MEGSON, HEAGLE & FRIEND

CIVIL ENGINEERS & LAND SURVEYORS, LLC
81 RANKIN ROAD
GLASTONBURY, CONNECTICUT 06033
PHONE (860) 659-0587
FAX (860) 657-4429

HYDROLOGY AND HYDRAULICS
ENGINEERING REPORT

219 ADDISON ROAD
PREPARED FOR
TRUNORTH CONSTRUCTION, INC
GLASTONBURY, CT

August, 2020

Prepared By:

Jonathan H. Sczurek, P.E.

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I. INTRODUCTION

Project Description:

This project is located at 219 Addison Rd, on the north west corner of the intersection with Eastern Blvd. It will consist of the construction of 4 new office buildings with 18 units total on 2.42 acres located in a Planned Employment zone. The project will be accessed via a two-way driveway connection to Addison Road.

The site currently drains toward the northwest corner of the property where there are wetland soils that are associated with an intermittent watercourse that drains into a tributary of Salmon Brook. Pre and Post Development drainage patterns will be maintained and MS4 requirements met.

The proposed Stormwater Management System will include directing runoff from paved areas to a Detention Basin located in the northwest corner of the site. The basin is sized to attenuate peak flows from the 2-100 year return frequency storms. The roof areas will be directed into subsurface infiltration structures sized to store and infiltrate a 100-year storm from all of the buildings.

The water quality volume will be treated by separating and infiltrating the roof runoff, directing pavement to a vegetated swale along the easterly property line, installation of a stone infiltration trench in the northerly parking area and construction of a detention basin with a moist bottom and wetland plantings.

Drainage Considerations:

The proposed drainage system is designed to treat the WQV of the collected runoff by allowing for a 12-14 hr residence time within the detention basin along with a moist bottom to be planted with a wetland matrix. There are also other LID techniques incorporated into the design such as deep sump catch basins; directing runoff from a portion of the parking to a vegetated swale to increase time of concentration and allow for more nutrient uptake; sheet flow from a portion of the parking to a stone infiltration trench to increase time of concentration and dissipate energy or runoff; and infiltration of roof areas.

Soil testing was done on the site and there was high groundwater encountered in the area of the detention basin, allowing for a moist bottom, suitable for wetland plantings. The areas of roof infiltration also had indication of groundwater, but much deeper and the bottom of the systems will be above the high groundwater.

Methodology:

The stormwater models for the proposed development were designed using SCS TR-20 methodology, as detention is required, being in a subwatershed "C" as defined in the Salmon Brook Master Drainage Study. The hydrographs are included in Appendix B. The results demonstrate the peak flows for the 2, 10, 25, 50 & 100 year return frequency storms.

The storm drainage system was sized based on a 10 year return frequency storm. Sizing for the proposed Water Quality Treatment/MS 4 systems was calculated utilizing the techniques outlined in the 2004 Connecticut Stormwater Quality Manual. The Water Quality Volume was computed with the formulas presented in this manual.

Conclusions:

- The proposed drainage system will adequately convey a 10 year return frequency storm in accordance with the Town of Glastonbury requirements.

- No adverse impacts from development will be created for downstream areas.

- 100-year storm volumes from the proposed Building Roof Areas will be collected and infiltrated within the Subsurface Infiltration Chambers proposed.

- The proposed improvements will meet the MS 4 requirements for disconnecting paved areas from Town drainage systems.

II. STORMWATER RUNOFF

Pre-Development Runoff to Point 'A'

4.209 AC

CN =46

Tc=14.0 Min

SCS TR-20 (Use NOAA ATLAS14 rainfall rates)

Q_2 = 0.02 cfs V_2 = 0.015 af

Q_{10} = 0.58 cfs V_{10} = 0.156 af

Q_{25} = 1.99 cfs V_{25} = 0.303 af

Q_{50} = 3.55 cfs V_{50} = 0.439 af

Q_{100} = 5.32 cfs V_{100} = 0.593 af

Post-Development Runoff to Point 'A' (with no infiltration)

4.209 AC

CN =62

Tc=12.3 Min

SCS TR-20 (Use NOAA ATLAS14 rainfall rates)

Q_2 = 1.05 cfs V_2 = 0.150 af

Q_{10} = 5.09 cfs V_{10} = 0.477 af

Q_{25} = 8.21 cfs V_{25} = 0.731 af

Q_{50} = 10.95 cfs V_{50} = 0.947 af

Q_{100} =13.74 cfs V_{100} = 1.175 af

Post-Development Runoff to Point 'A' (with roof infiltration)

3.881 AC

CN =59

Tc=12.3 Min

SCS TR-20 (Use NOAA ATLAS14 rainfall rates)

Q_2 = 0.53 cfs V_2 = 0.106 af

Q_{10} = 3.78 cfs V_{10} = 0.376 af

Q_{25} = 6.45 cfs V_{25} = 0.593 af

Q_{50} = 8.71 cfs V_{50} = 0.779 af

Q_{100} =11.26 cfs V_{100} = 0.978 af

Increase in Runoff Due to Development

	Post	**-**	**Pre**	**=**	**Increase**
Q_2 :	0.53 cfs	-	0.02 cfs	=	0.51 cfs
Q_{10} :	3.78 cfs	-	0.58 cfs	=	3.20 cfs
Q_{25} :	6.45 cfs	-	1.99 cfs	=	4.46 cfs
Q_{50} :	8.71 cfs	-	3.55 cfs	=	5.16 cfs
Q_{100} :	11.26 cfs	-	5.32 cfs	=	5.94 cfs

Post-Development Runoff to Detention Pond

2.347 AC

CN =63

Tc=9.0 Min

SCS TR-20 (Use NOAA ATLAS14 rainfall rates)

Q_2 = 0.79 cfs	V_2 = 0.090 af
Q_{10} = 3.48 cfs	V_{10} = 0.279 af
Q_{25} = 5.52 cfs	V_{25} = 0.424 af
Q_{50} = 7.21 cfs	V_{50} = 0.547 af
Q_{100} =8.99 cfs	V_{100} = 0.676 af

Allowable Release Rate from Detention Pond

	Runoff In	-	Increase	=	Allowable Discharge
Q_2 :	0.79 cfs	-	0.51 cfs	=	0.28 cfs
Q_{10} :	3.48 cfs	-	3.20 cfs	=	0.28 cfs
Q_{25} :	5.52 cfs	-	4.46 cfs	=	1.06 cfs
Q_{50} :	7.21 cfs	-	5.16 cfs	=	2.05 cfs
Q_{100} :	8.99 cfs	-	5.94 cfs	=	3.05 cfs

Release Rate from Detention Pond as Designed

Q_2 : 0.02 cfs

Q_{10} : 0.23 cfs

Q_{25} : 0.59 cfs

Q_{50} : 0.83 cfs

Q_{100} : 1.04 cfs

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JOB _____
SHEET NO._____ OF_____
CALC. BY_____ DATE_____
CHECKED BY_____ DATE_____
SCALE_____

DRAINAGE AREAS

STRUCTURE: CB 1
WOODED AREA= —
LAWN AREA= 0.06 Ac
IMPERVIOUS AREA= 0.20 Ac
TOTAL AREA= 0.26 Ac
C_{IMP}=[(0.25)(—)+(0.35)(.06)+(0.9)(.20)]/(.26)= 0.77

LENGTH= 160 FT
ELEVATION CHANGE= 6 FT
SLOPE= 3.7%
T_C= 5 MIN

STRUCTURE: CB 2
WOODED AREA= —
LAWN AREA= 0.05 Ac
IMPERVIOUS AREA= 0.22 Ac
TOTAL AREA= 0.27 Ac
C_{IMP}=[(0.25)(—)+(0.35)(.05)+(0.9)(.22)]/(.27)= 0.80

LENGTH= 165 FT
ELEVATION CHANGE= 6 FT
SLOPE= 3.6%
T_C= 5 MIN

STRUCTURE: CB 3
WOODED AREA= —
LAWN AREA= 0.04 Ac
IMPERVIOUS AREA= 0.26 Ac
TOTAL AREA= 0.30 Ac
C_{IMP}=[(0.25)(—)+(0.35)(.04)+(0.9)(.26)]/(.30)= 0.83

LENGTH= 170 FT
ELEVATION CHANGE= 6 FT
SLOPE= 3.5%
T_C= 5 MIN

STRUCTURE: CB 4
WOODED AREA= —
LAWN AREA= 0.24 Ac
IMPERVIOUS AREA= 0.01 Ac
TOTAL AREA= 0.25 Ac
C_{IMP}=[(0.25)(—)+(0.35)(.24)+(0.9)(.01)]/(.25)= 0.37

LENGTH= 140 FT
ELEVATION CHANGE= 6 FT
SLOPE= 4.3%
T_C= 10 MIN

STRUCTURE: CB 5
WOODED AREA= —
LAWN AREA= 0.04 Ac
IMPERVIOUS AREA= 0.19 Ac
TOTAL AREA= 0.23 Ac
C_{IMP}=[(0.25)(—)+(0.35)(.04)+(0.9)(.19)]/(.23)= 0.80

LENGTH= 130 FT
ELEVATION CHANGE= 4 FT
SLOPE= 3.1%
T_C= 5 MIN

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Project 219 ADDISON RD — Designed by JHS — Date 8-20

Town GLASTONBURY — Checked by — Date

Sheet No. of

Storm Sewer System Design

Line Segment	1	CB1 TO CB2		CB2 TO CB3		CB3 TO FE6		CB4 TO CB5		CB5 TO FE7															
MIN Time to Inlet	2	5		5		1		10		5															
MIN Time in Pipe	3	9		20		5		14		10															
MIN Accumulated Time	4	5		5		5		10		10															
AI Entering CB	5	0.20		0.20 0.22		0.42 0.24		0.09		0.09 0.18															
Sum of AI in System	6	0.20		0.42		0.66		0.09		0.27															
IN/HR Rainfall Intensity	7	7.45		7.45		7.45		5.29		5.29															
CFS Q in System	8	1.49		3.13		4.92		0.48		1.43															
Pipe Size	9	15"		15"		15"		15"		15"															
Length of Pipe	10	42'		112'		32'		65'		42'															
Slope	11	1.0%		1.0%		1.0		2%		1.0%															
FT/S Average Velocity	12	4.5		5.7		6.1		4.5		4.2															
CFS Full Capacity	13	7.2		7.2		7.2		10.0		7.2															
FT Headwater	14	0.69		1.06		1.02		0.5		0.69															
"n"	15	.012																							

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JOB ..... TOWN .....
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CHECKED BY ..... DATE .....
PROJ. .....
SCALE .....

OUTLET PROTECTION

APRON DIMENSIONS

LENGHT, L_a, $= \frac{1.7\,Q + 8\,D_o}{(D_o)^{3/2}}$

D_o = MAX. INSIDE PIPE DIA.
Q = PIPE DISCHARGE, C.F.S.
T_w = TAILWATER.
d_{50} = MEDIAN STONE DIA. (RIP RAP)

WIDTH, W, WITH NO DEFINED CHANNEL.

$T_w \geq 1/2\ D_o$. $W = 3\,D_o + 0.4\,L_a$.

$T_w < 1/2\ D_o$. $W = 3\,D_o + L_a$.

RIP RAP, MEDIAN STONE DIA., d_{50}

$$d_{50} = \frac{0.02}{T_w} \times \left(\frac{Q}{D_o}\right)^{4/3}$$

OUTLET NO./STA. F6 TYPE

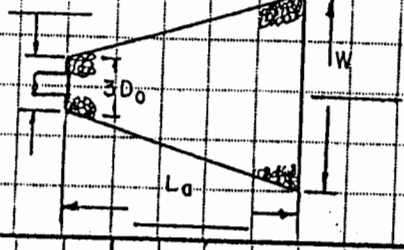
D_o = 15" Q = 4.92 CFS

T_w = 0.8 FT ≥ (<) CHANNEL (YES) NO

$L_a = \frac{1.7(4.92)}{(1.25)^{3/2}} + 8(1.25) =$ 16 FT

$W = 3(1.25) + .4(16) =$ 10 FT

$d = \frac{0.02}{0.8} \times \left(\frac{4.92}{1.25}\right)^{4/3} =$ 0.15 FT



L_a = 16 FT
W = 10 FT
d_{50} = 0.15 RIP RAP
STD. INT. (MOD.)

OUTLET NO./STA. F7 TYPE

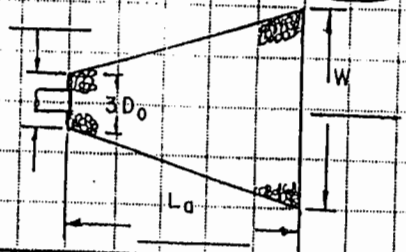
D_o = 15" Q = 1.43

T_w = 0.4 FT ≥ (<) CHANNEL YES (NO)

$L_a = \frac{1.7(1.43)}{(1.25)^{3/2}} + 8(1.25) =$ 12 FT

$W = 3(1.25) + 12 =$ 16 FT

$d = \frac{0.02}{.4} \times \left(\frac{1.43}{1.25}\right)^{4/3} =$ 0.06 FT



L_a = 12 FT
W = 16 FT
d_{50} = 0.06 FT RIP RAP
STD. INT. (MOD.)

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JOB ____ TOWN ____
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CHECKED BY ____ DATE ____
PROJ. ____ SCALE ____

OUTLET PROTECTION

APRON DIMENSIONS

LENGHT, L_a, $= \dfrac{1.7\,Q + 8D_o}{(D_o)^{3/2}}$

D_o = MAX. INSIDE PIPE DIA.
Q = PIPE DISCHARGE, C.F.S.
Tw = TAILWATER
d_{50} = MEDIAN STONE DIA. (RIP RAP)

WIDTH, W, WITH NO DEFINED CHANNEL.

Tw ≥ 1/2 D_o. $W = 3D_o + 0.4\,L_a$.

Tw < 1/2 D_o. $W = 3D_o + L_a$.

RIP RAP, MEDIAN STONE DIA., d_{50}

$$d_{50} = \frac{0.02}{Tw} \times \left(\frac{Q}{D_o}\right)^{4/3}$$

OUTLET NO./STA. ____ TYPE ____

D_o = 12" Q = 1.1

Tw = 0.35 ≧ (2)

CHANNEL. YES (NO)

$L_a = \dfrac{1.7(1.1)}{(1.0)^{3/2}} + 8(1.0) = 10.$

L_a = 10'

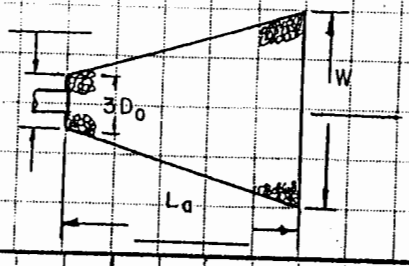
$W = 3(1.0) + 10 = 13$

W = 13'

$d = \dfrac{0.02}{.35} \times \left(\dfrac{1.1}{1.0}\right)^{4/3} = 0.06$

d_{50} = .06 RIP RAP

STD. INT. (MOD.)



OUTLET NO./STA. ____ TYPE ____

D_o = ____ Q = ____

Tw = ____ ≧ (2)

CHANNEL. YES NO

$L_a = \dfrac{1.7}{(\quad)^{3/2}} + 8 = $ ____

L_a = ____

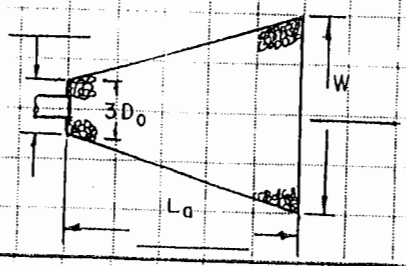
W = 3 ____ + ____ = ____

W = ____

$d = \dfrac{0.02}{\quad} \times \left(\dfrac{\quad}{\quad}\right)^{4/3} = $ ____

d_{50} = ____ RIP RAP

STD. INT. MOD.



