

Appendix G

Little Bear Brook HydroCAD Model

NOAA Rainfall Data



NOAA Atlas 14, Volume 2, Version 3
Location name: Princeton, New Jersey, US*
Latitude: 40.3167°, Longitude: -74.6333°
Elevation: 58 ft*
 * source: Google Maps



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF tabular](#) | [PF graphical](#) | [Maps & aerals](#)

PF tabular

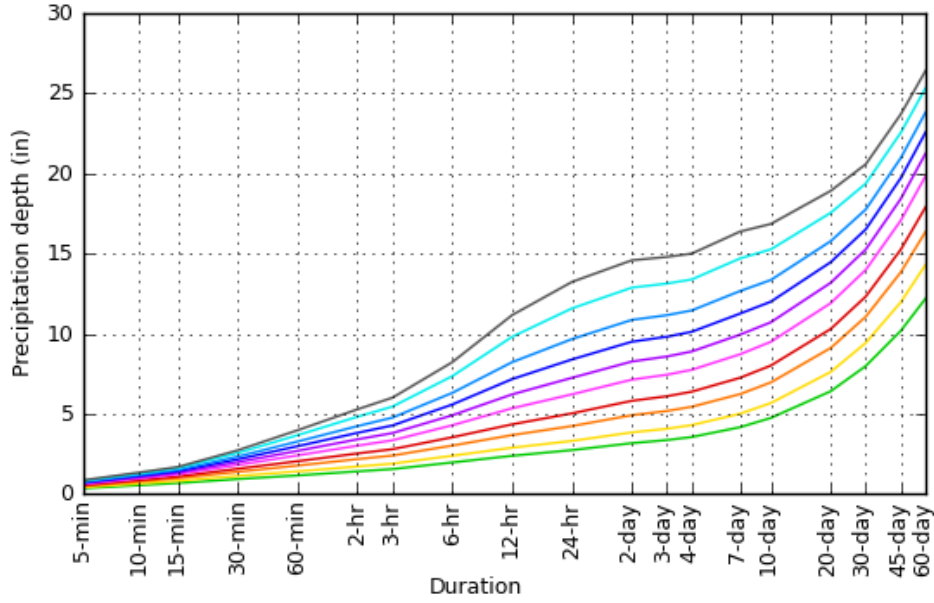
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.338 (0.305-0.374)	0.403 (0.365-0.447)	0.479 (0.432-0.530)	0.534 (0.482-0.591)	0.603 (0.541-0.666)	0.653 (0.583-0.721)	0.702 (0.624-0.777)	0.748 (0.661-0.830)	0.806 (0.705-0.899)	0.850 (0.738-0.952)
10-min	0.540 (0.488-0.598)	0.644 (0.584-0.714)	0.767 (0.692-0.848)	0.855 (0.771-0.946)	0.961 (0.862-1.06)	1.04 (0.928-1.15)	1.12 (0.991-1.24)	1.19 (1.05-1.32)	1.27 (1.12-1.42)	1.34 (1.16-1.50)
15-min	0.675 (0.610-0.748)	0.810 (0.734-0.898)	0.970 (0.876-1.07)	1.08 (0.975-1.20)	1.22 (1.09-1.35)	1.32 (1.18-1.45)	1.41 (1.25-1.56)	1.50 (1.32-1.66)	1.60 (1.40-1.79)	1.68 (1.46-1.88)
30-min	0.925 (0.836-1.02)	1.12 (1.01-1.24)	1.38 (1.24-1.52)	1.57 (1.41-1.73)	1.80 (1.62-1.99)	1.98 (1.77-2.19)	2.16 (1.92-2.39)	2.33 (2.06-2.58)	2.55 (2.23-2.85)	2.72 (2.36-3.05)
60-min	1.15 (1.04-1.28)	1.40 (1.27-1.56)	1.77 (1.59-1.96)	2.04 (1.84-2.26)	2.40 (2.15-2.65)	2.69 (2.40-2.97)	2.98 (2.64-3.29)	3.27 (2.89-3.63)	3.66 (3.21-4.09)	3.97 (3.45-4.45)
2-hr	1.40 (1.27-1.56)	1.71 (1.54-1.90)	2.17 (1.96-2.40)	2.52 (2.27-2.79)	3.01 (2.69-3.32)	3.40 (3.03-3.76)	3.81 (3.37-4.21)	4.23 (3.71-4.69)	4.81 (4.18-5.37)	5.28 (4.54-5.91)
3-hr	1.55 (1.39-1.73)	1.89 (1.70-2.10)	2.39 (2.15-2.67)	2.79 (2.50-3.11)	3.35 (2.98-3.72)	3.79 (3.36-4.23)	4.27 (3.75-4.76)	4.76 (4.15-5.31)	5.45 (4.68-6.11)	6.00 (5.10-6.77)
6-hr	1.96 (1.76-2.21)	2.38 (2.13-2.68)	3.02 (2.69-3.38)	3.53 (3.15-3.95)	4.28 (3.78-4.79)	4.91 (4.30-5.47)	5.58 (4.84-6.23)	6.30 (5.41-7.04)	7.35 (6.21-8.25)	8.22 (6.86-9.27)
12-hr	2.38 (2.13-2.70)	2.88 (2.57-3.27)	3.67 (3.27-4.16)	4.34 (3.85-4.91)	5.34 (4.69-6.01)	6.21 (5.41-6.99)	7.17 (6.16-8.06)	8.22 (6.97-9.27)	9.80 (8.15-11.1)	11.2 (9.12-12.7)
24-hr	2.73 (2.50-3.01)	3.31 (3.03-3.64)	4.23 (3.87-4.66)	5.03 (4.58-5.52)	6.21 (5.62-6.81)	7.25 (6.49-7.93)	8.39 (7.45-9.17)	9.66 (8.49-10.6)	11.6 (10.0-12.7)	13.2 (11.3-14.6)
2-day	3.17 (2.90-3.49)	3.84 (3.51-4.23)	4.91 (4.48-5.41)	5.81 (5.28-6.38)	7.13 (6.44-7.82)	8.26 (7.41-9.05)	9.50 (8.45-10.4)	10.9 (9.56-11.9)	12.9 (11.2-14.2)	14.6 (12.5-16.1)
3-day	3.36 (3.08-3.68)	4.07 (3.73-4.46)	5.17 (4.74-5.67)	6.09 (5.57-6.67)	7.44 (6.75-8.13)	8.57 (7.74-9.36)	9.81 (8.78-10.7)	11.2 (9.89-12.2)	13.1 (11.5-14.4)	14.8 (12.8-16.3)
4-day	3.55 (3.27-3.88)	4.29 (3.96-4.70)	5.44 (5.00-5.94)	6.38 (5.85-6.96)	7.74 (7.07-8.43)	8.89 (8.06-9.67)	10.1 (9.11-11.0)	11.4 (10.2-12.5)	13.4 (11.8-14.6)	15.0 (13.1-16.4)
7-day	4.16 (3.84-4.54)	5.00 (4.61-5.46)	6.23 (5.73-6.80)	7.25 (6.65-7.91)	8.71 (7.95-9.50)	9.94 (9.02-10.8)	11.3 (10.1-12.2)	12.7 (11.3-13.8)	14.7 (13.0-16.1)	16.4 (14.3-18.0)
10-day	4.74 (4.40-5.14)	5.67 (5.26-6.15)	6.96 (6.44-7.54)	8.01 (7.40-8.68)	9.49 (8.73-10.3)	10.7 (9.81-11.6)	12.0 (10.9-13.0)	13.3 (12.1-14.5)	15.3 (13.6-16.6)	16.8 (14.9-18.4)
20-day	6.41 (6.02-6.84)	7.61 (7.14-8.12)	9.11 (8.53-9.72)	10.3 (9.63-11.0)	11.9 (11.1-12.7)	13.2 (12.3-14.0)	14.5 (13.4-15.4)	15.8 (14.5-16.8)	17.5 (16.0-18.8)	18.9 (17.2-20.3)
30-day	7.98 (7.56-8.44)	9.43 (8.93-9.97)	11.1 (10.4-11.7)	12.3 (11.6-13.0)	14.0 (13.2-14.8)	15.3 (14.3-16.1)	16.5 (15.4-17.4)	17.8 (16.5-18.8)	19.4 (17.9-20.6)	20.6 (19.0-21.9)
45-day	10.2 (9.67-10.7)	12.0 (11.4-12.6)	13.8 (13.1-14.6)	15.2 (14.4-16.0)	17.1 (16.1-17.9)	18.4 (17.4-19.4)	19.7 (18.6-20.8)	21.0 (19.7-22.1)	22.5 (21.1-23.8)	23.7 (22.1-25.1)
60-day	12.2 (11.6-12.8)	14.3 (13.6-15.0)	16.4 (15.6-17.2)	17.9 (17.0-18.8)	19.8 (18.8-20.8)	21.2 (20.2-22.3)	22.6 (21.4-23.7)	23.8 (22.5-25.1)	25.3 (23.8-26.7)	26.4 (24.8-27.9)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

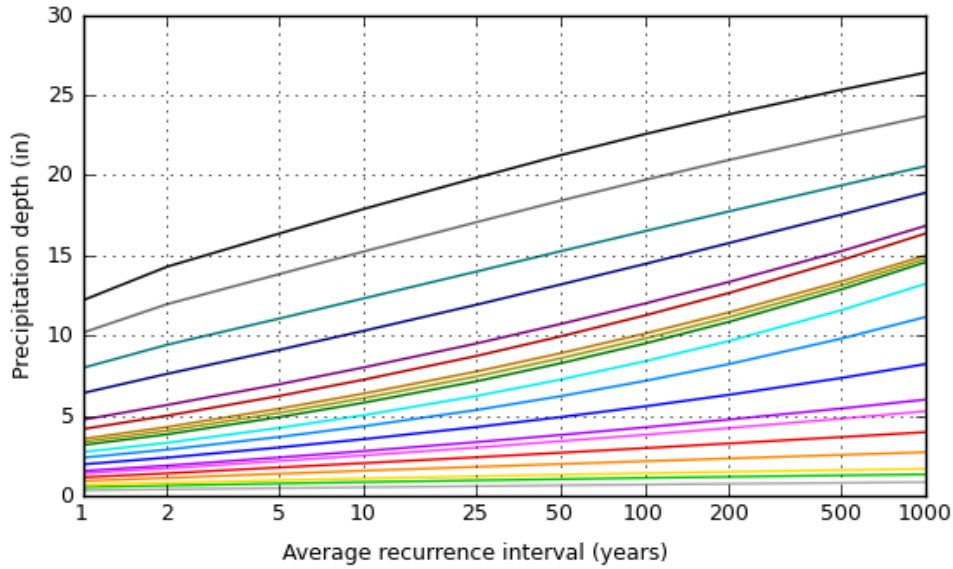
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PF graphical

PDS-based depth-duration-frequency (DDF) curves
 Latitude: 40.3167°, Longitude: -74.6333°



