



Drainage Analysis for Temporary Basin F

Princeton Junction Train Station Redevelopment

Block 6, Lots 8, 54, 55.01 & 76
Township of West Windsor, Mercer County, New Jersey

November 2021
Revised May 12, 2022

Prepared For
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A handwritten signature in blue ink, appearing to read 'Dan Sobieski', is written over a horizontal line.

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N.J. Professional Engineer License No. GE55019

MC Project No. 16000081A



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STORMWATER MANAGEMENT SUMMARY

The stormwater runoff resulting from the temporary condition of the proposed development is designed to not exceed existing flows contributing to Point of Analysis 2. In order to meet this standard, a temporary Basin F is to be constructed to service some of the proposed development until the completion of the Washington Road realignment and final construction of Basin F.

To evaluate the proposed site for compliance with the above standards, the Unit Hydrograph method and the HydroCAD v10.10-3.a hydrologic/hydraulic model from HydroCAD Software Solutions were utilized. The NOAA Atlas Point Precipitation Frequency Estimates (Type C rainfall distribution) was used for the analysis. The existing and proposed site are paved with storm sewers with short time of concentrations. Therefore, a minimum time of concentrations of 6 minutes was utilized for on-site areas.

STUDY AREAS

The drainage areas utilized to analyze and calculate the stormwater quantity for this temporary condition were established based on the proposed hydrologic limits of disturbance and the existing and proposed topography. The following is a listing of the existing drainage areas used in this report and a description of their location:

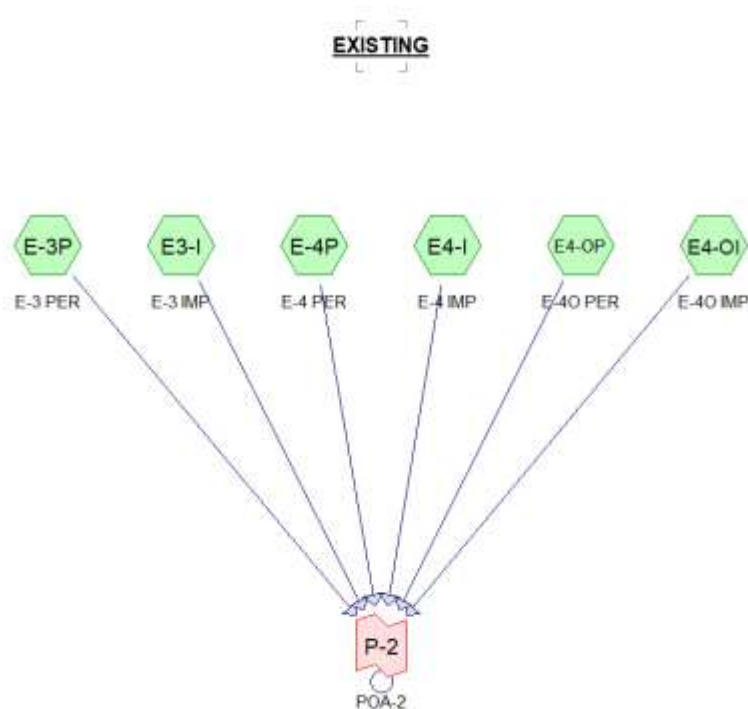
Existing Areas:

- Existing DA E3 – On-site drainage area consisting mostly of roof, parking lot and landscape areas. This drainage area is captured by the existing stormwater conveyance system located within Washington Road and discharges to Point of Analysis (POA-2) located northwest of the site.
- Existing DA E4 – Off-site drainage area consisting of Washington Road and adjacent wooded areas. This drainage area is captured by the existing stormwater conveyance system located within Washington Road and discharges to Point of Analysis (POA-2) located northwest of the site.



Existing DA E4O – Off-site drainage area consisting of Washington Road and adjacent wooded areas tributary to DA E4. This drainage area is captured by the existing stormwater conveyance system located within Washington Road and discharges to Point of Analysis (POA-2) located northwest of the site.

EXISTING CONDITIONS NETWORK DIAGRAM (POA-2)



The following is a listing of the proposed drainage areas used in this report and a description of their location:

Proposed Areas:

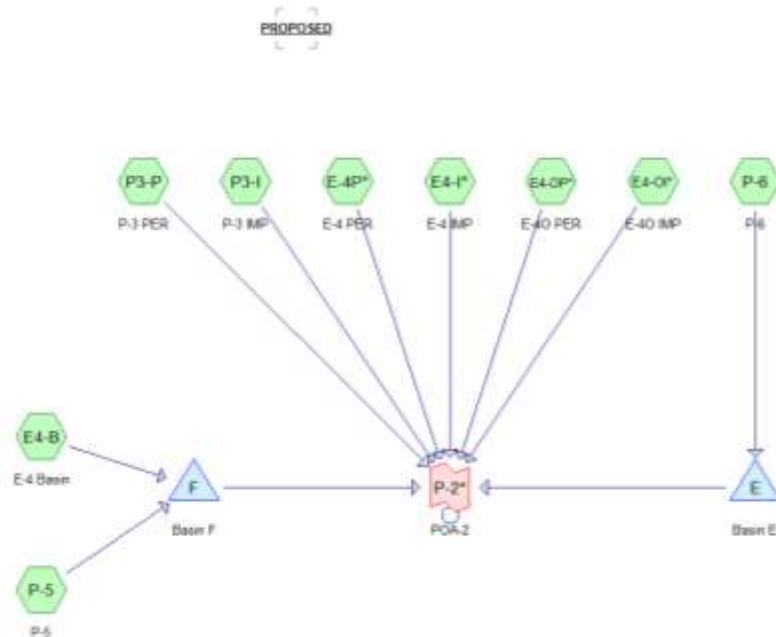
Existing DA P-3 – On-site drainage area consisting of roof, parking lots and landscape areas. This drainage area is captured by the existing stormwater conveyance system located within Washington Road and discharges to Point of Analysis (POA-2) located northwest of the site.



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- Proposed DA P-5 – On-site drainage area consisting of proposed landscaping and pavement and roof areas. This area will be on-site storm sewers and detained by Basin F and discharged to POA-2.
- Proposed DA P-6 – On-site drainage area consisting mostly of landscaping and pavement. This area will be collected by the proposed storm sewer, treated for 80% TSS removal by MTD E and conveyed to Basin E before being discharged to POA-2.
- Proposed DA E-4 – On-site drainage area consisting of undisturbed roadway and grassed areas. This drainage area is captured by the existing stormwater conveyance system located within Washington Road and discharges to Point of Analysis (POA-2) located northwest of the site.
- Proposed DA E-4O – Off-site drainage area consisting of undisturbed roadway and grassed areas. This drainage area is captured by the existing stormwater conveyance system located within Washington Road and discharges to Point of Analysis (POA-2) located northwest of the site.
- Proposed DA P-4B – On-site drainage area consisting mostly of landscaped area and basin area that will be captured and collected by Temporary Basin F. Temporary Basin F ties into an existing stormwater system within Washington Road to the North discharging off-site at POA-2.



PROPOSED CONDITIONS NETWORK DIAGRAM (POA-2)



STORMWATER MANAGEMENT

The proposed peak flows to the point of analysis are summarized in the following tables:

POA	STORM (YEAR)	EXISTING RUNOFF (CFS)	PROPOSED RUNOFF (CFS)
2	2	4.93	4.64
	10	7.52	6.99
	100	15.06	13.98

As demonstrated in the analysis, the existing stormwater conditions is met at POA #2.

Basin F peak elevation:

Basin F will reach a peak elevation of 64.02 ft for the interim condition during the 100-year storm event and impound 0.454 ac-ft of water.



SOIL EROSION AND SEDIMENT CONTROL

In accordance with the Soil Erosion and Sediment Control Act, soil erosion measures were incorporated into the design and graphically depicted on the Soil Erosion and Sediment Control Plans. These measures include, but are not limited to:

- Sediment Barriers and Silt Fences
- Conduit Outlet Protection
- Stormwater Management Basins
- Stabilized Construction Access
- Topsoil Stockpiles
- Storm Sewer Inlet Protection
- Temporary and Permanent Stabilization

Conduit outlet protection was provided at the outfall into the basin and was designed based upon the 25-year storm frequency event from HydroCAD. The tailwater resulting from the 2-year water surface elevation was utilized within the basin. For detailed calculations, refer to the Appendix.

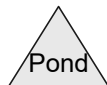
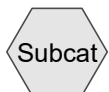
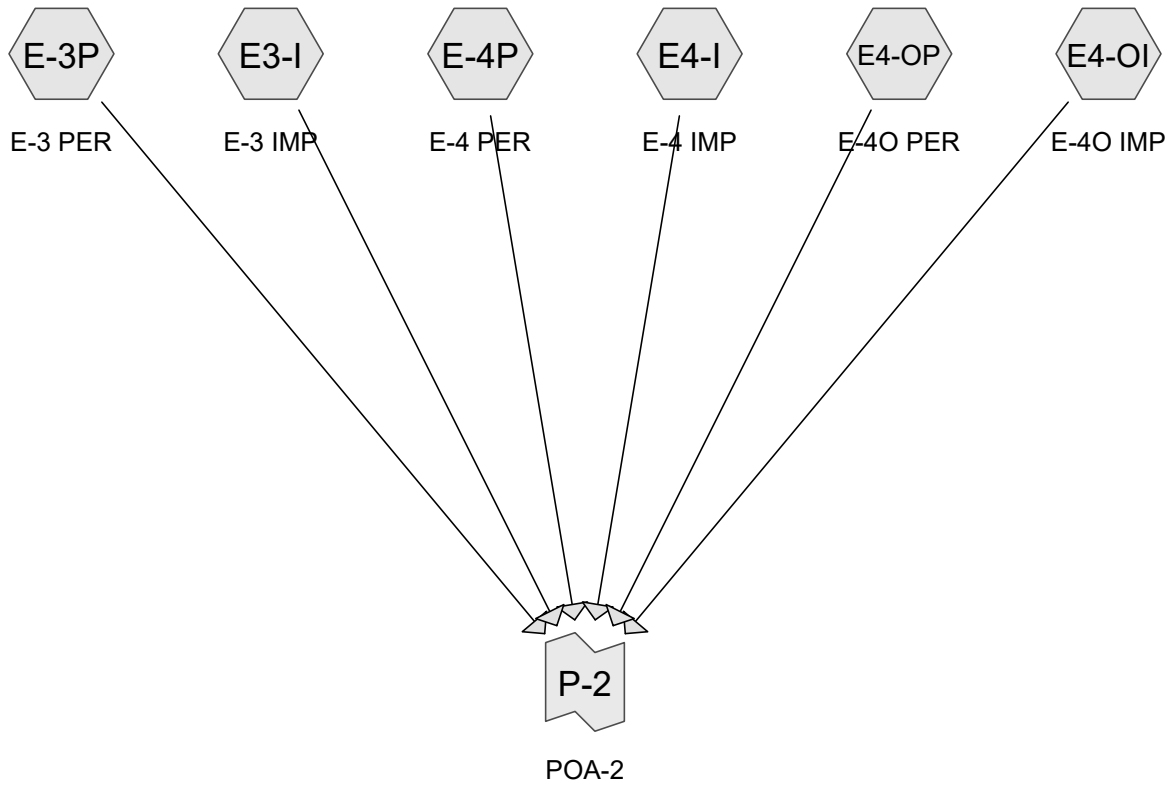
R:\Projects\2016\16000081A\Reports\Drainage\SWM Report\SCD Submission - Basin F Temporary\211000_Temporary Basin F.asd.docx



APPENDIX A

EXISTING CONDITIONS

EXISTING



Routing Diagram for 210930_Pulte_4

Prepared by Maser Consulting, Printed 11/19/2021
HydroCAD® 10.10-3a s/n 10901 © 2020 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.569	39	>75% Grass cover, Good, HSG A (E-3P, E-4P, E4-OP)
0.170	80	>75% Grass cover, Good, HSG D (E-3P)
0.959	98	Paved parking, HSG A (E3-I, E4-I, E4-OI)
0.650	98	Paved parking, HSG D (E3-I)
0.733	30	Woods, Good, HSG A (E-4P)
0.069	32	Woods/grass comb., Good, HSG A (E4-OP)
5.150	57	TOTAL AREA

Summary for Subcatchment E-3P: E-3 PER

Runoff = 0.01 cfs @ 24.05 hrs, Volume= 0.005 af, Depth= 0.02"

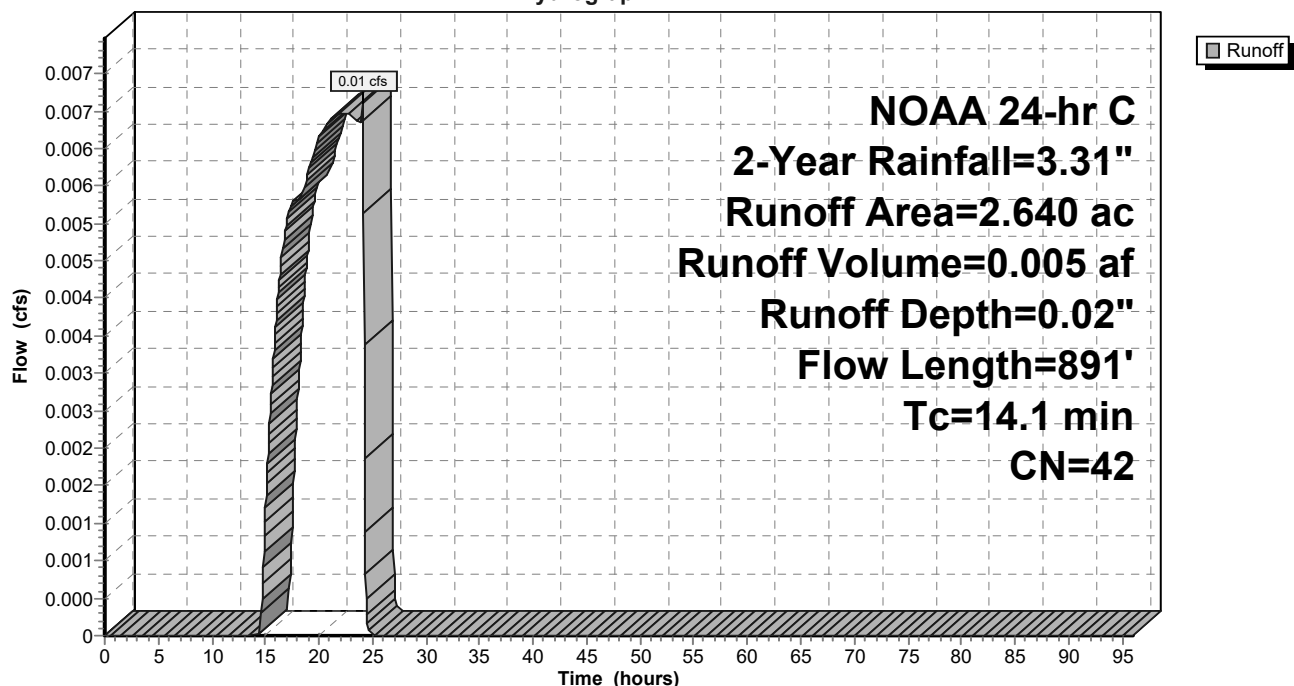
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
2.470	39	>75% Grass cover, Good, HSG A
0.170	80	>75% Grass cover, Good, HSG D
2.640	42	Weighted Average
2.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	32	0.0060	0.06		Sheet Flow, sheet lawn Grass: Dense n= 0.240 P2= 3.31"
1.5	174	0.0150	1.97		Shallow Concentrated Flow, Lawn shallow concentrated Unpaved Kv= 16.1 fps
1.3	155	0.0090	1.93		Shallow Concentrated Flow, shallow concentrated road Paved Kv= 20.3 fps
2.2	530	0.0080	4.07	7.18	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.017 Concrete sewer w/manholes & inlets
14.1	891	Total			

Subcatchment E-3P: E-3 PER

Hydrograph



Summary for Subcatchment E-4P: E-4 PER

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

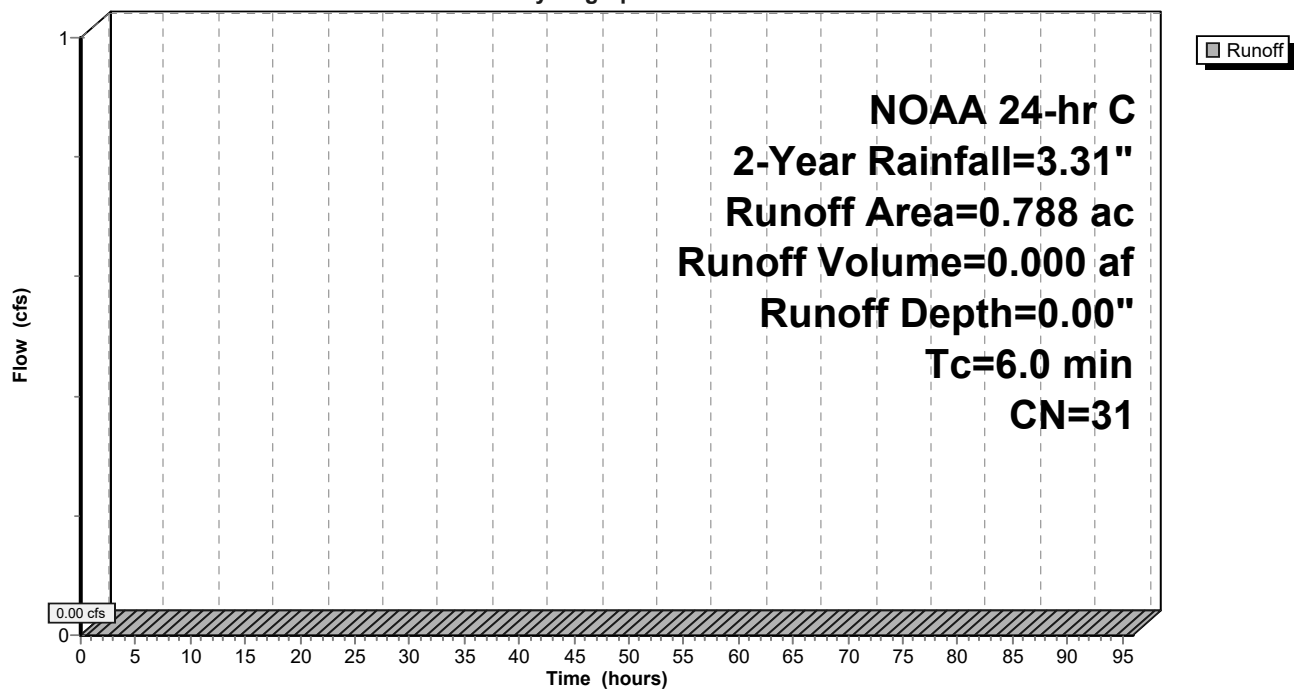
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.733	30	Woods, Good, HSG A
0.055	39	>75% Grass cover, Good, HSG A
0.788	31	Weighted Average
0.788		100.00% Pervious Area

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

Subcatchment E-4P: E-4 PER

Hydrograph



Summary for Subcatchment E3-I: E-3 IMP

Runoff = 3.14 cfs @ 12.17 hrs, Volume= 0.269 af, Depth= 3.08"

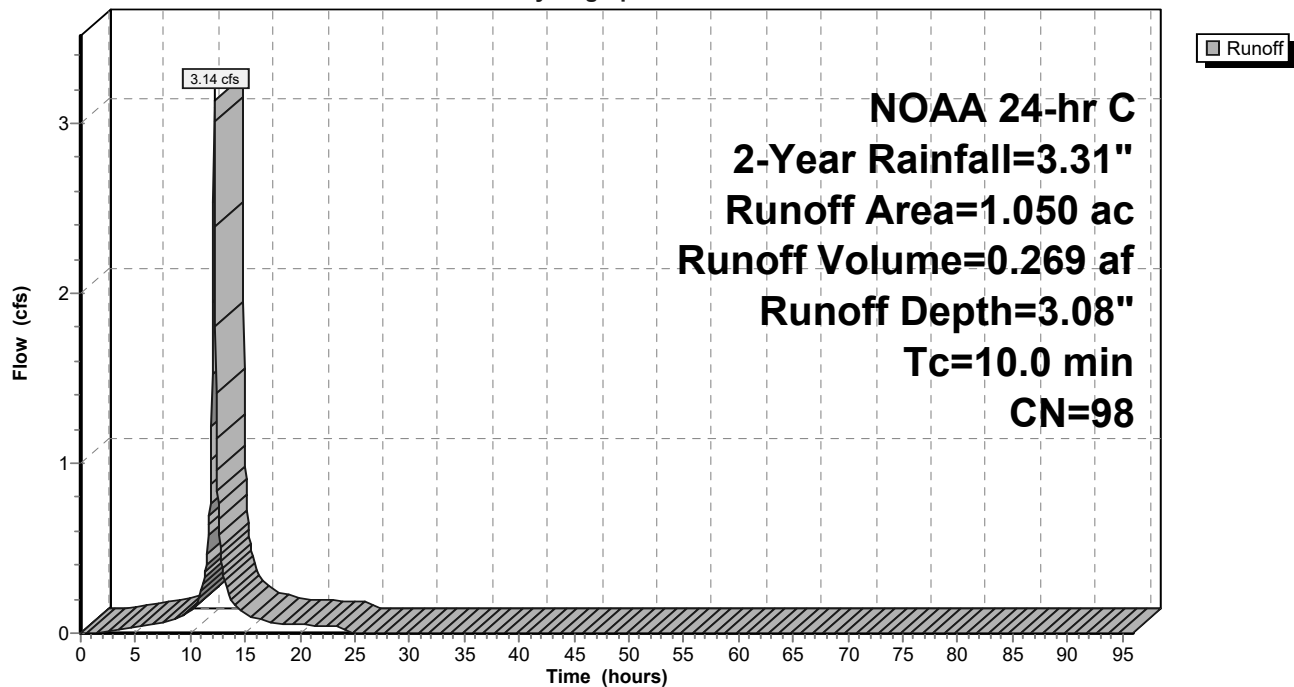
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG A
0.650	98	Paved parking, HSG D
1.050	98	Weighted Average
1.050		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Assumed 10 minutes