III. REQUIRED WATER QUALITY VOLUMES

Buildings A & B

$WQV = \frac{(1") (R) (A)}{12}$ Where $R = 0.05 + 0.009(I)$

I= % Impervious Surface

Total Drainage Area = .10 AC

Impervious Area = 0.10 AC

$I = \frac{0.10\ AC}{0.10\ AC} = 100$

$R = 0.05 + 0.009(100) = 0.95$

$WQV = \frac{(1")(0.95)(0.10)}{12} = 0.0079$ AC-FT = **345 CF**

Buildings C & D

$WQV = \frac{(1") (R) (A)}{12}$ Where $R = 0.05 + 0.009(I)$

I= % Impervious Surface

Total Drainage Area = 0.07 AC

Impervious Area = 0.07AC

$I = \frac{0.07\ AC}{0.07\ AC} = 100$

$R = 0.05 + 0.009(100) = 0.95$

$WQV = \frac{(1")(0.95)(0.07)}{12} = 0.0055$ AC-FT = **241 CF**

Detention Basin

WQV = $\frac{(1") (R) (A)}{12}$ Where R = 0.05 + 0.009(I)

I= % Impervious Surface

Total Drainage Area = 3.88 AC

Impervious Area = 1.25 AC

I = $\frac{1.25\ AC}{3.88\ AC}$ = 32.2

R = 0.05 + 0.009(32.2) = 0.34

WQV = $\frac{(1")(0.34)(3.88)}{12}$ = 0.1099 AC-FT = **4,786 CF**

IV. WATER QUALITY VOLUMES PROVIDED

Buildings A & B:

2,714 CF Provided > 345 CF Required

Buildings C & D

1,825 CF Provided > 241 CF Required

Detention Basin

5,800 CF Storage Below Outlet Structure > 4,786 CF

APPENDIX A

HYDROCAD REPORT

PRE DEVELOPMENT TO POINT A

Summary for Subcatchment 1S: Pre-Development to Point A

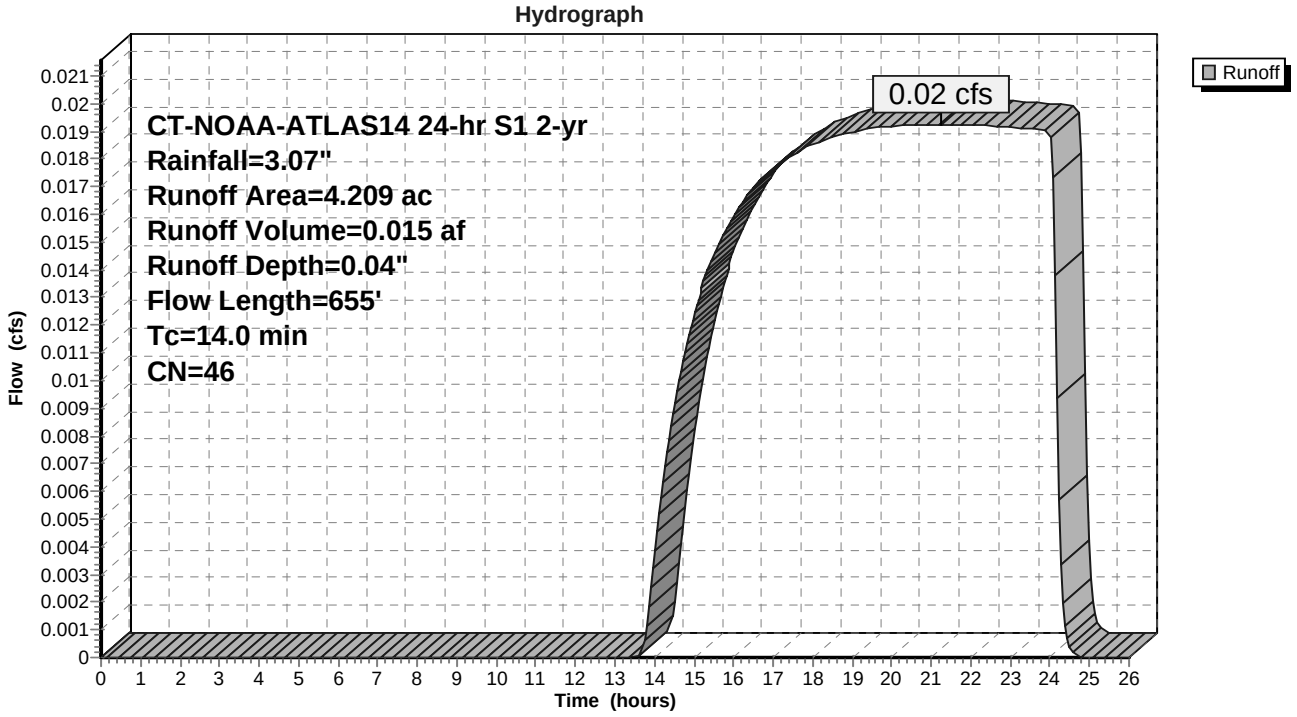
Runoff = 0.02 cfs @ 21.25 hrs, Volume= 0.015 af, Depth= 0.04"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 2-yr Rainfall=3.07"

Area (ac)	CN	Description
0.516	98	Paved parking, HSG A
0.278	32	Woods/grass comb., Good, HSG A
0.172	77	Woods, Good, HSG D
0.098	73	Brush, Good, HSG D
0.315	30	Brush, Good, HSG A
0.796	30	Meadow, non-grazed, HSG A
2.034	39	>75% Grass cover, Good, HSG A
4.209	46	Weighted Average
3.693		87.74% Pervious Area
0.516		12.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
3.0	555	0.0360	3.05		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	655	Total			

Subcatchment 1S: Pre-Development to Point A



Summary for Subcatchment 1S: Pre-Development to Point A

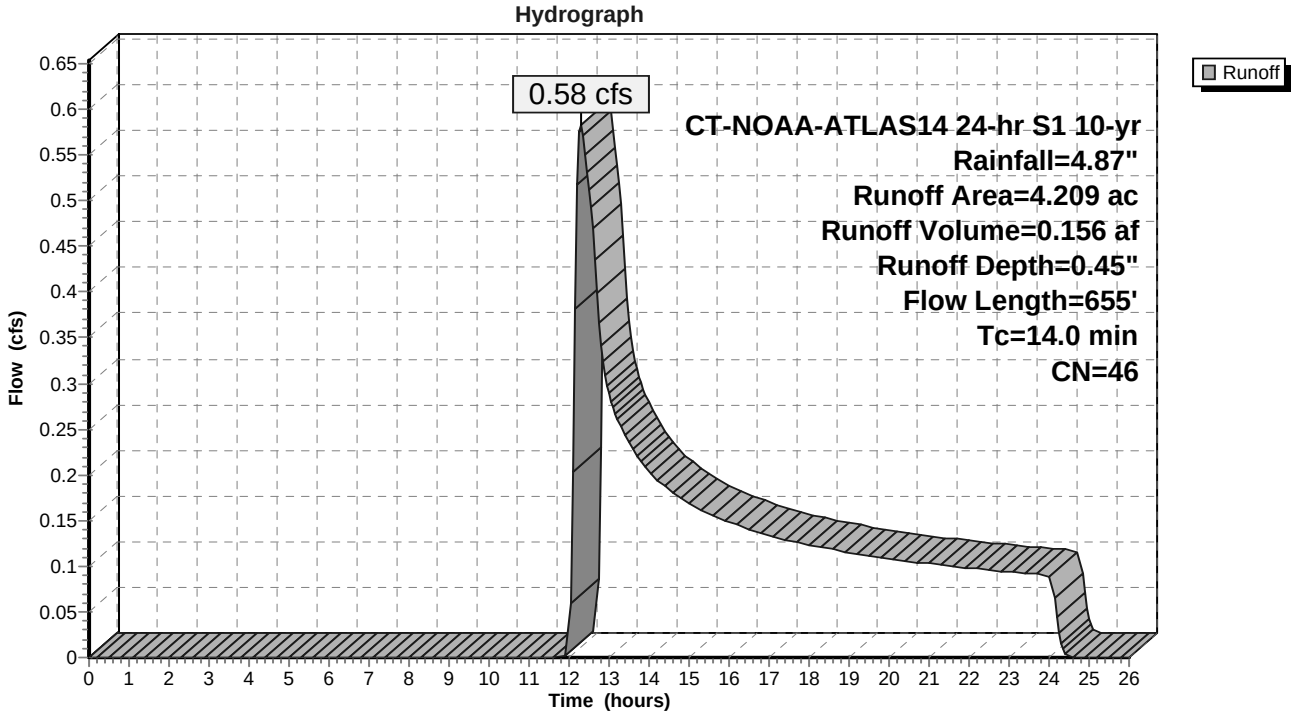
Runoff = 0.58 cfs @ 12.29 hrs, Volume= 0.156 af, Depth= 0.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 10-yr Rainfall=4.87"

Area (ac)	CN	Description
0.516	98	Paved parking, HSG A
0.278	32	Woods/grass comb., Good, HSG A
0.172	77	Woods, Good, HSG D
0.098	73	Brush, Good, HSG D
0.315	30	Brush, Good, HSG A
0.796	30	Meadow, non-grazed, HSG A
2.034	39	>75% Grass cover, Good, HSG A
4.209	46	Weighted Average
3.693		87.74% Pervious Area
0.516		12.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
3.0	555	0.0360	3.05		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	655	Total			

Subcatchment 1S: Pre-Development to Point A



Summary for Subcatchment 1S: Pre-Development to Point A

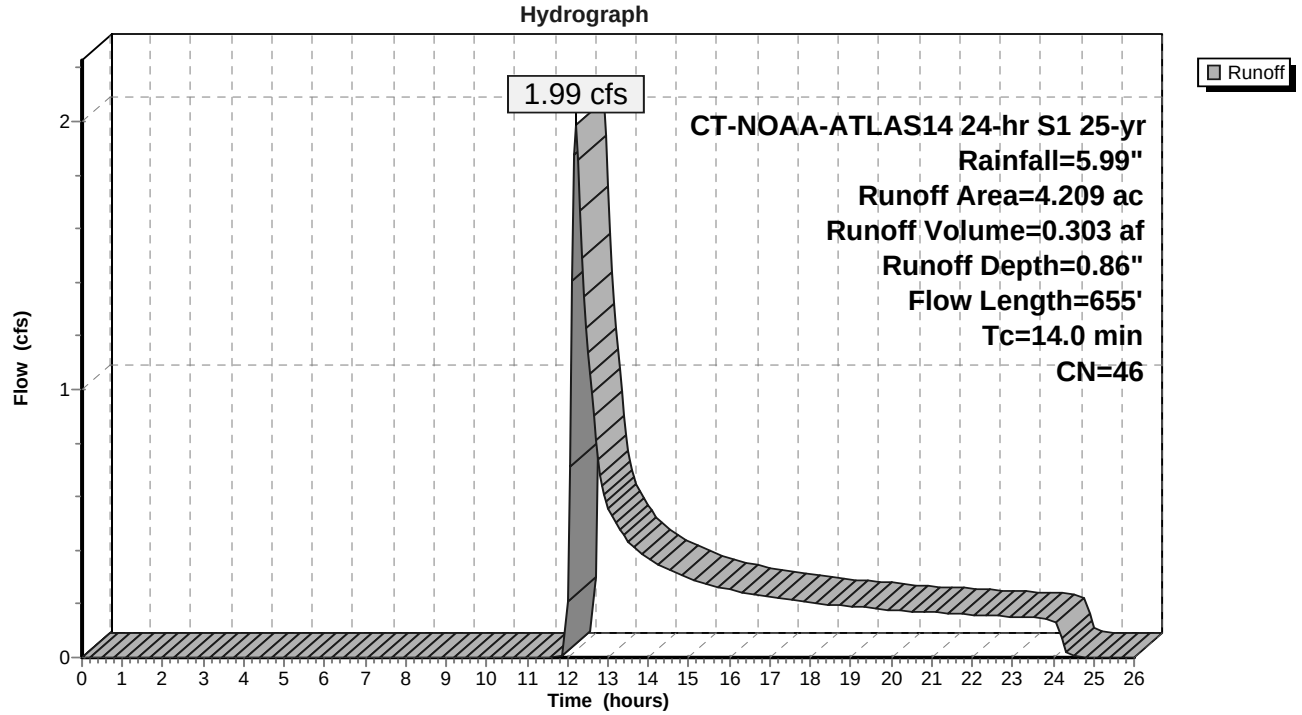
Runoff = 1.99 cfs @ 12.20 hrs, Volume= 0.303 af, Depth= 0.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 25-yr Rainfall=5.99"

Area (ac)	CN	Description
0.516	98	Paved parking, HSG A
0.278	32	Woods/grass comb., Good, HSG A
0.172	77	Woods, Good, HSG D
0.098	73	Brush, Good, HSG D
0.315	30	Brush, Good, HSG A
0.796	30	Meadow, non-grazed, HSG A
2.034	39	>75% Grass cover, Good, HSG A
4.209	46	Weighted Average
3.693		87.74% Pervious Area
0.516		12.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
3.0	555	0.0360	3.05		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	655	Total			

Subcatchment 1S: Pre-Development to Point A



Summary for Subcatchment 1S: Pre-Development to Point A

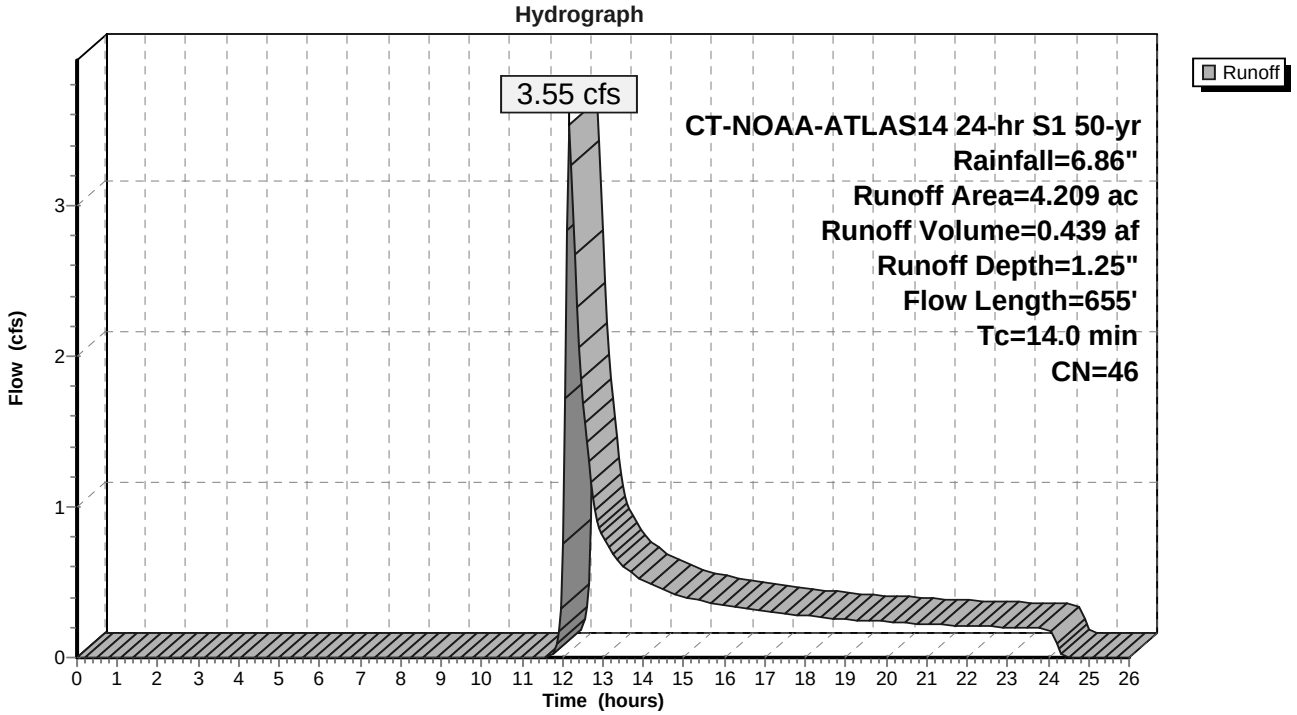
Runoff = 3.55 cfs @ 12.17 hrs, Volume= 0.439 af, Depth= 1.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 50-yr Rainfall=6.86"

Area (ac)	CN	Description
0.516	98	Paved parking, HSG A
0.278	32	Woods/grass comb., Good, HSG A
0.172	77	Woods, Good, HSG D
0.098	73	Brush, Good, HSG D
0.315	30	Brush, Good, HSG A
0.796	30	Meadow, non-grazed, HSG A
2.034	39	>75% Grass cover, Good, HSG A
4.209	46	Weighted Average
3.693		87.74% Pervious Area
0.516		12.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
3.0	555	0.0360	3.05		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	655	Total			

