

May

Engineering, LLC

Civil Engineering, Site Planning, and Consulting

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DRAINAGE REPORT

August 18, 2025

Property Located at:

888 Norwich New London Tpke (Rt 32)
Uncasville, CT 06382

Prepared For:

DEPOT ROAD PROPERTY LLC
133 CHAPEL HILL RD
OAKDALE, CT 06370

Prepared By:

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



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This stormwater management report is developed in support of a site plan for a commercial lot, after the existing structure and bituminous pavement was removed. The property is located 888 Norwich-New London Tnpk in the Uncasville, CT. The 2023 Connecticut Stormwater Quality Manual standards have been considered and evaluated for a plan review to demonstrate that stormwater design along with stormwater management methods/devices can be effectively implemented to achieve Water Quality Volumes and Required Retention Volumes.

SITE DESCRIPTION:

The site is a 0.34-acre parcel located on the western side of Norwich-New London Tpk (Rt 32). Previously, before 2023, the commercial lot contained a wood frame structure (900 sf) and associated bituminous paved parking. The impervious area was approximately half the lot area. The remaining lot area was grassed lawn. The parcel has average slopes of less than 1%. There is an existing paved drive apron that provides access to the parcel.

The soil type is primarily a hydraulic soil group A; consisting of *HINCKLEY* gravelly sandy loam and *CHARLTON-CHATFIELD* gravelly sandy loam. The soil types were evaluated for their permeability and have a moderate-to-high infiltration rate, referencing the USDA Natural Resource Conservation Service Soil Survey for this parcel. The existing parcel does contain a Directly Connected Impervious Areas (DCIA) which is an inactive catch basin that is not connected to any storm water conveyance system. Due to the topography, all stormwater flow generated on this parcel is hydraulically isolated and remains onsite. Existing conditions were verified after several large rainfalls in the spring and summer of 2025. After large rainfall events, onsite inspection noted no ponding or soil migration of fines, or acute channelization. There was little evidence of soil erosion. This further demonstrates that the onsite soil has a high infiltration capacity and the soil conditions at the site are stable.

The proposed vehicle parking design will have approximately 0.3 ac of disturbance. HydroCad Stormwater modeling software using Soil Conservation Service (SCS/NRCS) methods was used to develop existing stormwater conditions, which were then compared to proposed/developed conditions.

Water quality volumes (WQV), Required Retention volumes (RRV), Water Quality Flows (WQF) and pollutant reduction BMPs were evaluated and target values were accomplished by the implementation of stormwater infiltration and retention devices to achieve the required 90% reduction in total suspended solids (TSS) and pollutant reduction.

Bituminous/asphalt millings are used as a pervious material, incorporated in the parking area design to provide stormwater infiltration, storage and treatment to attenuate stormwater volumes and provide pollution reduction. Stormwater estimates have been modeled and estimated to ensure required stormwater WQV.

Asphalt millings are a good option for drainage surfaces, especially for driveways and parking lots, due to their porous nature which allows water to pass through. This prevents water from pooling and causing damage or safety hazards.

DESIGN METHODOLOGY AND EVALUATION

The before condition has 0.34 ac site containing:

- Impervious roof area 900 sf
- Impervious bituminous paved 7,551 sf
- Grassed lawn area 6,403 sf

Before condition has a weighted CN of 0.85

The after condition has 0.34 ac site containing:

- Asphalt Millings pervious parking 14,833 sf

After condition has a weighted CN of 0.76

Asphalt millings have a high infiltration rate and storage capacity to retain stormwater and provide treatment and peak runoff attenuation. By storing and infiltrating stormwater this provide multiple benefits, including retention (volume reduction), groundwater recharge, treatment, and stormwater quantity control and provide pollutant removal of:

- Sediments - High (includes sediment-bound pollutants)
- Phosphorus - Moderate
- Nitrogen - Moderate
- Bacteria - High