Subcatchment E3-I: E-3 IMP

Hydrograph



Summary for Subcatchment E4-I: E-4 IMP

Runoff = 1.67 cfs @ 12.13 hrs, Volume= 0.126 af, Depth= 3.08"

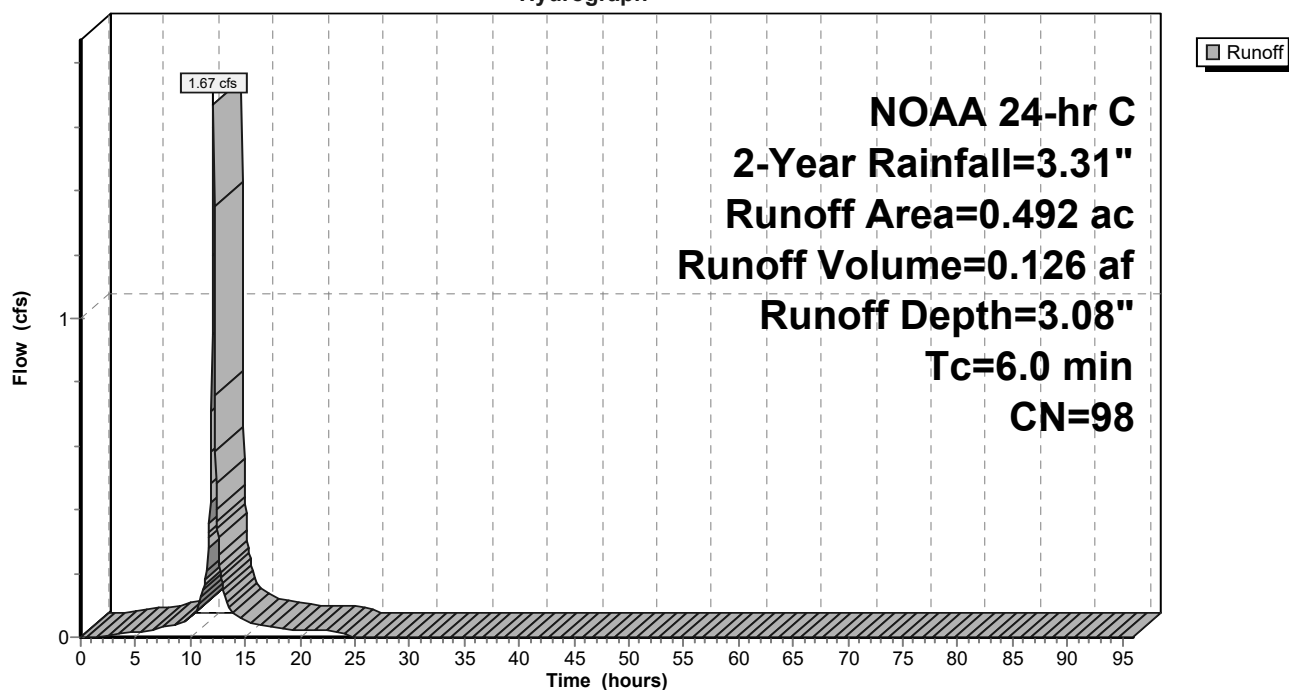
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.492	98	Paved parking, HSG A
0.492		100.00% Impervious Area

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

Subcatchment E4-I: E-4 IMP

Hydrograph



Summary for Subcatchment E4-OI: E-40 IMP

Runoff = 0.23 cfs @ 12.13 hrs, Volume= 0.017 af, Depth= 3.08"

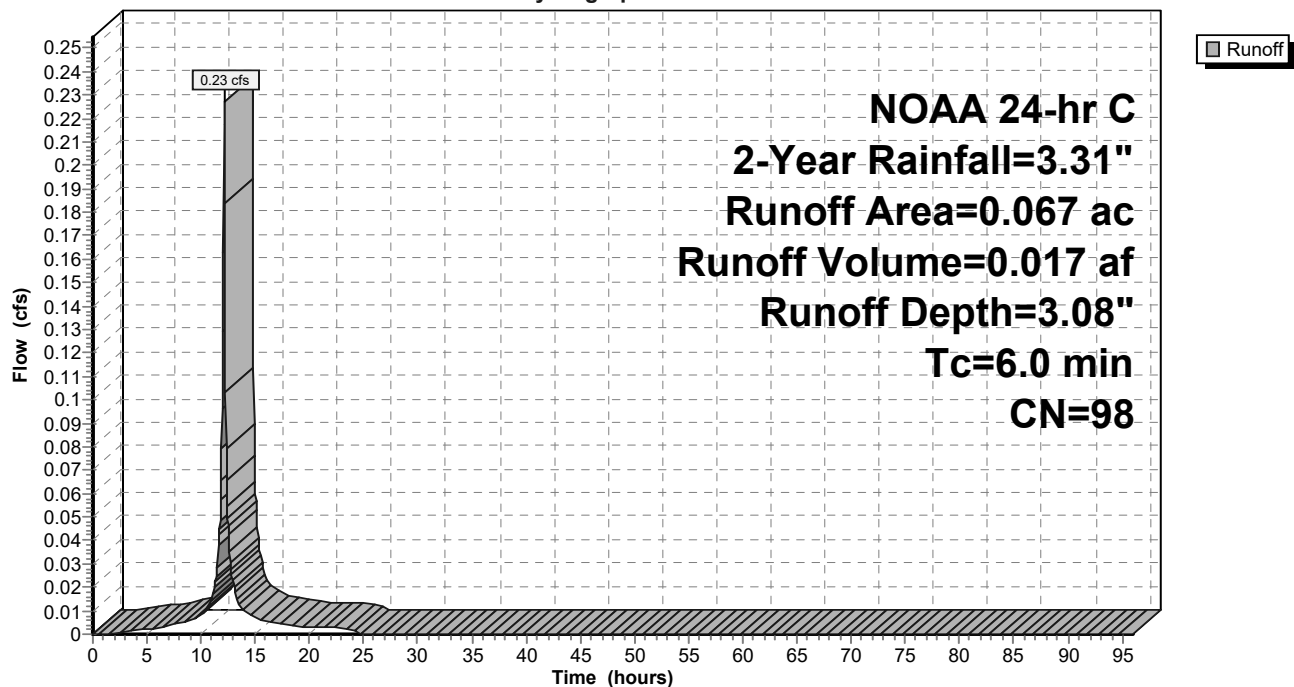
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG A
0.067		100.00% Impervious Area

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

Subcatchment E4-OI: E-40 IMP

Hydrograph



Summary for Subcatchment E4-OP: E-40 PER

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

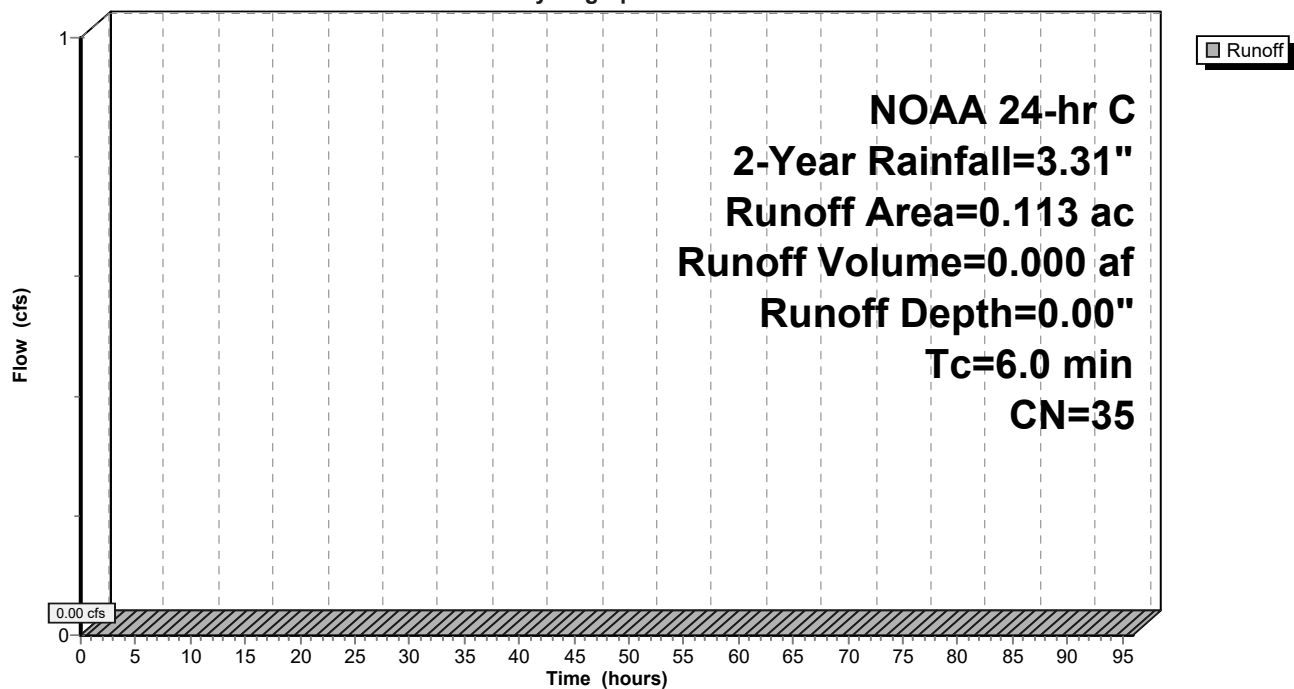
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.069	32	Woods/grass comb., Good, HSG A
0.044	39	>75% Grass cover, Good, HSG A
0.113	35	Weighted Average
0.113		100.00% Pervious Area

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

Subcatchment E4-OP: E-40 PER

Hydrograph



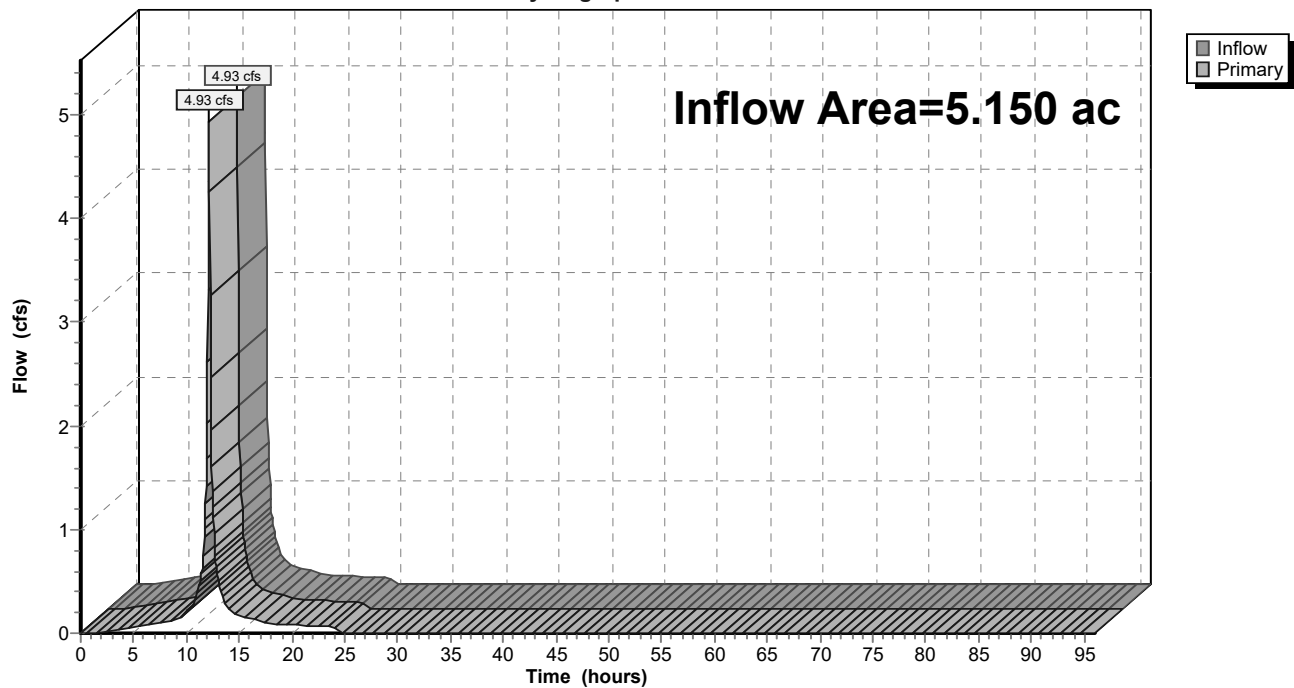
Summary for Link P-2: POA-2

Inflow Area = 5.150 ac, 31.24% Impervious, Inflow Depth = 0.97" for 2-Year event
Inflow = 4.93 cfs @ 12.15 hrs, Volume= 0.417 af
Primary = 4.93 cfs @ 12.15 hrs, Volume= 0.417 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link P-2: POA-2

Hydrograph



Summary for Subcatchment E-3P: E-3 PER

Runoff = 0.24 cfs @ 12.58 hrs, Volume= 0.069 af, Depth= 0.31"

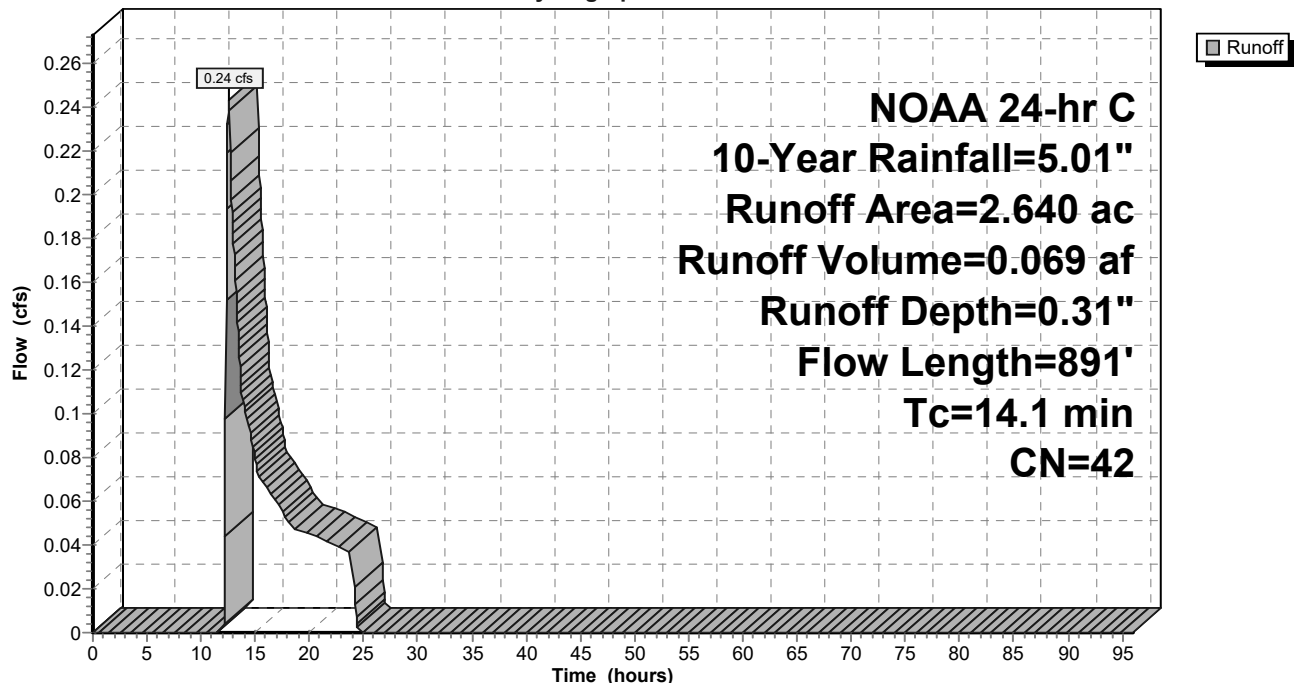
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
2.470	39	>75% Grass cover, Good, HSG A
0.170	80	>75% Grass cover, Good, HSG D
2.640	42	Weighted Average
2.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	32	0.0060	0.06		Sheet Flow, sheet lawn Grass: Dense n= 0.240 P2= 3.31"
1.5	174	0.0150	1.97		Shallow Concentrated Flow, Lawn shallow concentrated Unpaved Kv= 16.1 fps
1.3	155	0.0090	1.93		Shallow Concentrated Flow, shallow concentrated road Paved Kv= 20.3 fps
2.2	530	0.0080	4.07	7.18	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.017 Concrete sewer w/manholes & inlets
14.1	891	Total			

Subcatchment E-3P: E-3 PER

Hydrograph



Summary for Subcatchment E-4P: E-4 PER

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.001 af, Depth= 0.01"

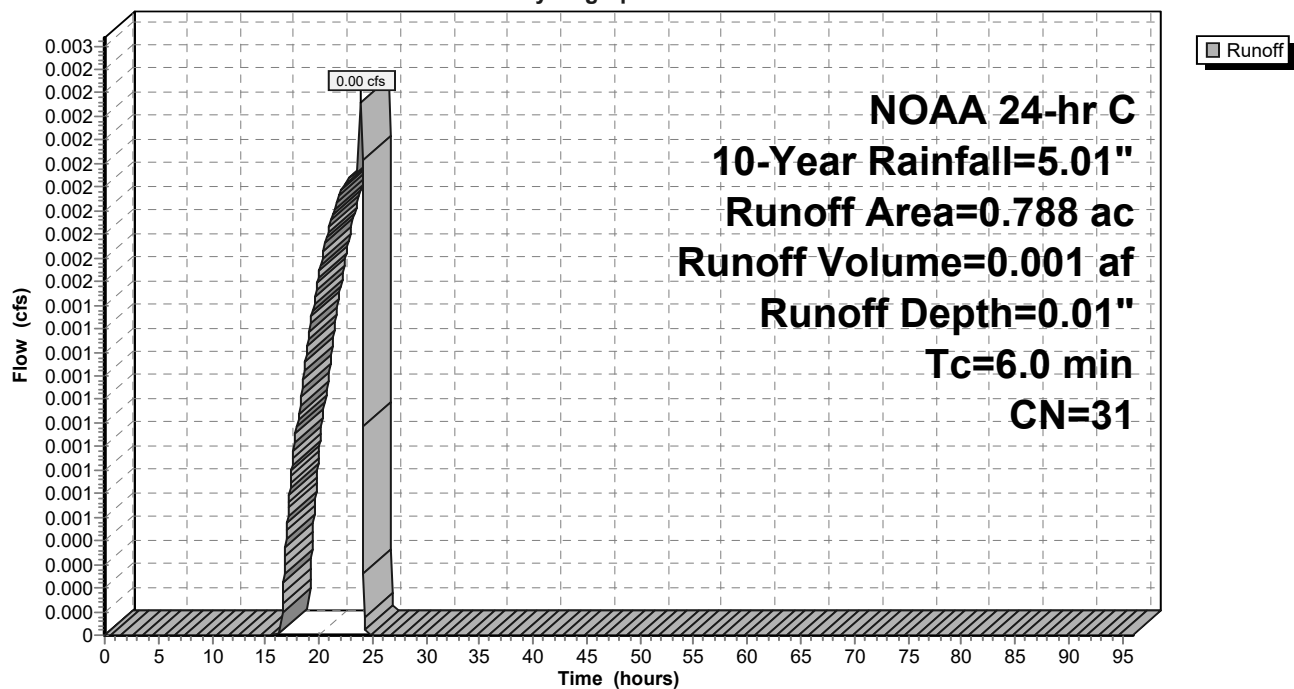
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.733	30	Woods, Good, HSG A
0.055	39	>75% Grass cover, Good, HSG A
0.788	31	Weighted Average
0.788		100.00% Pervious Area

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

Subcatchment E-4P: E-4 PER

Hydrograph



Summary for Subcatchment E3-I: E-3 IMP

Runoff = 4.79 cfs @ 12.17 hrs, Volume= 0.418 af, Depth= 4.77"