Subcatchment 1S: Pre-Development to Point A



Summary for Subcatchment 1S: Pre-Development to Point A

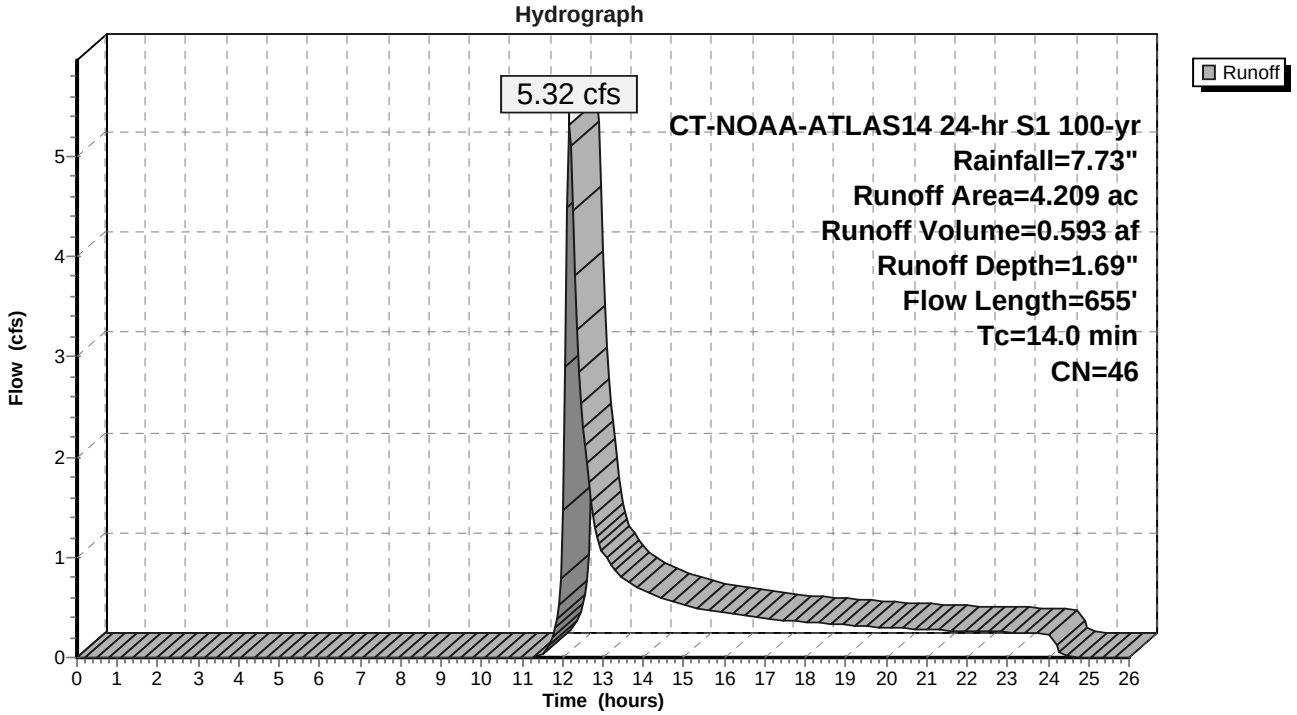
Runoff = 5.32 cfs @ 12.17 hrs, Volume= 0.593 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 100-yr Rainfall=7.73"

Area (ac)	CN	Description
0.516	98	Paved parking, HSG A
0.278	32	Woods/grass comb., Good, HSG A
0.172	77	Woods, Good, HSG D
0.098	73	Brush, Good, HSG D
0.315	30	Brush, Good, HSG A
0.796	30	Meadow, non-grazed, HSG A
2.034	39	>75% Grass cover, Good, HSG A
4.209	46	Weighted Average
3.693		87.74% Pervious Area
0.516		12.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.0	100	0.0400	0.15		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
3.0	555	0.0360	3.05		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
14.0	655	Total			

Subcatchment 1S: Pre-Development to Point A



APPENDIX B

HYDROCAD REPORT

POST DEVELOPMENT TO POINT A

Summary for Subcatchment 2S: Post-Development to Point A

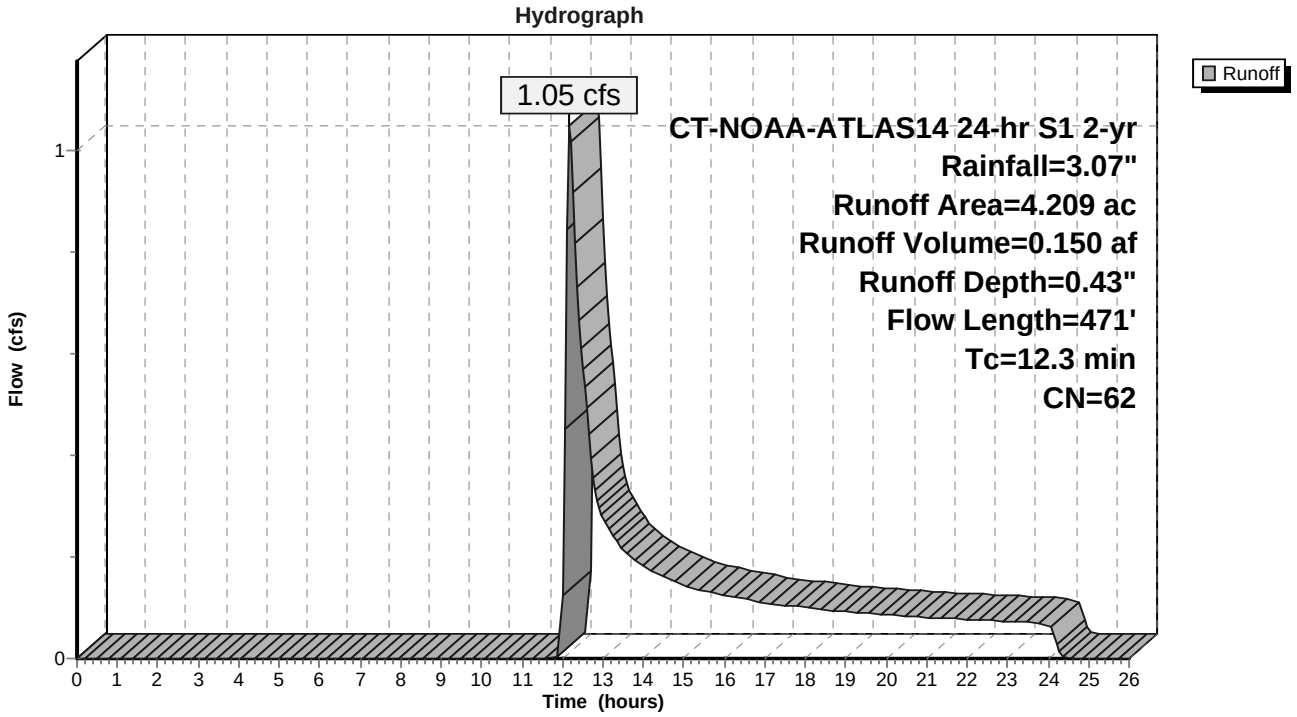
Runoff = 1.05 cfs @ 12.17 hrs, Volume= 0.150 af, Depth= 0.43"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 2-yr Rainfall=3.07"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	0.328	98	Roofs, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	4.209	62	Weighted Average
	2.631		62.51% Pervious Area
	1.578		37.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 2S: Post-Development to Point A



Summary for Subcatchment 2S: Post-Development to Point A

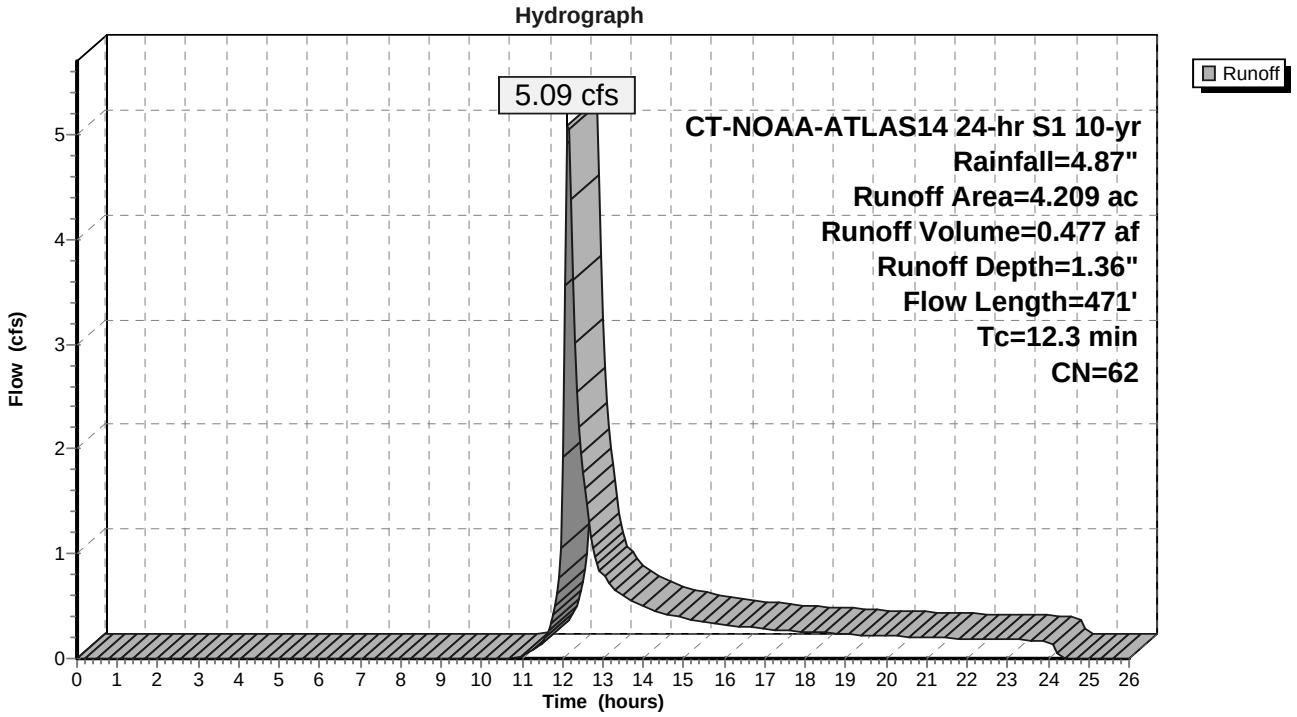
Runoff = 5.09 cfs @ 12.13 hrs, Volume= 0.477 af, Depth= 1.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 10-yr Rainfall=4.87"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	0.328	98	Roofs, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	4.209	62	Weighted Average
	2.631		62.51% Pervious Area
	1.578		37.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 2S: Post-Development to Point A



Summary for Subcatchment 2S: Post-Development to Point A

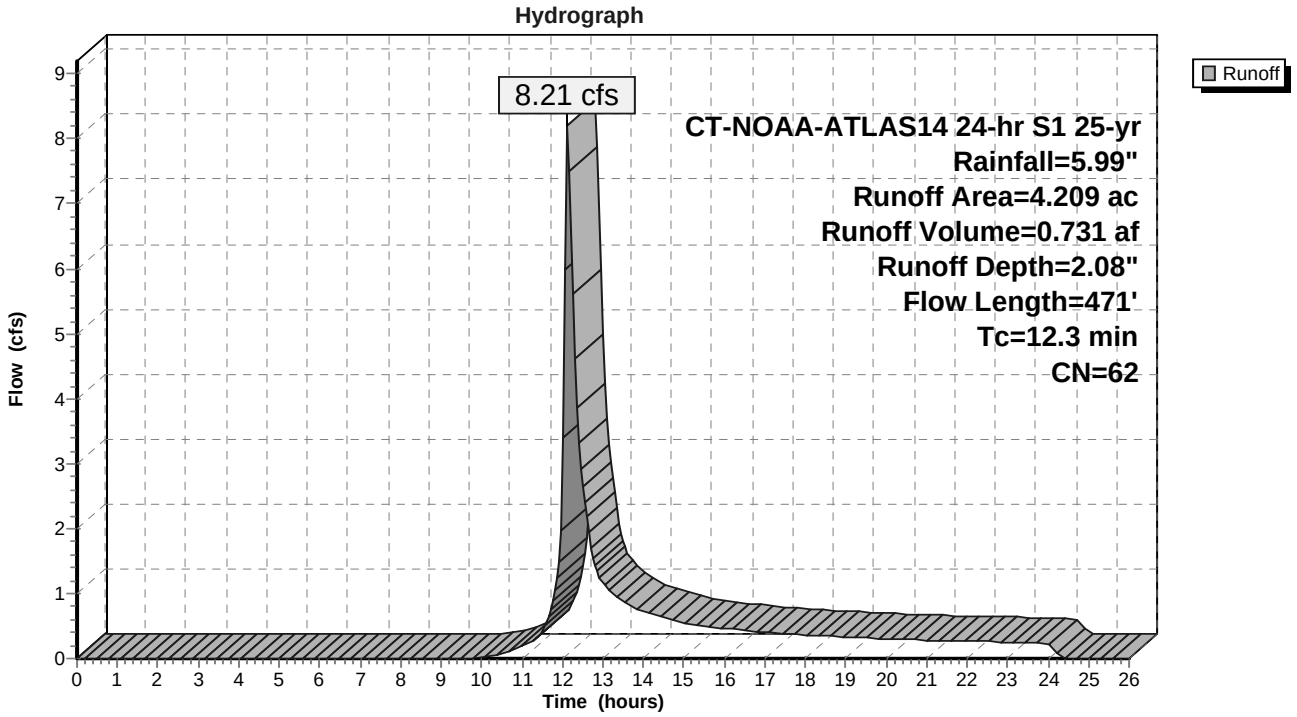
Runoff = 8.21 cfs @ 12.13 hrs, Volume= 0.731 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 25-yr Rainfall=5.99"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	0.328	98	Roofs, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	4.209	62	Weighted Average
	2.631		62.51% Pervious Area
	1.578		37.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 2S: Post-Development to Point A



Summary for Subcatchment 2S: Post-Development to Point A

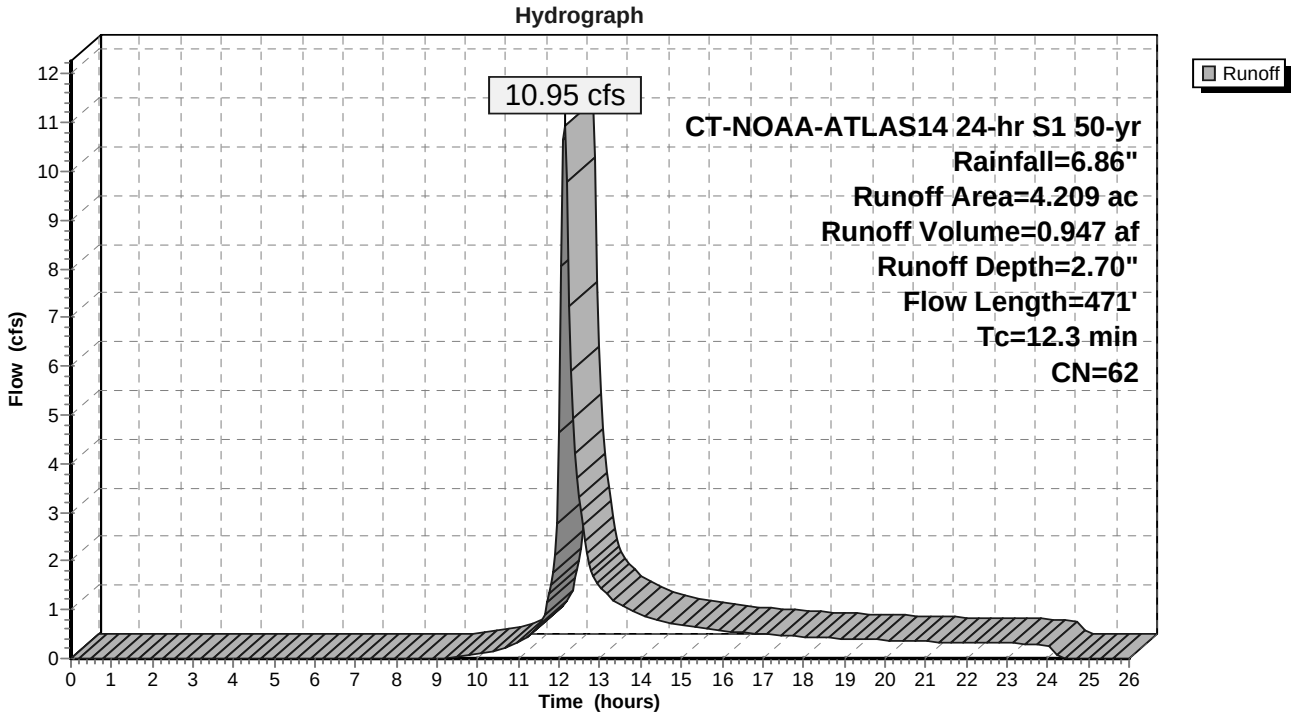
Runoff = 10.95 cfs @ 12.12 hrs, Volume= 0.947 af, Depth= 2.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 50-yr Rainfall=6.86"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	0.328	98	Roofs, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	4.209	62	Weighted Average
	2.631		62.51% Pervious Area
	1.578		37.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 2S: Post-Development to Point A