Average recurrence interval (years)	
1	
2	
5	
10	
25	
50	
100	
200	
500	
1000	

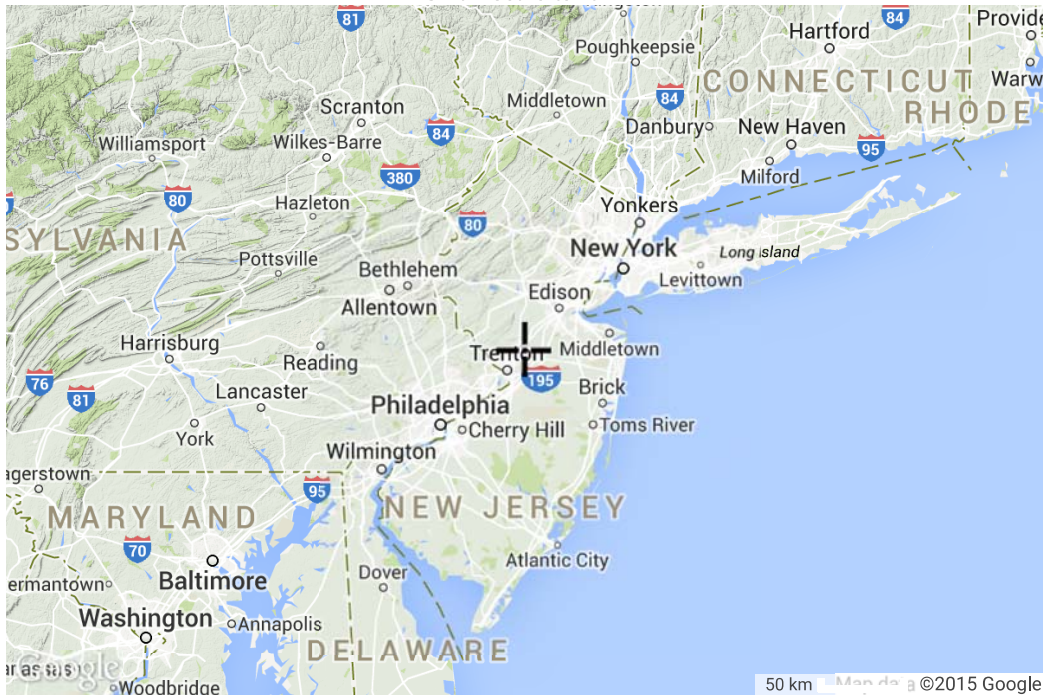


Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

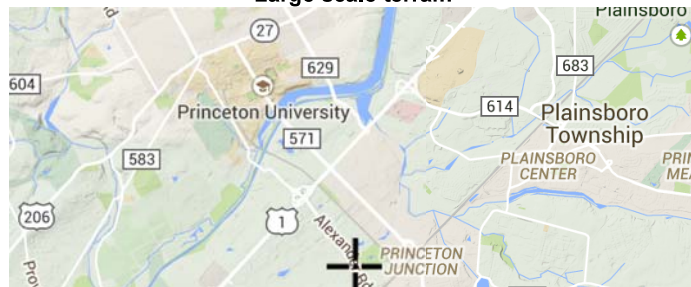
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Maps & aerials

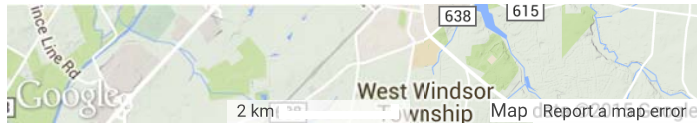
Small scale terrain



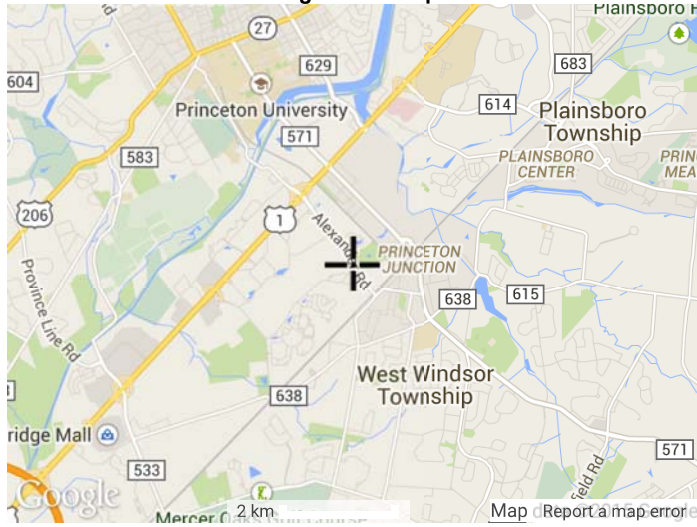
Large scale terrain



Precipitation Frequency Data Server



Large scale map



Large scale aerial

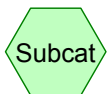
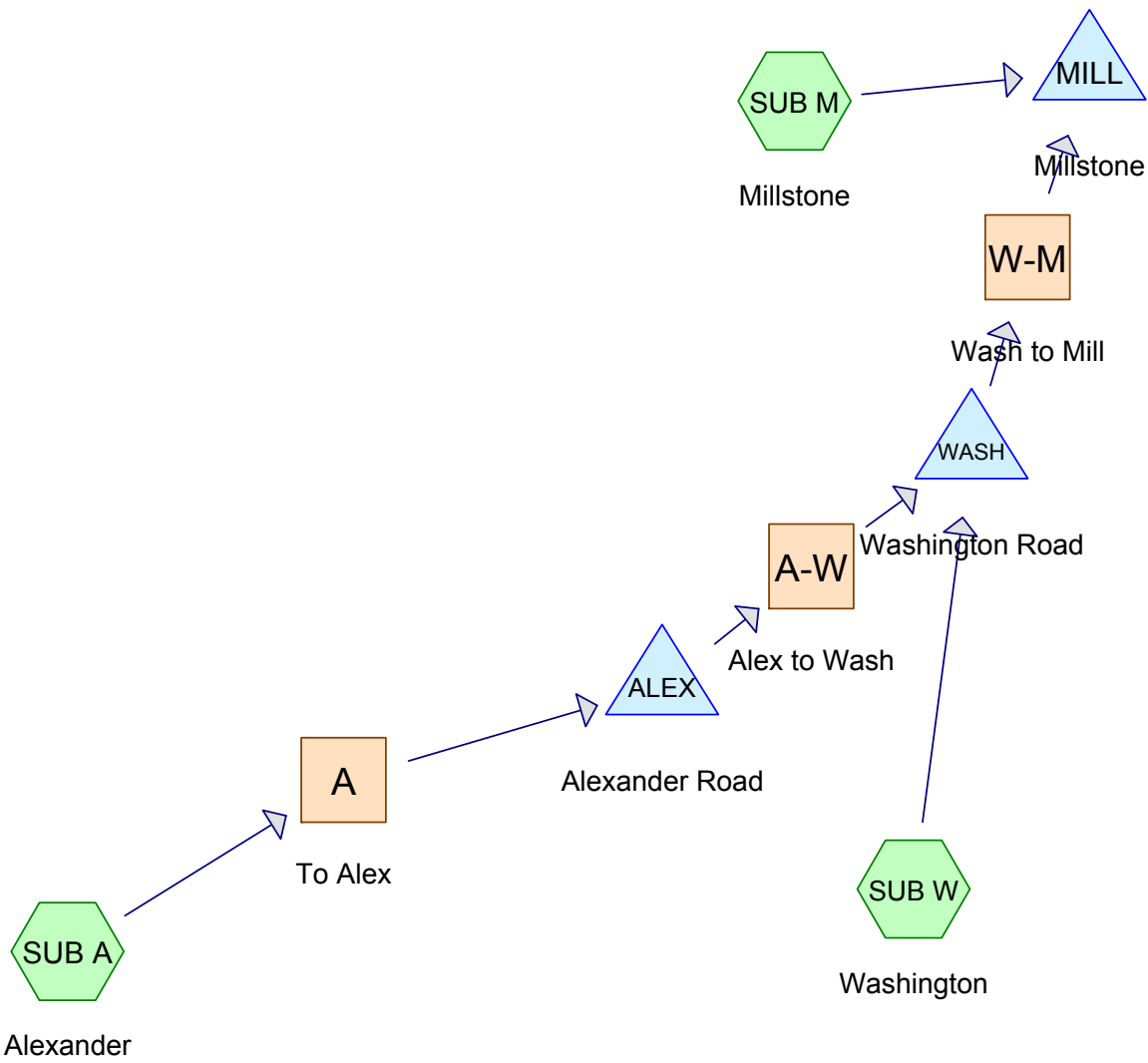


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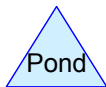
HydroCAD Report – 1 to 100-Year Storms



Subcat



Reach



Pond



Link

Little Bear Brook 1 to 100-Year

Prepared by Toshiba

Printed 4/17/2015

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Page 2

Summary for Subcatchment SUB A: Alexander

Runoff = 423.53 cfs @ 12.83 hrs, Volume= 86.379 af, Depth= 0.87"

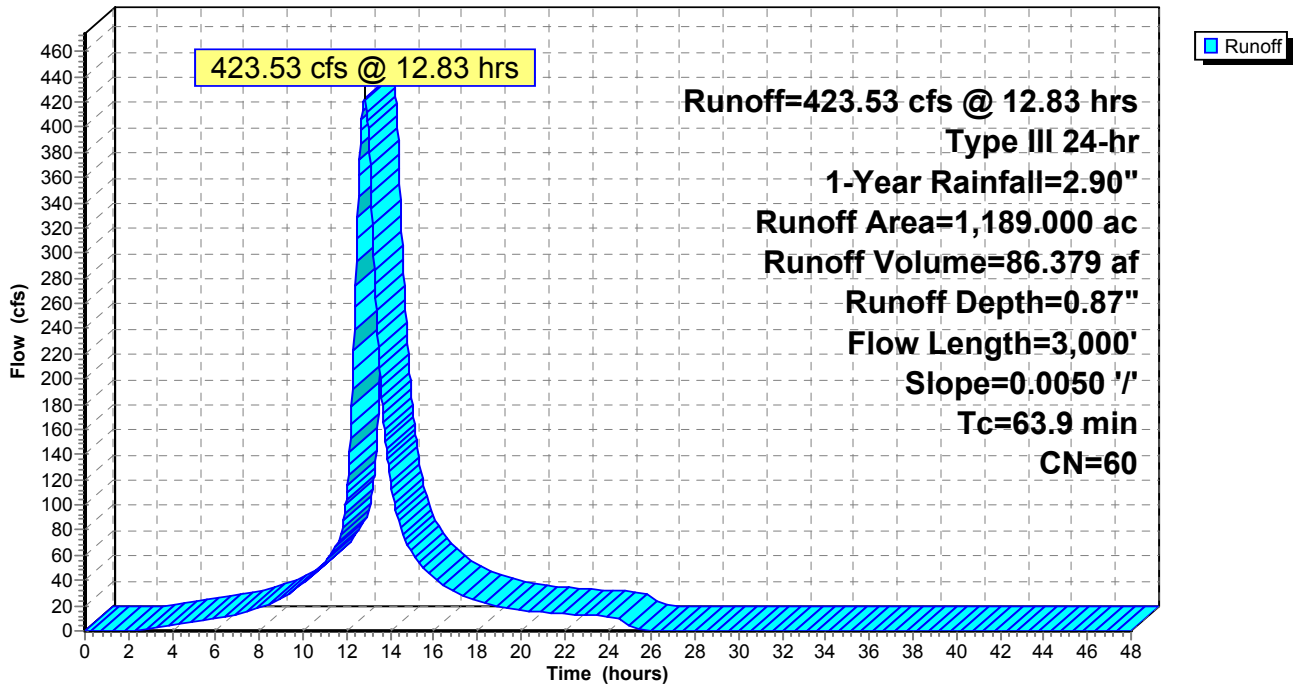
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 1-Year Rainfall=2.90"