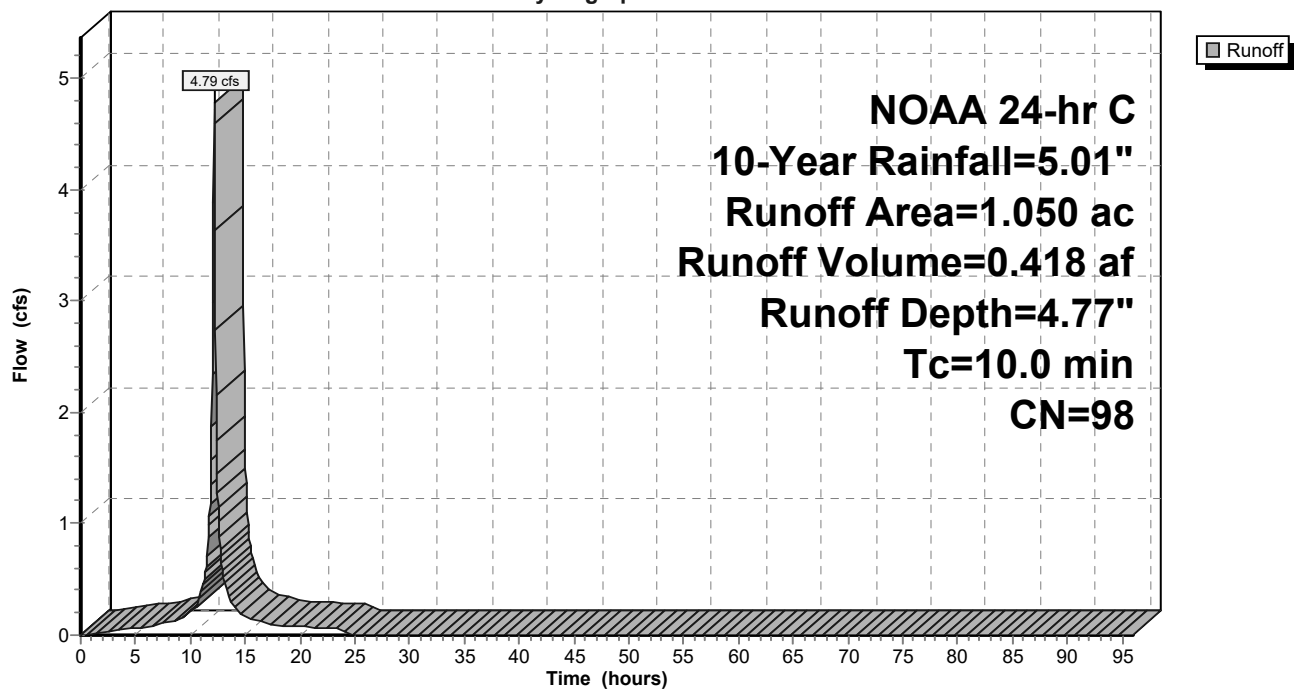
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG A
0.650	98	Paved parking, HSG D
1.050	98	Weighted Average
1.050		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Assumed 10 minutes

Subcatchment E3-I: E-3 IMP

Hydrograph



Summary for Subcatchment E4-I: E-4 IMP

Runoff = 2.54 cfs @ 12.13 hrs, Volume= 0.196 af, Depth= 4.77"

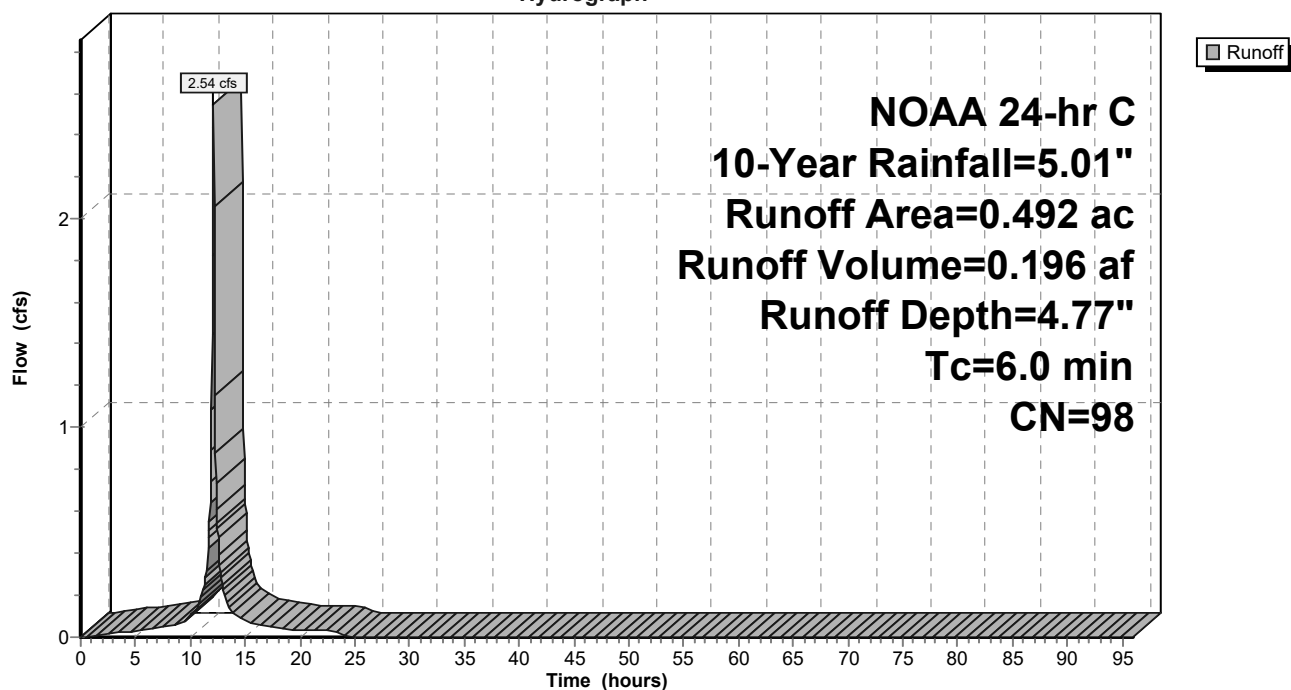
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.492	98	Paved parking, HSG A
0.492		100.00% Impervious Area

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

Subcatchment E4-I: E-4 IMP

Hydrograph



Summary for Subcatchment E4-OI: E-40 IMP

Runoff = 0.35 cfs @ 12.13 hrs, Volume= 0.027 af, Depth= 4.77"

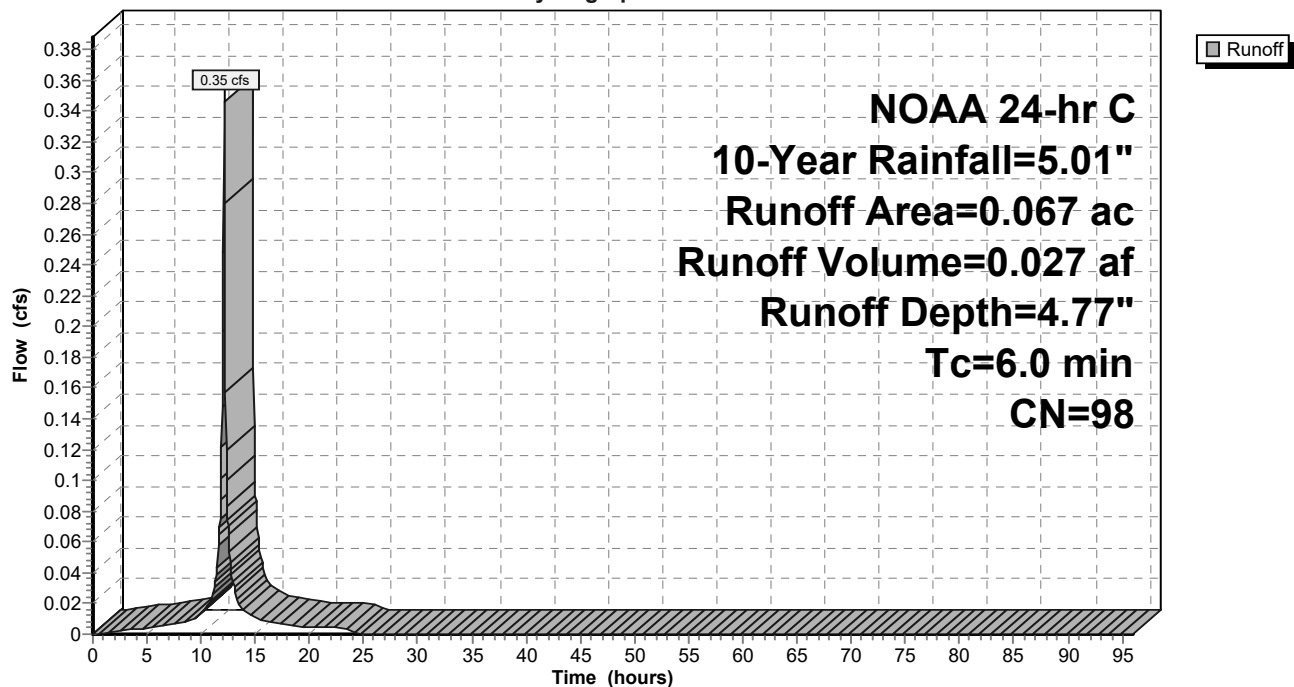
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG A
0.067		100.00% Impervious Area

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

Subcatchment E4-OI: E-40 IMP

Hydrograph



Summary for Subcatchment E4-OP: E-40 PER

Runoff = 0.00 cfs @ 14.54 hrs, Volume= 0.001 af, Depth= 0.08"

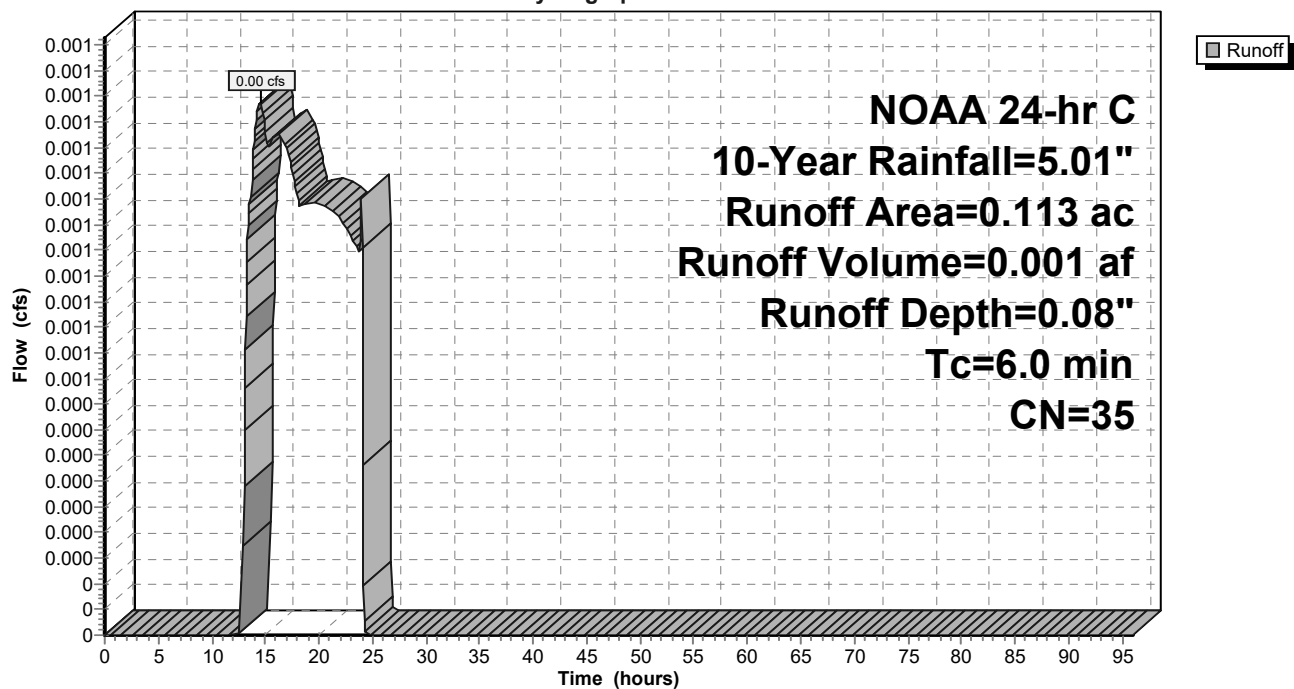
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.069	32	Woods/grass comb., Good, HSG A
0.044	39	>75% Grass cover, Good, HSG A
0.113	35	Weighted Average
0.113		100.00% Pervious Area

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

Subcatchment E4-OP: E-40 PER

Hydrograph



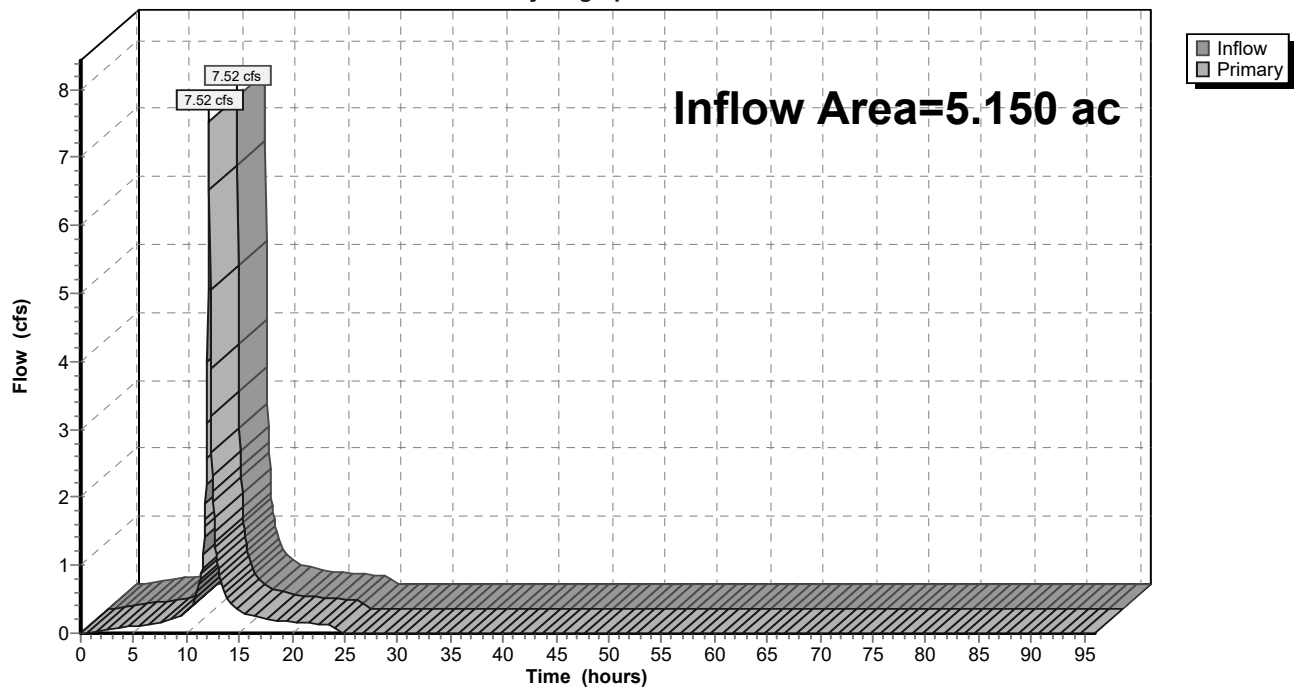
Summary for Link P-2: POA-2

Inflow Area = 5.150 ac, 31.24% Impervious, Inflow Depth = 1.66" for 10-Year event
Inflow = 7.52 cfs @ 12.15 hrs, Volume= 0.711 af
Primary = 7.52 cfs @ 12.15 hrs, Volume= 0.711 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link P-2: POA-2

Hydrograph



Summary for Subcatchment E-3P: E-3 PER

Runoff = 3.38 cfs @ 12.26 hrs, Volume= 0.352 af, Depth= 1.60"

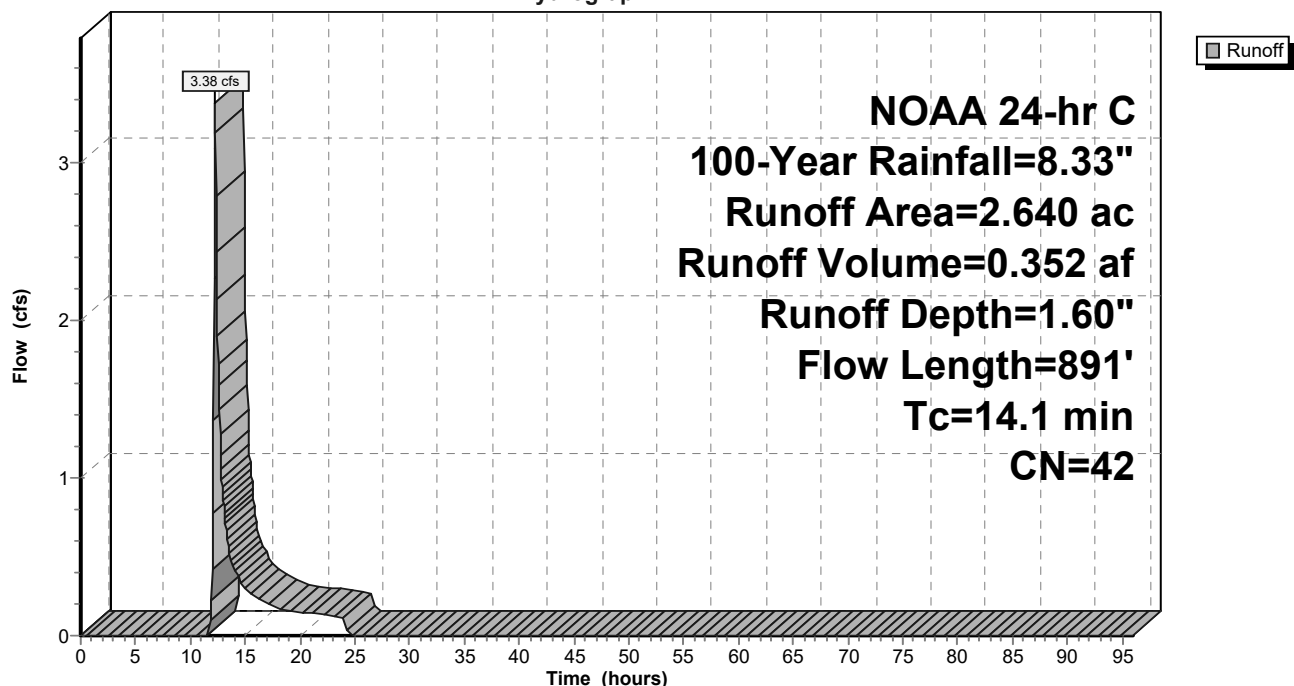
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
2.470	39	>75% Grass cover, Good, HSG A
0.170	80	>75% Grass cover, Good, HSG D
2.640	42	Weighted Average
2.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	32	0.0060	0.06		Sheet Flow, sheet lawn Grass: Dense n= 0.240 P2= 3.31"
1.5	174	0.0150	1.97		Shallow Concentrated Flow, Lawn shallow concentrated Unpaved Kv= 16.1 fps
1.3	155	0.0090	1.93		Shallow Concentrated Flow, shallow concentrated road Paved Kv= 20.3 fps
2.2	530	0.0080	4.07	7.18	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.017 Concrete sewer w/manholes & inlets
14.1	891	Total			

Subcatchment E-3P: E-3 PER

Hydrograph



Summary for Subcatchment E-4P: E-4 PER

Runoff = 0.15 cfs @ 12.28 hrs, Volume= 0.038 af, Depth= 0.58"

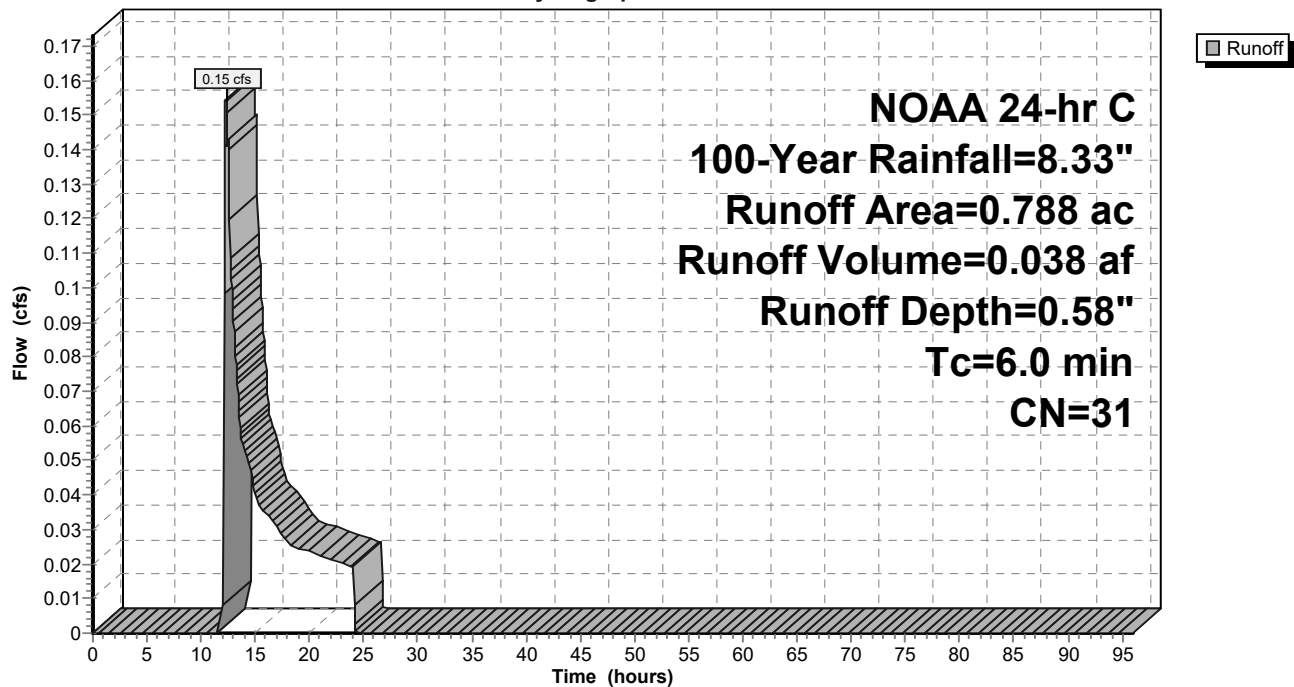
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.733	30	Woods, Good, HSG A
0.055	39	>75% Grass cover, Good, HSG A
0.788	31	Weighted Average
0.788		100.00% Pervious Area