Summary for Subcatchment 2S: Post-Development to Point A

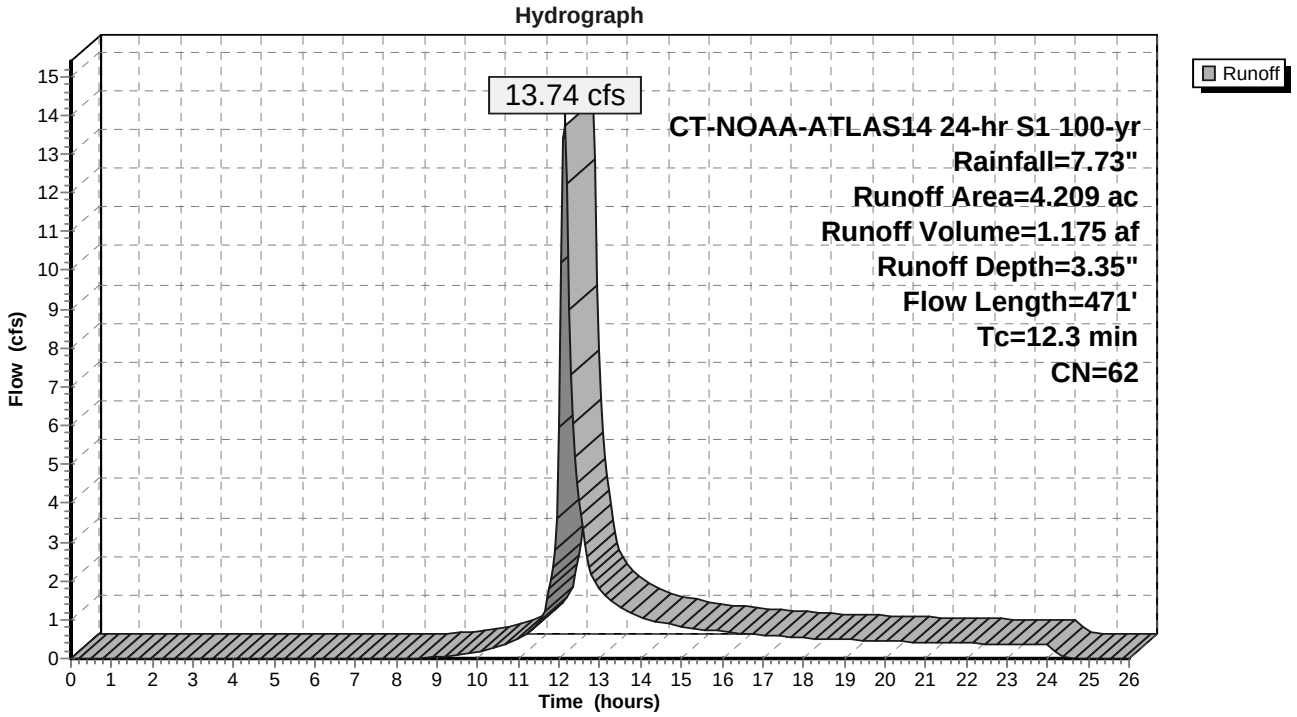
Runoff = 13.74 cfs @ 12.12 hrs, Volume= 1.175 af, Depth= 3.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 100-yr Rainfall=7.73"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	0.328	98	Roofs, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	4.209	62	Weighted Average
	2.631		62.51% Pervious Area
	1.578		37.49% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 2S: Post-Development to Point A



APPENDIX C

HYDROCAD REPORT

POST DEVELOPMENT TO POINT A

(WITH ROOF INFILTRATION)

Summary for Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)

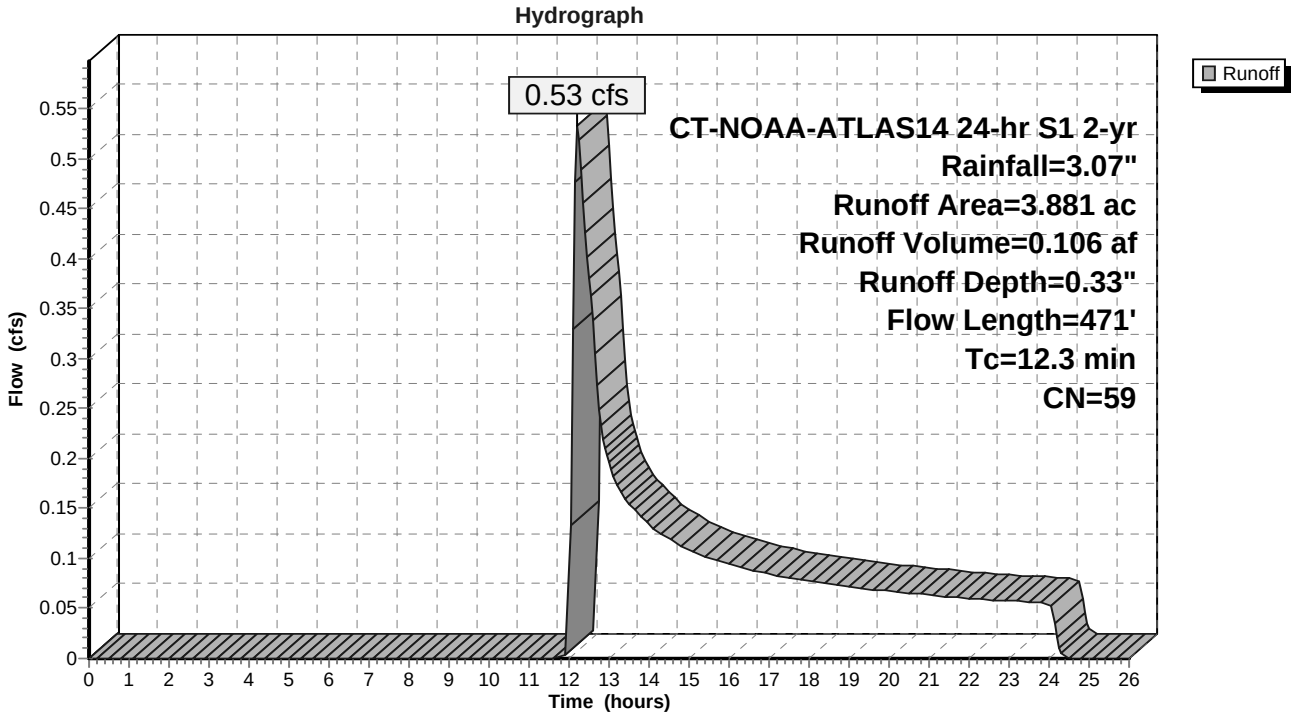
Runoff = 0.53 cfs @ 12.22 hrs, Volume= 0.106 af, Depth= 0.33"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 2-yr Rainfall=3.07"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	3.881	59	Weighted Average
	2.631		67.79% Pervious Area
	1.250		32.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)



Summary for Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)

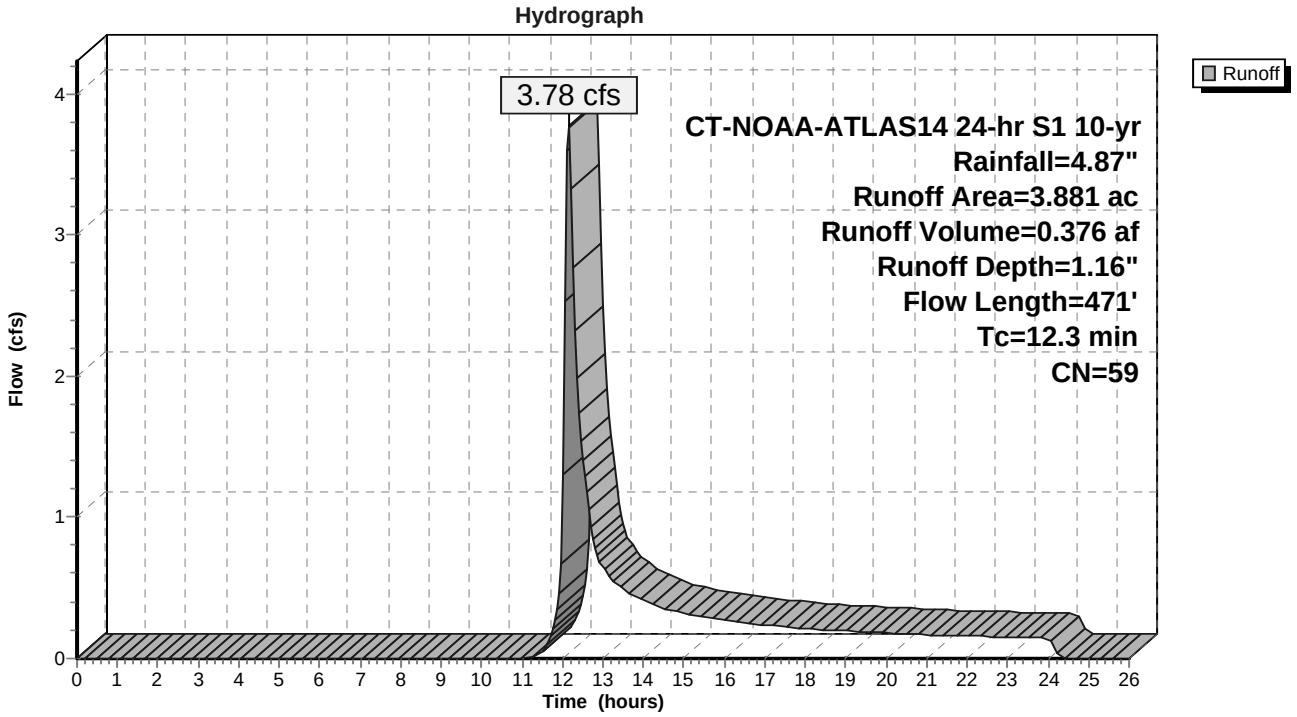
Runoff = 3.78 cfs @ 12.14 hrs, Volume= 0.376 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 10-yr Rainfall=4.87"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	3.881	59	Weighted Average
	2.631		67.79% Pervious Area
	1.250		32.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)



Summary for Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)

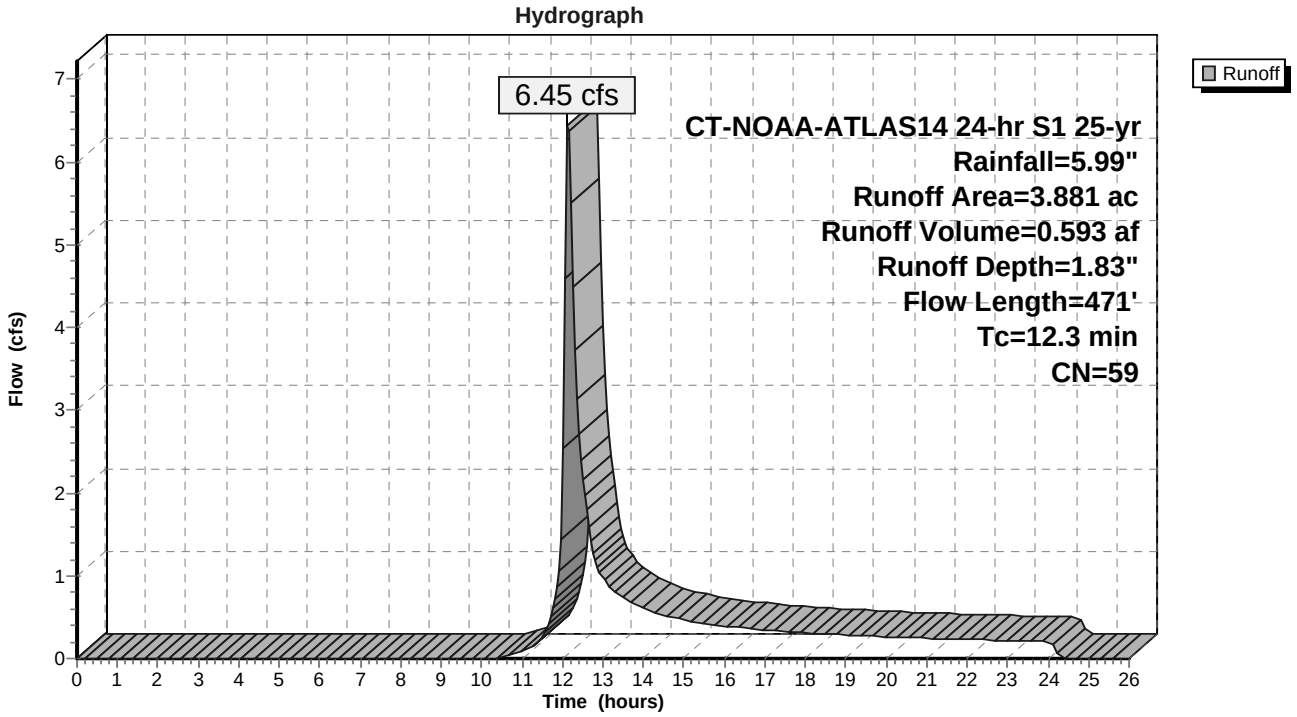
Runoff = 6.45 cfs @ 12.13 hrs, Volume= 0.593 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 25-yr Rainfall=5.99"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	3.881	59	Weighted Average
	2.631		67.79% Pervious Area
	1.250		32.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)



Summary for Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)

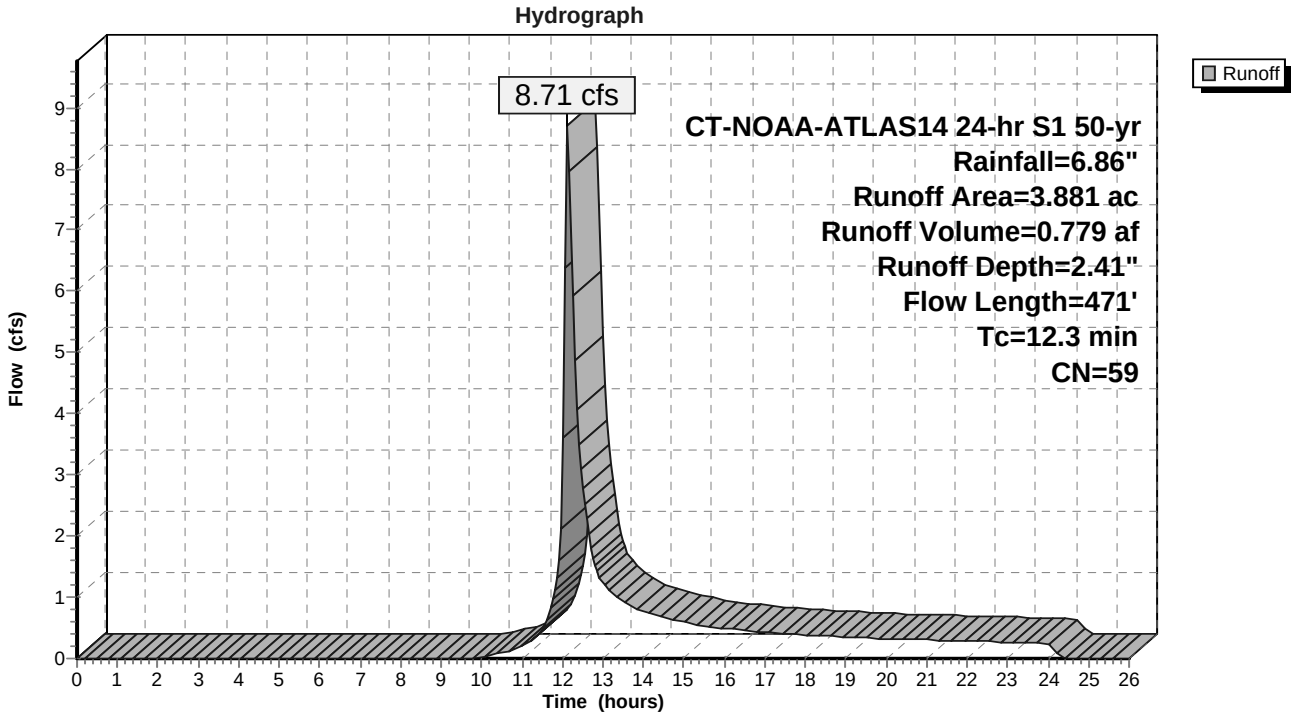
Runoff = 8.71 cfs @ 12.13 hrs, Volume= 0.779 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 50-yr Rainfall=6.86"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	3.881	59	Weighted Average
	2.631		67.79% Pervious Area
	1.250		32.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)