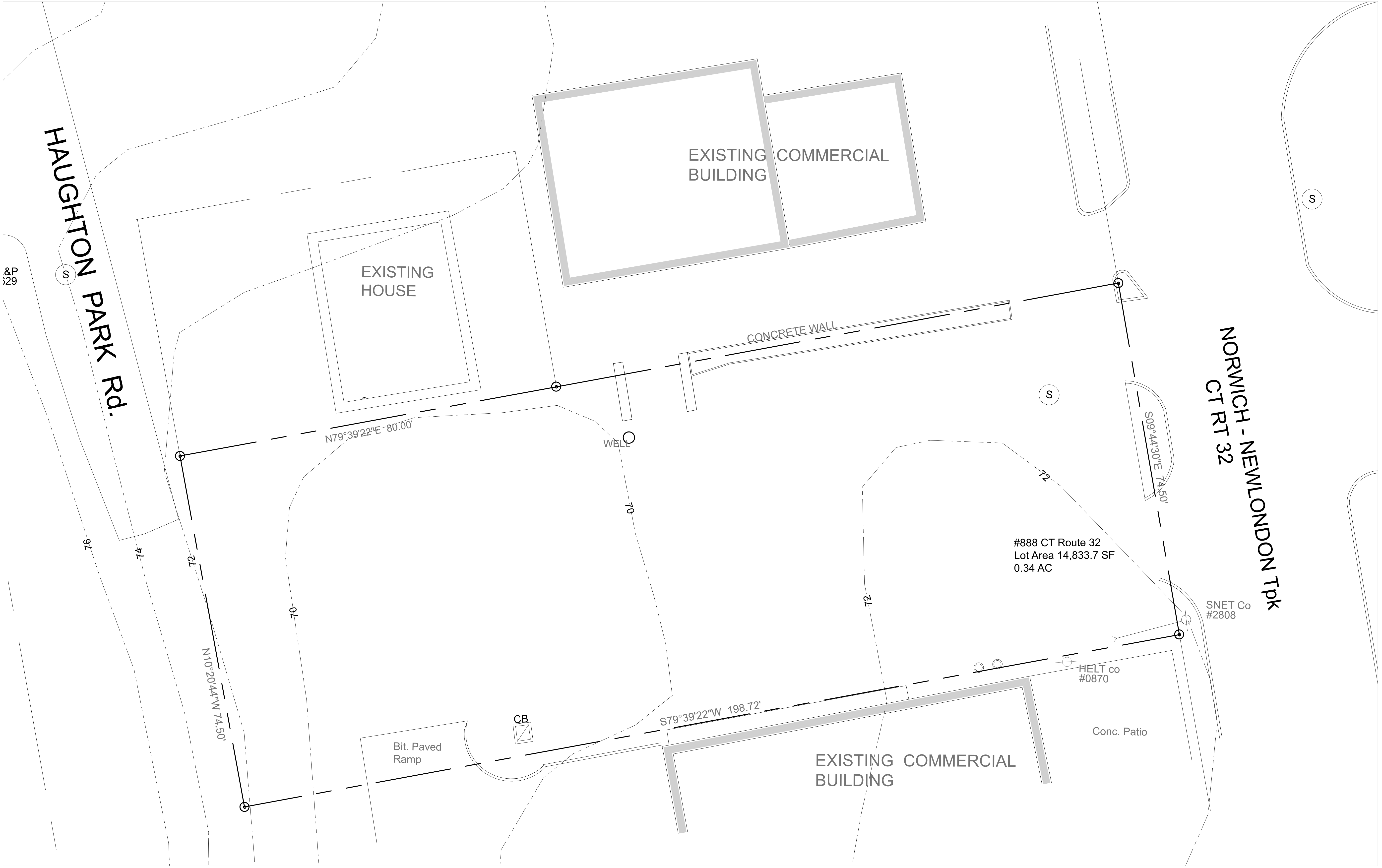
SUMMARIZED RESULTS FROM HYDROCAD FOR STORM EVENTS

Stormwater Runoff Amounts (cfs)

	2 year	10 year	25 year	50 year	100 year
Before	0.86	1.40	1.76	2.0	2.31
Proposed	0.54	1.02	1.35	1.57	1.87
Change (cfs)	0.32	0.38	0.41	0.43	0.44
% reduction	22.8%	15.1%	12.7%	11.6%	10.6%

SUMMARY

The proposed site plan as designed has incorporated stormwater BMPs and reduction practices to mitigate stormwater impacts. Water Quality Volumes and Required Retention Volumes are achieved and implemented with standard design practices that are within parameters of the existing site conditions using standard stormwater designs- Best Management Practices (2023 CT Stormwater Design Manual). The proposed site plan has an overall average stormwater reduction of 15% in peak runoff attenuation and exceeds WQV requirements for reduction.



Lot Layout After

Pennells Auto Before

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Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.40	2
2	10 year	Type III 24-hr		Default	24.00	1	4.80	2
3	25 year	Type III 24-hr		Default	24.00	1	5.70	2
4	50 year	Type III 24-hr		Default	24.00	1	6.30	2
5	100 year	Type III 24-hr		Default	24.00	1	7.10	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.147	68	<50% Grass cover, Poor, HSG A (1S)
0.173	98	Paved parking, HSG B (1S)
0.021	98	Roofs, HSG B (1S)
0.341	85	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.147	HSG A	1S
0.194	HSG B	1S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.341		TOTAL AREA

Pennells Auto Before

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.147	0.000	0.000	0.000	0.000	0.147	<50% Grass cover, Poor	1S
0.000	0.173	0.000	0.000	0.000	0.173	Paved parking	1S
0.000	0.021	0.000	0.000	0.000	0.021	Roofs	1S
0.147	0.194	0.000	0.000	0.000	0.341	TOTAL AREA	

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Type III 24-hr 2-year Rainfall=3.40"

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Summary for Subcatchment 1S: Before

Runoff = 0.86 cfs @ 12.02 hrs, Volume= 0.051 af, Depth> 1.80"

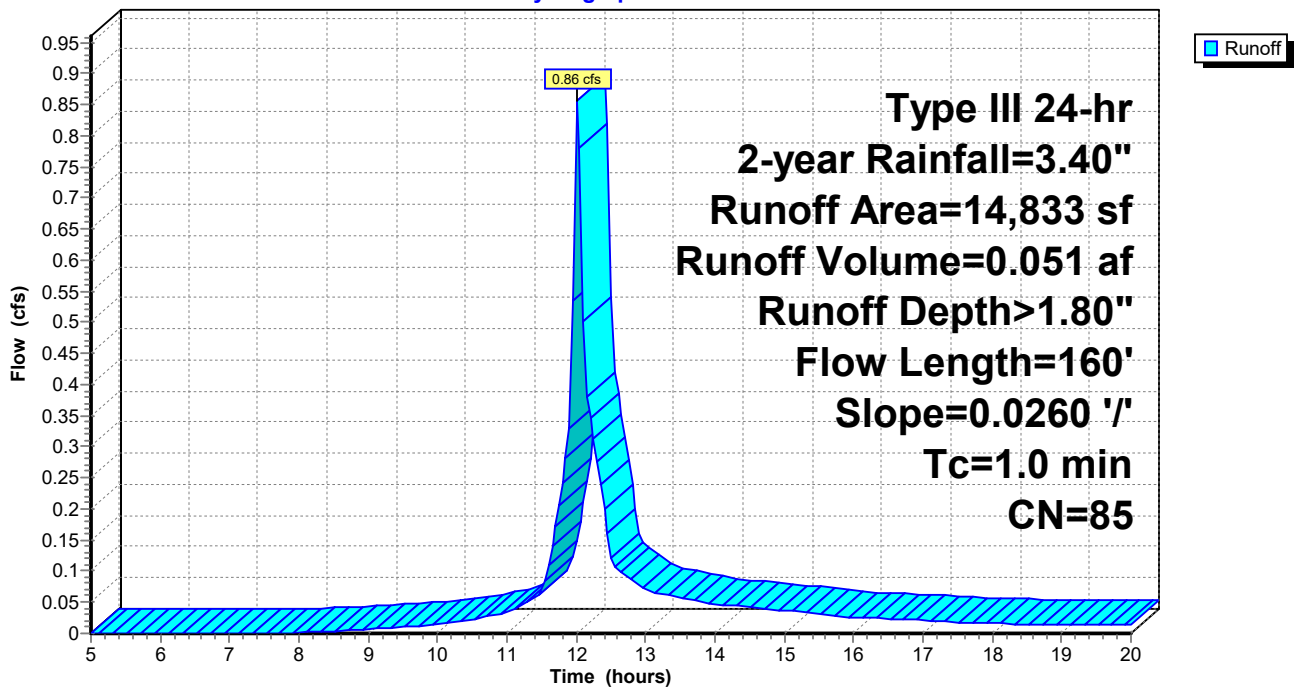
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.40"