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

Subcatchment E-4P: E-4 PER

Hydrograph



Summary for Subcatchment E3-I: E-3 IMP

Runoff = 7.99 cfs @ 12.17 hrs, Volume= 0.708 af, Depth= 8.09"

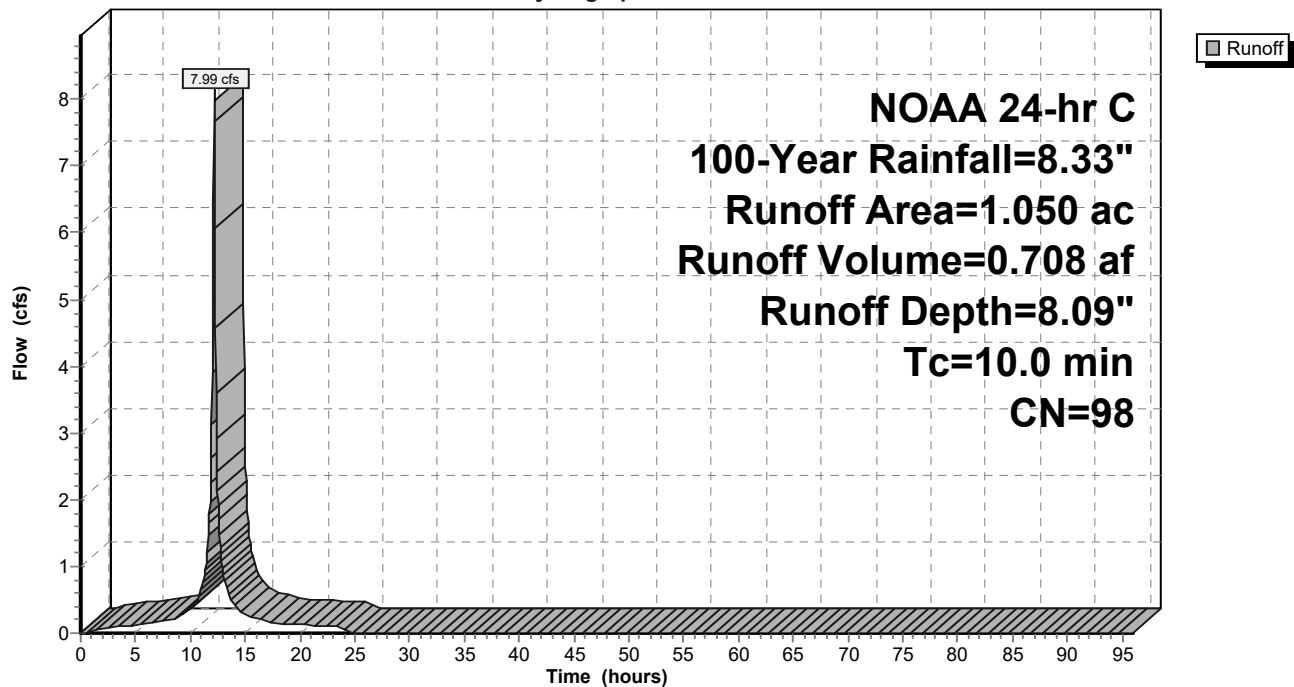
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG A
0.650	98	Paved parking, HSG D
1.050	98	Weighted Average
1.050		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Assumed 10 minutes

Subcatchment E3-I: E-3 IMP

Hydrograph



Summary for Subcatchment E4-I: E-4 IMP

Runoff = 4.25 cfs @ 12.13 hrs, Volume= 0.332 af, Depth= 8.09"

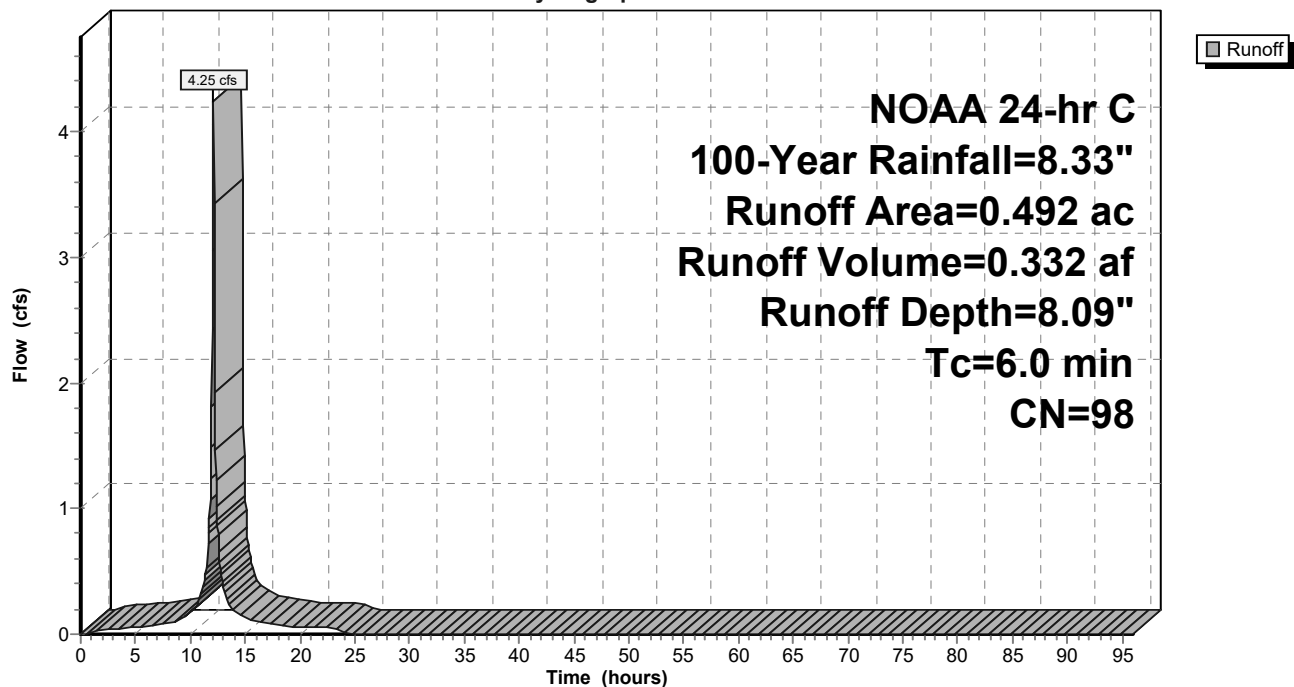
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.492	98	Paved parking, HSG A
0.492		100.00% Impervious Area

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

Subcatchment E4-I: E-4 IMP

Hydrograph



Summary for Subcatchment E4-OI: E-40 IMP

Runoff = 0.58 cfs @ 12.13 hrs, Volume= 0.045 af, Depth= 8.09"

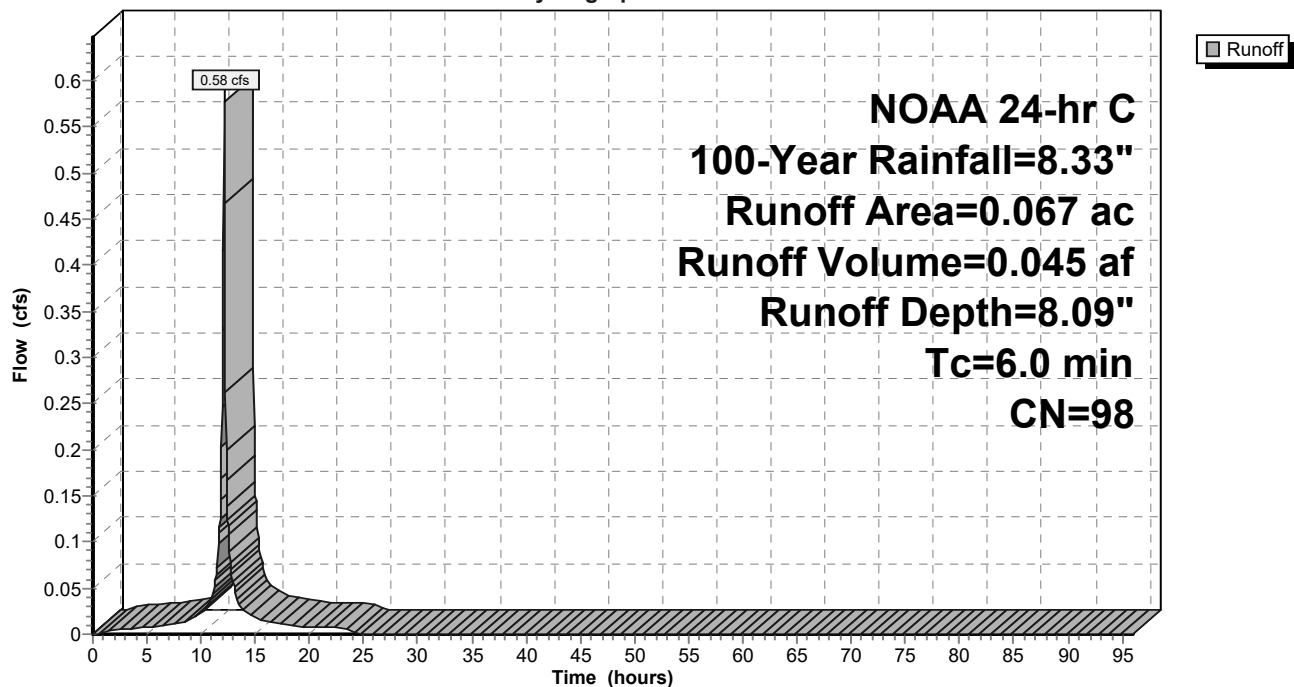
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG A
0.067		100.00% Impervious Area

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

Subcatchment E4-OI: E-40 IMP

Hydrograph



Summary for Subcatchment E4-OP: E-40 PER

Runoff = 0.08 cfs @ 12.16 hrs, Volume= 0.009 af, Depth= 0.92"

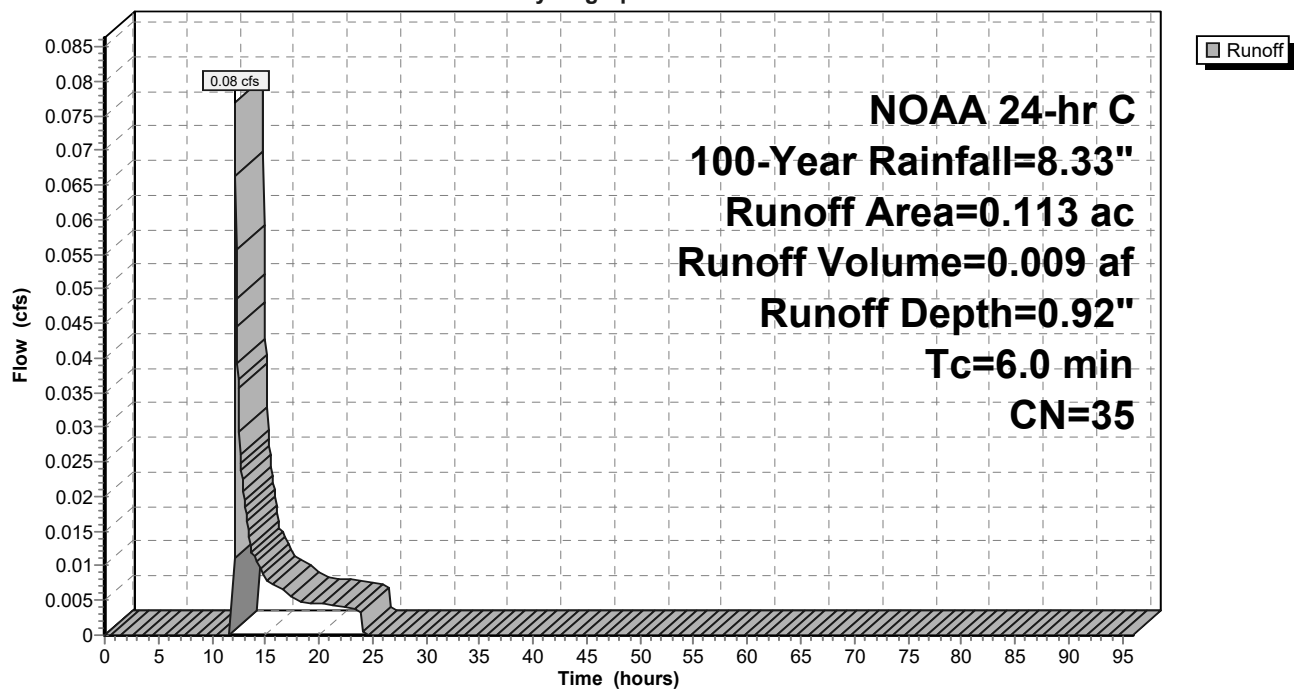
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.069	32	Woods/grass comb., Good, HSG A
0.044	39	>75% Grass cover, Good, HSG A
0.113	35	Weighted Average
0.113		100.00% Pervious Area

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

Subcatchment E4-OP: E-40 PER

Hydrograph



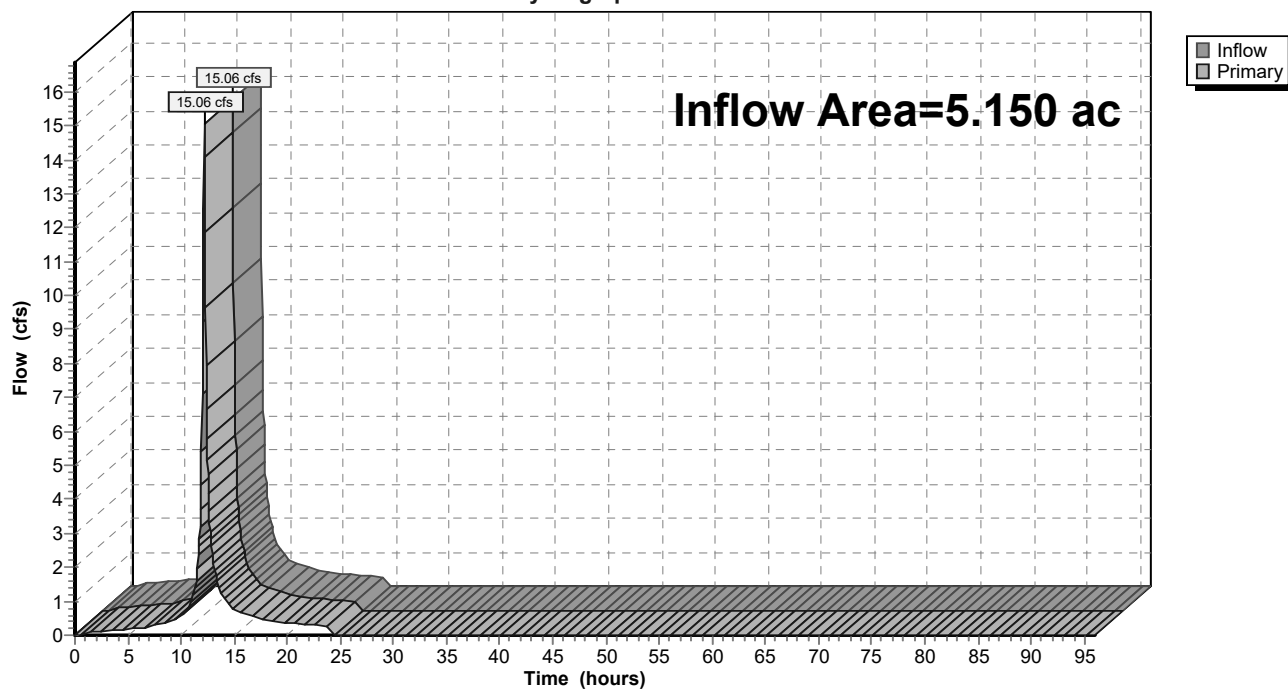
Summary for Link P-2: POA-2

Inflow Area = 5.150 ac, 31.24% Impervious, Inflow Depth = 3.46" for 100-Year event
Inflow = 15.06 cfs @ 12.16 hrs, Volume= 1.483 af
Primary = 15.06 cfs @ 12.16 hrs, Volume= 1.483 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link P-2: POA-2

Hydrograph



Summary for Subcatchment E-3P: E-3 PER

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

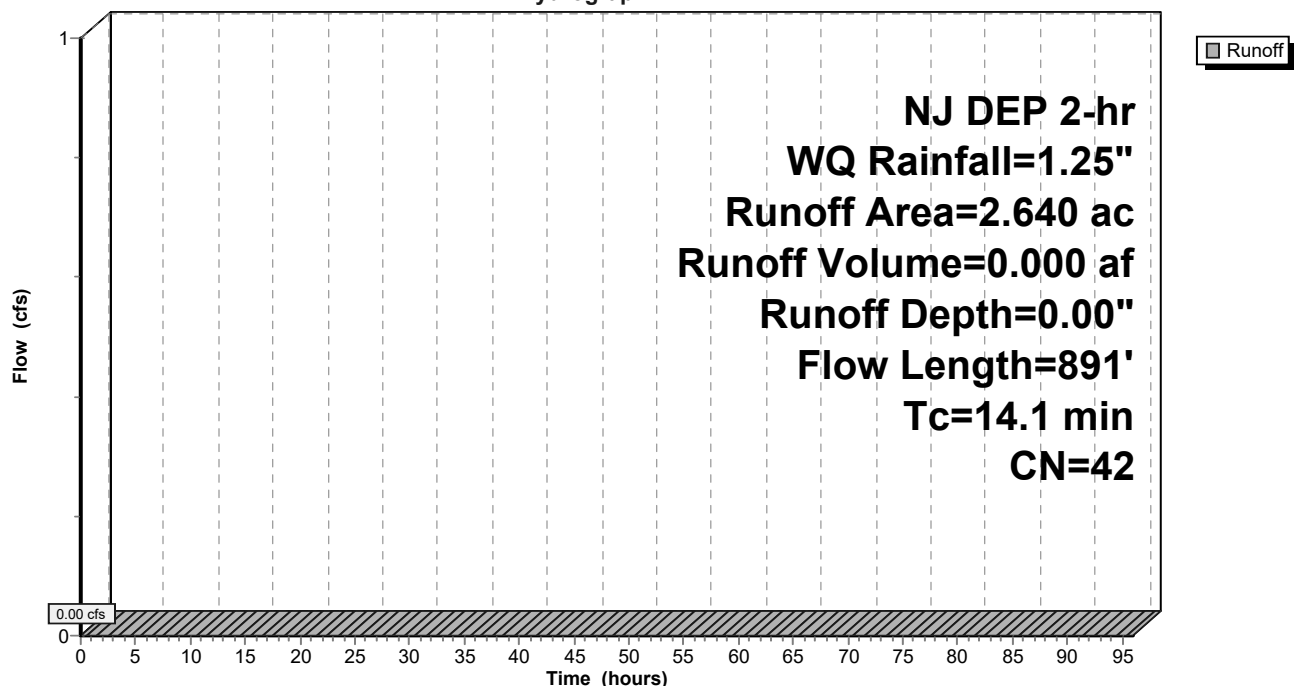
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
2.470	39	>75% Grass cover, Good, HSG A
0.170	80	>75% Grass cover, Good, HSG D
2.640	42	Weighted Average
2.640		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	32	0.0060	0.06		Sheet Flow, sheet lawn Grass: Dense n= 0.240 P2= 3.31"
1.5	174	0.0150	1.97		Shallow Concentrated Flow, Lawn shallow concentrated Unpaved Kv= 16.1 fps
1.3	155	0.0090	1.93		Shallow Concentrated Flow, shallow concentrated road Paved Kv= 20.3 fps
2.2	530	0.0080	4.07	7.18	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.017 Concrete sewer w/manholes & inlets
14.1	891	Total			