Area (ac)	CN	Description
* 801.000	42	See Excel and ArcGIS
* 388.000	98	See Excel and ArcGIS
1,189.000	60	Weighted Average
801.000	42	67.37% Pervious Area
388.000	98	32.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
43.9	3,000	0.0050	1.14		Shallow Concentrated Flow, Estimated SCF Time
					Unpaved Kv= 16.1 fps
63.9	3,000	Total			

Subcatchment SUB A: Alexander

Hydrograph



Little Bear Brook 1 to 100-Year

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Summary for Subcatchment SUB M: Millstone

Runoff = 37.32 cfs @ 13.58 hrs, Volume= 11.584 af, Depth= 0.62"

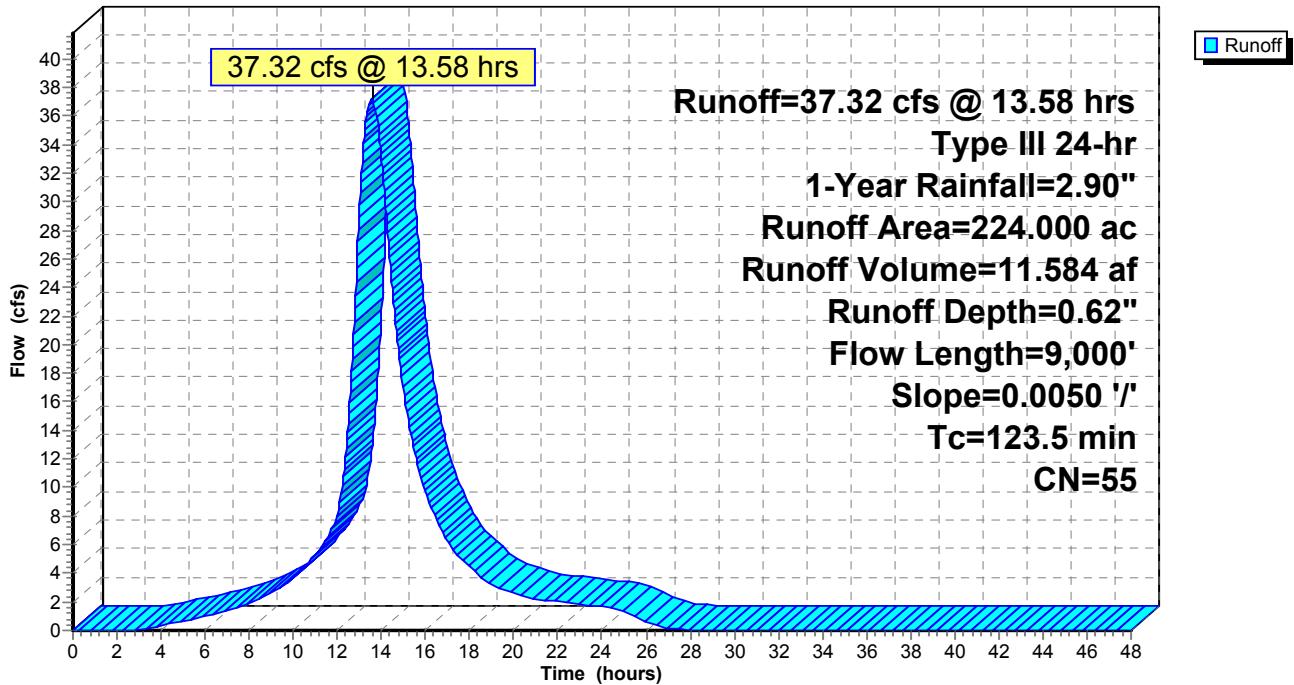
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 1-Year Rainfall=2.90"

Area (ac)	CN	Description
* 172.000	42	See Excel and ArcGIS
* 52.000	98	See Excel and ArcGIS
224.000	55	Weighted Average
172.000	42	76.79% Pervious Area
52.000	98	23.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
81.3	7,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
22.2	2,000		1.50		Direct Entry, Estimated Channel Time
123.5	9,000	Total			

Subcatchment SUB M: Millstone

Hydrograph



Little Bear Brook 1 to 100-Year

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Summary for Subcatchment SUB W: Washington

Runoff = 82.68 cfs @ 13.53 hrs, Volume= 25.690 af, Depth= 0.74"

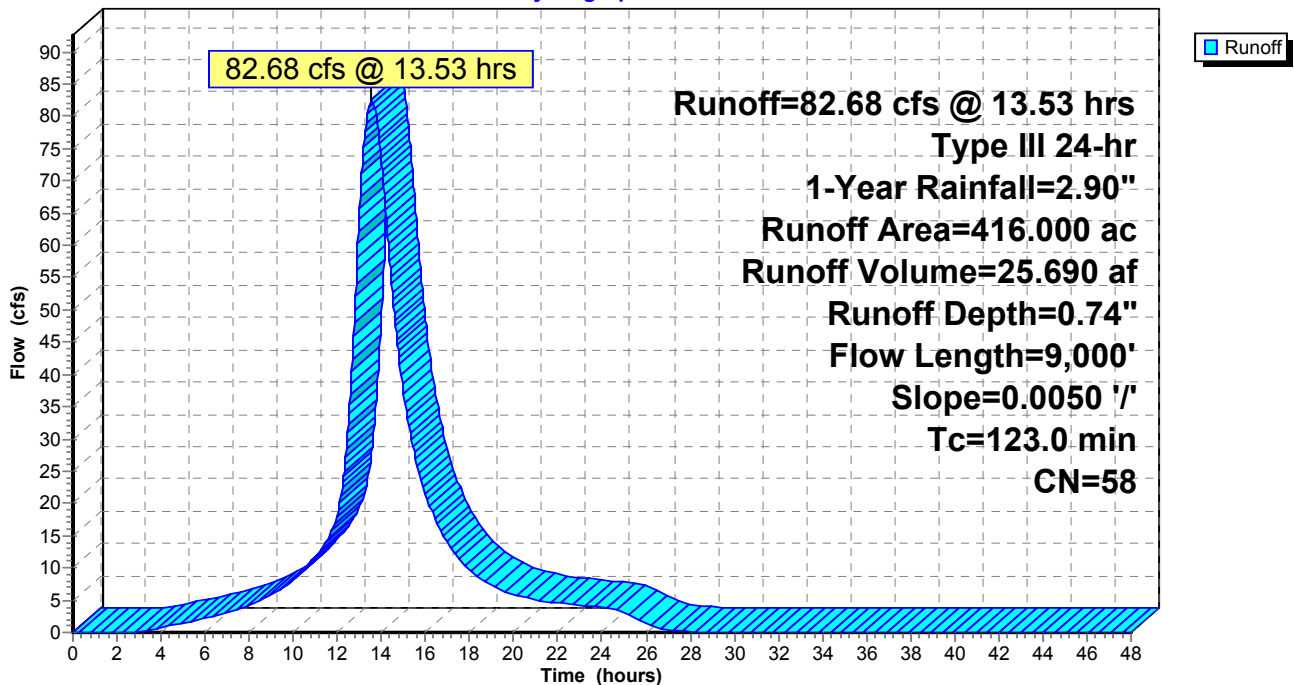
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 1-Year Rainfall=2.90"

Area (ac)	CN	Description
* 301.000	43	See Excel and ArcGIS
* 115.000	98	See Excel and ArcGIS
416.000	58	Weighted Average
301.000	43	72.36% Pervious Area
115.000	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
69.7	6,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
33.3	3,000		1.50		Direct Entry, Estimated Channel Time
123.0	9,000	Total			

Subcatchment SUB W: Washington

Hydrograph



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Summary for Subcatchment SUB A: Alexander

Runoff = 512.48 cfs @ 12.83 hrs, Volume= 107.728 af, Depth= 1.09"

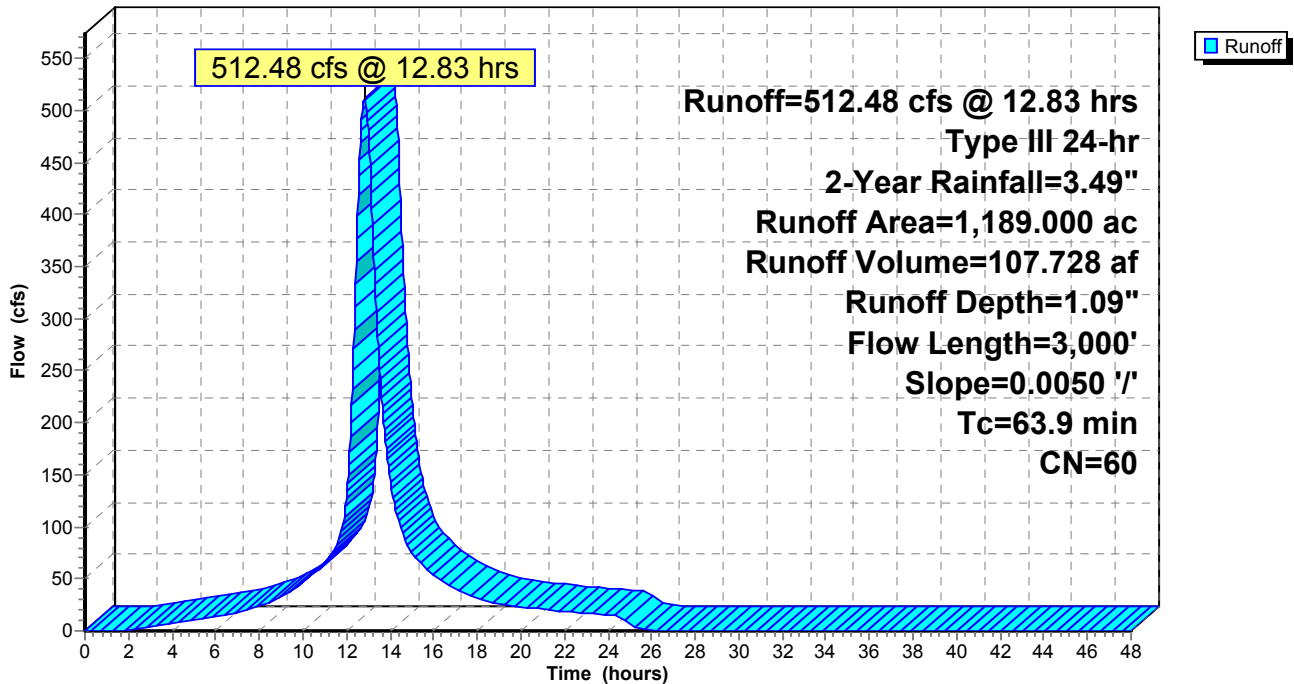
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.49"

Area (ac)	CN	Description
* 801.000	42	See Excel and ArcGIS
* 388.000	98	See Excel and ArcGIS
1,189.000	60	Weighted Average
801.000	42	67.37% Pervious Area
388.000	98	32.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
43.9	3,000	0.0050	1.14		Shallow Concentrated Flow, Estimated SCF Time
					Unpaved Kv= 16.1 fps
63.9	3,000	Total			

Subcatchment SUB A: Alexander

Hydrograph



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Summary for Subcatchment SUB M: Millstone

Runoff = 45.19 cfs @ 13.58 hrs, Volume= 14.634 af, Depth= 0.78"