Summary for Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)

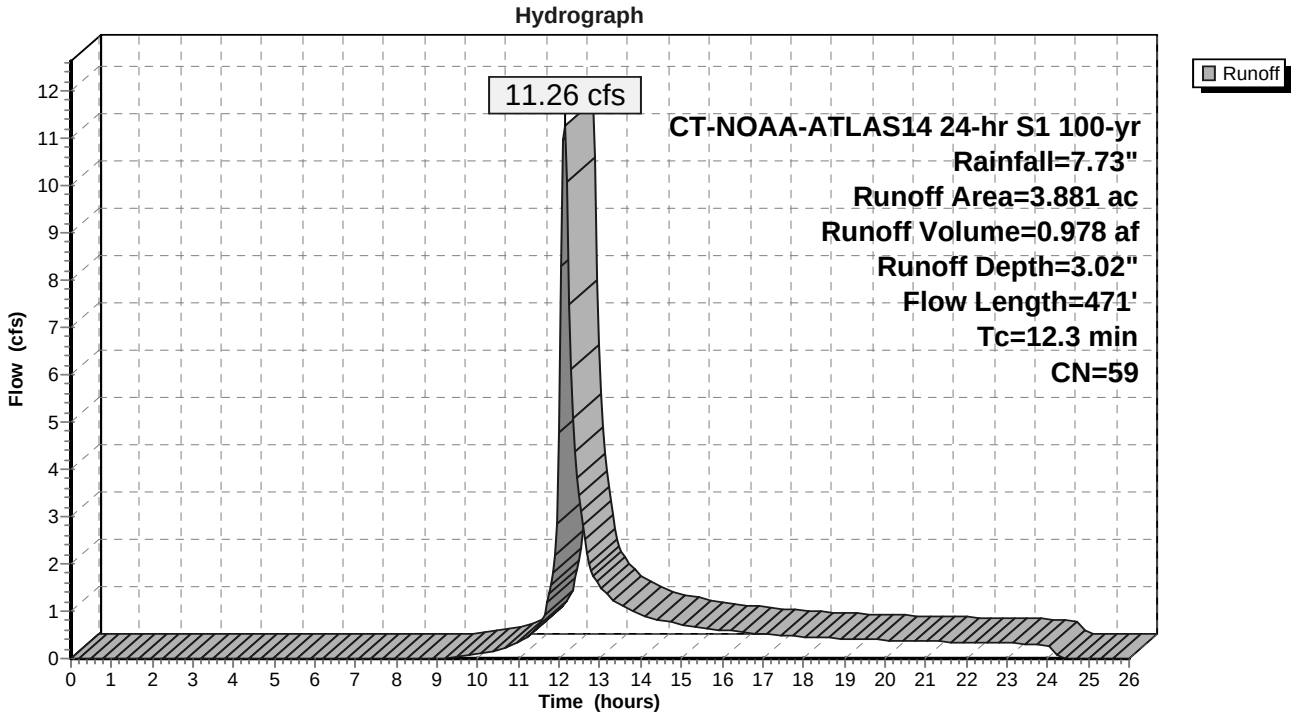
Runoff = 11.26 cfs @ 12.12 hrs, Volume= 0.978 af, Depth= 3.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 100-yr Rainfall=7.73"

	Area (ac)	CN	Description
*	0.336	98	Paved parking, HSG A(Offsite)
*	0.178	32	Woods/grass comb., Good, HSG A(Offsite)
*	0.172	77	Woods, Good, HSG D(Offsite)
*	0.098	73	Brush, Good, HSG D(Offsite)
*	0.315	30	Brush, Good, HSG A (Offsite)
	0.914	98	Paved parking, HSG A
	1.080	39	>75% Grass cover, Good, HSG A
*	0.688	39	>75% Grass cover, Good, HSG A (Offsite)
	0.100	30	Woods, Good, HSG A
	3.881	59	Weighted Average
	2.631		67.79% Pervious Area
	1.250		32.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.6	100	0.0440	0.16		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.08"
1.7	371	0.0540	3.74		**Shallow Concentrated Flow,** Unpaved Kv= 16.1 fps
12.3	471	Total			

Subcatchment 6S: Post-Development to Point A (w/Roof Infilt)



APPENDIX D

HYDROCAD REPORT

DETENTION BASIN ROUTING

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	7P	120.00	119.85	15.0	0.0100	0.012	12.0	0.0	0.0

Summary for Pond 7P: Det. Basin

Inflow Area = 2.347 ac, 42.14% Impervious, Inflow Depth = 0.46" for 2-yr event
Inflow = 0.79 cfs @ 12.11 hrs, Volume= 0.090 af
Outflow = 0.02 cfs @ 24.12 hrs, Volume= 0.024 af, Atten= 97%, Lag= 720.3 min
Primary = 0.02 cfs @ 24.12 hrs, Volume= 0.024 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 120.84' @ 24.12 hrs Surf.Area= 4,086 sf Storage= 3,053 cf

Plug-Flow detention time= 438.6 min calculated for 0.024 af (26% of inflow)
Center-of-Mass det. time= 230.0 min (1,173.8 - 943.8)

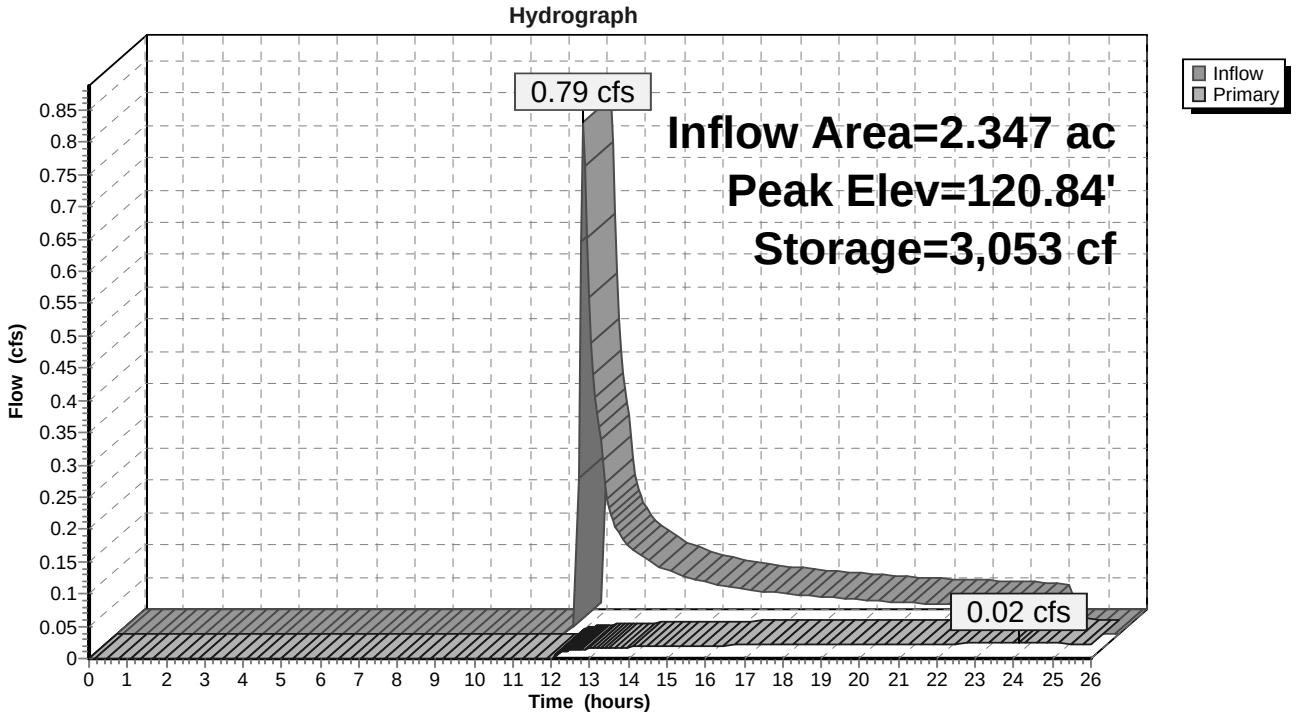
Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	15,040 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	3,210	220.0	0	0	3,210
121.00	4,267	282.0	3,726	3,726	5,699
122.00	5,716	403.0	4,974	8,700	12,304
123.00	6,985	436.0	6,340	15,040	14,547

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	**12.0" Round Culvert** L= 15.0' Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	121.50'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	120.00'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.02 cfs @ 24.12 hrs HW=120.84' (Free Discharge)
└**1=Culvert** (Passes 0.02 cfs of 1.85 cfs potential flow)
  ├**2=Orifice/Grate** (Controls 0.00 cfs)
  └**3=Orifice/Grate** (Orifice Controls 0.02 cfs @ 4.30 fps)

Pond 7P: Det. Basin



Summary for Pond 7P: Det. Basin

Inflow Area = 2.347 ac, 42.14% Impervious, Inflow Depth = 1.43" for 10-yr event
Inflow = 3.48 cfs @ 12.09 hrs, Volume= 0.279 af
Outflow = 0.23 cfs @ 14.88 hrs, Volume= 0.142 af, Atten= 94%, Lag= 167.5 min
Primary = 0.23 cfs @ 14.88 hrs, Volume= 0.142 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 121.61' @ 14.88 hrs Surf.Area= 5,128 sf Storage= 6,595 cf

Plug-Flow detention time= 364.1 min calculated for 0.142 af (51% of inflow)
Center-of-Mass det. time= 204.7 min (1,104.2 - 899.6)

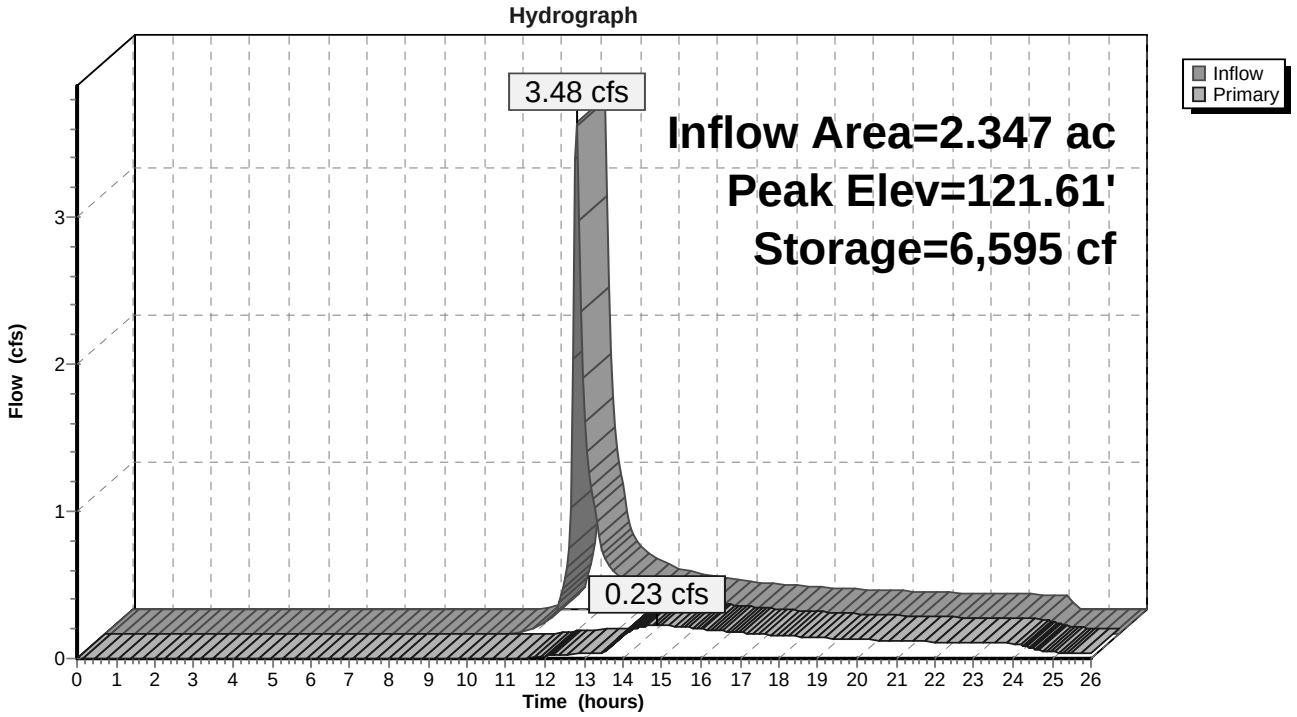
Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	15,040 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	3,210	220.0	0	0	3,210
121.00	4,267	282.0	3,726	3,726	5,699
122.00	5,716	403.0	4,974	8,700	12,304
123.00	6,985	436.0	6,340	15,040	14,547

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	**12.0" Round Culvert** L= 15.0' Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	121.50'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	120.00'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.22 cfs @ 14.88 hrs HW=121.61' (Free Discharge)
└**1=Culvert** (Passes 0.22 cfs of 3.99 cfs potential flow)
  ├**2=Orifice/Grate** (Weir Controls 0.19 cfs @ 1.09 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.03 cfs @ 6.03 fps)

Pond 7P: Det. Basin



Summary for Pond 7P: Det. Basin

Inflow Area = 2.347 ac, 42.14% Impervious, Inflow Depth = 2.17" for 25-yr event
Inflow = 5.52 cfs @ 12.08 hrs, Volume= 0.424 af
Outflow = 0.59 cfs @ 13.13 hrs, Volume= 0.286 af, Atten= 89%, Lag= 62.9 min
Primary = 0.59 cfs @ 13.13 hrs, Volume= 0.286 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 121.84' @ 13.13 hrs Surf.Area= 5,473 sf Storage= 7,815 cf

Plug-Flow detention time= 252.1 min calculated for 0.286 af (68% of inflow)
Center-of-Mass det. time= 125.8 min (1,010.6 - 884.8)

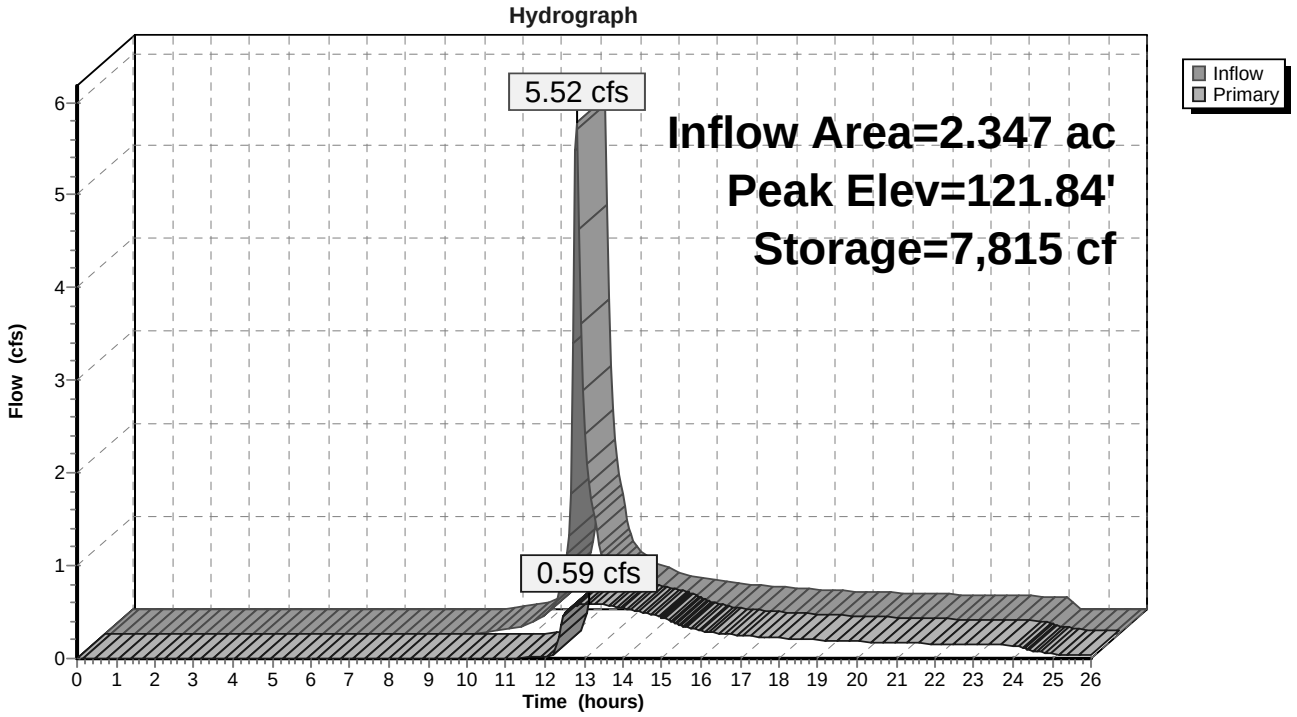
Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	15,040 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	3,210	220.0	0	0	3,210
121.00	4,267	282.0	3,726	3,726	5,699
122.00	5,716	403.0	4,974	8,700	12,304
123.00	6,985	436.0	6,340	15,040	14,547