Subcatchment E-3P: E-3 PER

Hydrograph



Summary for Subcatchment E-4P: E-4 PER

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

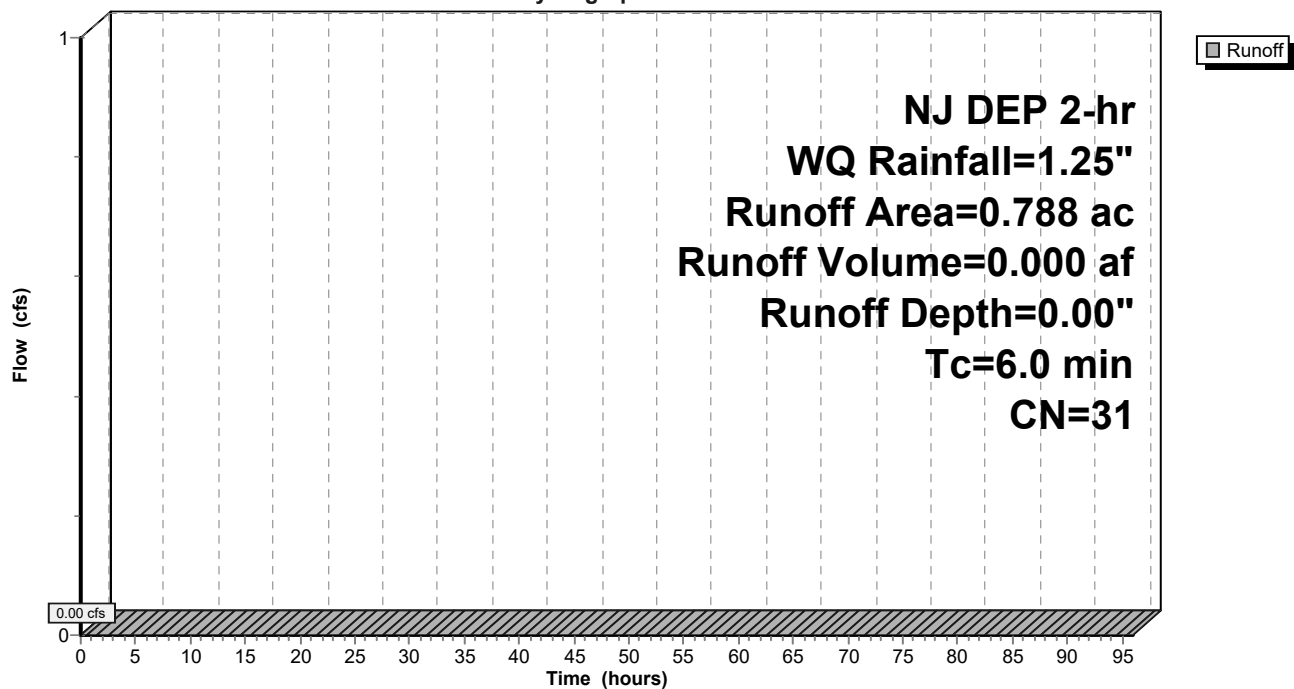
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.733	30	Woods, Good, HSG A
0.055	39	>75% Grass cover, Good, HSG A
0.788	31	Weighted Average
0.788		100.00% Pervious Area

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

Subcatchment E-4P: E-4 PER

Hydrograph



Summary for Subcatchment E3-I: E-3 IMP

Runoff = 2.71 cfs @ 1.15 hrs, Volume= 0.091 af, Depth= 1.03"

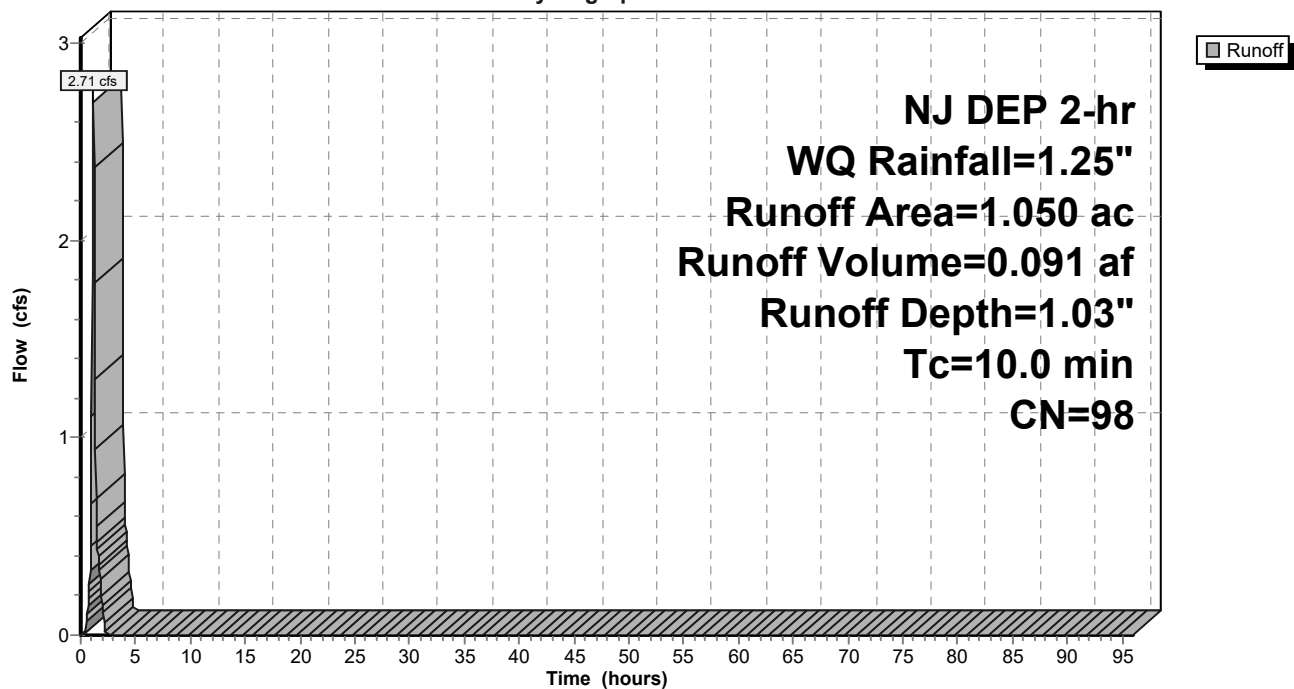
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.400	98	Paved parking, HSG A
0.650	98	Paved parking, HSG D
1.050	98	Weighted Average
1.050		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Assumed 10 minutes

Subcatchment E3-I: E-3 IMP

Hydrograph



Summary for Subcatchment E4-I: E-4 IMP

Runoff = 1.42 cfs @ 1.09 hrs, Volume= 0.042 af, Depth= 1.03"

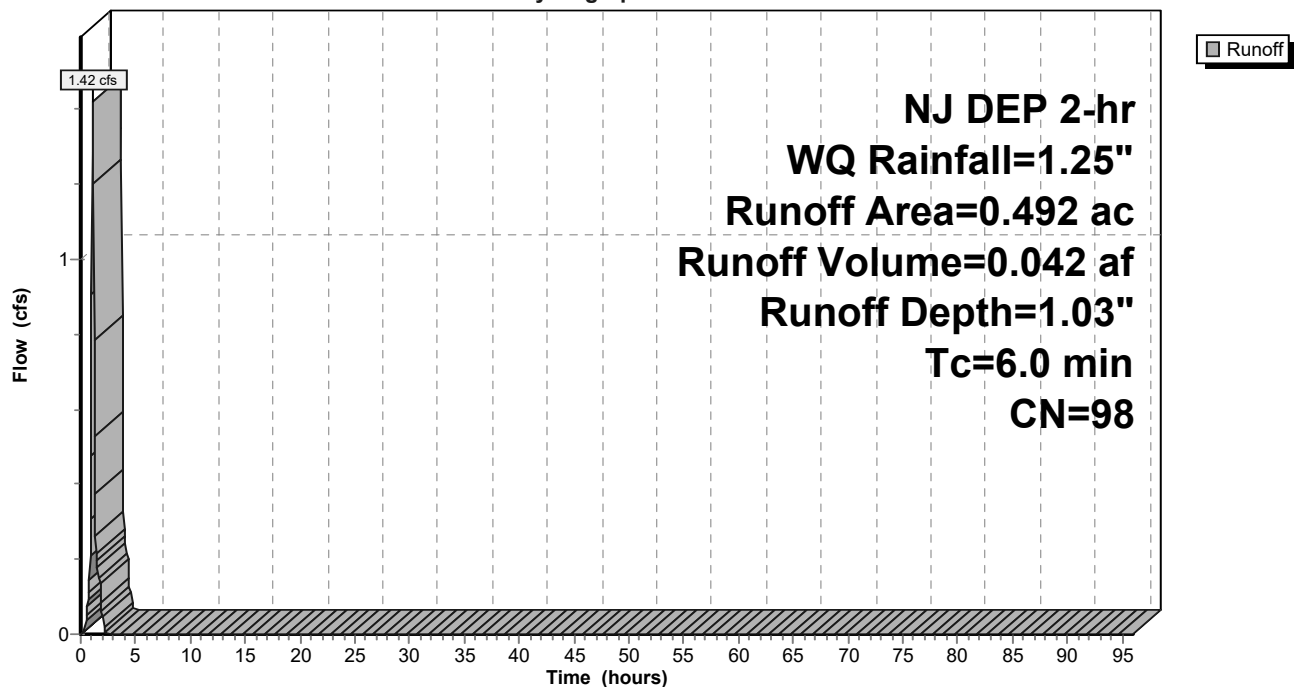
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.492	98	Paved parking, HSG A
0.492		100.00% Impervious Area

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

Subcatchment E4-I: E-4 IMP

Hydrograph



Summary for Subcatchment E4-OI: E-40 IMP

Runoff = 0.19 cfs @ 1.09 hrs, Volume= 0.006 af, Depth= 1.03"

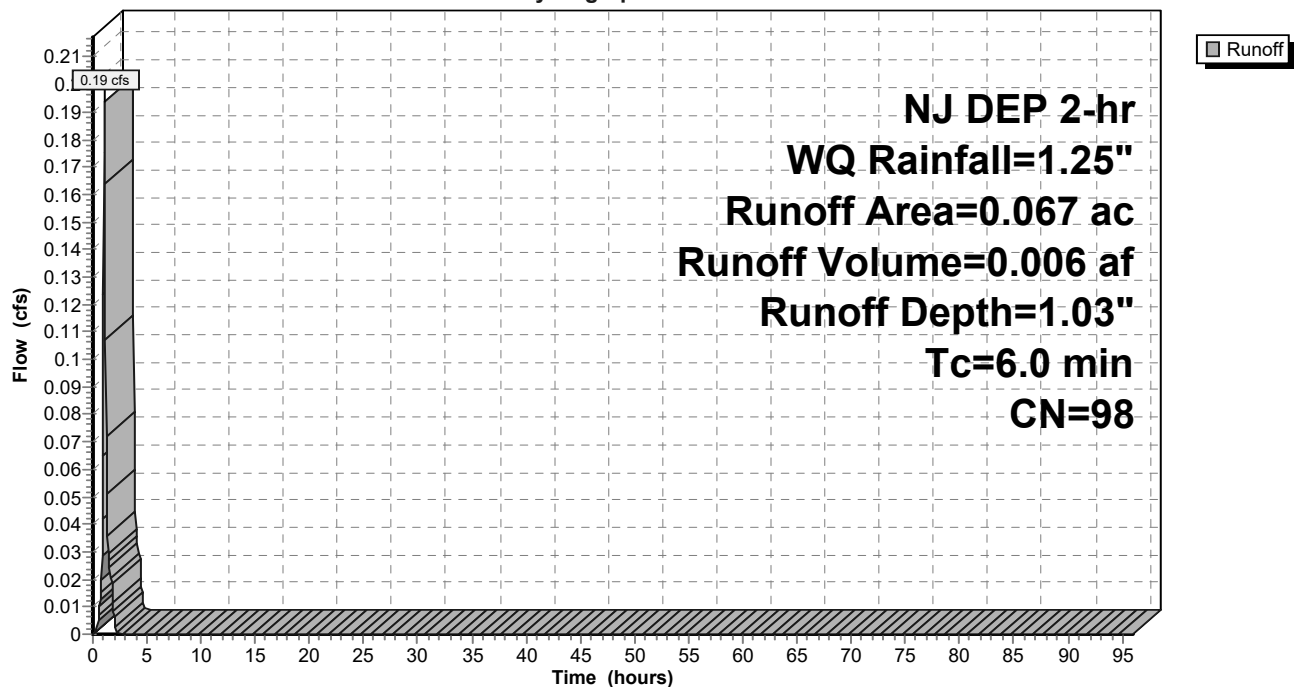
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG A
0.067		100.00% Impervious Area

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

Subcatchment E4-OI: E-40 IMP

Hydrograph



Summary for Subcatchment E4-OP: E-40 PER

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

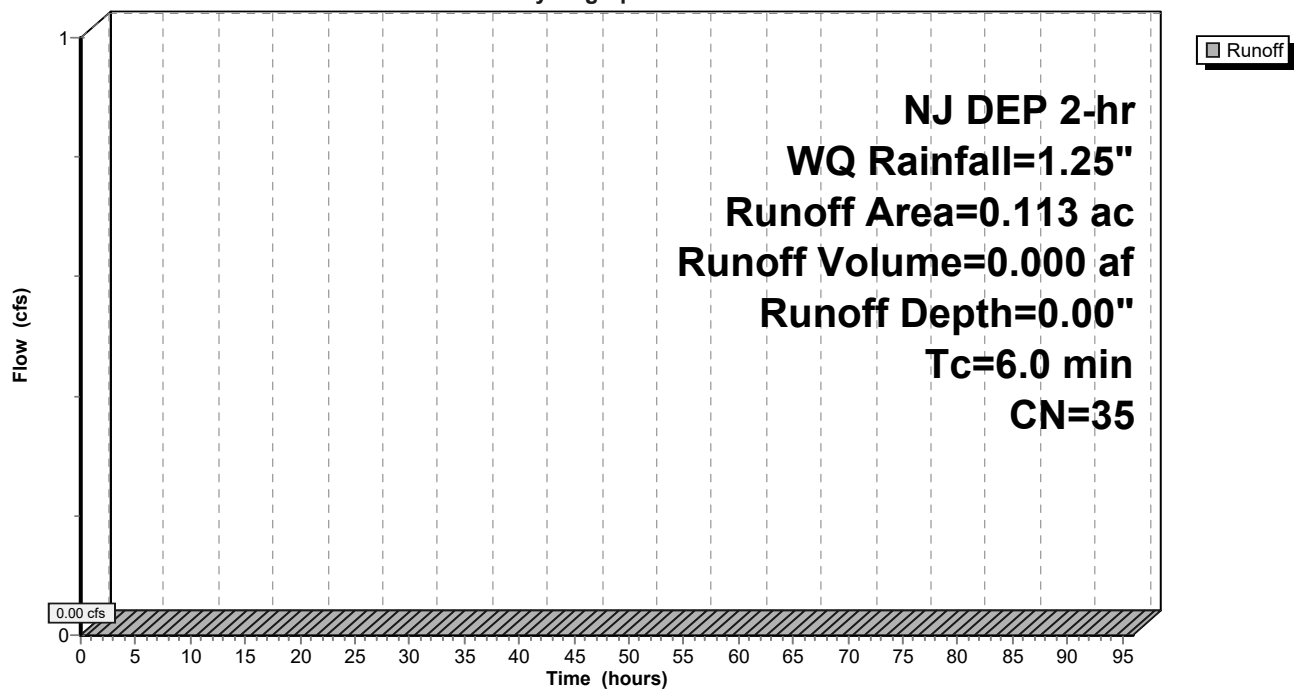
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.069	32	Woods/grass comb., Good, HSG A
0.044	39	>75% Grass cover, Good, HSG A
0.113	35	Weighted Average
0.113		100.00% Pervious Area

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

Subcatchment E4-OP: E-40 PER

Hydrograph



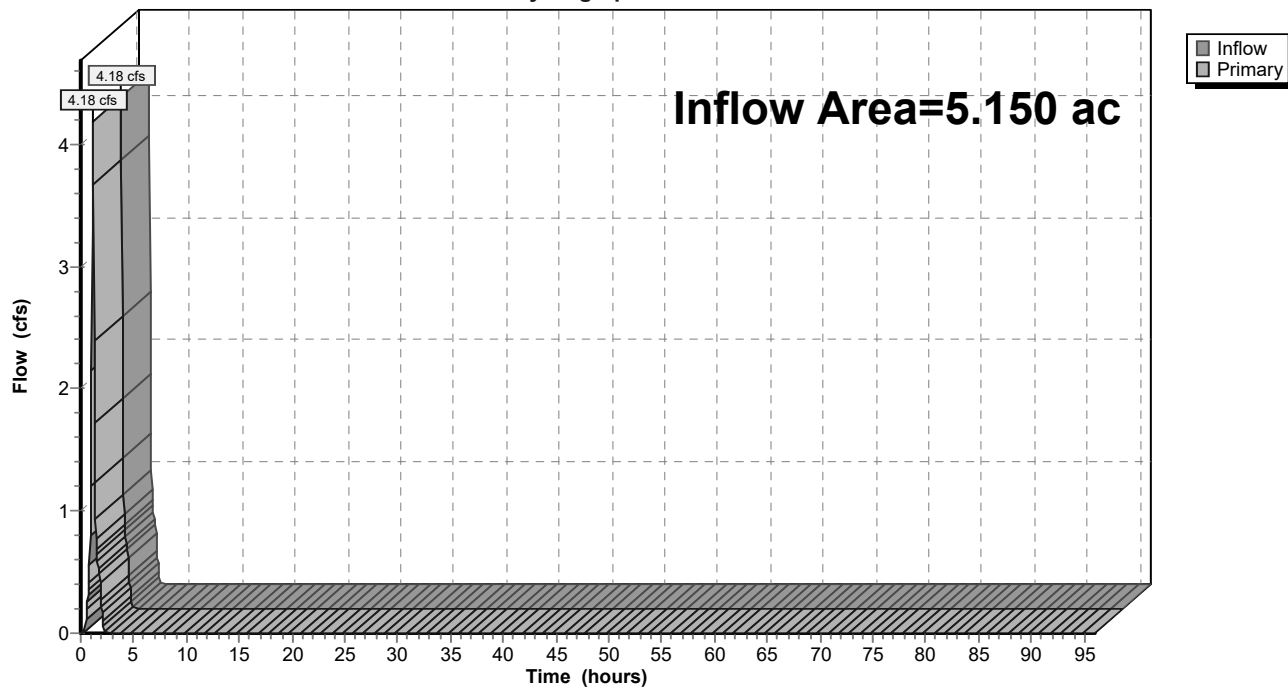
Summary for Link P-2: POA-2

Inflow Area = 5.150 ac, 31.24% Impervious, Inflow Depth = 0.32" for WQ event
Inflow = 4.18 cfs @ 1.12 hrs, Volume= 0.139 af
Primary = 4.18 cfs @ 1.12 hrs, Volume= 0.139 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link P-2: POA-2

Hydrograph

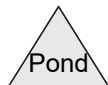
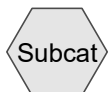
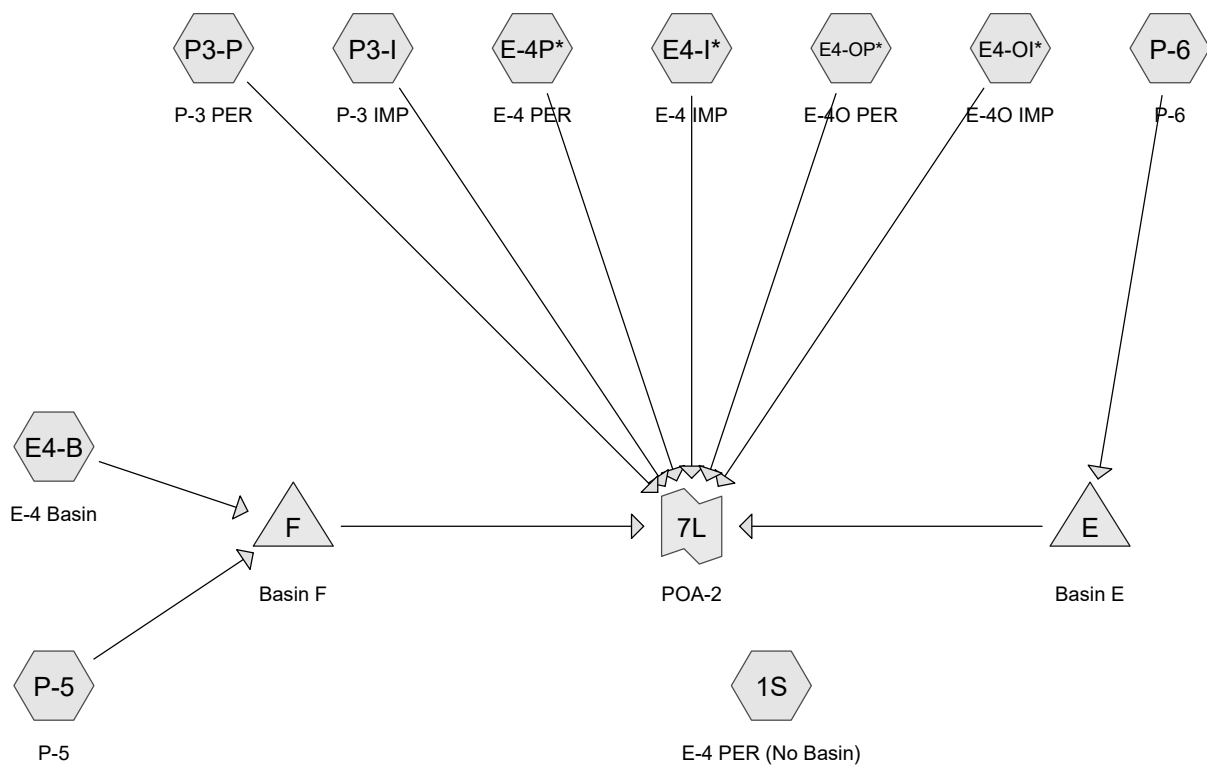