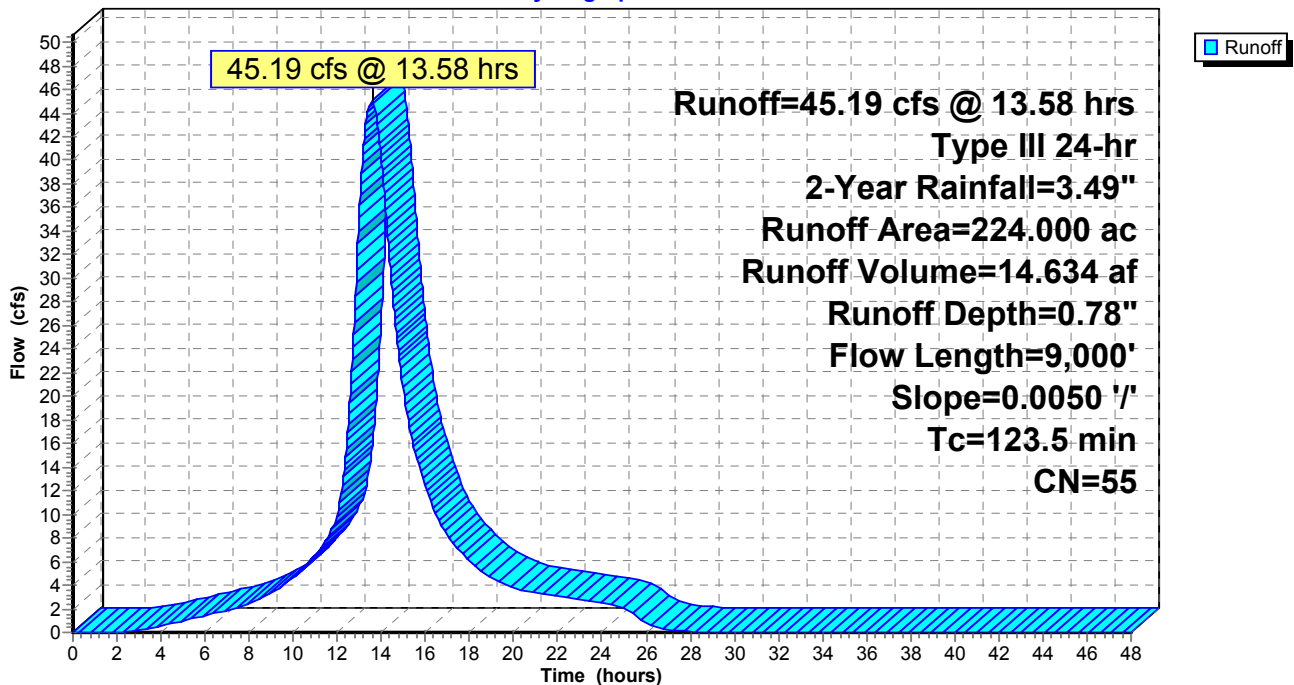
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.49"

Area (ac)	CN	Description
* 172.000	42	See Excel and ArcGIS
* 52.000	98	See Excel and ArcGIS
224.000	55	Weighted Average
172.000	42	76.79% Pervious Area
52.000	98	23.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
81.3	7,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
22.2	2,000		1.50		Direct Entry, Estimated Channel Time
123.5	9,000	Total			

Subcatchment SUB M: Millstone

Hydrograph



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Summary for Subcatchment SUB W: Washington

Runoff = 100.12 cfs @ 13.53 hrs, Volume= 32.460 af, Depth= 0.94"

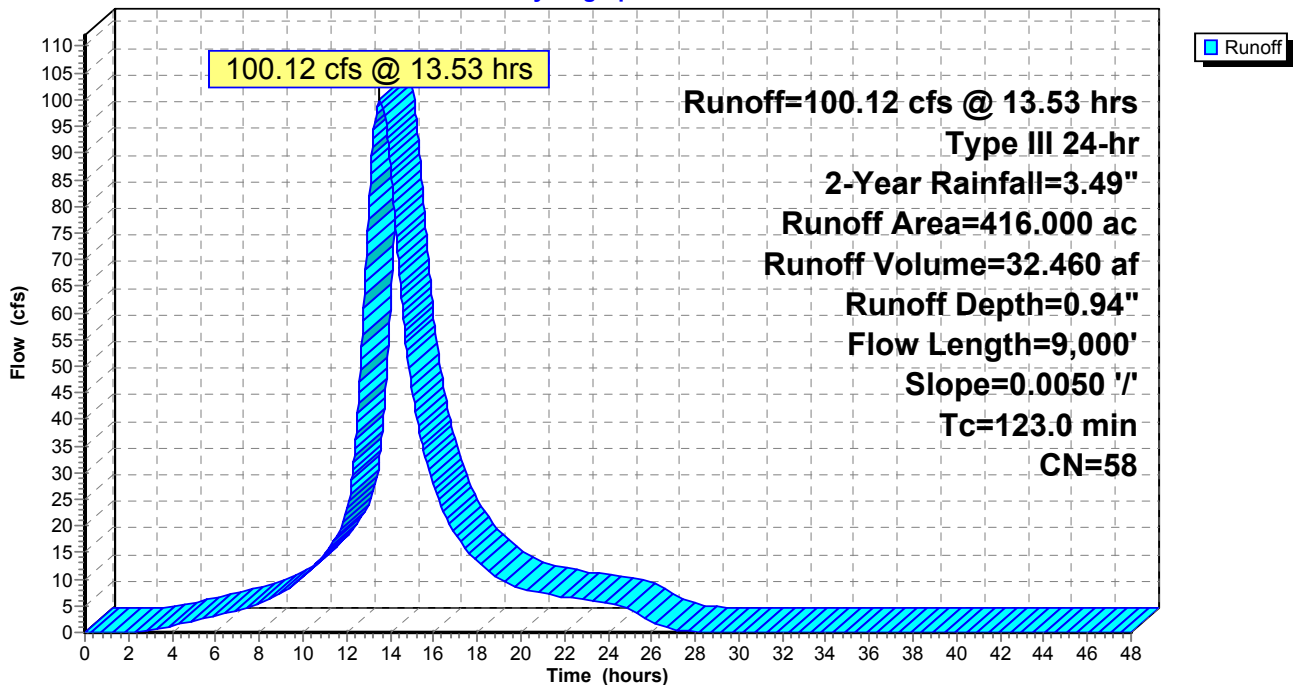
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-Year Rainfall=3.49"

Area (ac)	CN	Description
* 301.000	43	See Excel and ArcGIS
* 115.000	98	See Excel and ArcGIS
416.000	58	Weighted Average
301.000	43	72.36% Pervious Area
115.000	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
69.7	6,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
33.3	3,000		1.50		Direct Entry, Estimated Channel Time
123.0	9,000	Total			

Subcatchment SUB W: Washington

Hydrograph



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Summary for Subcatchment SUB A: Alexander

Runoff = 656.85 cfs @ 12.84 hrs, Volume= 147.153 af, Depth= 1.49"

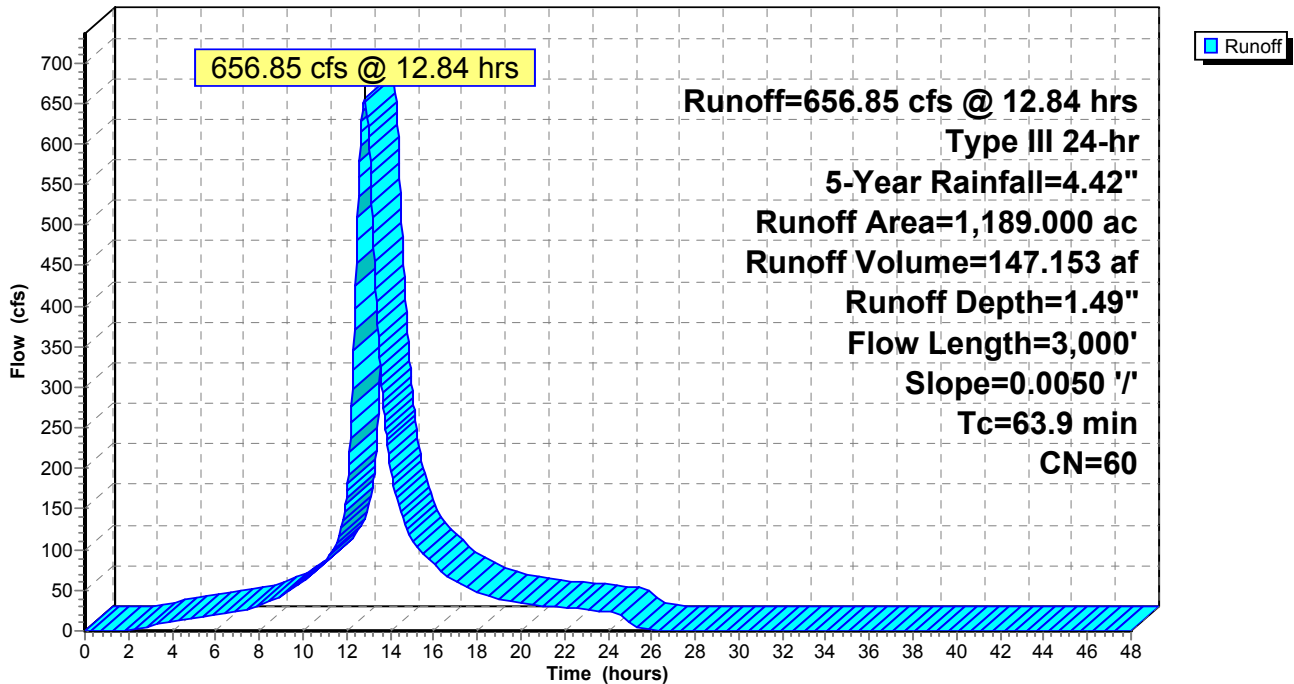
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 5-Year Rainfall=4.42"

Area (ac)	CN	Description
* 801.000	42	See Excel and ArcGIS
* 388.000	98	See Excel and ArcGIS
1,189.000	60	Weighted Average
801.000	42	67.37% Pervious Area
388.000	98	32.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
43.9	3,000	0.0050	1.14		Shallow Concentrated Flow, Estimated SCF Time
					Unpaved Kv= 16.1 fps
63.9	3,000	Total			

Subcatchment SUB A: Alexander

Hydrograph



Little Bear Brook 1 to 100-Year

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Summary for Subcatchment SUB M: Millstone

Runoff = 58.94 cfs @ 13.58 hrs, Volume= 20.679 af, Depth= 1.11"