Area (sf)	CN	Description
7,551	98	Paved parking, HSG B
900	98	Roofs, HSG B
6,382	68	<50% Grass cover, Poor, HSG A
14,833	85	Weighted Average
6,382		43.03% Pervious Area
8,451		56.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0260	0.99		Sheet Flow, paved Smooth surfaces n= 0.011 P2= 3.35"
0.8	150	0.0260	3.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	160	Total			

Subcatchment 1S: Before

Hydrograph



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Type III 24-hr 10 year Rainfall=4.80"

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Summary for Subcatchment 1S: Before

Runoff = 1.40 cfs @ 12.02 hrs, Volume= 0.085 af, Depth> 3.00"

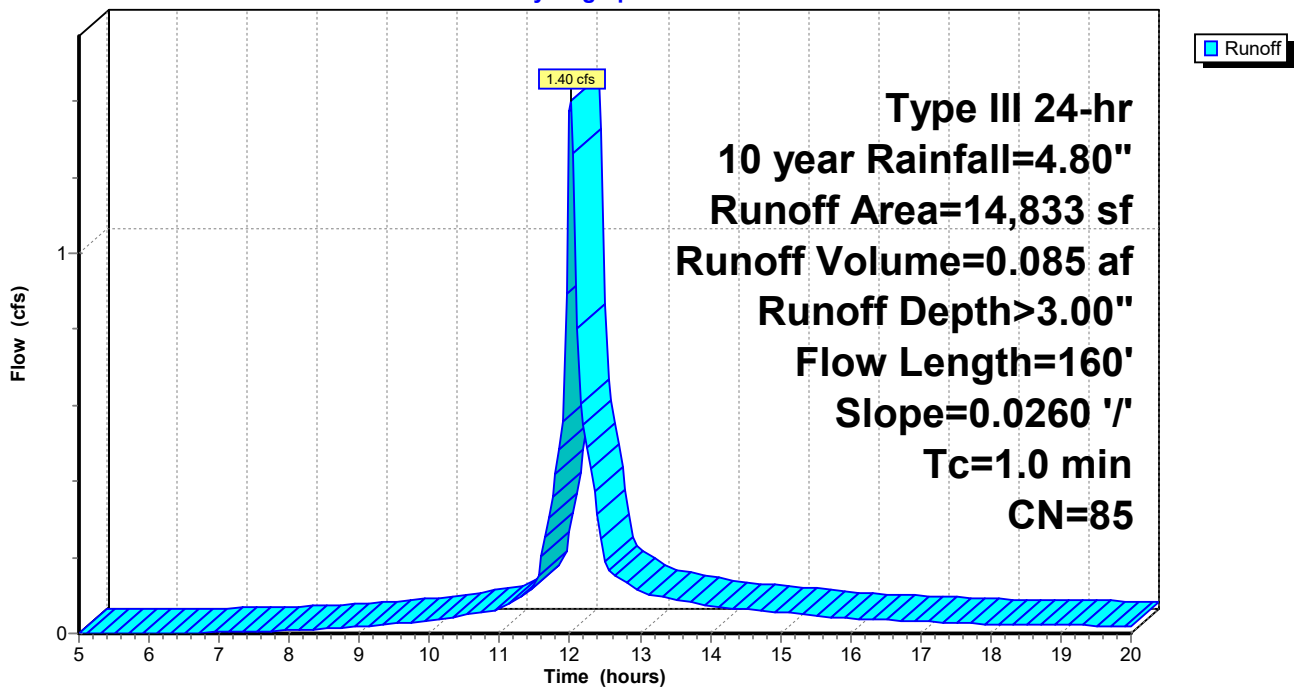
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
7,551	98	Paved parking, HSG B
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0260	0.99		Sheet Flow, paved Smooth surfaces n= 0.011 P2= 3.35"
0.8	150	0.0260	3.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	160	Total			

Subcatchment 1S: Before

Hydrograph



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Type III 24-hr 25 year Rainfall=5.70"

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Summary for Subcatchment 1S: Before

Runoff = 1.76 cfs @ 12.01 hrs, Volume= 0.108 af, Depth> 3.79"