APPENDIX B

PROPOSED CONDITIONS

PROPOSED



Routing Diagram for 211121_Pulte

Prepared by Maser Consulting, Printed 11/21/2021
HydroCAD® 10.10-3a s/n 10901 © 2020 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.766	39	>75% Grass cover, Good, HSG A (1S, E-4P*, E4-B, E4-OP*, P-5, P3-P)
0.211	80	>75% Grass cover, Good, HSG D (P-6, P3-P)
1.947	98	Paved parking, HSG A (E4-I*, E4-OI*, P-5, P3-I)
1.014	98	Paved parking, HSG D (P-6, P3-I)
0.733	30	Woods, Good, HSG A (1S)
0.069	32	Woods/grass comb., Good, HSG A (E4-OP*)
6.740	65	TOTAL AREA

Summary for Subcatchment 1S: E-4 PER (No Basin)

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

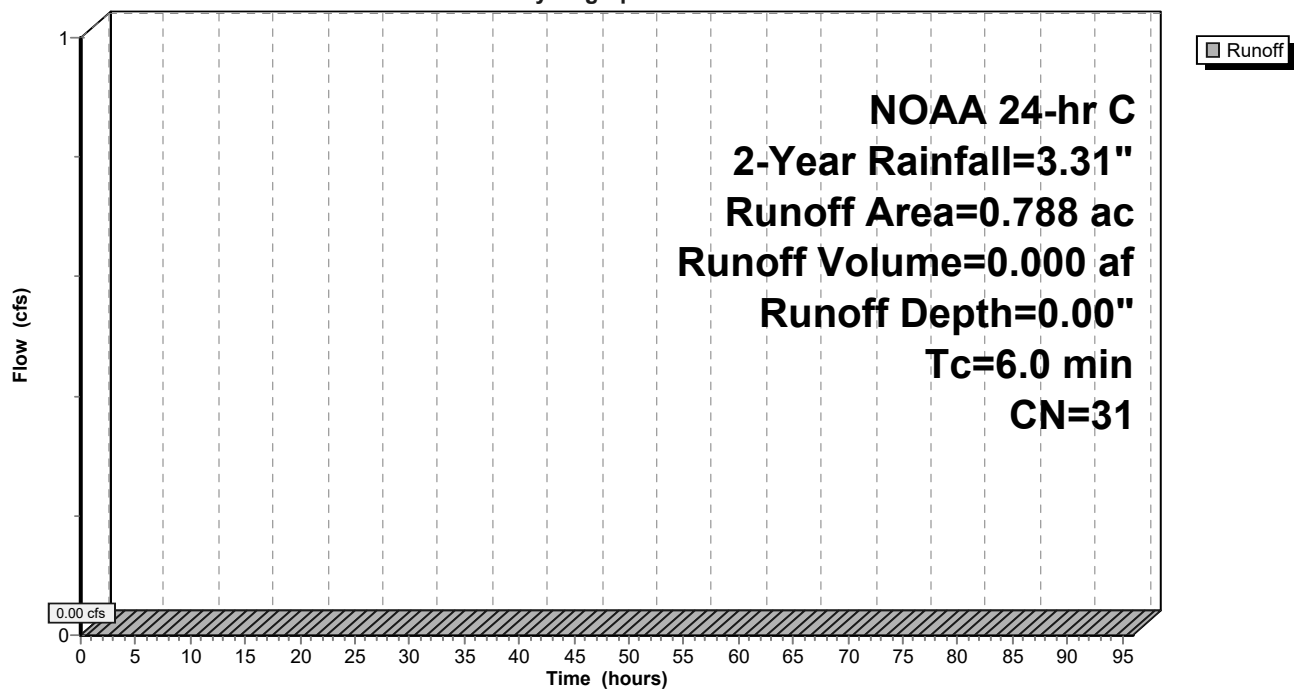
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.733	30	Woods, Good, HSG A
0.055	39	>75% Grass cover, Good, HSG A
0.788	31	Weighted Average
0.788		100.00% Pervious Area

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

Subcatchment 1S: E-4 PER (No Basin)

Hydrograph



Summary for Subcatchment E-4P*: E-4 PER

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

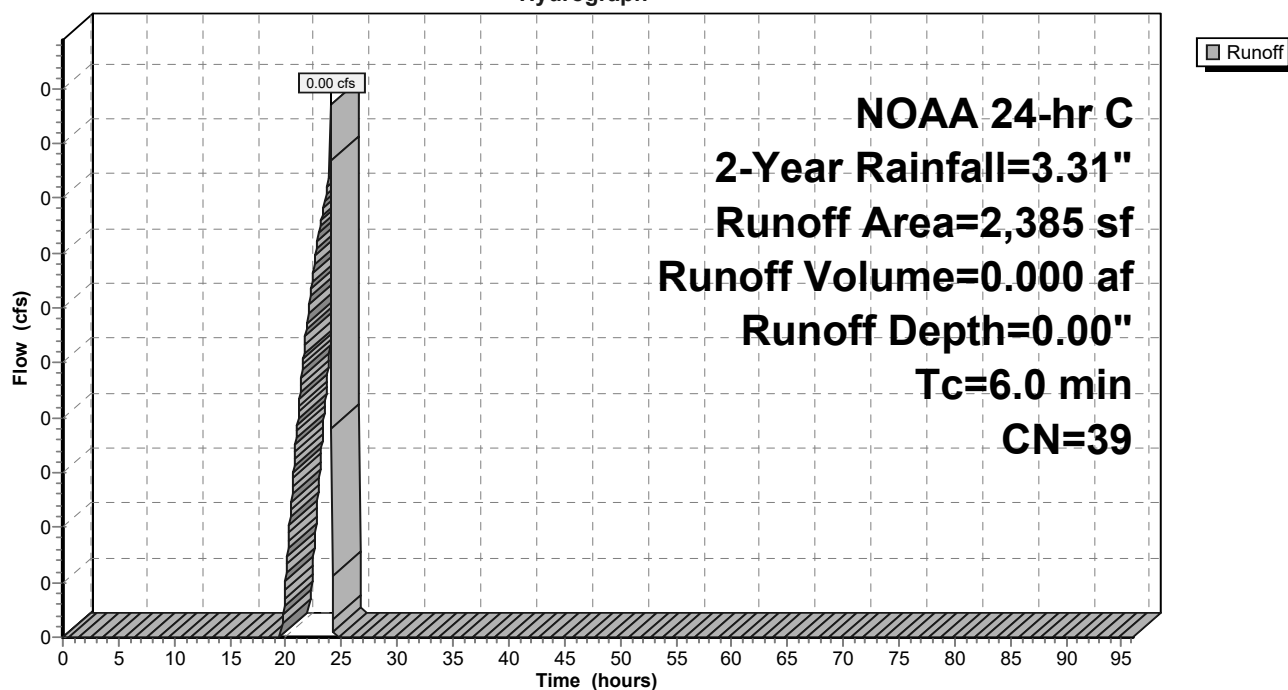
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (sf)	CN	Description
2,385	39	>75% Grass cover, Good, HSG A
2,385		100.00% Pervious Area

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

Subcatchment E-4P*: E-4 PER

Hydrograph



Summary for Subcatchment E4-B: E-4 Basin

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"

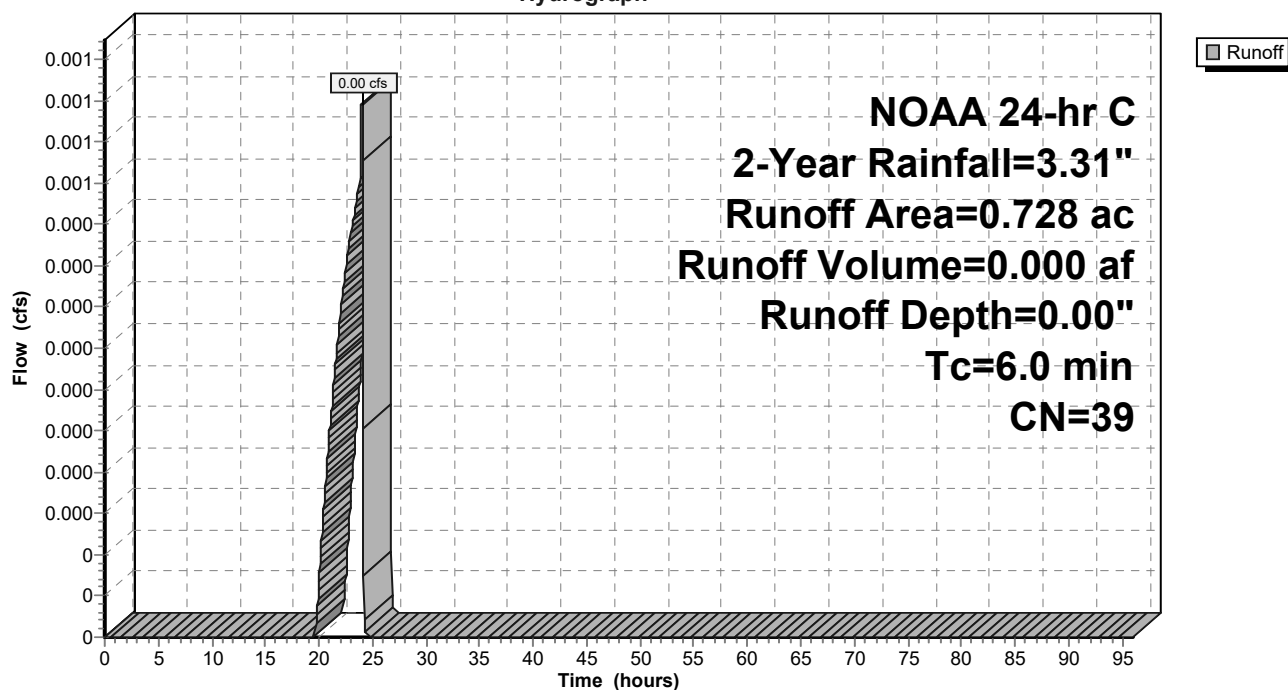
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.728	39	>75% Grass cover, Good, HSG A
0.728		100.00% Pervious Area

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

Subcatchment E4-B: E-4 Basin

Hydrograph



Summary for Subcatchment E4-I*: E-4 IMP

Runoff = 1.67 cfs @ 12.13 hrs, Volume= 0.126 af, Depth= 3.08"

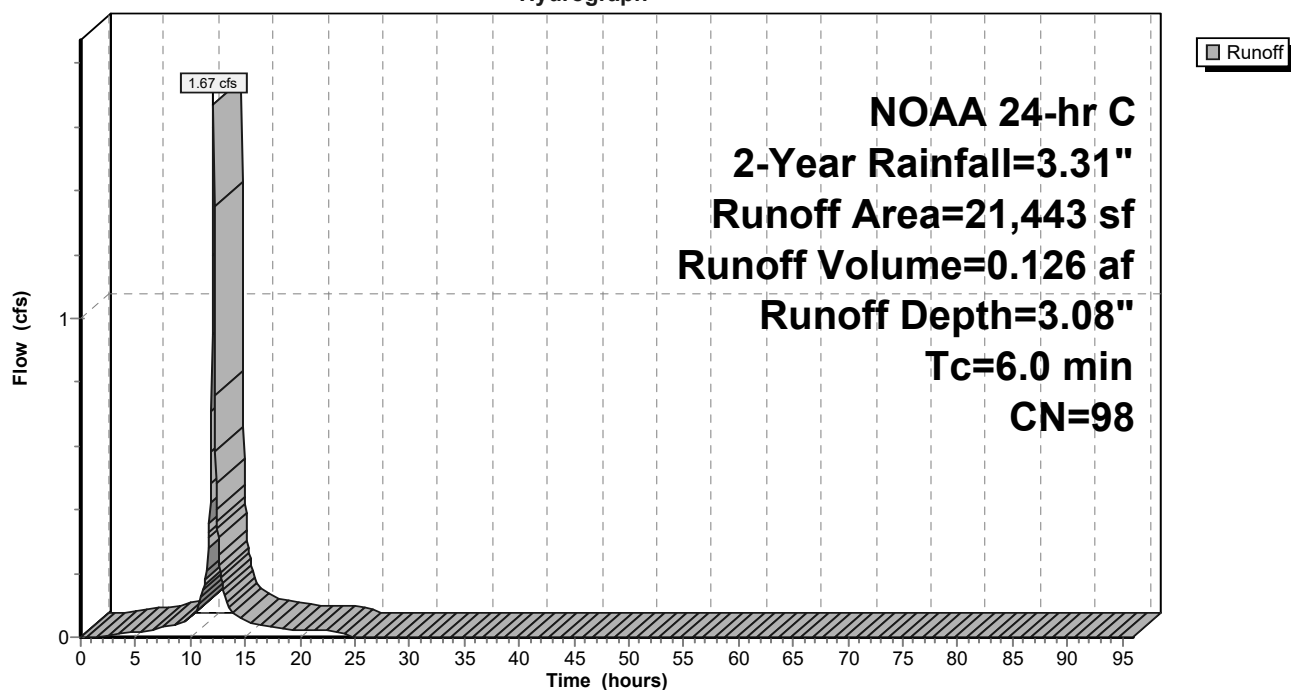
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (sf)	CN	Description
21,443	98	Paved parking, HSG A
21,443		100.00% Impervious Area

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

Subcatchment E4-I*: E-4 IMP

Hydrograph



Summary for Subcatchment E4-OI*: E-4O IMP

Runoff = 0.23 cfs @ 12.13 hrs, Volume= 0.017 af, Depth= 3.08"

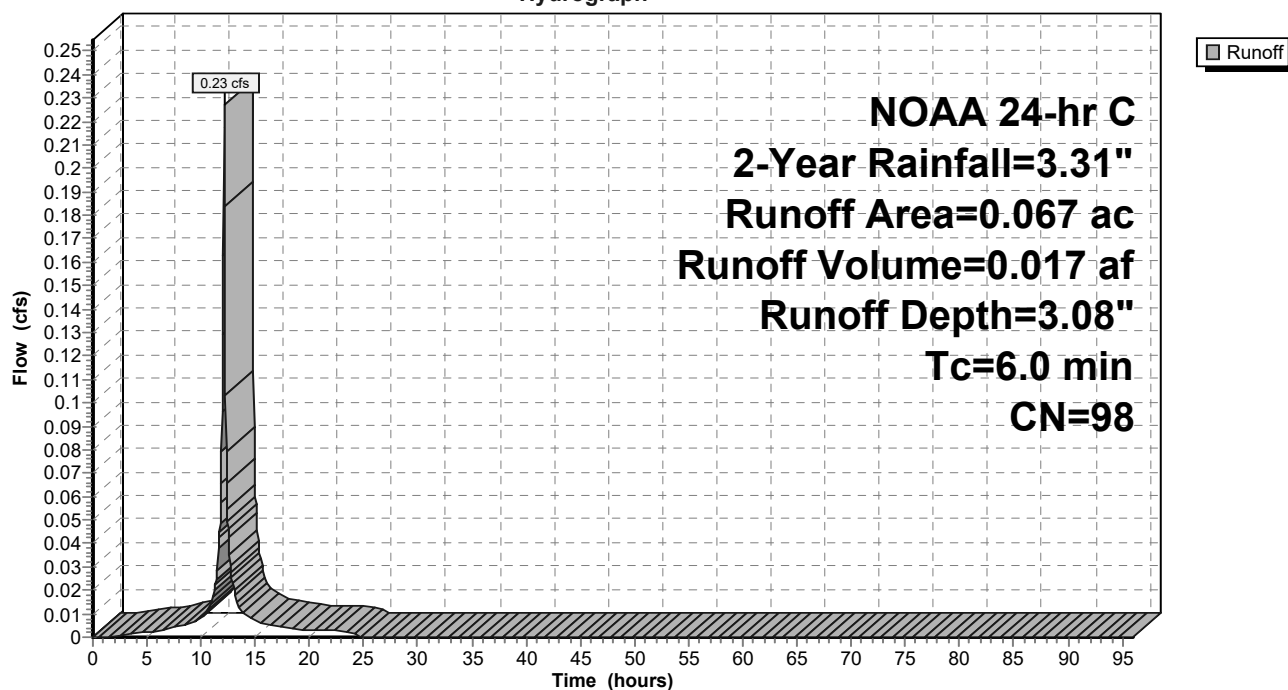
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG A
0.067		100.00% Impervious Area

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

Subcatchment E4-OI*: E-4O IMP

Hydrograph



Summary for Subcatchment E4-OP*: E-40 PER

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

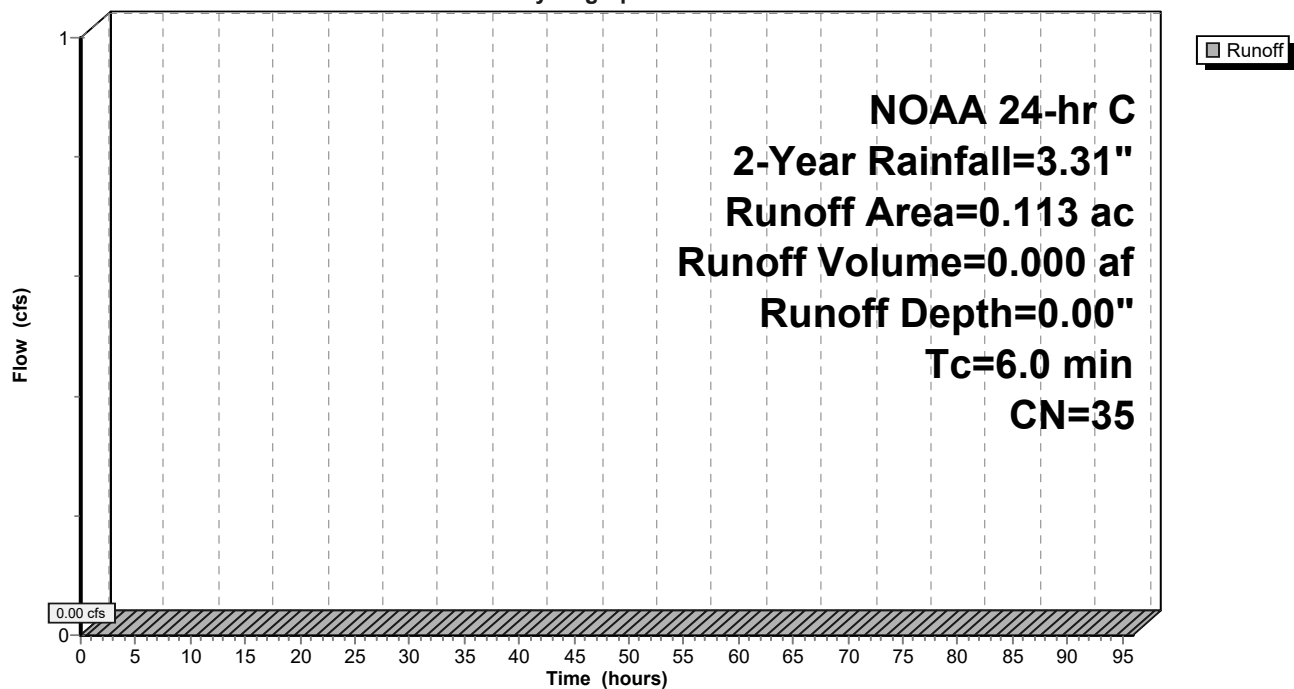
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.069	32	Woods/grass comb., Good, HSG A
0.044	39	>75% Grass cover, Good, HSG A
0.113	35	Weighted Average
0.113		100.00% Pervious Area

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

Subcatchment E4-OP*: E-40 PER

Hydrograph



Summary for Subcatchment P-5: P-5

Runoff = 4.45 cfs @ 12.13 hrs, Volume= 0.304 af, Depth= 2.46"

