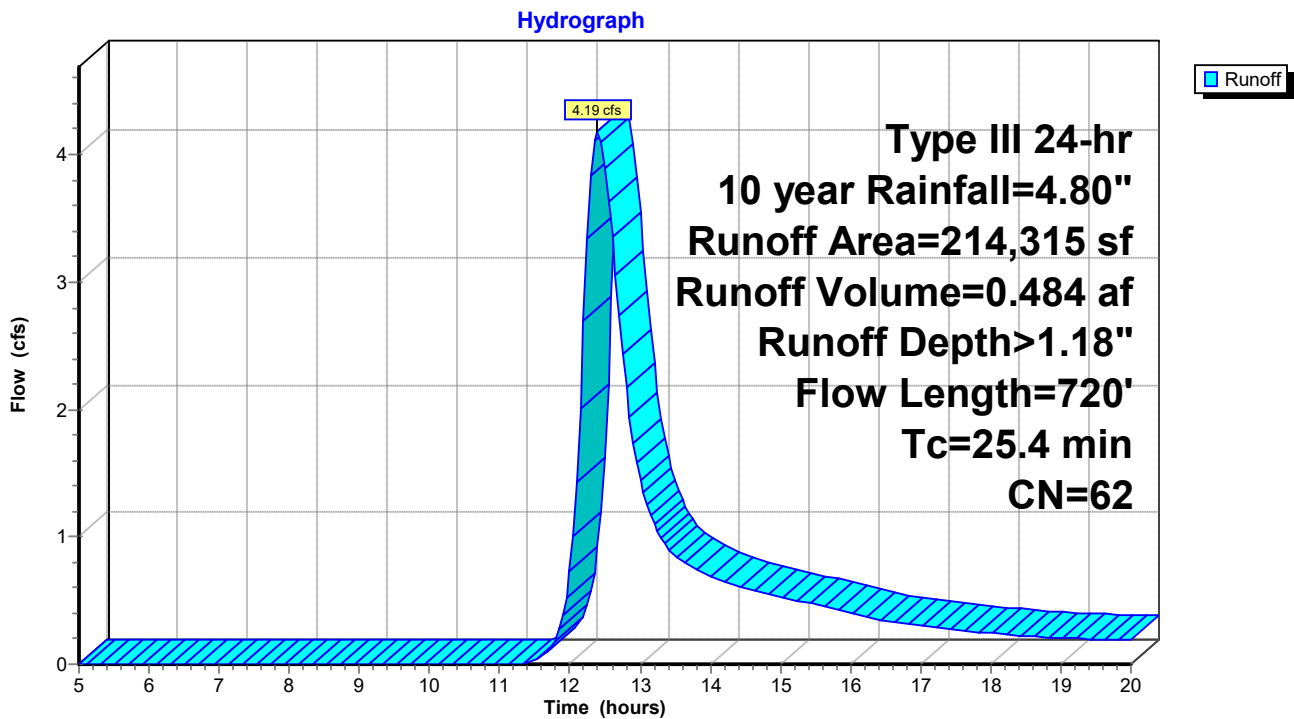
Runoff = 4.19 cfs @ 12.40 hrs, Volume= 0.484 af, Depth> 1.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
135,339	67	Brush, Poor, HSG B
57,135	49	50-75% Grass cover, Fair, HSG A
14,300	83	Paved roads w/open ditches, 50% imp, HSG A
* 7,541	25	Connected to Rain Garden Good, HSG A
214,315	62	Weighted Average
207,165		96.66% Pervious Area
7,150		3.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	45	0.0100	0.05		Sheet Flow, Sheet Flow
10.8	675	0.0220	1.04		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc
					Short Grass Pasture Kv= 7.0 fps
25.4	720	Total			

Subcatchment 1S: Proposed



Summary for Subcatchment 1S: Proposed

Runoff = 6.27 cfs @ 12.38 hrs, Volume= 0.701 af, Depth> 1.71"