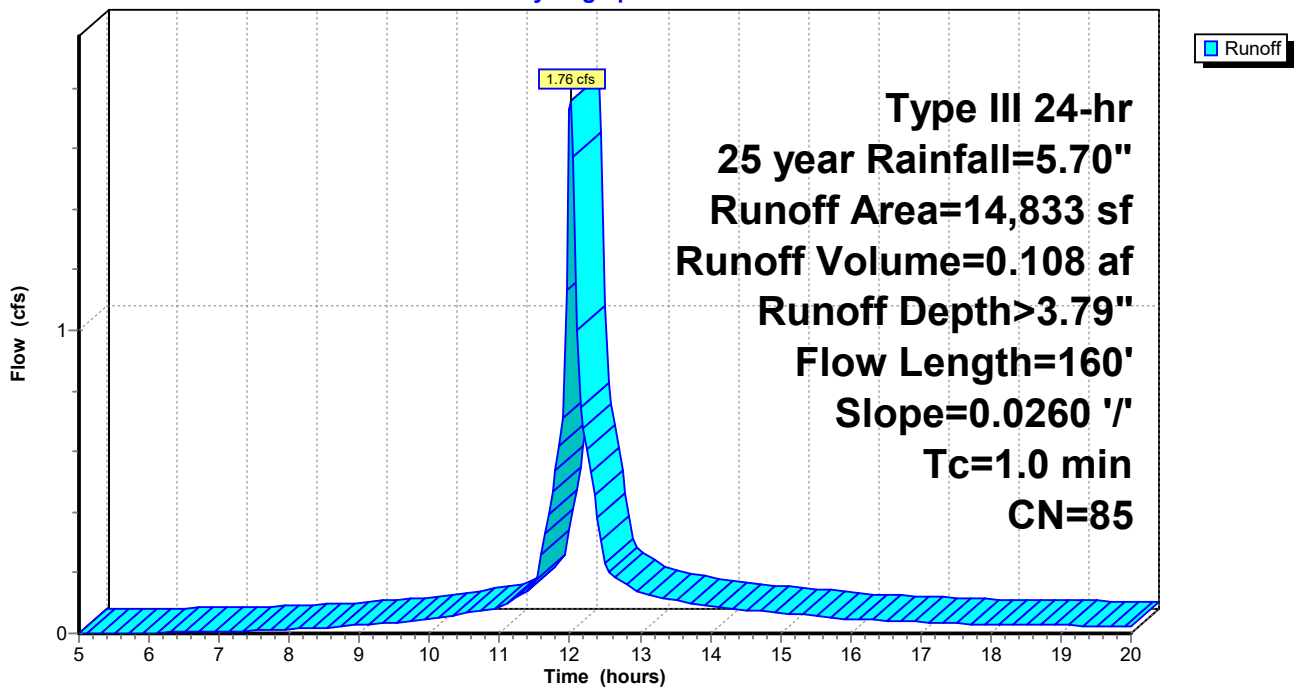
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 year Rainfall=5.70"

Area (sf)	CN	Description
7,551	98	Paved parking, HSG B
900	98	Roofs, HSG B
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0260	0.99		Sheet Flow, paved Smooth surfaces n= 0.011 P2= 3.35"
0.8	150	0.0260	3.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	160	Total			

Subcatchment 1S: Before

Hydrograph



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Type III 24-hr 50 year Rainfall=6.30"

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Summary for Subcatchment 1S: Before

Runoff = 2.00 cfs @ 12.01 hrs, Volume= 0.123 af, Depth> 4.33"

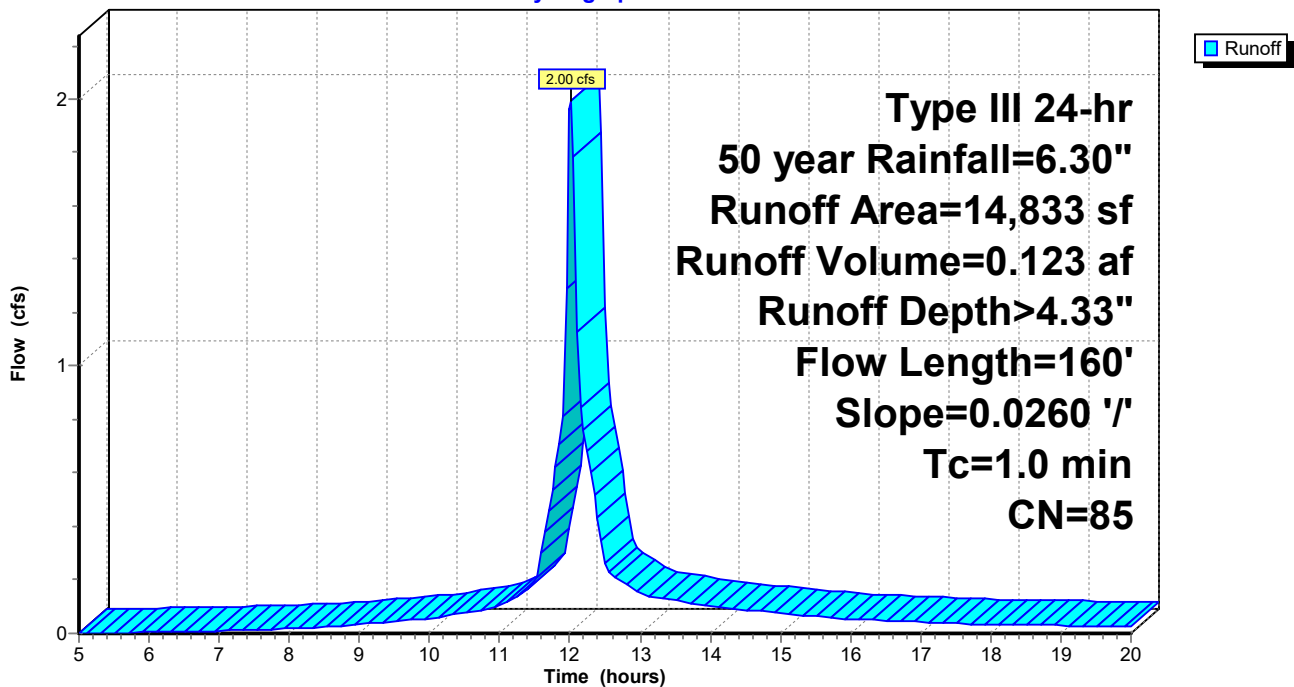
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.30"