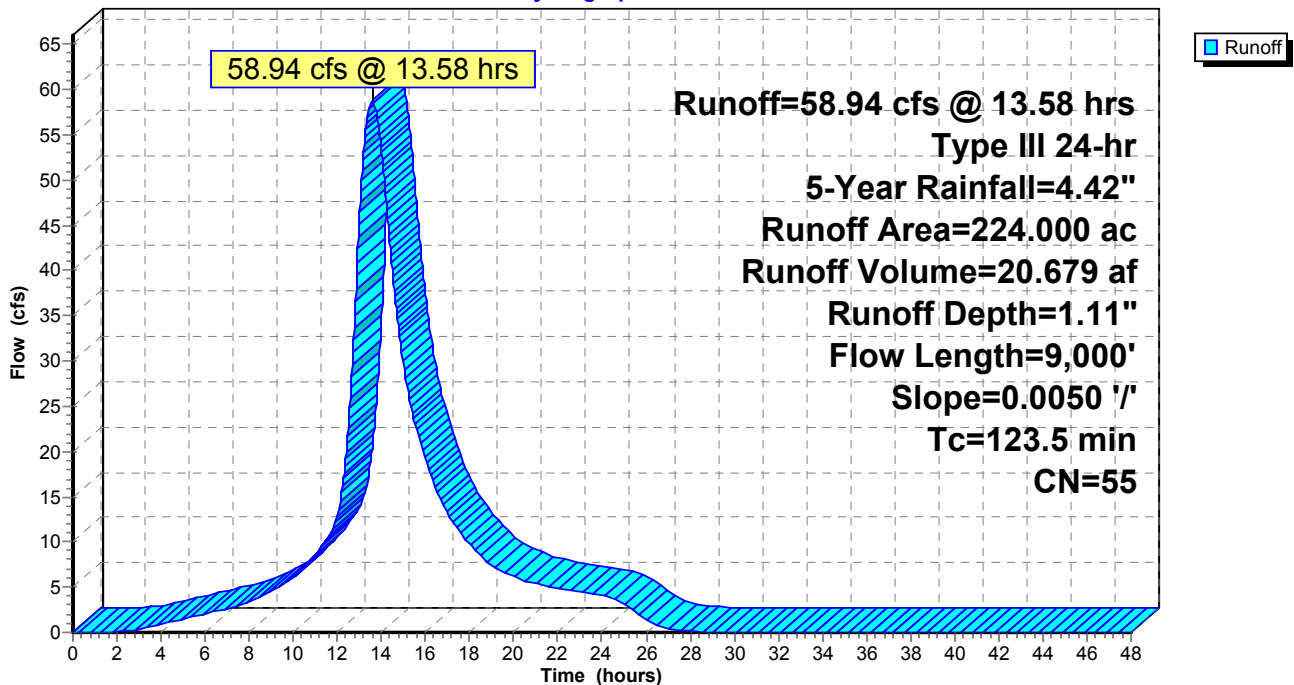
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Type III 24-hr 5-Year Rainfall=4.42"

Area (ac)	CN	Description
* 172.000	42	See Excel and ArcGIS
* 52.000	98	See Excel and ArcGIS
224.000	55	Weighted Average
172.000	42	76.79% Pervious Area
52.000	98	23.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
81.3	7,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
22.2	2,000		1.50		Direct Entry, Estimated Channel Time
123.5	9,000	Total			

Subcatchment SUB M: Millstone

Hydrograph



Little Bear Brook 1 to 100-Year

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Summary for Subcatchment SUB W: Washington

Runoff = 131.10 cfs @ 13.54 hrs, Volume= 45.322 af, Depth= 1.31"

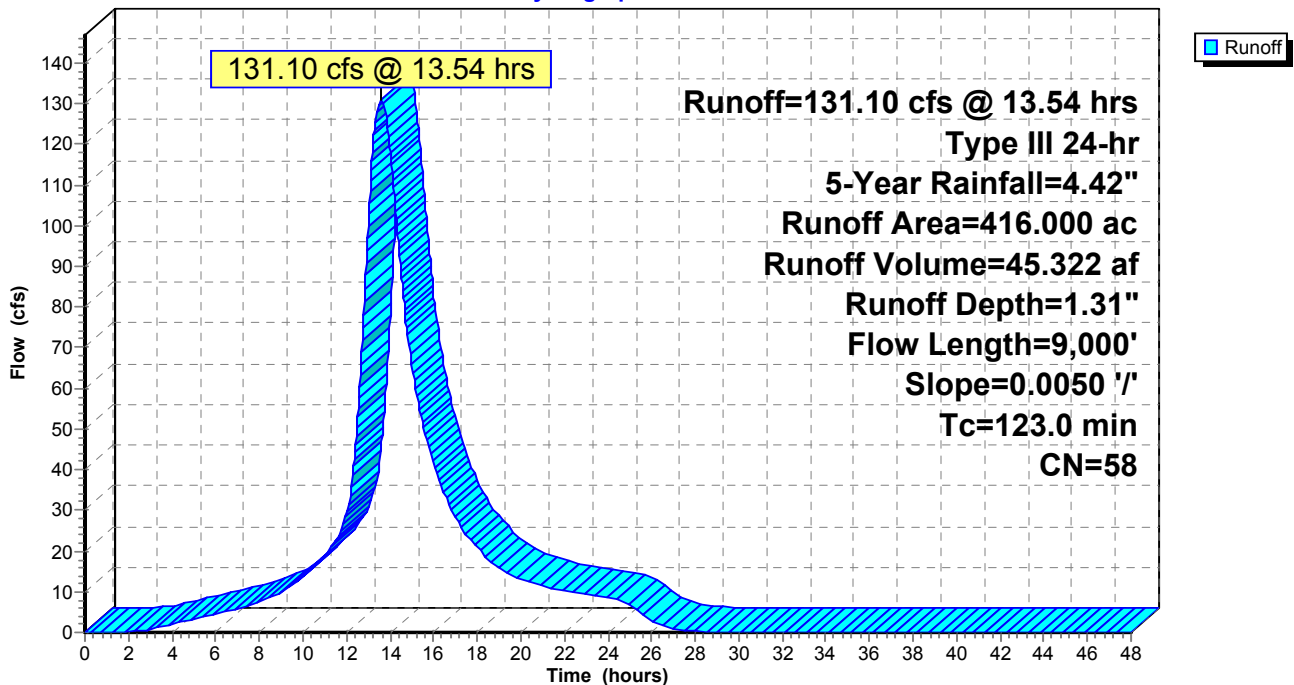
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 5-Year Rainfall=4.42"

Area (ac)	CN	Description
* 301.000	43	See Excel and ArcGIS
* 115.000	98	See Excel and ArcGIS
416.000	58	Weighted Average
301.000	43	72.36% Pervious Area
115.000	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
69.7	6,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
33.3	3,000		1.50		Direct Entry, Estimated Channel Time
123.0	9,000	Total			

Subcatchment SUB W: Washington

Hydrograph



Little Bear Brook 1 to 100-Year

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Summary for Subcatchment SUB A: Alexander

Runoff = 803.40 cfs @ 12.85 hrs, Volume= 184.379 af, Depth= 1.86"

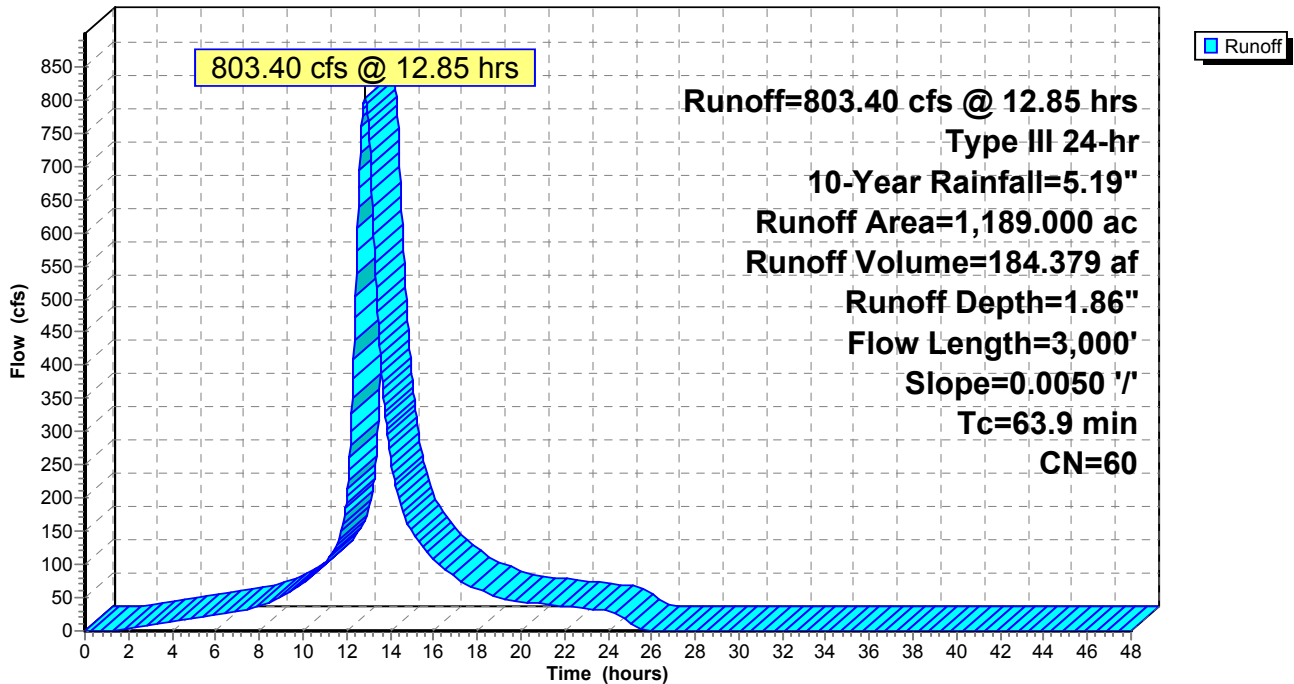
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.19"

Area (ac)	CN	Description
* 801.000	42	See Excel and ArcGIS
* 388.000	98	See Excel and ArcGIS
1,189.000	60	Weighted Average
801.000	42	67.37% Pervious Area
388.000	98	32.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
43.9	3,000	0.0050	1.14		Shallow Concentrated Flow, Estimated SCF Time
					Unpaved Kv= 16.1 fps
63.9	3,000	Total			

Subcatchment SUB A: Alexander

Hydrograph



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Summary for Subcatchment SUB M: Millstone

Runoff = 74.26 cfs @ 13.59 hrs, Volume= 26.667 af, Depth= 1.43"

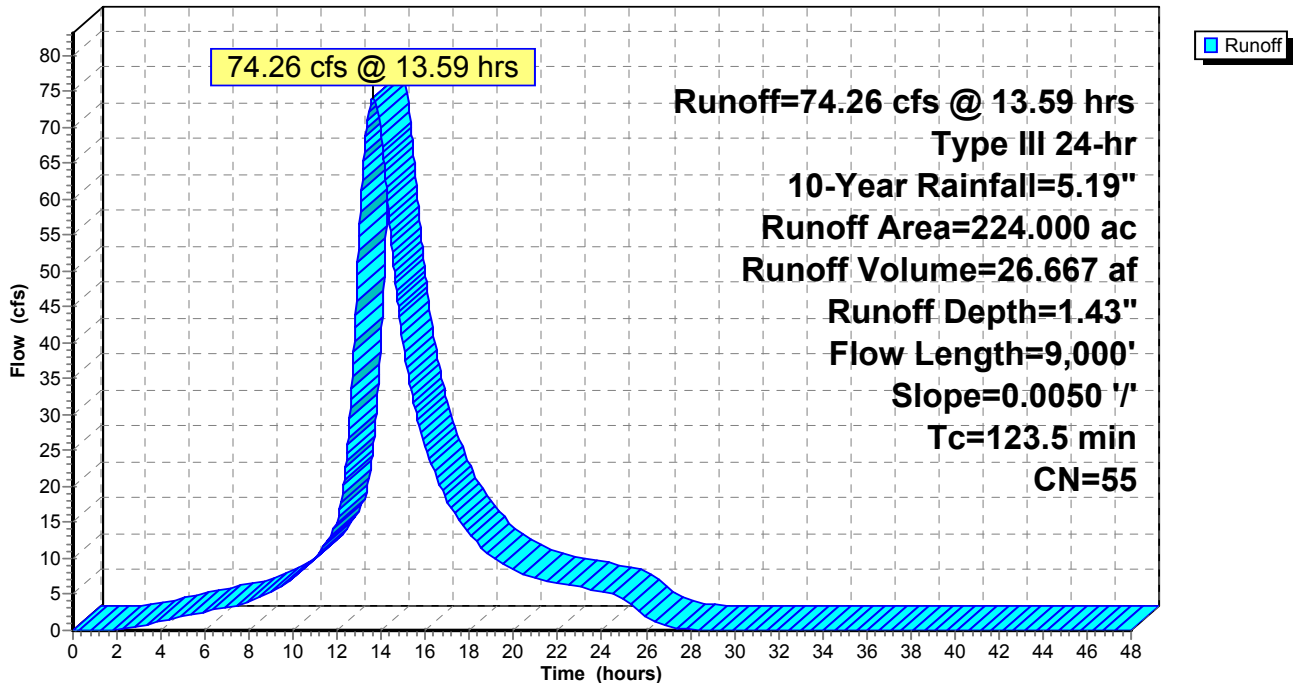
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.19"