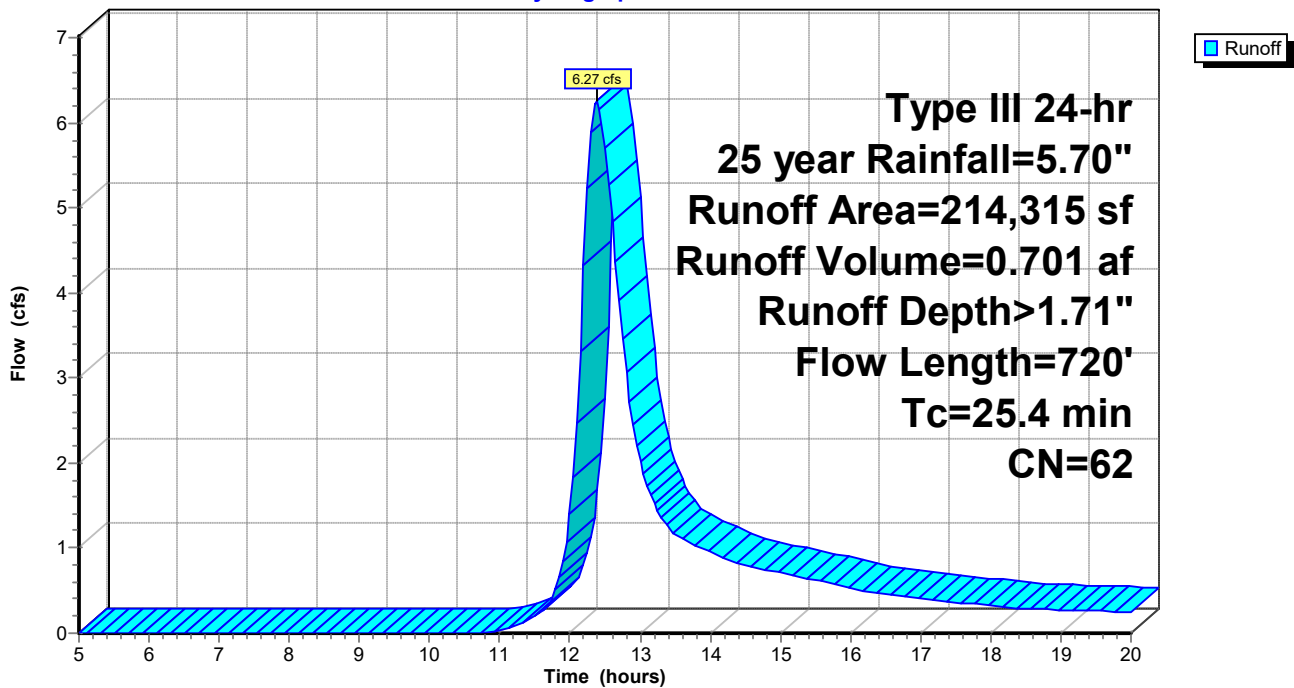
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25 year Rainfall=5.70"

Area (sf)	CN	Description
135,339	67	Brush, Poor, HSG B
57,135	49	50-75% Grass cover, Fair, HSG A
14,300	83	Paved roads w/open ditches, 50% imp, HSG A
* 7,541	25	Connected to Rain Garden Good, HSG A
214,315	62	Weighted Average
207,165		96.66% Pervious Area
7,150		3.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	45	0.0100	0.05		Sheet Flow, Sheet Flow
10.8	675	0.0220	1.04		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc Short Grass Pasture Kv= 7.0 fps
25.4	720	Total			

Subcatchment 1S: Proposed

Hydrograph



Summary for Subcatchment 1S: Proposed

Runoff = 7.76 cfs @ 12.38 hrs, Volume= 0.857 af, Depth> 2.09"