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	**12.0" Round Culvert** L= 15.0' Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	121.50'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	120.00'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.59 cfs @ 13.13 hrs HW=121.84' (Free Discharge)
└**1=Culvert** (Passes 0.59 cfs of 4.38 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.55 cfs @ 2.82 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.04 cfs @ 6.46 fps)

Pond 7P: Det. Basin



Summary for Pond 7P: Det. Basin

Inflow Area = 2.347 ac, 42.14% Impervious, Inflow Depth = 2.80" for 50-yr event
Inflow = 7.21 cfs @ 12.08 hrs, Volume= 0.547 af
Outflow = 0.83 cfs @ 12.95 hrs, Volume= 0.409 af, Atten= 88%, Lag= 52.4 min
Primary = 0.83 cfs @ 12.95 hrs, Volume= 0.409 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 122.20' @ 12.95 hrs Surf.Area= 5,960 sf Storage= 9,867 cf

Plug-Flow detention time= 219.5 min calculated for 0.409 af (75% of inflow)
Center-of-Mass det. time= 112.5 min (988.7 - 876.2)

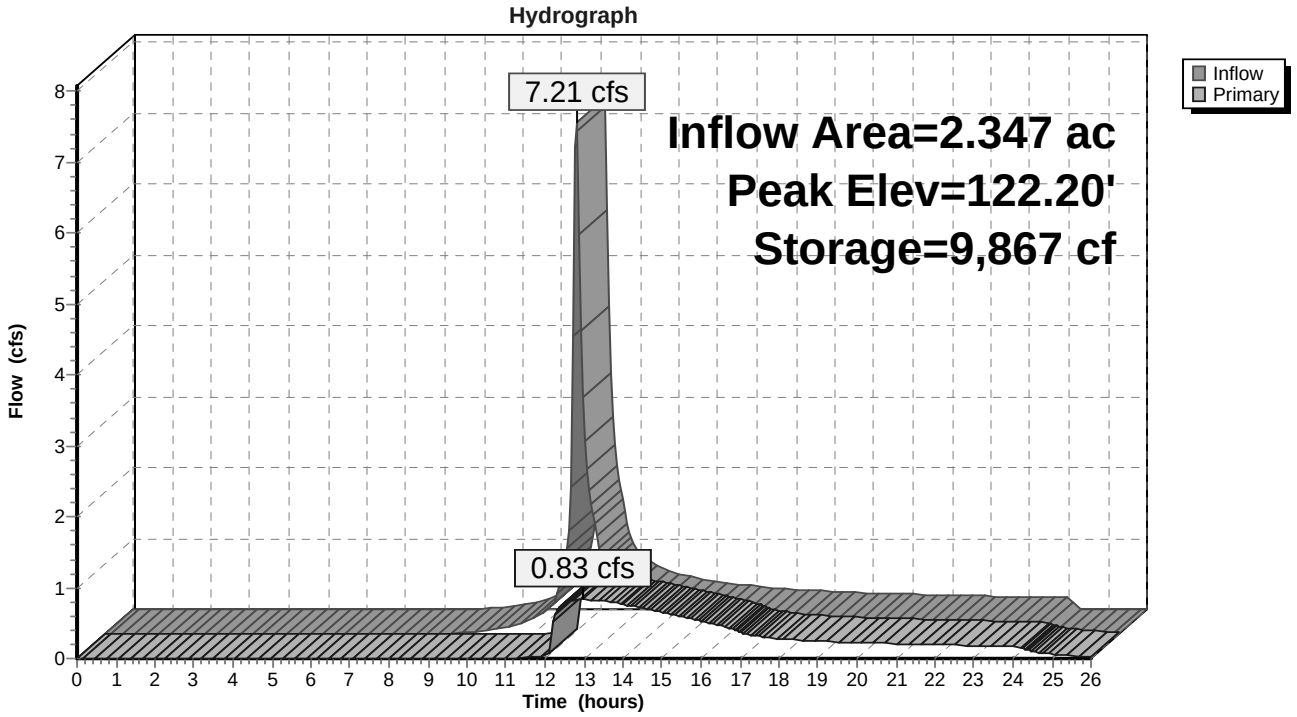
Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	15,040 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	3,210	220.0	0	0	3,210
121.00	4,267	282.0	3,726	3,726	5,699
122.00	5,716	403.0	4,974	8,700	12,304
123.00	6,985	436.0	6,340	15,040	14,547

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	**12.0" Round Culvert** L= 15.0' Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	121.50'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	120.00'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=0.83 cfs @ 12.95 hrs HW=122.20' (Free Discharge)
└**1=Culvert** (Passes 0.83 cfs of 4.93 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.79 cfs @ 4.03 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.04 cfs @ 7.07 fps)

Pond 7P: Det. Basin



Summary for Pond 7P: Det. Basin

Inflow Area = 2.347 ac, 42.14% Impervious, Inflow Depth = 3.46" for 100-yr event
Inflow = 8.99 cfs @ 12.08 hrs, Volume= 0.676 af
Outflow = 1.04 cfs @ 12.91 hrs, Volume= 0.538 af, Atten= 88%, Lag= 49.8 min
Primary = 1.04 cfs @ 12.91 hrs, Volume= 0.538 af

Routing by Stor-Ind method, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
Peak Elev= 122.61' @ 12.91 hrs Surf.Area= 6,473 sf Storage= 12,404 cf

Plug-Flow detention time= 205.1 min calculated for 0.537 af (79% of inflow)
Center-of-Mass det. time= 113.8 min (982.4 - 868.6)

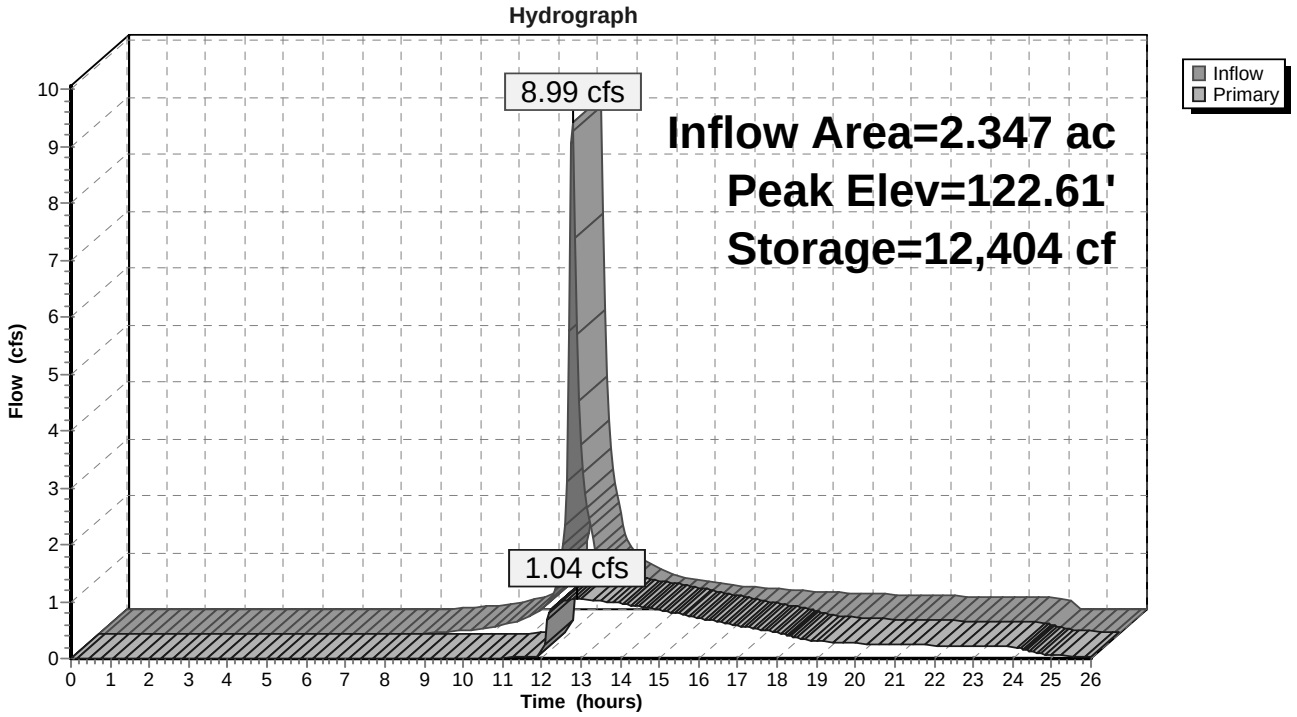
Volume	Invert	Avail.Storage	Storage Description
#1	120.00'	15,040 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
120.00	3,210	220.0	0	0	3,210
121.00	4,267	282.0	3,726	3,726	5,699
122.00	5,716	403.0	4,974	8,700	12,304
123.00	6,985	436.0	6,340	15,040	14,547

Device	Routing	Invert	Outlet Devices
#1	Primary	120.00'	**12.0" Round Culvert** L= 15.0' Ke= 0.500 Inlet / Outlet Invert= 120.00' / 119.85' S= 0.0100 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Device 1	121.50'	**6.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	120.00'	**1.0" Vert. Orifice/Grate** C= 0.600

Primary OutFlow Max=1.04 cfs @ 12.91 hrs HW=122.61' (Free Discharge)
└**1=Culvert** (Passes 1.04 cfs of 5.49 cfs potential flow)
  └**2=Orifice/Grate** (Orifice Controls 1.00 cfs @ 5.07 fps)
  └**3=Orifice/Grate** (Orifice Controls 0.04 cfs @ 7.71 fps)

Pond 7P: Det. Basin



APPENDIX E

HYDROCAD REPORT

ROOF INFILTRATION DESIGN

Summary for Subcatchment 5S: Roof Area - 4 Unit

[49] Hint: Tc<2dt may require smaller dt

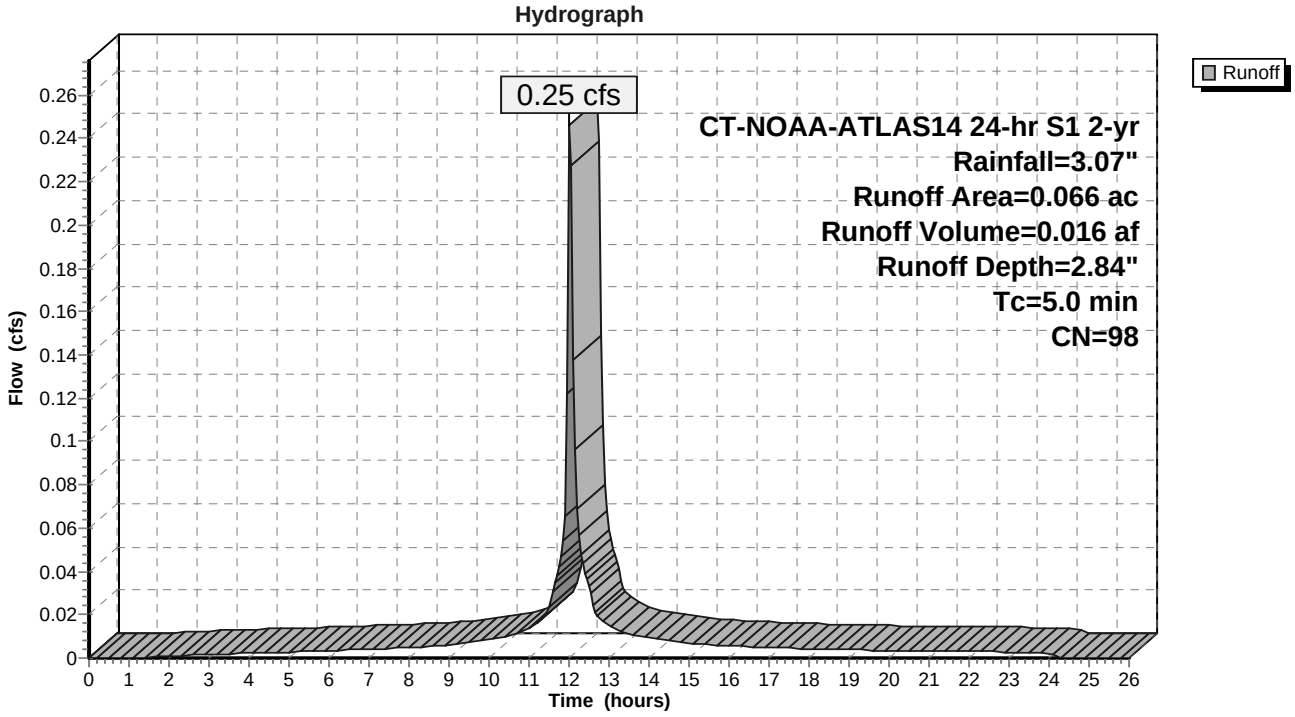
Runoff = 0.25 cfs @ 12.02 hrs, Volume= 0.016 af, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 2-yr Rainfall=3.07"

Area (ac)	CN	Description
0.066	98	Roofs, HSG A
0.066		100.00% Impervious Area

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

Subcatchment 5S: Roof Area - 4 Unit



Summary for Subcatchment 5S: Roof Area - 4 Unit

[49] Hint: Tc<2dt may require smaller dt

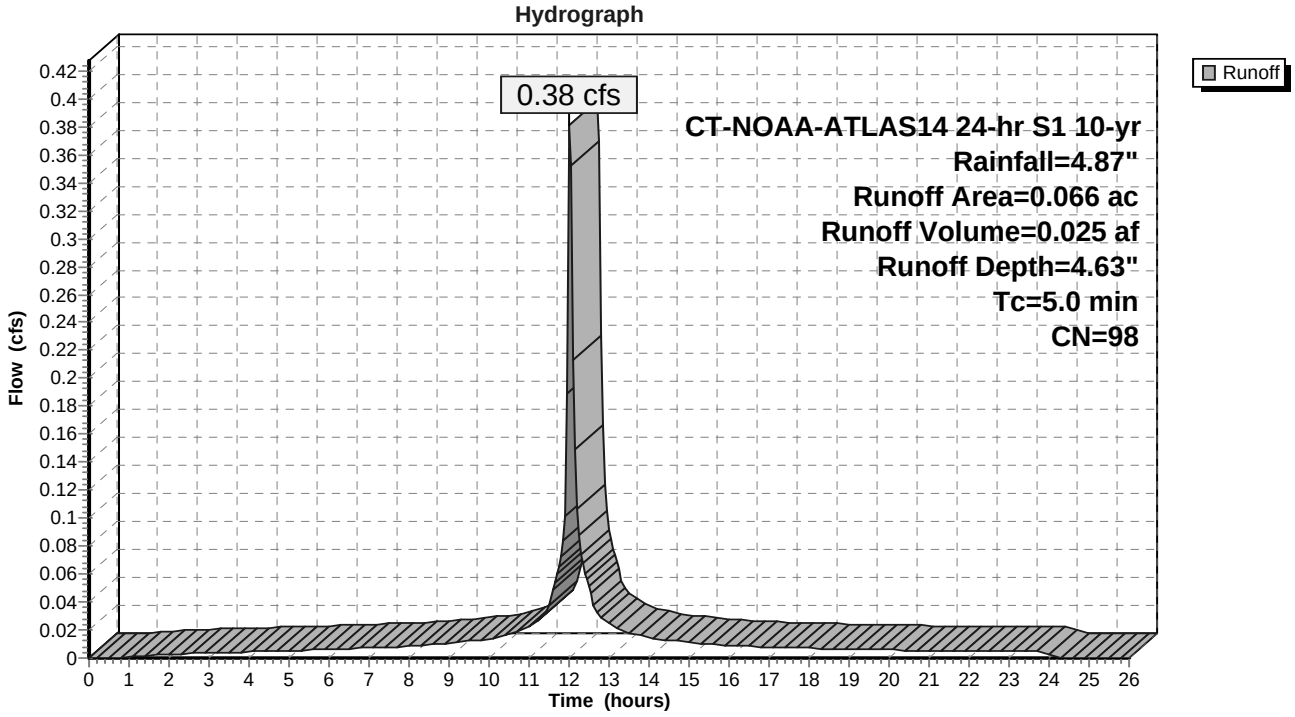
Runoff = 0.38 cfs @ 12.02 hrs, Volume= 0.025 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 10-yr Rainfall=4.87"