Area (ac)	CN	Description
* 172.000	42	See Excel and ArcGIS
* 52.000	98	See Excel and ArcGIS
224.000	55	Weighted Average
172.000	42	76.79% Pervious Area
52.000	98	23.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
81.3	7,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
22.2	2,000		1.50		Direct Entry, Estimated Channel Time
123.5	9,000	Total			

Subcatchment SUB M: Millstone

Hydrograph



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Summary for Subcatchment SUB W: Washington

Runoff = 163.90 cfs @ 13.56 hrs, Volume= 57.701 af, Depth= 1.66"

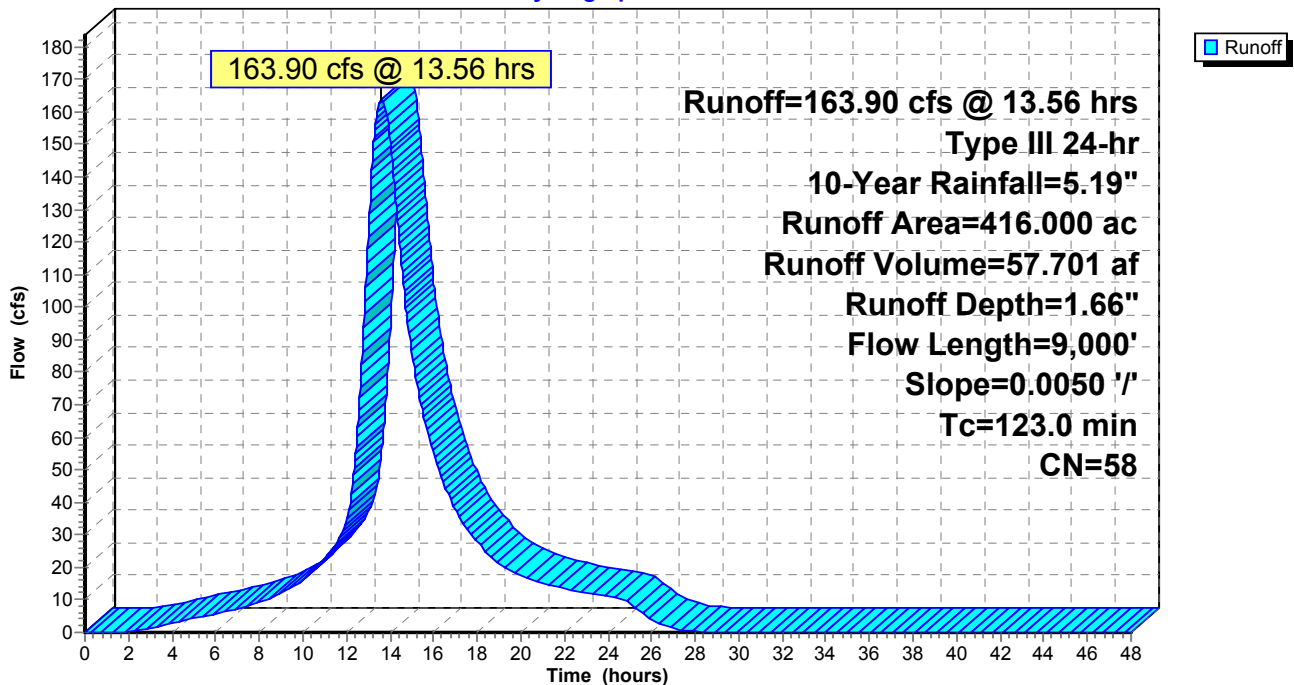
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-Year Rainfall=5.19"

Area (ac)	CN	Description
* 301.000	43	See Excel and ArcGIS
* 115.000	98	See Excel and ArcGIS
416.000	58	Weighted Average
301.000	43	72.36% Pervious Area
115.000	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
69.7	6,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
33.3	3,000		1.50		Direct Entry, Estimated Channel Time
123.0	9,000	Total			

Subcatchment SUB W: Washington

Hydrograph



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Summary for Subcatchment SUB A: Alexander

Runoff = 1,069.86 cfs @ 12.85 hrs, Volume= 245.293 af, Depth= 2.48"

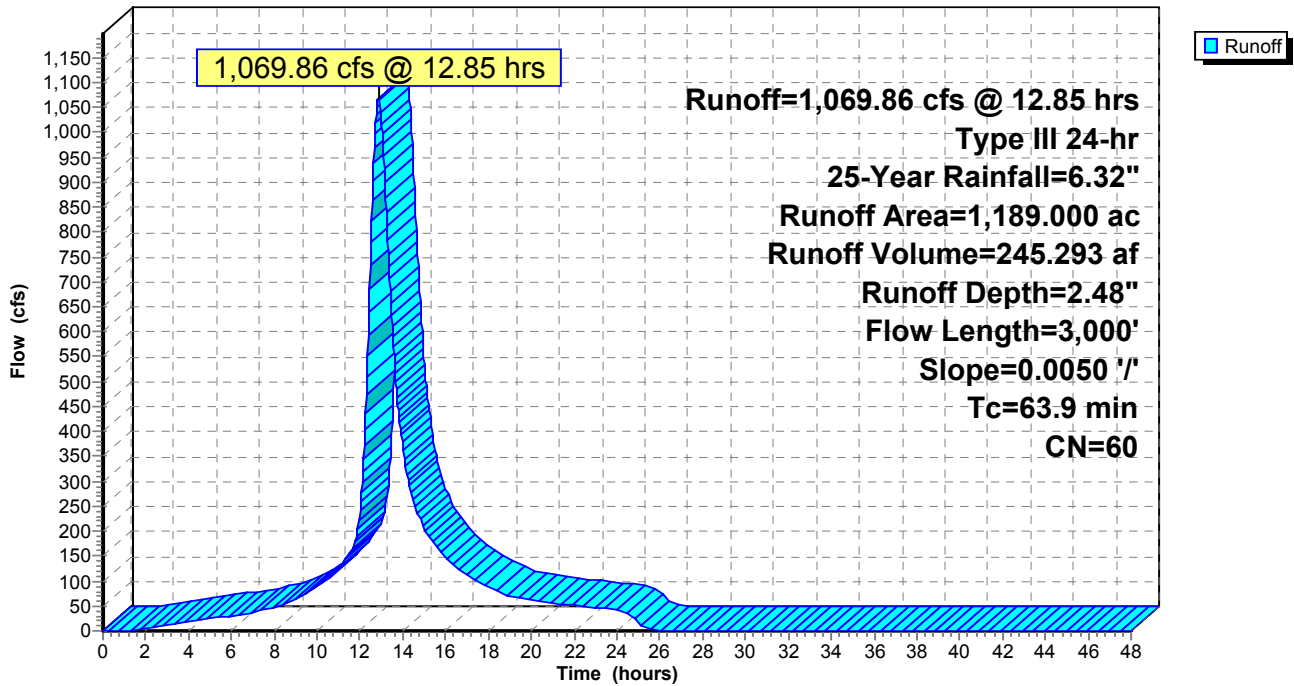
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.32"

Area (ac)	CN	Description
* 801.000	42	See Excel and ArcGIS
* 388.000	98	See Excel and ArcGIS
1,189.000	60	Weighted Average
801.000	42	67.37% Pervious Area
388.000	98	32.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
43.9	3,000	0.0050	1.14		Shallow Concentrated Flow, Estimated SCF Time
					Unpaved Kv= 16.1 fps
63.9	3,000	Total			

Subcatchment SUB A: Alexander

Hydrograph



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Summary for Subcatchment SUB M: Millstone

Runoff = 102.85 cfs @ 13.60 hrs, Volume= 36.801 af, Depth= 1.97"

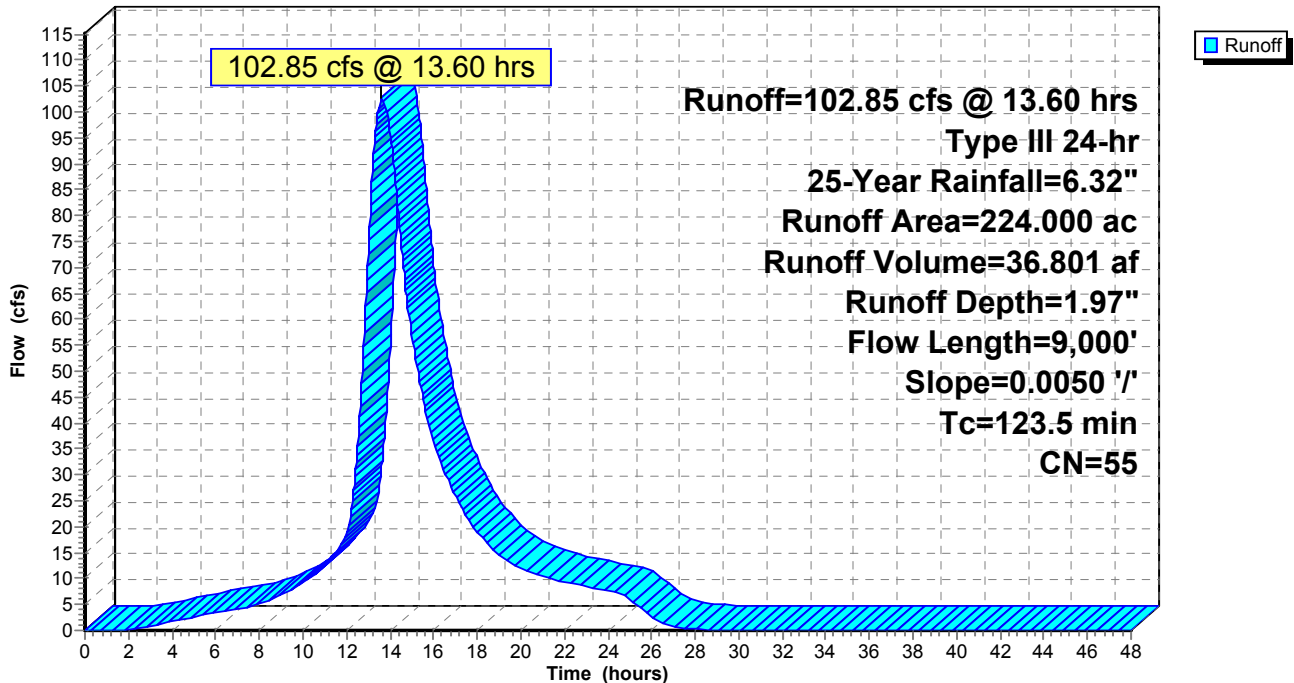
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.32"