Area (sf)	CN	Description
7,551	98	Paved parking, HSG B
900	98	Roofs, HSG B
6,382	68	<50% Grass cover, Poor, HSG A
14,833	85	Weighted Average
6,382		43.03% Pervious Area
8,451		56.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0260	0.99		Sheet Flow, paved Smooth surfaces n= 0.011 P2= 3.35"
0.8	150	0.0260	3.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	160	Total			

Subcatchment 1S: Before

Hydrograph



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Type III 24-hr 100 year Rainfall=7.10"

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Summary for Subcatchment 1S: Before

Runoff = 2.31 cfs @ 12.01 hrs, Volume= 0.143 af, Depth> 5.06"

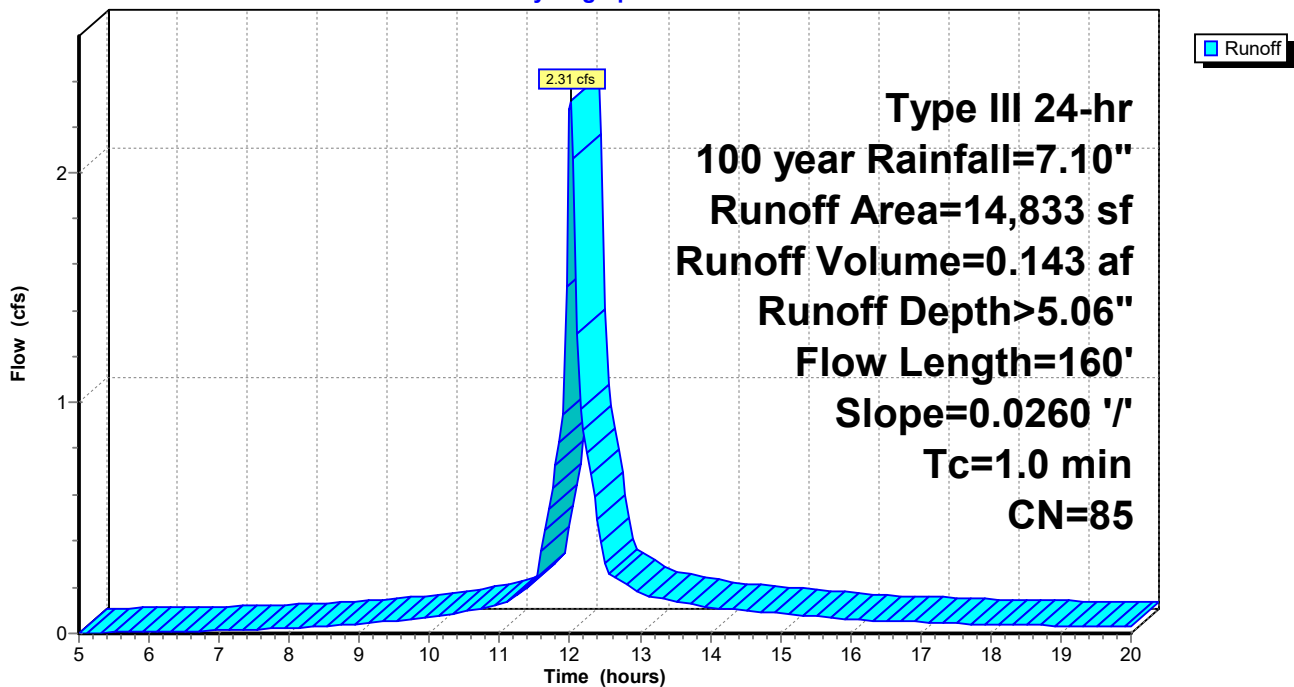
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.10"

Area (sf)	CN	Description
7,551	98	Paved parking, HSG B
900	98	Roofs, HSG B
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14,833	85	Weighted Average
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8,451		56.97% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.2	10	0.0260	0.99		Sheet Flow, paved Smooth surfaces n= 0.011 P2= 3.35"
0.8	150	0.0260	3.27		Shallow Concentrated Flow, Paved Kv= 20.3 fps
1.0	160	Total			

Subcatchment 1S: Before

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Multi-Event Tables

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Events for Subcatchment 1S: Before

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-year	3.40	0.86	0.051	1.80
10 year	4.80	1.40	0.085	3.00
25 year	5.70	1.76	0.108	3.79
50 year	6.30	2.00	0.123	4.33
100 year	7.10	2.31	0.143	5.06

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Page 1

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-year	Type III 24-hr		Default	24.00	1	3.40	2
2	10 year	Type III 24-hr		Default	24.00	1	4.80	2
3	25 year	Type III 24-hr		Default	24.00	1	5.70	2
4	50 year	Type III 24-hr		Default	24.00	1	6.30	2
5	100 year	Type III 24-hr		Default	24.00	1	7.10	2

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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.341	76	Gravel - Millings HSG A (1S)
0.341	76	TOTAL AREA

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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.341	HSG A	1S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
0.341		TOTAL AREA

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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.341	0.000	0.000	0.000	0.000	0.341	Gravel - Millings	1S
0.341	0.000	0.000	0.000	0.000	0.341	TOTAL AREA	

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Type III 24-hr 2-year Rainfall=3.40"

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Summary for Subcatchment 1S: After

Runoff = 0.54 cfs @ 12.06 hrs, Volume= 0.034 af, Depth> 1.19"