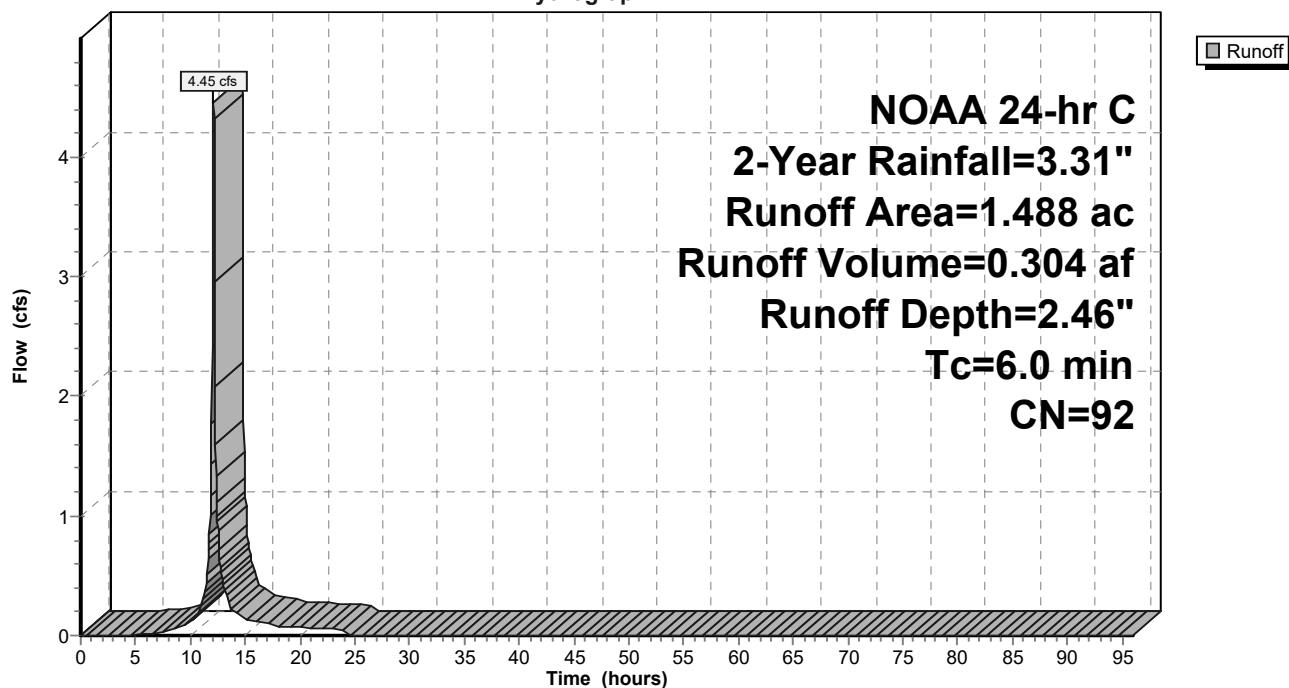
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
1.338	98	Paved parking, HSG A
0.150	39	>75% Grass cover, Good, HSG A
1.488	92	Weighted Average
0.150		10.08% Pervious Area
1.338		89.92% Impervious Area

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

Subcatchment P-5: P-5

Hydrograph

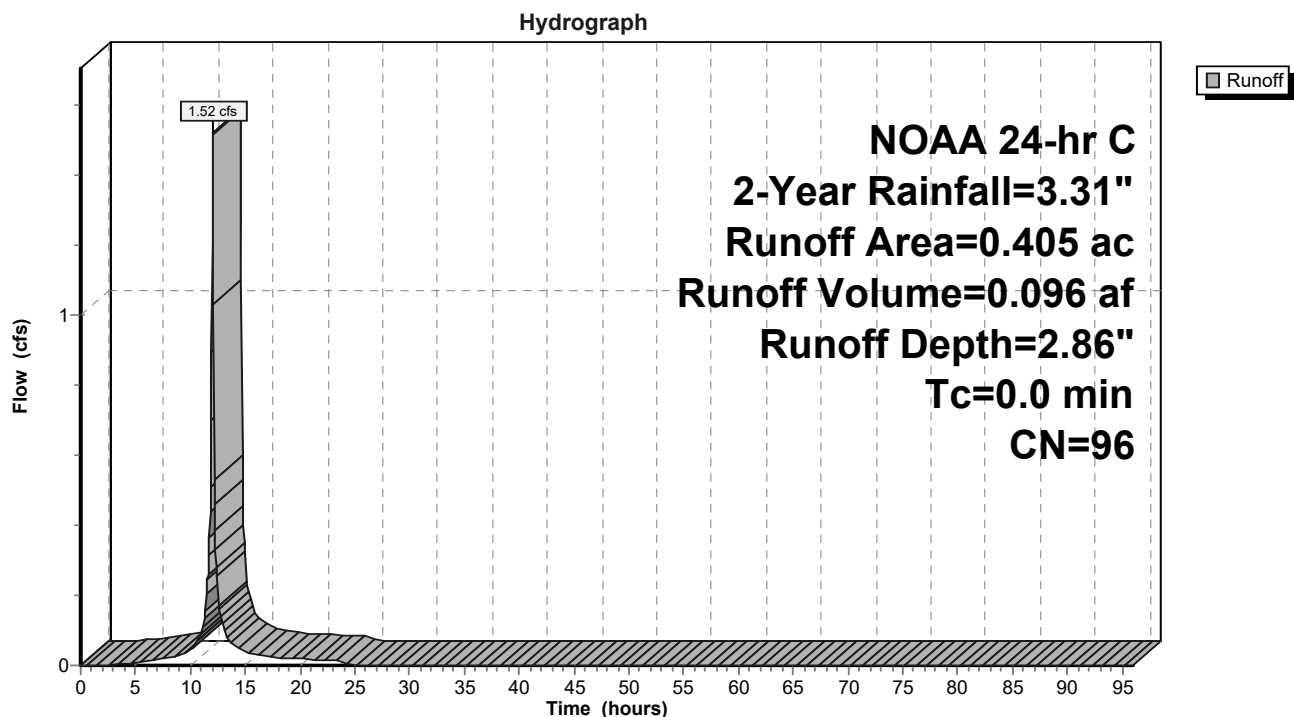


Summary for Subcatchment P-6: P-6

Runoff = 1.52 cfs @ 12.04 hrs, Volume= 0.096 af, Depth= 2.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.364	98	Paved parking, HSG D
0.041	80	>75% Grass cover, Good, HSG D
0.405	96	Weighted Average
0.041		10.12% Pervious Area
0.364		89.88% Impervious Area

Subcatchment P-6: P-6

Summary for Subcatchment P3-I: P-3 IMP

Runoff = 2.10 cfs @ 12.17 hrs, Volume= 0.179 af, Depth= 3.08"

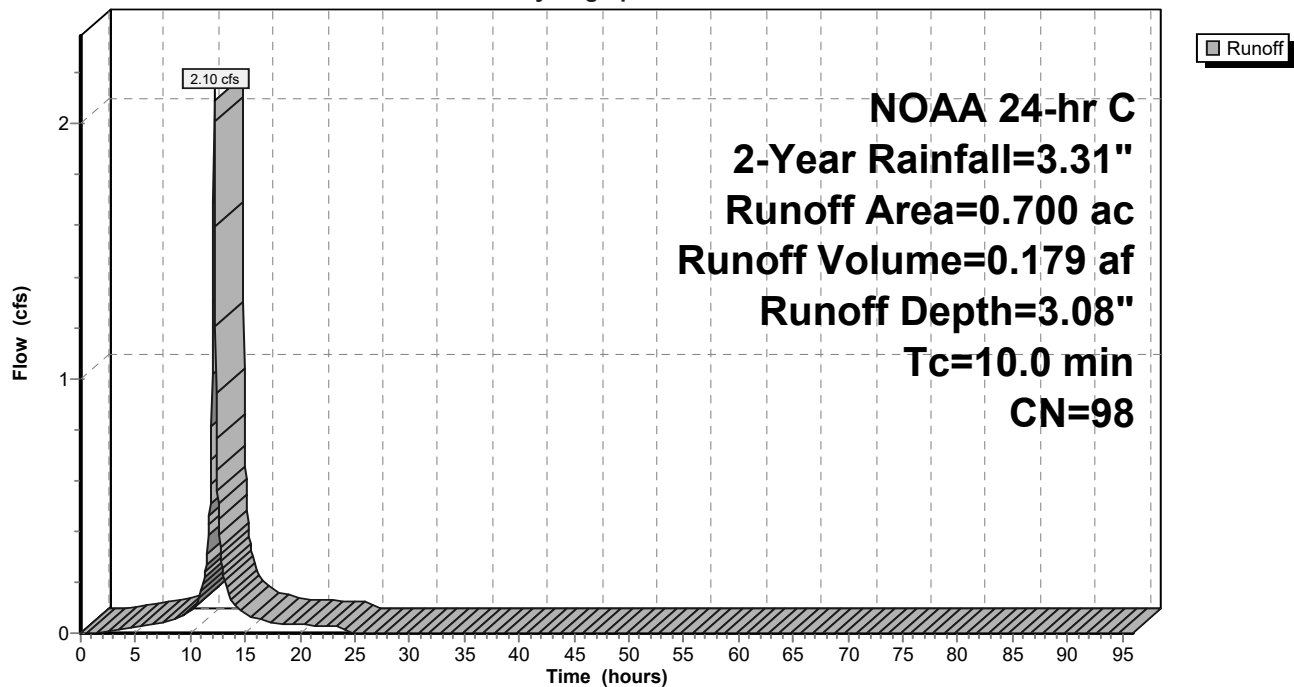
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
0.050	98	Paved parking, HSG A
0.650	98	Paved parking, HSG D
0.700	98	Weighted Average
0.700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Assumed 10 minutes

Subcatchment P3-I: P-3 IMP

Hydrograph



Summary for Subcatchment P3-P: P-3 PER

Runoff = 0.01 cfs @ 21.41 hrs, Volume= 0.005 af, Depth= 0.03"

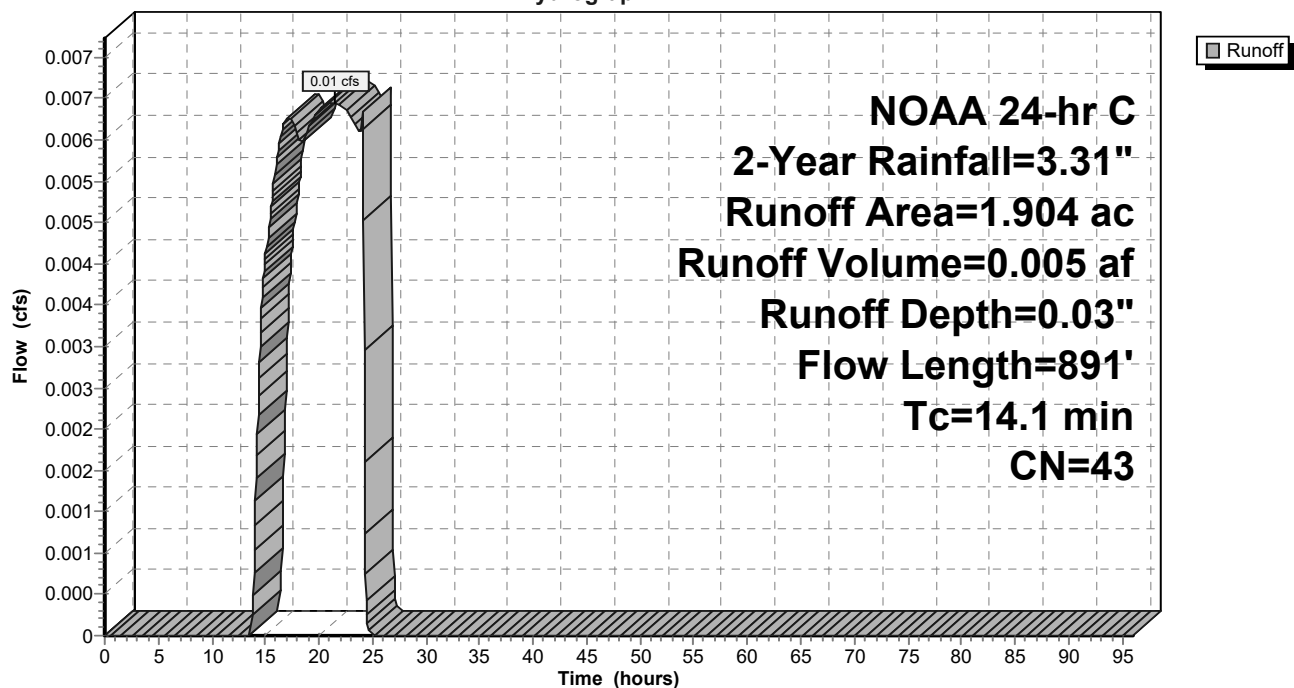
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
NOAA 24-hr C 2-Year Rainfall=3.31"

Area (ac)	CN	Description
1.734	39	>75% Grass cover, Good, HSG A
0.170	80	>75% Grass cover, Good, HSG D
1.904	43	Weighted Average
1.904		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	32	0.0060	0.06		Sheet Flow, sheet lawn Grass: Dense n= 0.240 P2= 3.31"
1.5	174	0.0150	1.97		Shallow Concentrated Flow, Lawn shallow concentrated Unpaved Kv= 16.1 fps
1.3	155	0.0090	1.93		Shallow Concentrated Flow, shallow concentrated road Paved Kv= 20.3 fps
2.2	530	0.0080	4.07	7.18	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.017 Concrete sewer w/manholes & inlets
14.1	891	Total			

Subcatchment P3-P: P-3 PER

Hydrograph



Summary for Pond E: Basin E

Inflow Area = 0.405 ac, 89.88% Impervious, Inflow Depth = 2.86" for 2-Year event
 Inflow = 1.52 cfs @ 12.04 hrs, Volume= 0.096 af
 Outflow = 0.39 cfs @ 12.25 hrs, Volume= 0.096 af, Atten= 74%, Lag= 12.3 min
 Primary = 0.39 cfs @ 12.25 hrs, Volume= 0.096 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 60.92' @ 12.25 hrs Surf.Area= 0.107 ac Storage= 0.039 af

Plug-Flow detention time= 167.1 min calculated for 0.096 af (100% of inflow)
 Center-of-Mass det. time= 168.8 min (938.1 - 769.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	60.50'	0.000 af	21.79'W x 213.46'L x 2.50'H Field A 0.267 af Overall - 0.267 af Embedded = 0.000 af x 0.0% Voids
#2A	60.50'	0.185 af	StormTrap ST2 SingleTrap 2-0x13 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 8.48' x 200.15' Core + 6.66' Border = 21.79' x 213.46' System
		0.185 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	59.15'	18.0" Round RCP_Round 18" L= 73.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 59.15' / 58.37' S= 0.0107 ' / Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	60.50'	6.0" Vert. 6" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	62.00'	4.0' long 4' Weir 2 End Contraction(s) 0.8' Crest Height

Primary OutFlow Max=0.39 cfs @ 12.25 hrs HW=60.92' (Free Discharge)

1=RCP_Round 18" (Passes 0.39 cfs of 9.80 cfs potential flow)

2=6" Orifice (Orifice Controls 0.39 cfs @ 2.21 fps)

3=4' Weir (Controls 0.00 cfs)

Pond E: Basin E - Chamber Wizard Field A**Chamber Model = StormTrapST2 SingleTrap 2-0 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf

Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

13 Chambers/Row x 15.40' Long = 200.15' Row Length +79.9" Border x 2 = 213.46' Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 = 21.79' Base Width

30.0" Chamber Height = 2.50' Field Height

13 Chambers x 231.7 cf + 5,051.4 cf Border = 8,063.1 cf Chamber Storage

13 Chambers x 326.4 cf + 7,386.4 cf Border = 11,629.0 cf Displacement

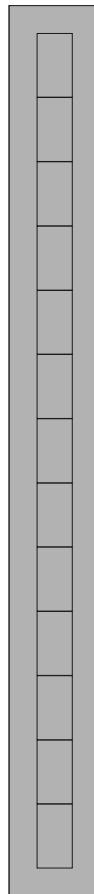
Chamber Storage = 8,063.1 cf = 0.185 af

Overall Storage Efficiency = 69.3%

Overall System Size = 213.46' x 21.79' x 2.50'

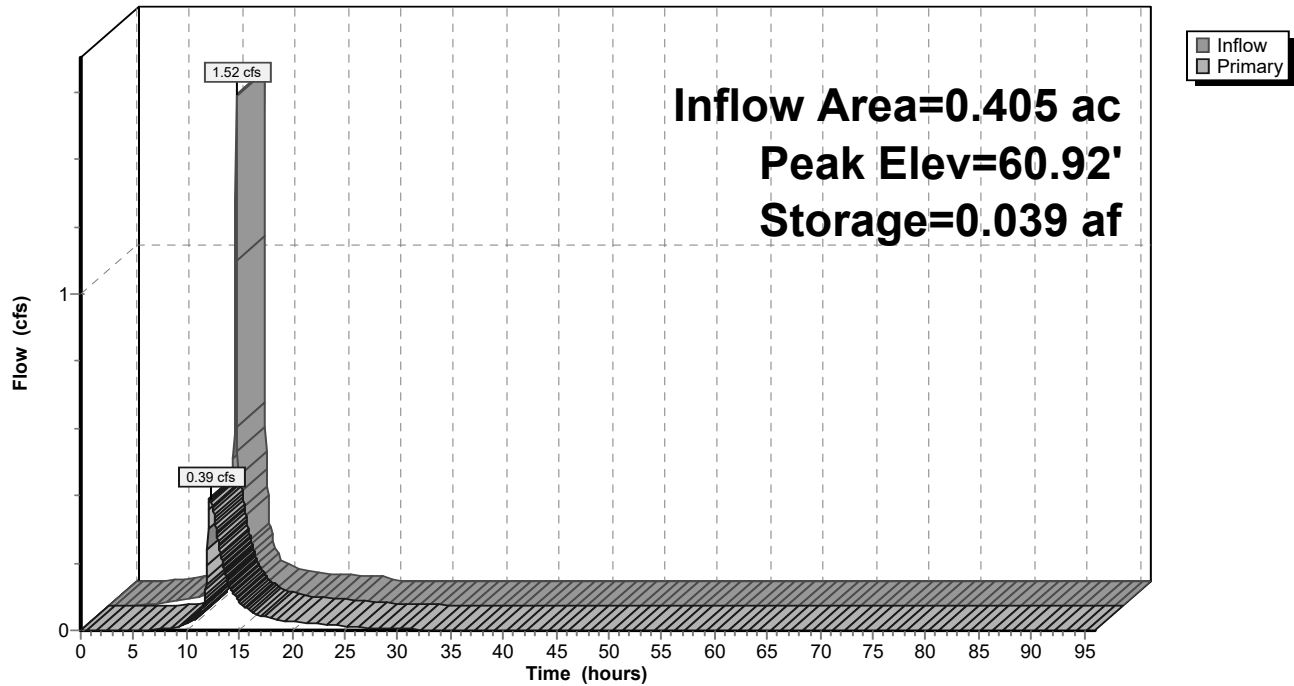
13 Chambers (plus border)

430.7 cy Field



Pond E: Basin E

Hydrograph



Summary for Pond F: Basin F

Inflow Area = 2.216 ac, 60.38% Impervious, Inflow Depth = 1.65" for 2-Year event
 Inflow = 4.45 cfs @ 12.13 hrs, Volume= 0.305 af
 Outflow = 0.42 cfs @ 13.02 hrs, Volume= 0.305 af, Atten= 91%, Lag= 53.7 min
 Primary = 0.42 cfs @ 13.02 hrs, Volume= 0.305 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 61.77' @ 13.02 hrs Surf.Area= 4,580 sf Storage= 6,412 cf

Plug-Flow detention time= 180.3 min calculated for 0.304 af (100% of inflow)
 Center-of-Mass det. time= 180.6 min (980.1 - 799.4)

Volume	Invert	Avail.Storage	Storage Description		
#1	60.00'	51,500 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)
60.00	2,880	250.0	0	0	2,880
61.00	3,662	270.0	3,263	3,263	3,747
62.00	4,881	311.0	4,257	7,520	5,665
63.00	6,265	350.0	5,559	13,079	7,743
64.00	7,814	395.0	7,025	20,104	10,437
65.00	9,517	431.0	8,652	28,756	12,839
66.00	11,353	466.0	10,422	39,177	15,377
67.00	13,319	500.0	12,323	51,500	18,035