Area (ac)	CN	Description
* 172.000	42	See Excel and ArcGIS
* 52.000	98	See Excel and ArcGIS
224.000	55	Weighted Average
172.000	42	76.79% Pervious Area
52.000	98	23.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
81.3	7,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
22.2	2,000		1.50		Direct Entry, Estimated Channel Time
123.5	9,000	Total			

Subcatchment SUB M: Millstone

Hydrograph



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Summary for Subcatchment SUB W: Washington

Runoff = 223.32 cfs @ 13.65 hrs, Volume= 78.230 af, Depth= 2.26"

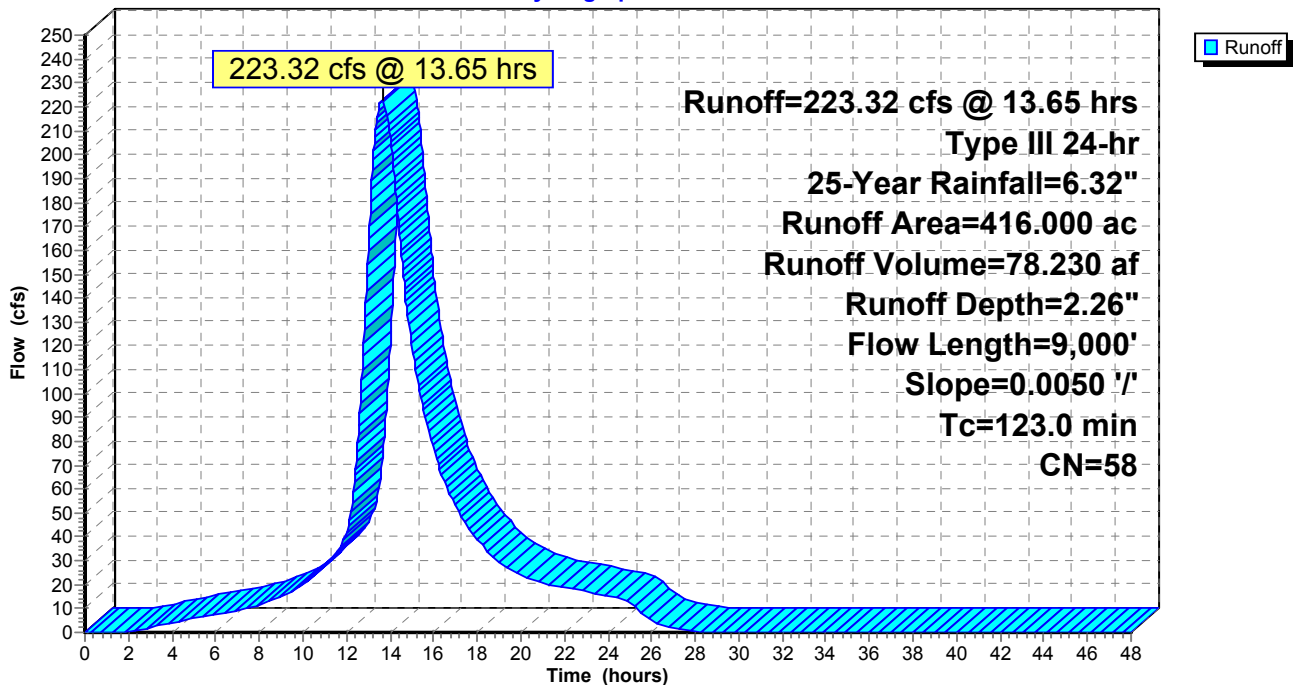
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-Year Rainfall=6.32"

Area (ac)	CN	Description
* 301.000	43	See Excel and ArcGIS
* 115.000	98	See Excel and ArcGIS
416.000	58	Weighted Average
301.000	43	72.36% Pervious Area
115.000	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
69.7	6,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
33.3	3,000		1.50		Direct Entry, Estimated Channel Time
123.0	9,000	Total			

Subcatchment SUB W: Washington

Hydrograph



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Summary for Subcatchment SUB A: Alexander

Runoff = 1,339.52 cfs @ 12.86 hrs, Volume= 302.607 af, Depth= 3.05"

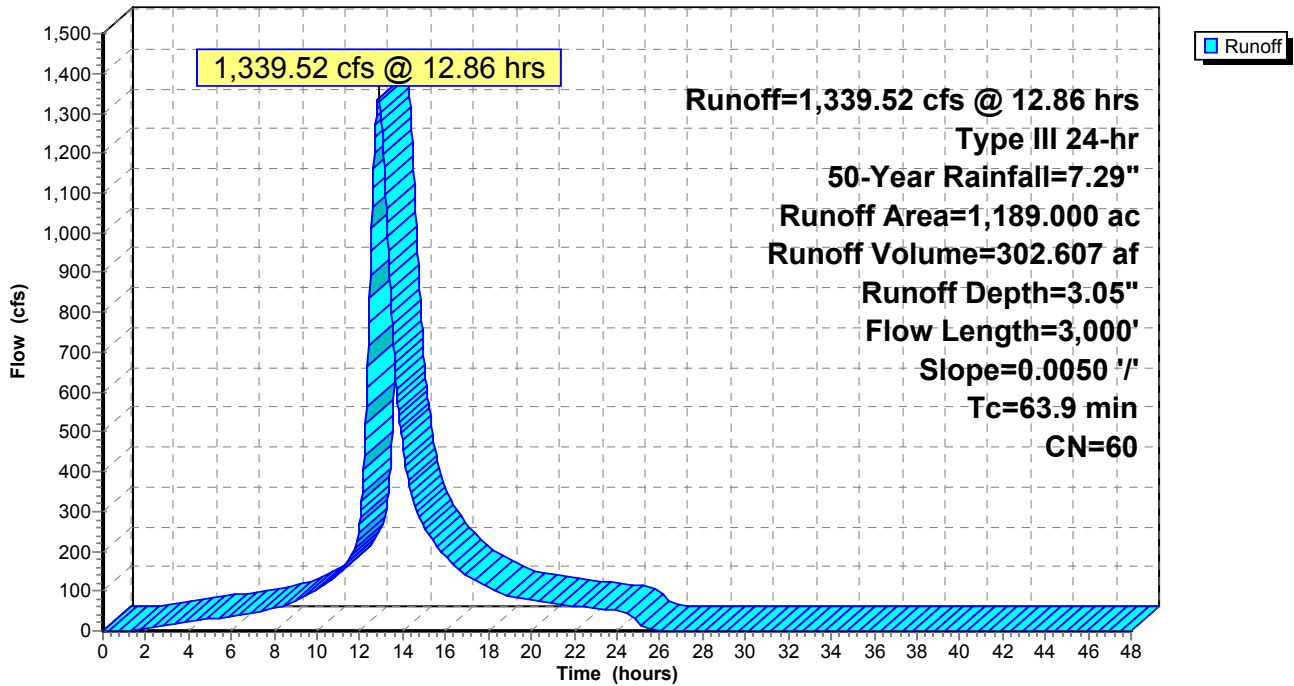
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 50-Year Rainfall=7.29"

Area (ac)	CN	Description
* 801.000	42	See Excel and ArcGIS
* 388.000	98	See Excel and ArcGIS
1,189.000	60	Weighted Average
801.000	42	67.37% Pervious Area
388.000	98	32.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
43.9	3,000	0.0050	1.14		Shallow Concentrated Flow, Estimated SCF Time
					Unpaved Kv= 16.1 fps
63.9	3,000	Total			

Subcatchment SUB A: Alexander

Hydrograph



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Summary for Subcatchment SUB M: Millstone

Runoff = 132.37 cfs @ 13.59 hrs, Volume= 46.579 af, Depth= 2.50"

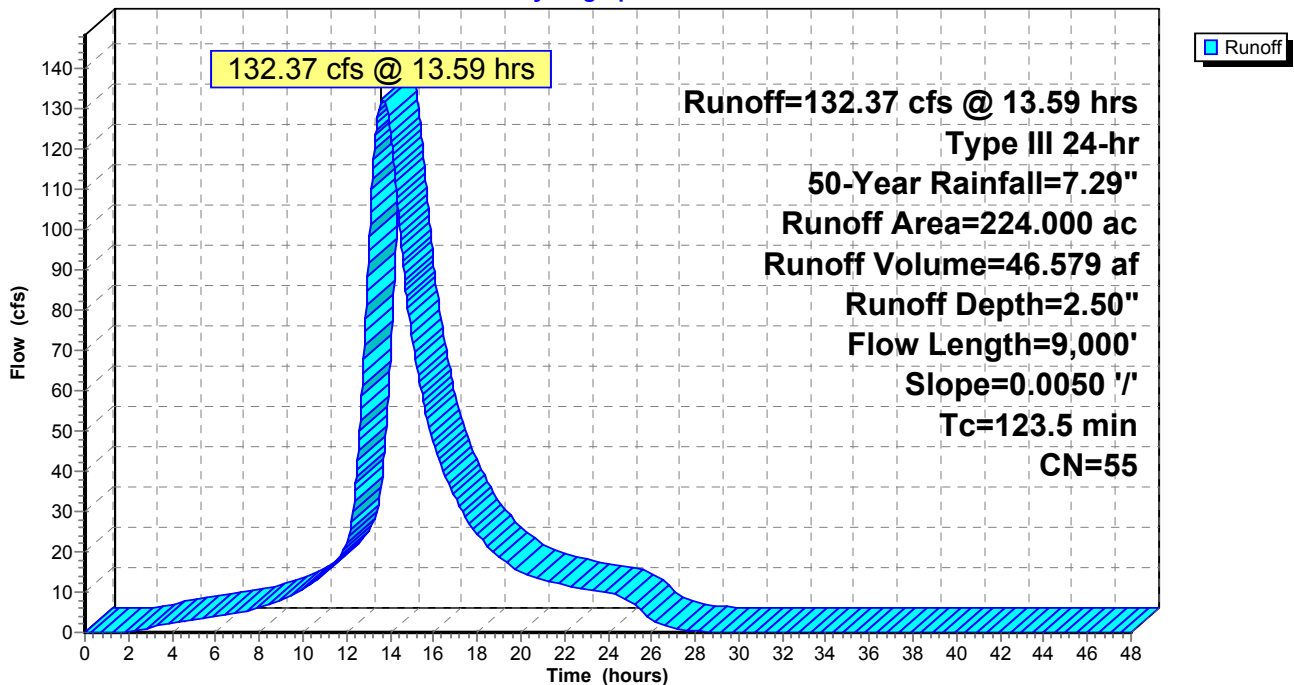
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 50-Year Rainfall=7.29"

Area (ac)	CN	Description
* 172.000	42	See Excel and ArcGIS
* 52.000	98	See Excel and ArcGIS
224.000	55	Weighted Average
172.000	42	76.79% Pervious Area
52.000	98	23.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
81.3	7,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
22.2	2,000		1.50		Direct Entry, Estimated Channel Time
123.5	9,000	Total			