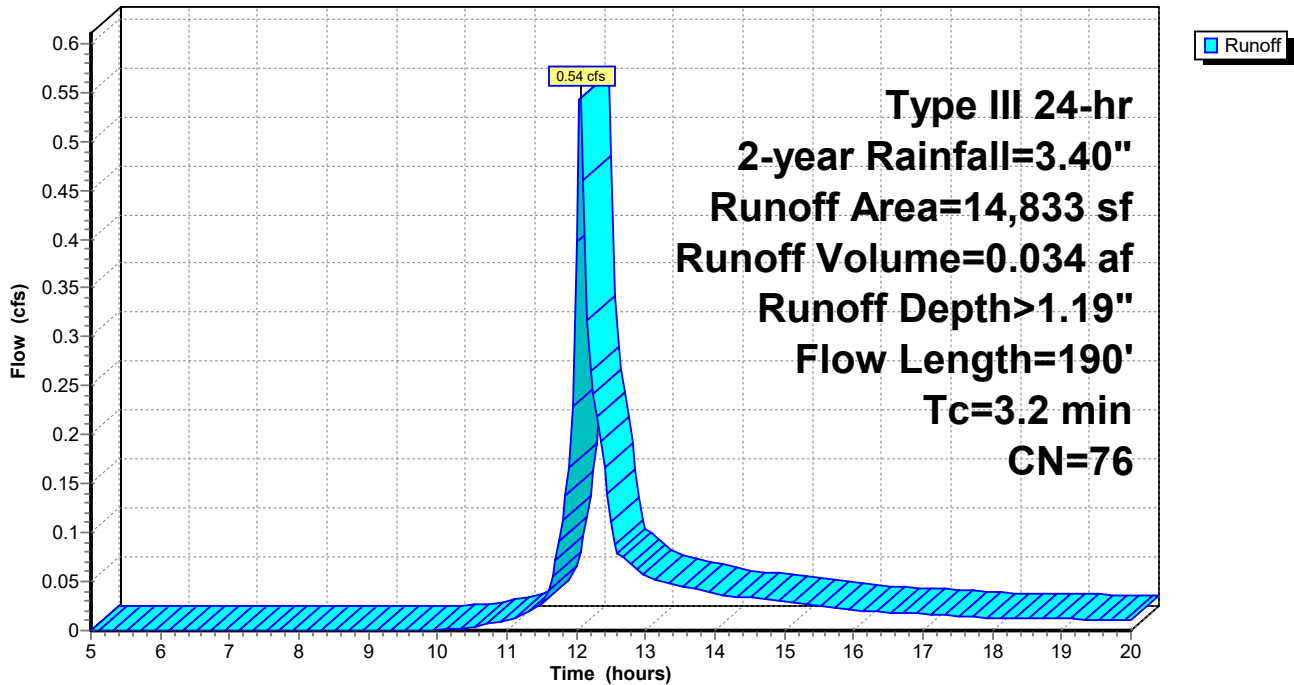
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-year Rainfall=3.40"

Area (sf)	CN	Description
* 14,833	76	Gravel - Millings HSG A
14,833		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	40	0.0300	0.41		Sheet Flow, Fallow n= 0.050 P2= 3.35"
1.6	150	0.0260	1.61		Shallow Concentrated Flow, shallow conc flow Nearly Bare & Untilled Kv= 10.0 fps
3.2	190	Total			

Subcatchment 1S: After

Hydrograph



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Type III 24-hr 10 year Rainfall=4.80"

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Summary for Subcatchment 1S: After

Runoff = 1.02 cfs @ 12.05 hrs, Volume= 0.063 af, Depth> 2.20"

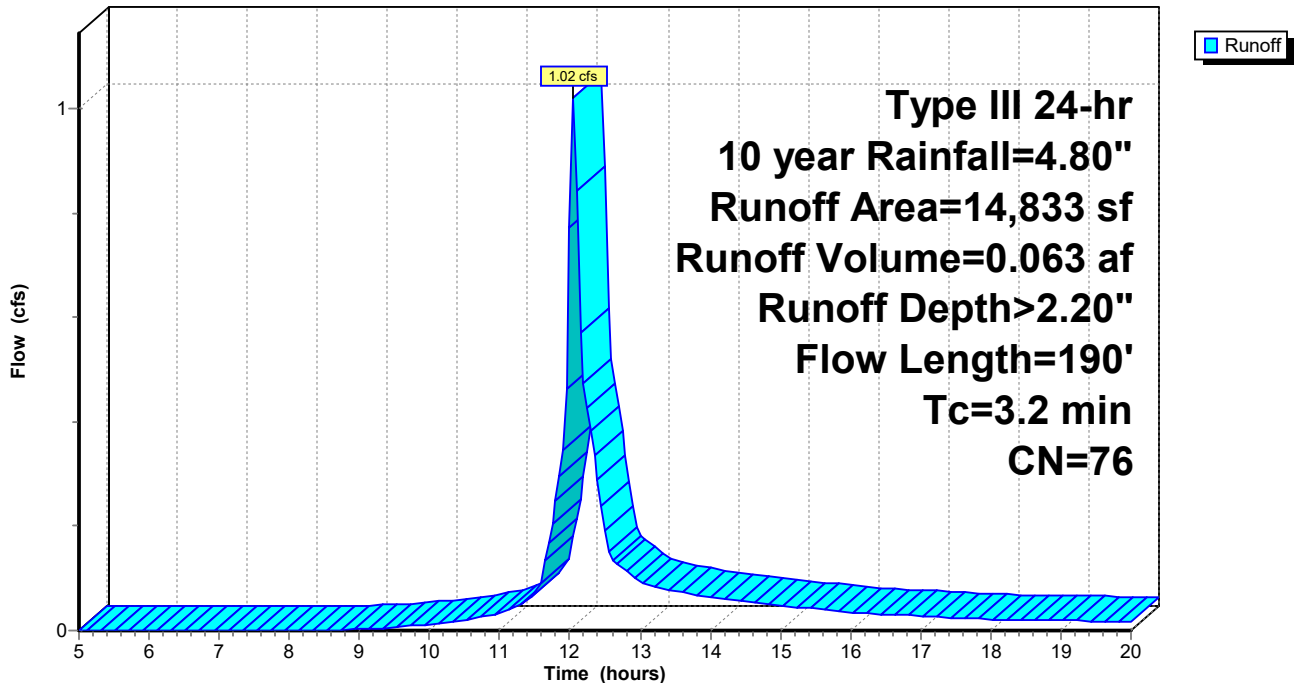
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 year Rainfall=4.80"