Area (ac)	CN	Description
0.066	98	Roofs, HSG A
0.066		100.00% Impervious Area

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

Subcatchment 5S: Roof Area - 4 Unit



Summary for Subcatchment 5S: Roof Area - 4 Unit

[49] Hint: Tc<2dt may require smaller dt

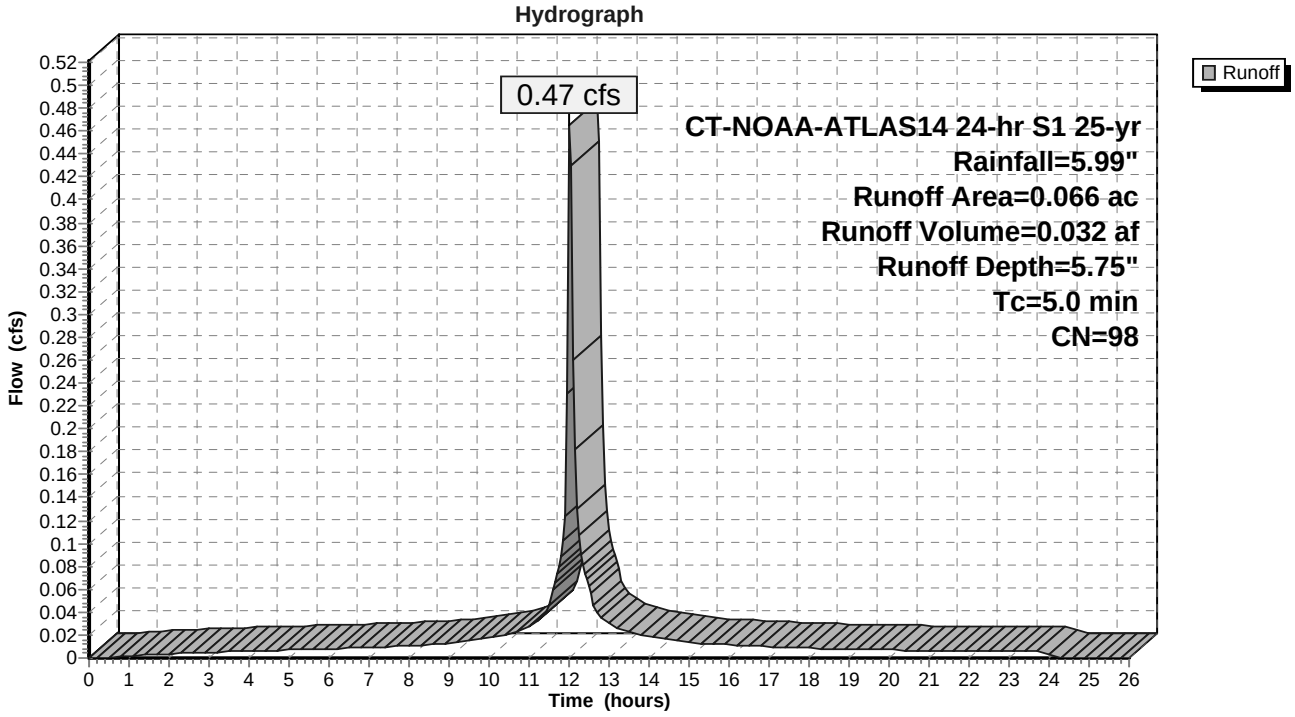
Runoff = 0.47 cfs @ 12.02 hrs, Volume= 0.032 af, Depth= 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 25-yr Rainfall=5.99"

Area (ac)	CN	Description
0.066	98	Roofs, HSG A
0.066		100.00% Impervious Area

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

Subcatchment 5S: Roof Area - 4 Unit



Summary for Subcatchment 5S: Roof Area - 4 Unit

[49] Hint: Tc<2dt may require smaller dt

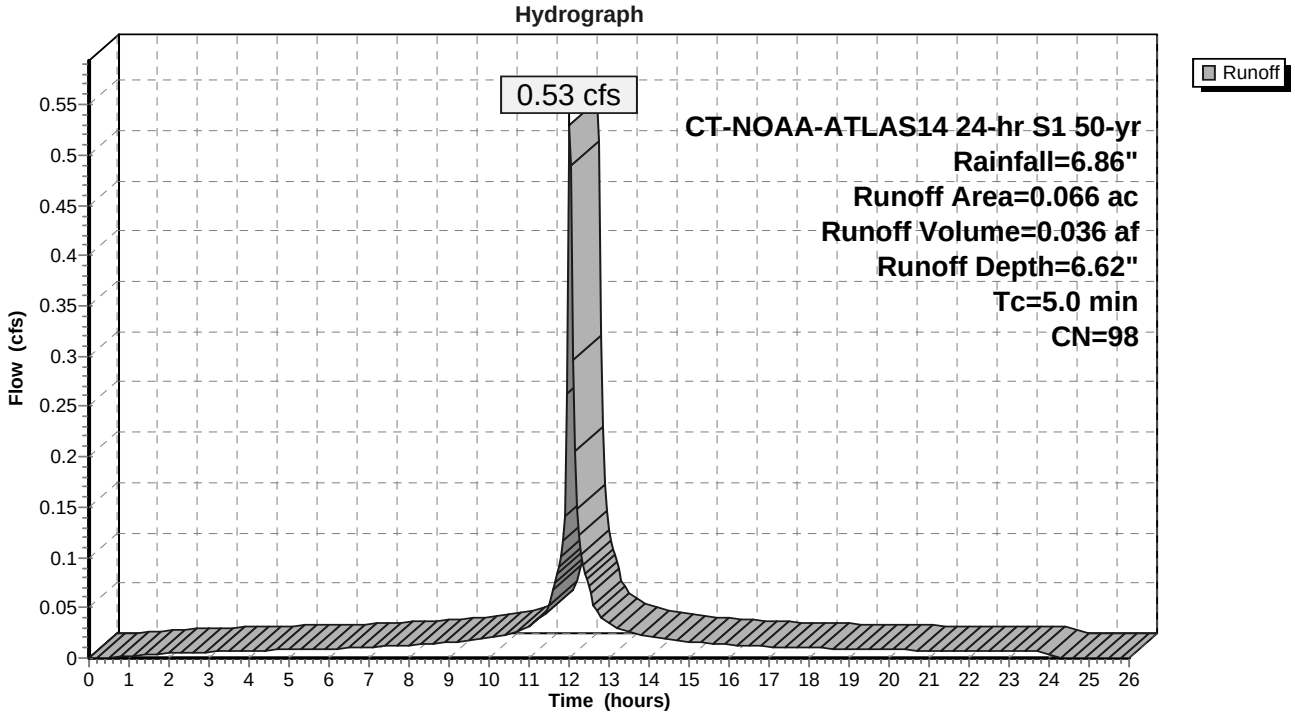
Runoff = 0.53 cfs @ 12.02 hrs, Volume= 0.036 af, Depth= 6.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 50-yr Rainfall=6.86"

Area (ac)	CN	Description
0.066	98	Roofs, HSG A
0.066		100.00% Impervious Area

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

Subcatchment 5S: Roof Area - 4 Unit



Summary for Subcatchment 5S: Roof Area - 4 Unit

[49] Hint: Tc<2dt may require smaller dt

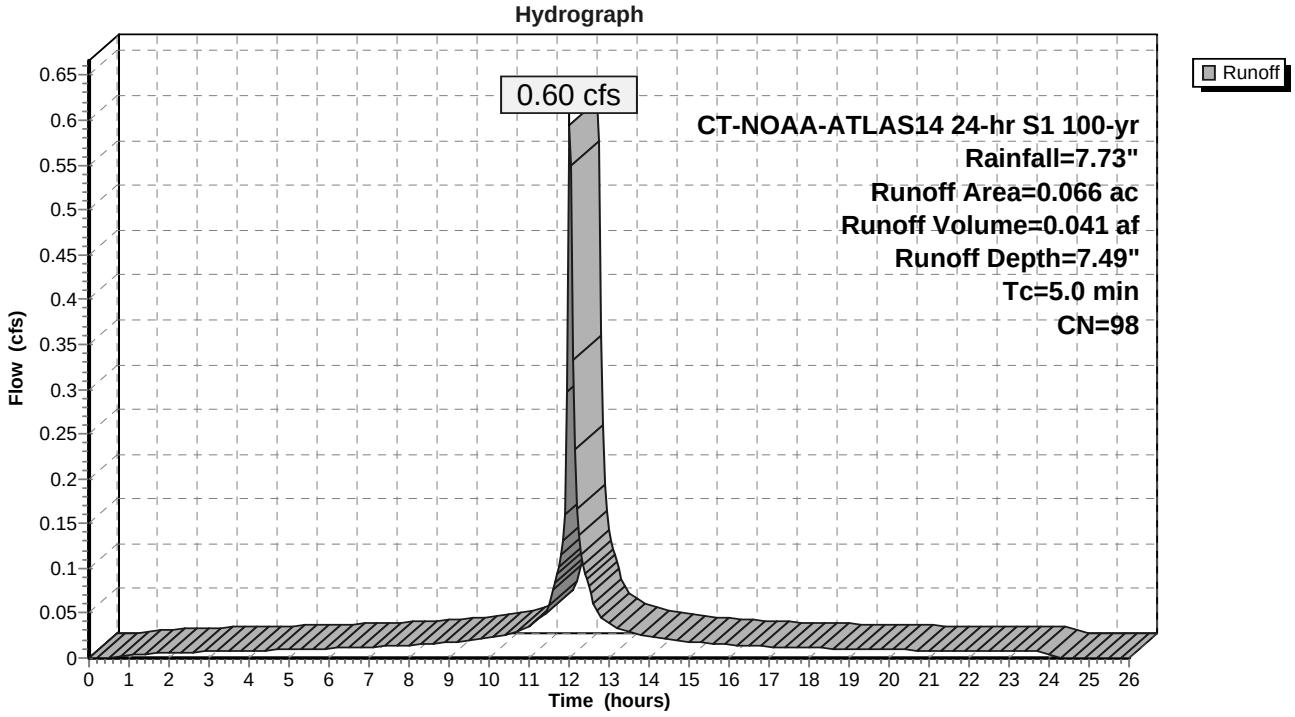
Runoff = 0.60 cfs @ 12.02 hrs, Volume= 0.041 af, Depth= 7.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 100-yr Rainfall=7.73"

Area (ac)	CN	Description
0.066	98	Roofs, HSG A
0.066		100.00% Impervious Area

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

Subcatchment 5S: Roof Area - 4 Unit



Summary for Subcatchment 4S: Roof Area - 5 Unit

[49] Hint: Tc<2dt may require smaller dt

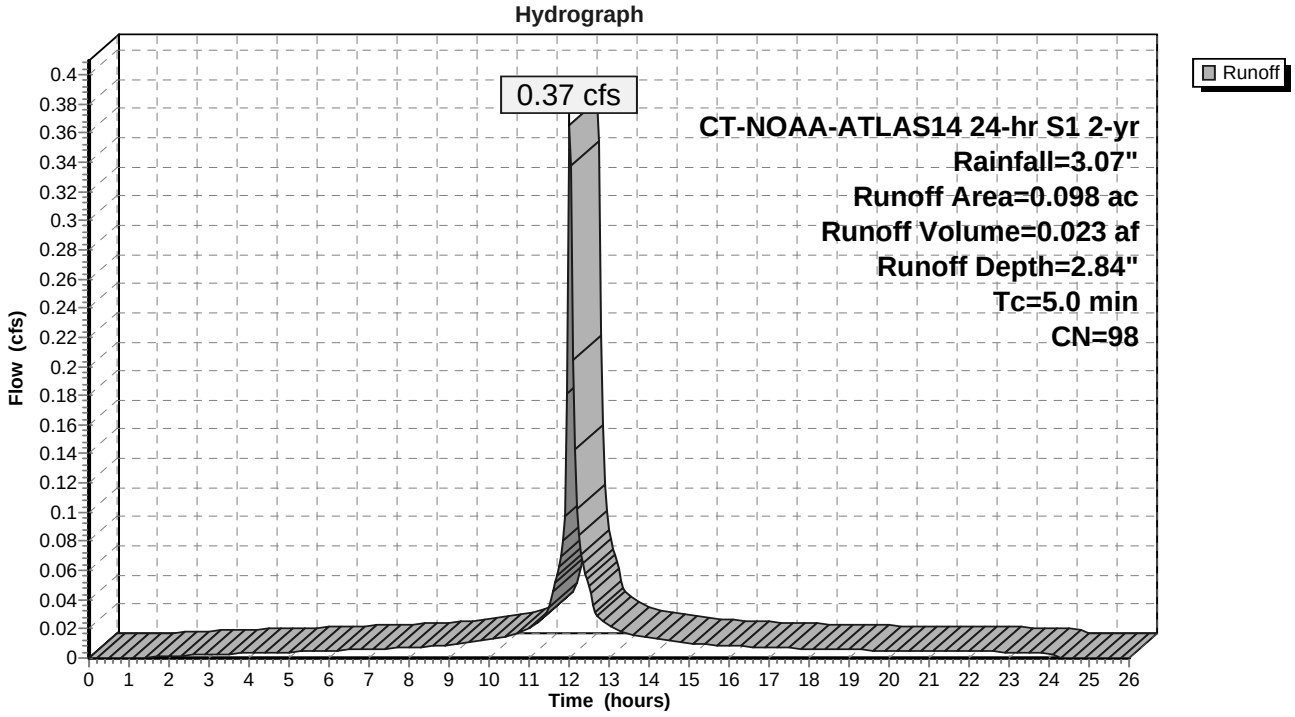
Runoff = 0.37 cfs @ 12.02 hrs, Volume= 0.023 af, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 2-yr Rainfall=3.07"