Subcatchment SUB M: Millstone

Hydrograph



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Summary for Subcatchment SUB W: Washington

Runoff = 283.27 cfs @ 13.66 hrs, Volume= 97.733 af, Depth= 2.82"

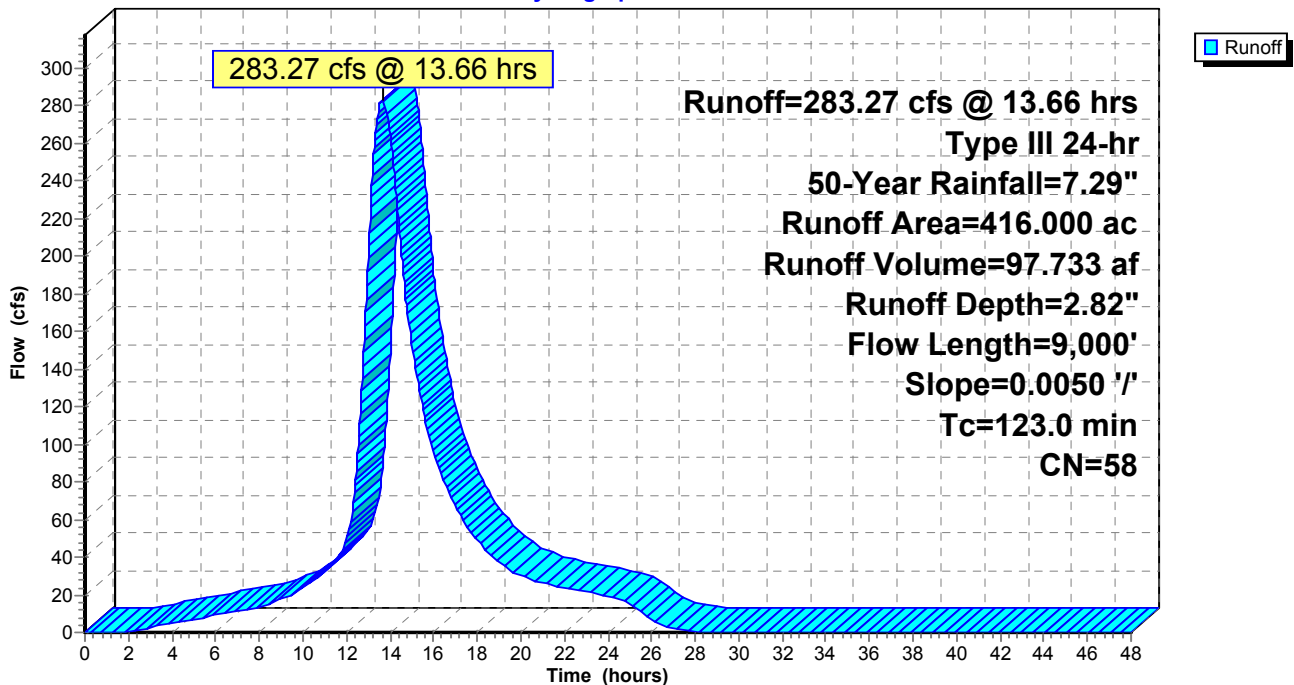
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 50-Year Rainfall=7.29"

Area (ac)	CN	Description
* 301.000	43	See Excel and ArcGIS
* 115.000	98	See Excel and ArcGIS
416.000	58	Weighted Average
301.000	43	72.36% Pervious Area
115.000	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
69.7	6,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
33.3	3,000		1.50		Direct Entry, Estimated Channel Time
123.0	9,000	Total			

Subcatchment SUB W: Washington

Hydrograph



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Summary for Subcatchment SUB A: Alexander

Runoff = 1,666.29 cfs @ 12.86 hrs, Volume= 369.027 af, Depth= 3.72"

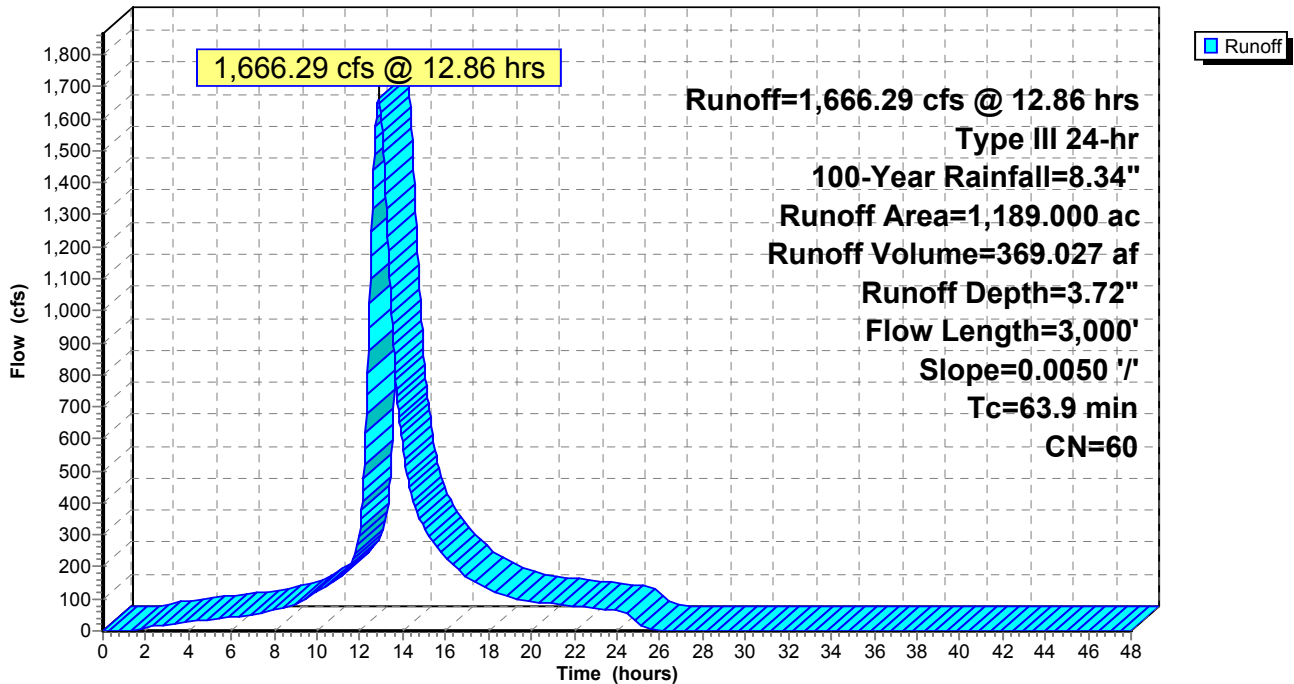
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.34"

Area (ac)	CN	Description
* 801.000	42	See Excel and ArcGIS
* 388.000	98	See Excel and ArcGIS
1,189.000	60	Weighted Average
801.000	42	67.37% Pervious Area
388.000	98	32.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
43.9	3,000	0.0050	1.14		Shallow Concentrated Flow, Estimated SCF Time
					Unpaved Kv= 16.1 fps
63.9	3,000	Total			

Subcatchment SUB A: Alexander

Hydrograph



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Summary for Subcatchment SUB M: Millstone

Runoff = 168.82 cfs @ 13.61 hrs, Volume= 58.104 af, Depth= 3.11"

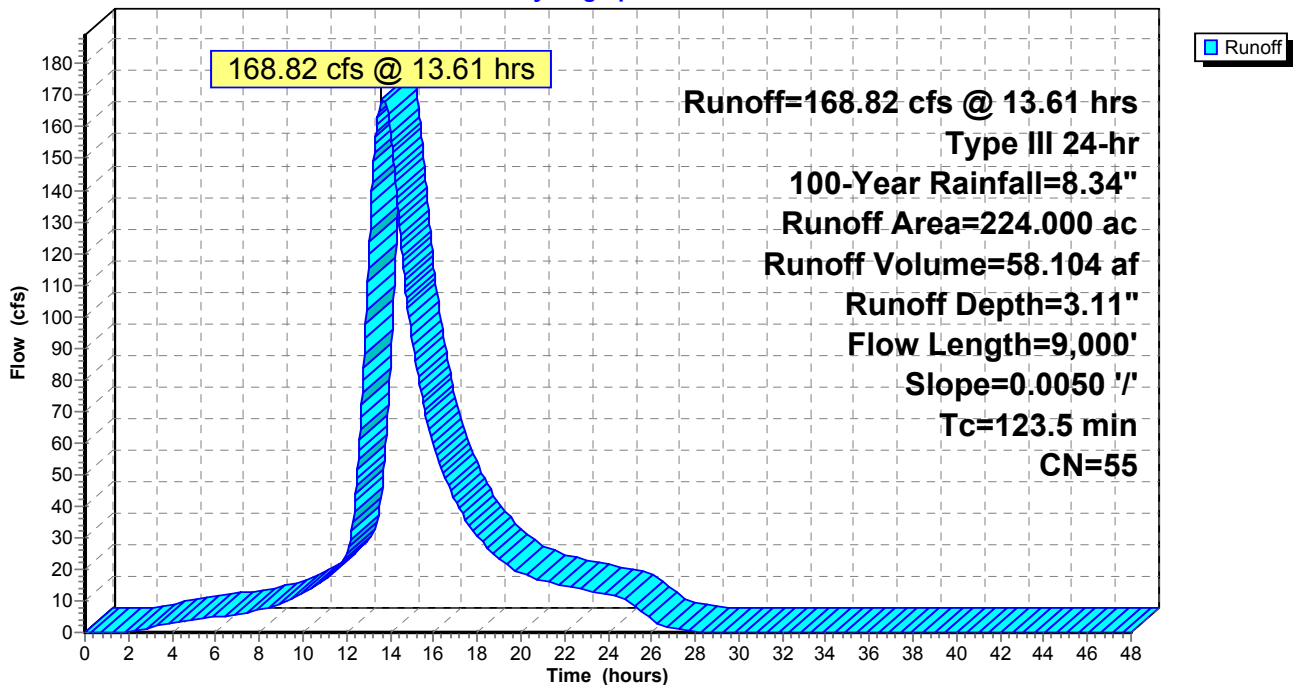
Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.34"

Area (ac)	CN	Description
* 172.000	42	See Excel and ArcGIS
* 52.000	98	See Excel and ArcGIS
224.000	55	Weighted Average
172.000	42	76.79% Pervious Area
52.000	98	23.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
81.3	7,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
22.2	2,000		1.50		Direct Entry, Estimated Channel Time
123.5	9,000	Total			

Subcatchment SUB M: Millstone

Hydrograph



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Summary for Subcatchment SUB W: Washington

Runoff = 355.77 cfs @ 13.66 hrs, Volume= 120.474 af, Depth= 3.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-Q, Time Span= 0.00-48.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-Year Rainfall=8.34"

Area (ac)	CN	Description
* 301.000	43	See Excel and ArcGIS
* 115.000	98	See Excel and ArcGIS
416.000	58	Weighted Average
301.000	43	72.36% Pervious Area
115.000	98	27.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
20.0					Direct Entry, Estimated Sheet Flow Time
69.7	6,000	0.0050	1.44		Shallow Concentrated Flow, Estimated SCF Time Paved Kv= 20.3 fps
33.3	3,000		1.50		Direct Entry, Estimated Channel Time
123.0	9,000	Total			

Subcatchment SUB W: Washington

Hydrograph