Area (sf)	CN	Description
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	40	0.0300	0.41		Sheet Flow, Fallow n= 0.050 P2= 3.35"
1.6	150	0.0260	1.61		Shallow Concentrated Flow, shallow conc flow Nearly Bare & Untilled Kv= 10.0 fps
3.2	190	Total			

Subcatchment 1S: After

Hydrograph



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Type III 24-hr 25 year Rainfall=5.70"

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Summary for Subcatchment 1S: After

Runoff = 1.35 cfs @ 12.05 hrs, Volume= 0.083 af, Depth> 2.91"

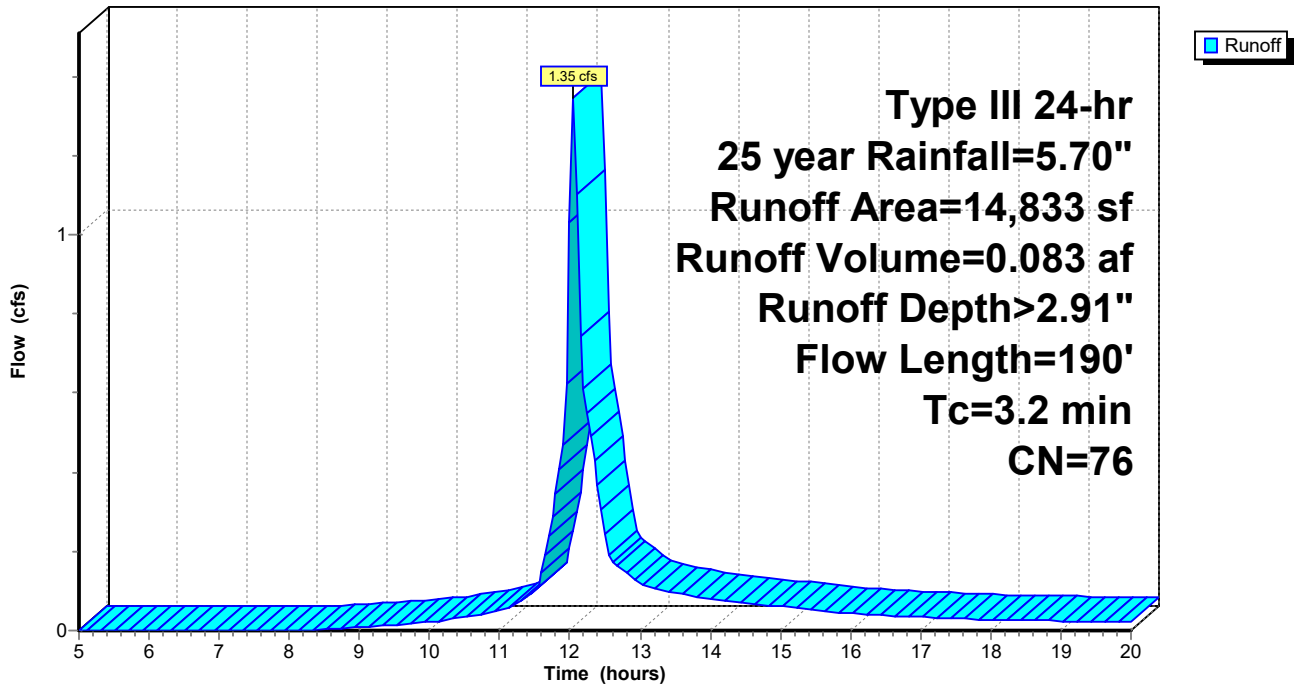
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 Type III 24-hr 25 year Rainfall=5.70"

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3.2	190	Total			

Subcatchment 1S: After

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Type III 24-hr 50 year Rainfall=6.30"

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Summary for Subcatchment 1S: After

Runoff = 1.57 cfs @ 12.05 hrs, Volume= 0.097 af, Depth> 3.40"