Area (ac)	CN	Description
0.098	98	Roofs, HSG A
0.098		100.00% Impervious Area

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

Subcatchment 4S: Roof Area - 5 Unit



Summary for Subcatchment 4S: Roof Area - 5 Unit

[49] Hint: Tc<2dt may require smaller dt

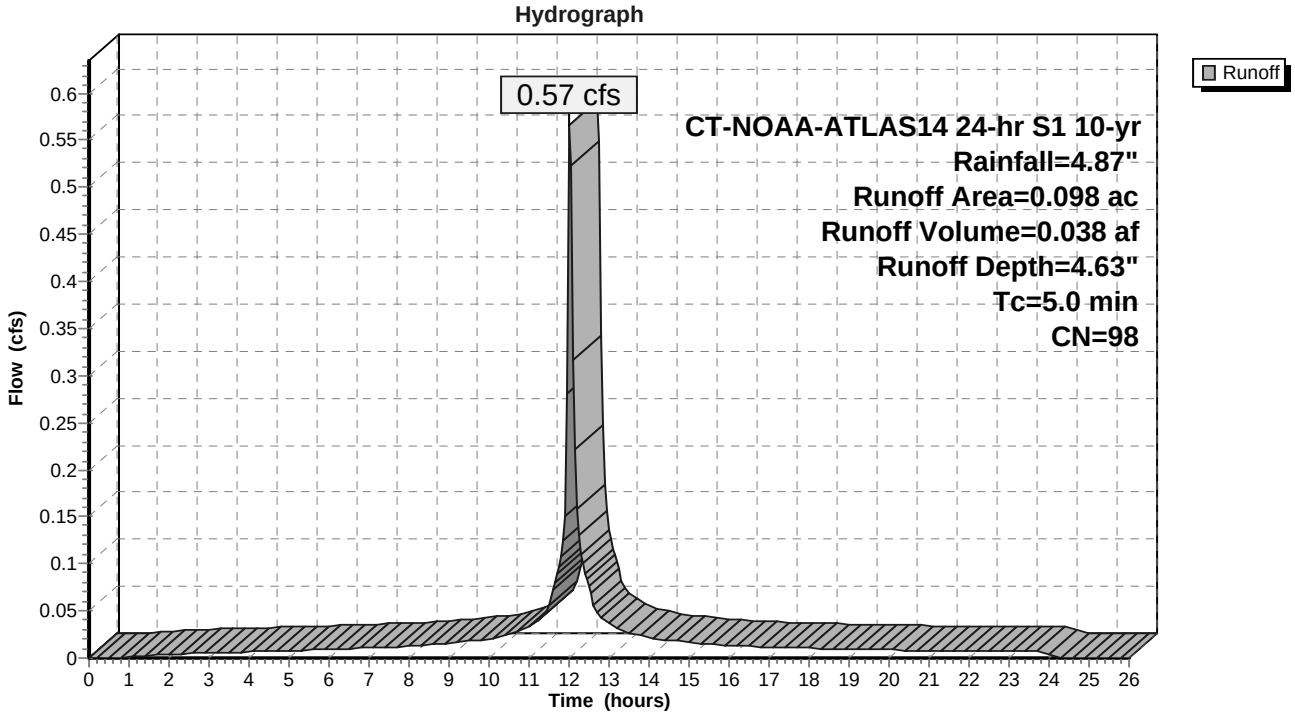
Runoff = 0.57 cfs @ 12.02 hrs, Volume= 0.038 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 10-yr Rainfall=4.87"

Area (ac)	CN	Description
0.098	98	Roofs, HSG A
0.098		100.00% Impervious Area

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

Subcatchment 4S: Roof Area - 5 Unit



Summary for Subcatchment 4S: Roof Area - 5 Unit

[49] Hint: Tc<2dt may require smaller dt

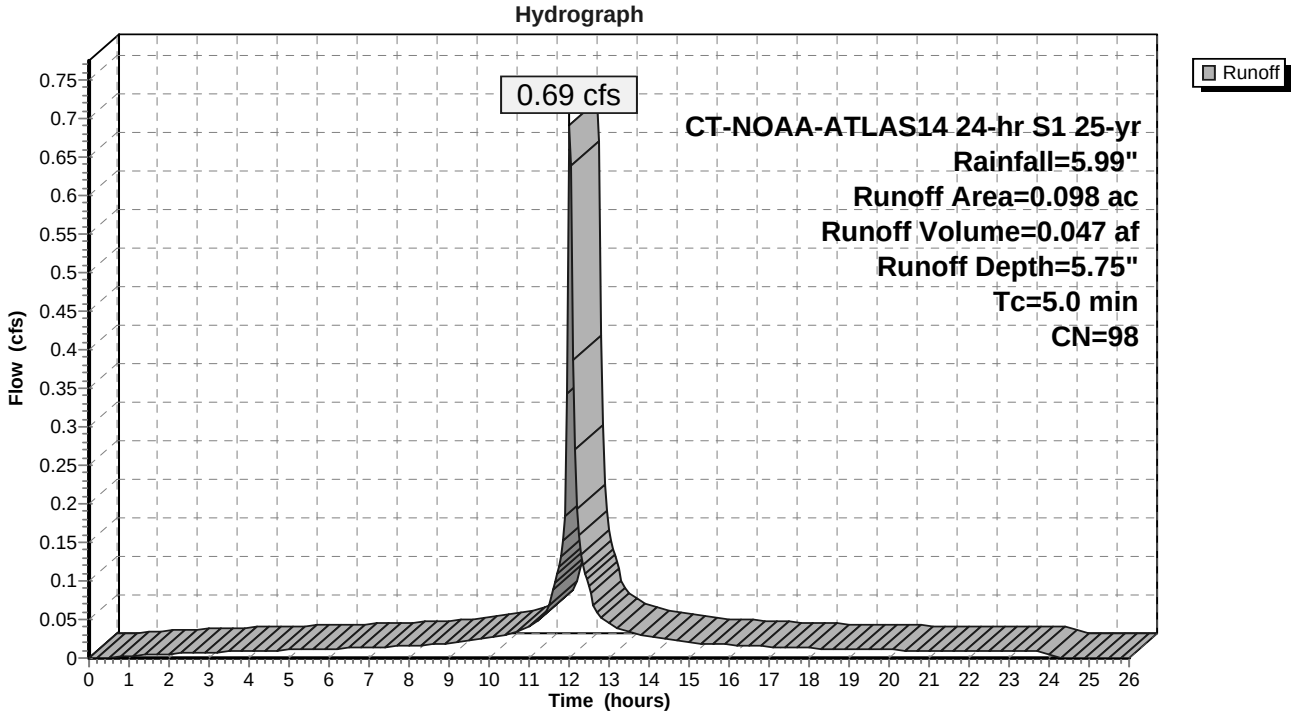
Runoff = 0.69 cfs @ 12.02 hrs, Volume= 0.047 af, Depth= 5.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 25-yr Rainfall=5.99"

Area (ac)	CN	Description
0.098	98	Roofs, HSG A
0.098		100.00% Impervious Area

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

Subcatchment 4S: Roof Area - 5 Unit



Summary for Subcatchment 4S: Roof Area - 5 Unit

[49] Hint: Tc<2dt may require smaller dt

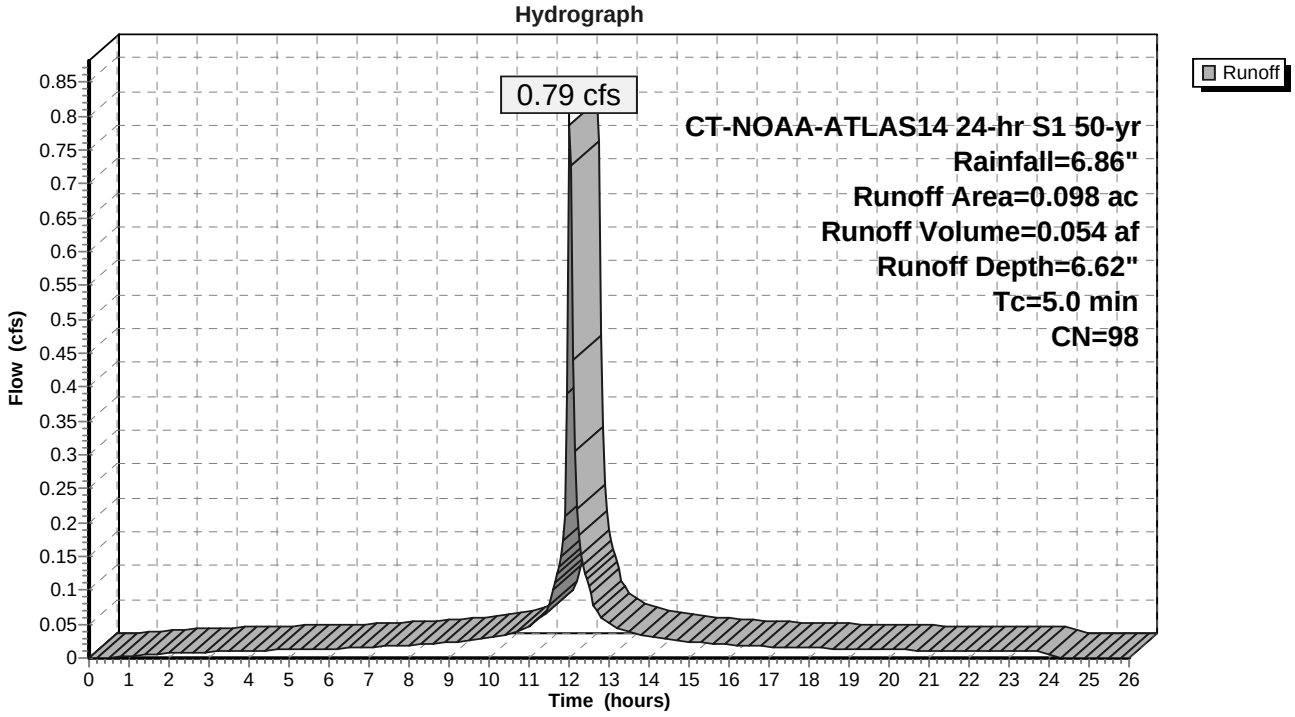
Runoff = 0.79 cfs @ 12.02 hrs, Volume= 0.054 af, Depth= 6.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 50-yr Rainfall=6.86"

Area (ac)	CN	Description
0.098	98	Roofs, HSG A
0.098		100.00% Impervious Area

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

Subcatchment 4S: Roof Area - 5 Unit



Summary for Subcatchment 4S: Roof Area - 5 Unit

[49] Hint: Tc<2dt may require smaller dt

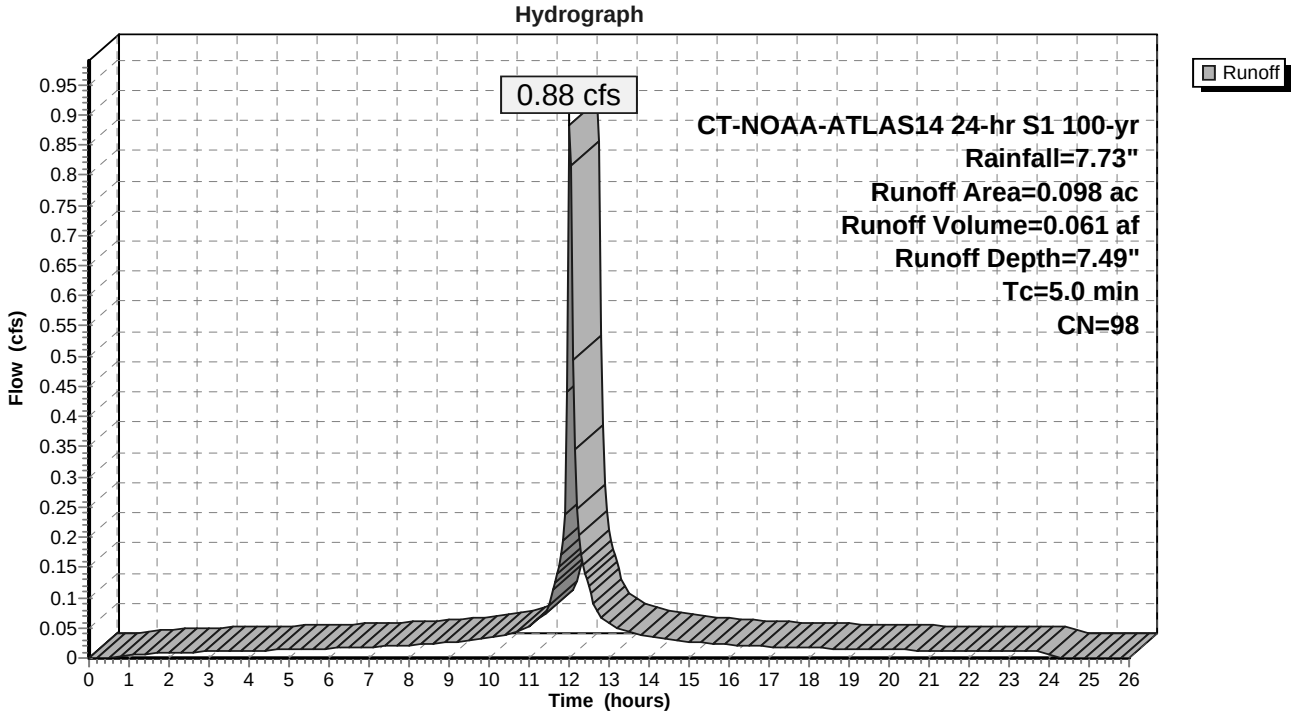
Runoff = 0.88 cfs @ 12.02 hrs, Volume= 0.061 af, Depth= 7.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-26.00 hrs, dt= 0.05 hrs
CT-NOAA-ATLAS14 24-hr S1 100-yr Rainfall=7.73"

Area (ac)	CN	Description
0.098	98	Roofs, HSG A
0.098		100.00% Impervious Area

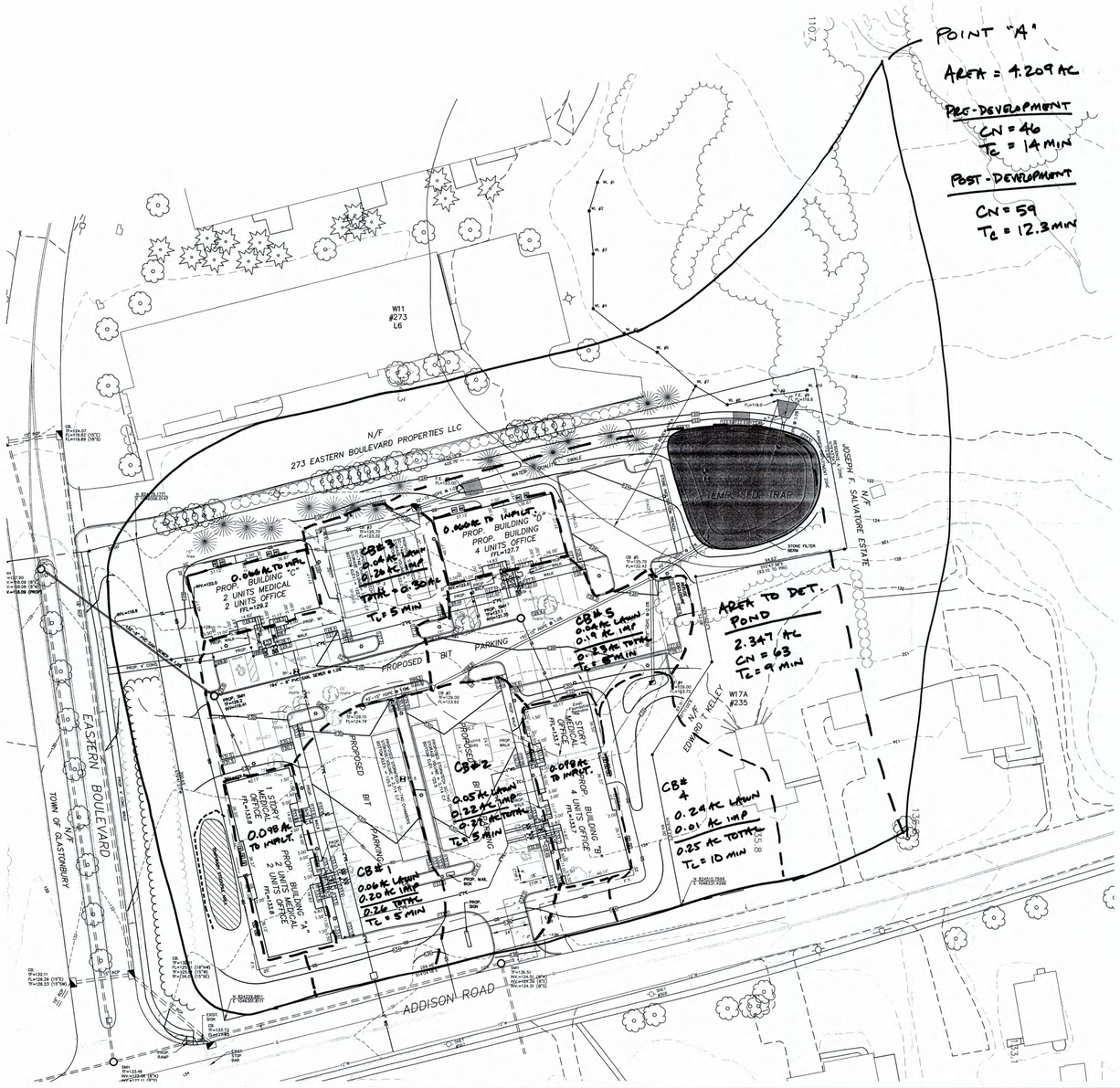
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0					**Direct Entry,**

Subcatchment 4S: Roof Area - 5 Unit



APPENDIX F

DRAINAGE AREA MAP



DRAINAGE AREA MAP
219 ADDISON ROAD
1" = 40'