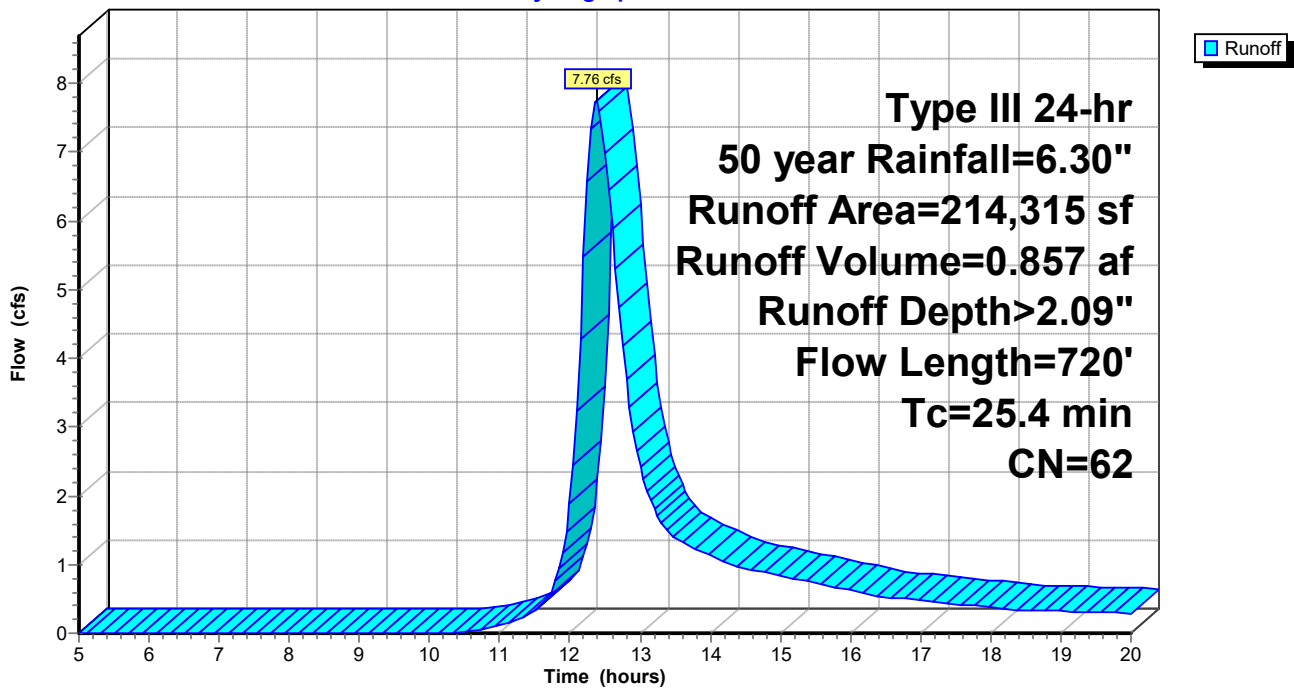
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.30"

Area (sf)	CN	Description
135,339	67	Brush, Poor, HSG B
57,135	49	50-75% Grass cover, Fair, HSG A
14,300	83	Paved roads w/open ditches, 50% imp, HSG A
* 7,541	25	Connected to Rain Garden Good, HSG A
214,315	62	Weighted Average
207,165		96.66% Pervious Area
7,150		3.34% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	45	0.0100	0.05		Sheet Flow, Sheet Flow
10.8	675	0.0220	1.04		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc
					Short Grass Pasture Kv= 7.0 fps
25.4	720	Total			

Subcatchment 1S: Proposed

Hydrograph



Summary for Subcatchment 1S: Proposed

Runoff = 9.86 cfs @ 12.37 hrs, Volume= 1.077 af, Depth> 2.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 100 year Rainfall=7.10"

Area (sf)	CN	Description
135,339	67	Brush, Poor, HSG B
57,135	49	50-75% Grass cover, Fair, HSG A
14,300	83	Paved roads w/open ditches, 50% imp, HSG A
* 7,541	25	Connected to Rain Garden Good, HSG A
214,315	62	Weighted Average
207,165		96.66% Pervious Area
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.6	45	0.0100	0.05		Sheet Flow, Sheet Flow
10.8	675	0.0220	1.04		Woods: Light underbrush n= 0.400 P2= 3.35" Shallow Concentrated Flow, #1 Shallow conc
25.4	720	Total			Short Grass Pasture Kv= 7.0 fps

Subcatchment 1S: Proposed

Hydrograph