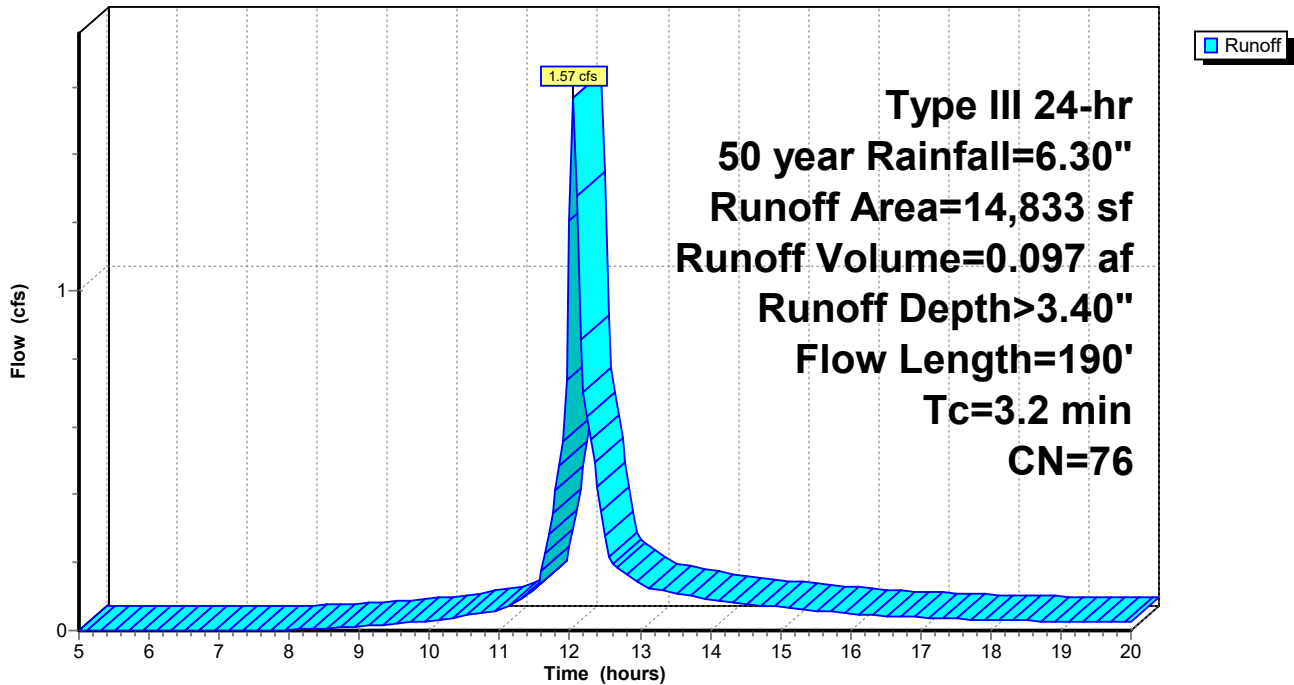
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 50 year Rainfall=6.30"

Area (sf)	CN	Description
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Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	40	0.0300	0.41		Sheet Flow, Fallow n= 0.050 P2= 3.35"
1.6	150	0.0260	1.61		Shallow Concentrated Flow, shallow conc flow Nearly Bare & Untilled Kv= 10.0 fps
3.2	190	Total			

Subcatchment 1S: After

Hydrograph



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Type III 24-hr 100 year Rainfall=7.10"

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Summary for Subcatchment 1S: After

Runoff = 1.87 cfs @ 12.05 hrs, Volume= 0.116 af, Depth> 4.07"

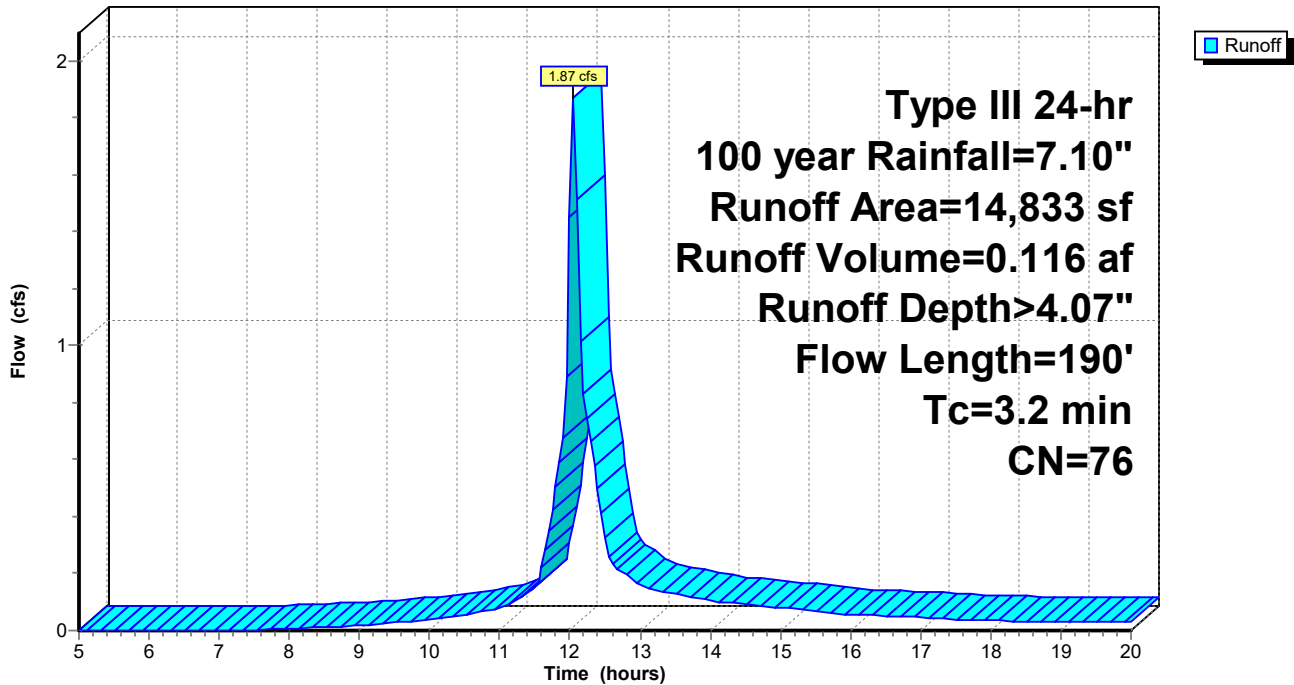
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 year Rainfall=7.10"

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Subcatchment 1S: After

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Pennells Auto After

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Multi-Event Tables

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Events for Subcatchment 1S: After

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-year	3.40	0.54	0.034	1.19
10 year	4.80	1.02	0.063	2.20
25 year	5.70	1.35	0.083	2.91
50 year	6.30	1.57	0.097	3.40
100 year	7.10	1.87	0.116	4.07