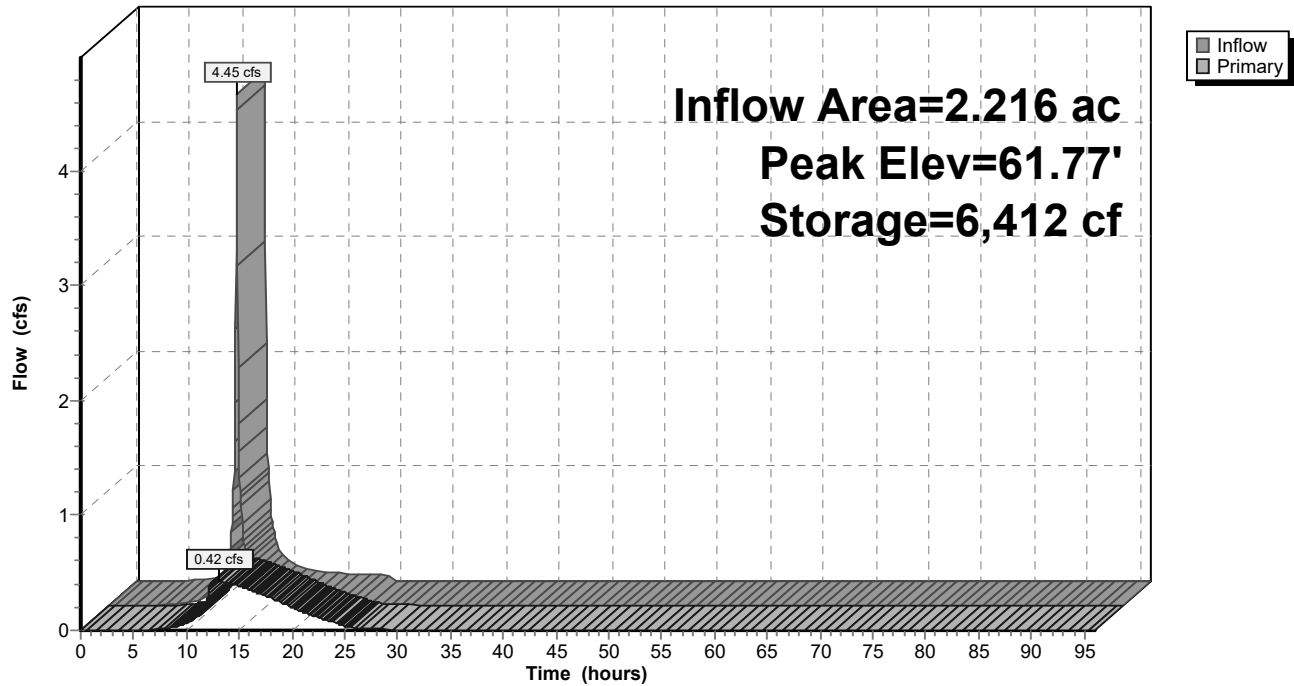
Device	Routing	Invert	Outlet Devices
#1	Primary	60.00'	18.0" Round RCP_Round 18" L= 44.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 60.00' / 59.75' S= 0.0057 ' S= 0.0057 ' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	60.00'	2.5" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	62.50'	4.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Device 1	65.00'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.42 cfs @ 13.02 hrs HW=61.77' (Free Discharge)

- 1=RCP_Round 18" (Passes 0.42 cfs of 8.36 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.42 cfs @ 6.21 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)
- 4=Orifice/Grate (Controls 0.00 cfs)

Pond F: Basin F

Hydrograph



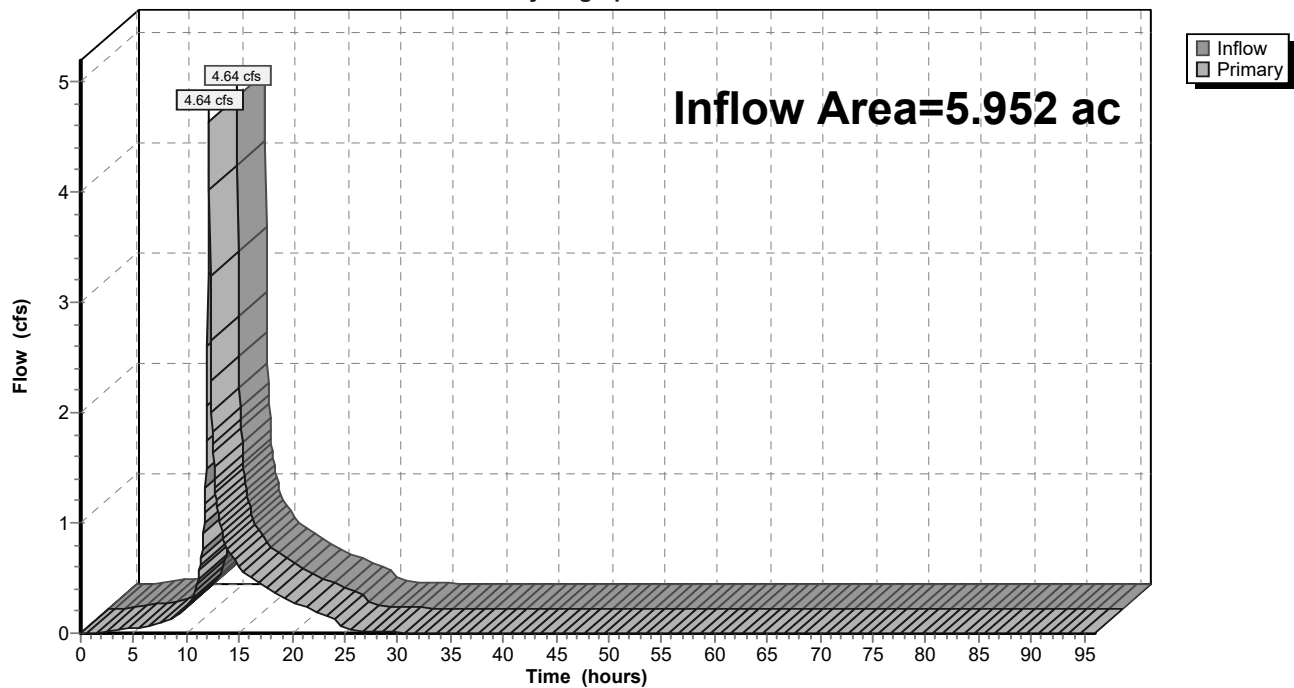
Summary for Link 7L: POA-2

Inflow Area = 5.952 ac, 49.75% Impervious, Inflow Depth = 1.47" for 2-Year event
Inflow = 4.64 cfs @ 12.15 hrs, Volume= 0.729 af
Primary = 4.64 cfs @ 12.15 hrs, Volume= 0.729 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link 7L: POA-2

Hydrograph



Summary for Subcatchment 1S: E-4 PER (No Basin)

Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.001 af, Depth= 0.01"

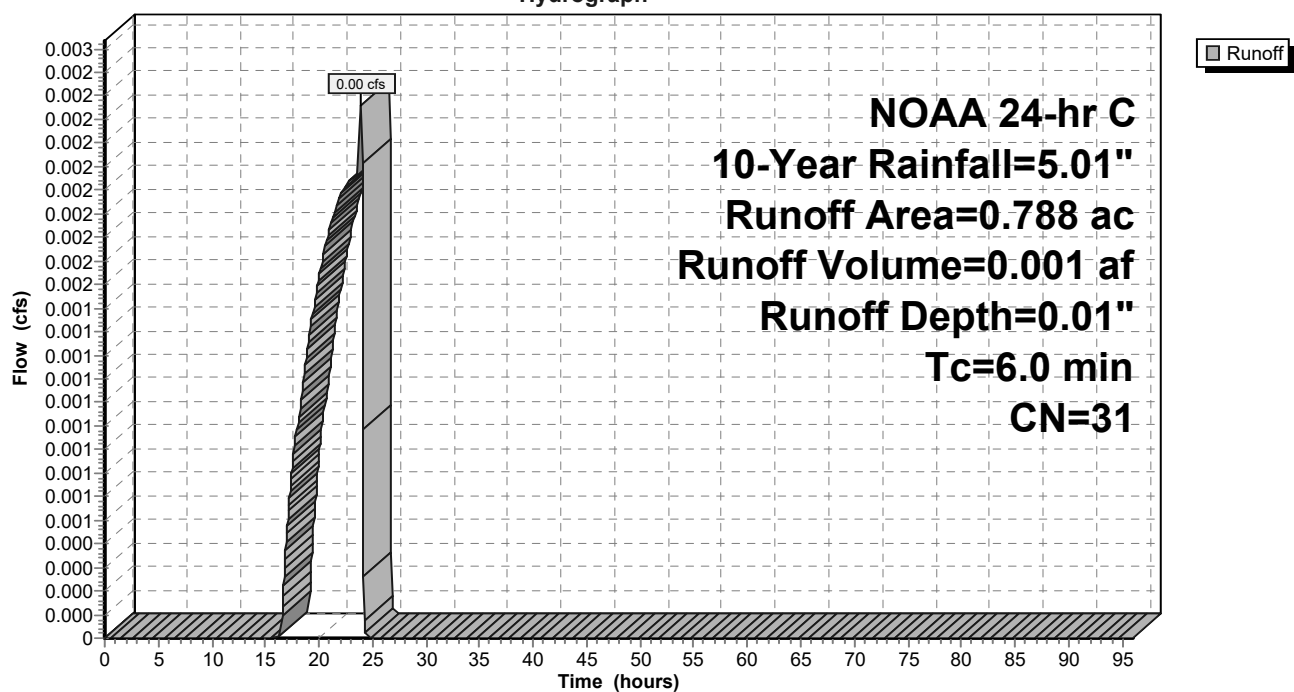
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.733	30	Woods, Good, HSG A
0.055	39	>75% Grass cover, Good, HSG A
0.788	31	Weighted Average
0.788		100.00% Pervious Area

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

Subcatchment 1S: E-4 PER (No Basin)

Hydrograph



Summary for Subcatchment E-4P*: E-4 PER

Runoff = 0.00 cfs @ 12.55 hrs, Volume= 0.001 af, Depth= 0.20"

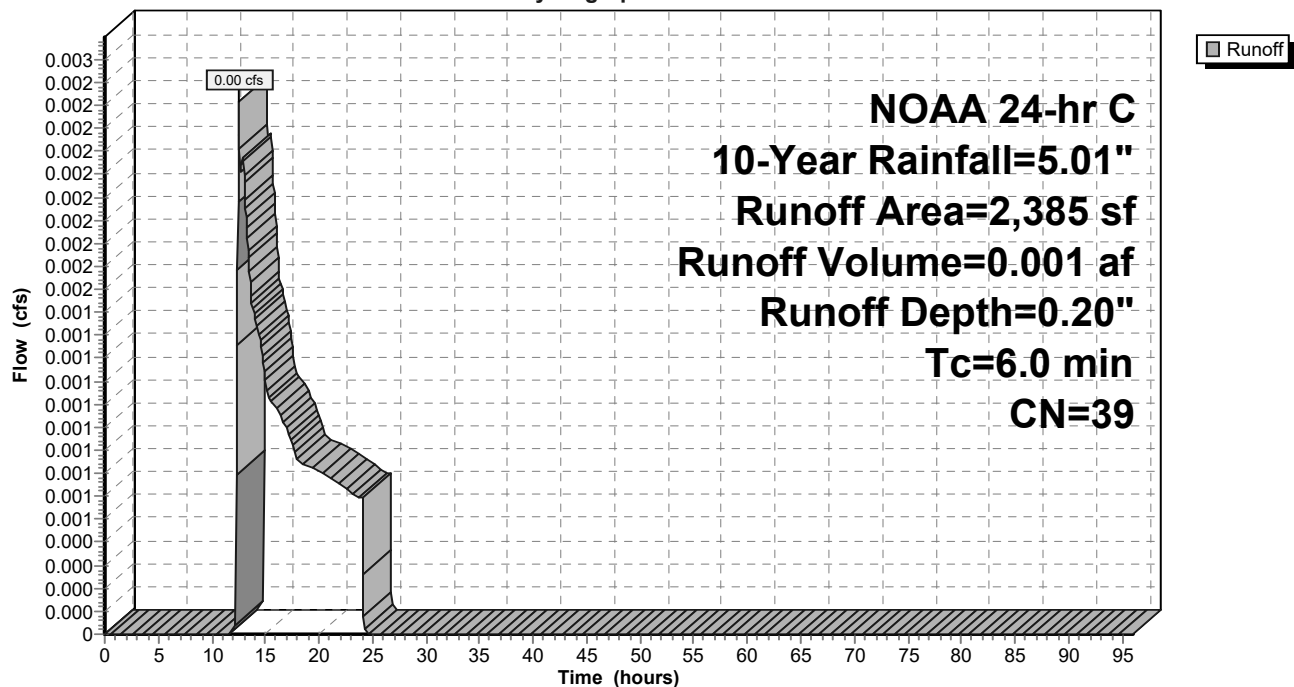
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (sf)	CN	Description
2,385	39	>75% Grass cover, Good, HSG A
2,385		100.00% Pervious Area

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

Subcatchment E-4P*: E-4 PER

Hydrograph



Summary for Subcatchment E4-B: E-4 Basin

Runoff = 0.03 cfs @ 12.55 hrs, Volume= 0.012 af, Depth= 0.20"

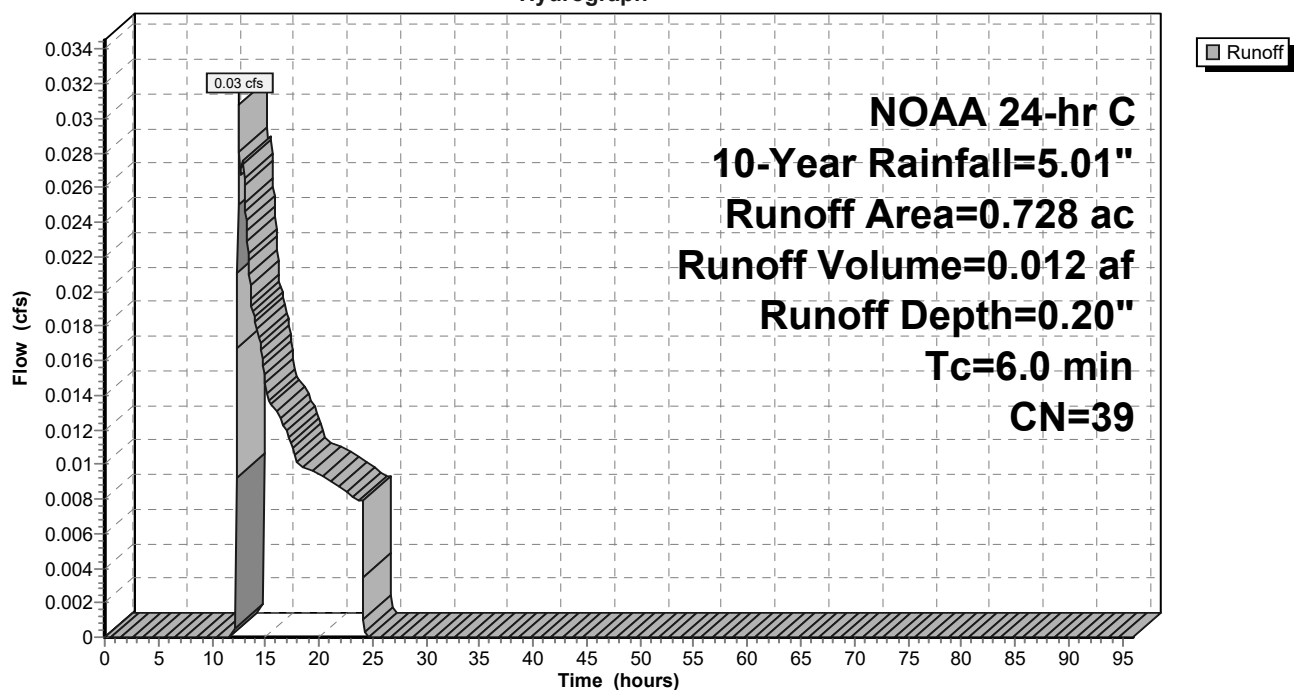
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.728	39	>75% Grass cover, Good, HSG A
0.728		100.00% Pervious Area

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

Subcatchment E4-B: E-4 Basin

Hydrograph



Summary for Subcatchment E4-I*: E-4 IMP

Runoff = 2.55 cfs @ 12.13 hrs, Volume= 0.196 af, Depth= 4.77"

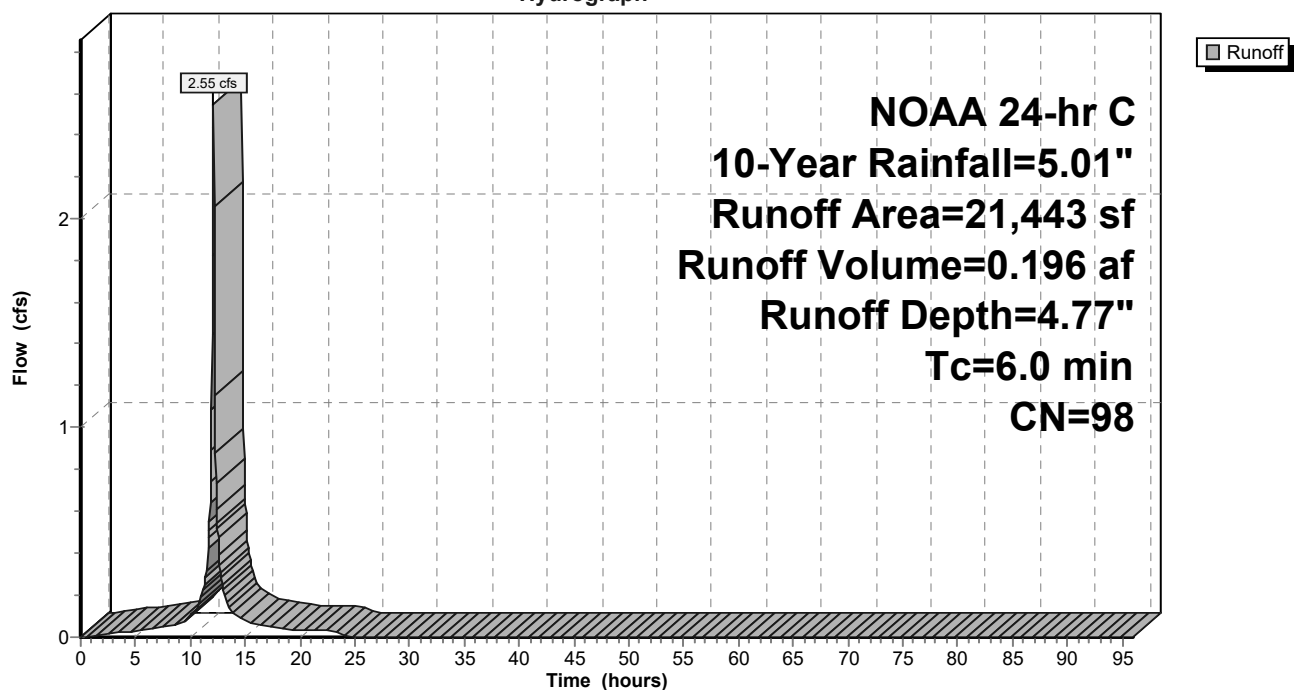
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (sf)	CN	Description
21,443	98	Paved parking, HSG A
21,443		100.00% Impervious Area

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

Subcatchment E4-I*: E-4 IMP

Hydrograph



Summary for Subcatchment E4-OI*: E-4O IMP

Runoff = 0.35 cfs @ 12.13 hrs, Volume= 0.027 af, Depth= 4.77"

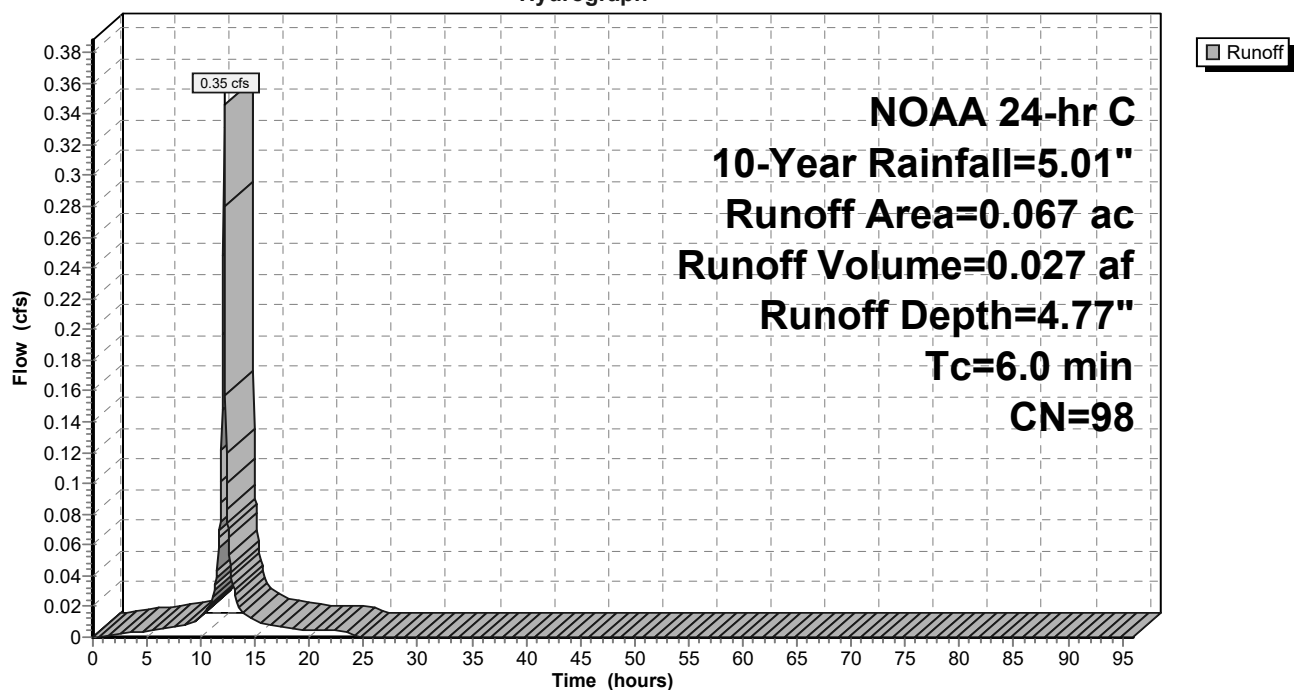
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG A
0.067		100.00% Impervious Area

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

Subcatchment E4-OI*: E-4O IMP

Hydrograph



Summary for Subcatchment E4-OP*: E-40 PER

Runoff = 0.00 cfs @ 14.54 hrs, Volume= 0.001 af, Depth= 0.08"

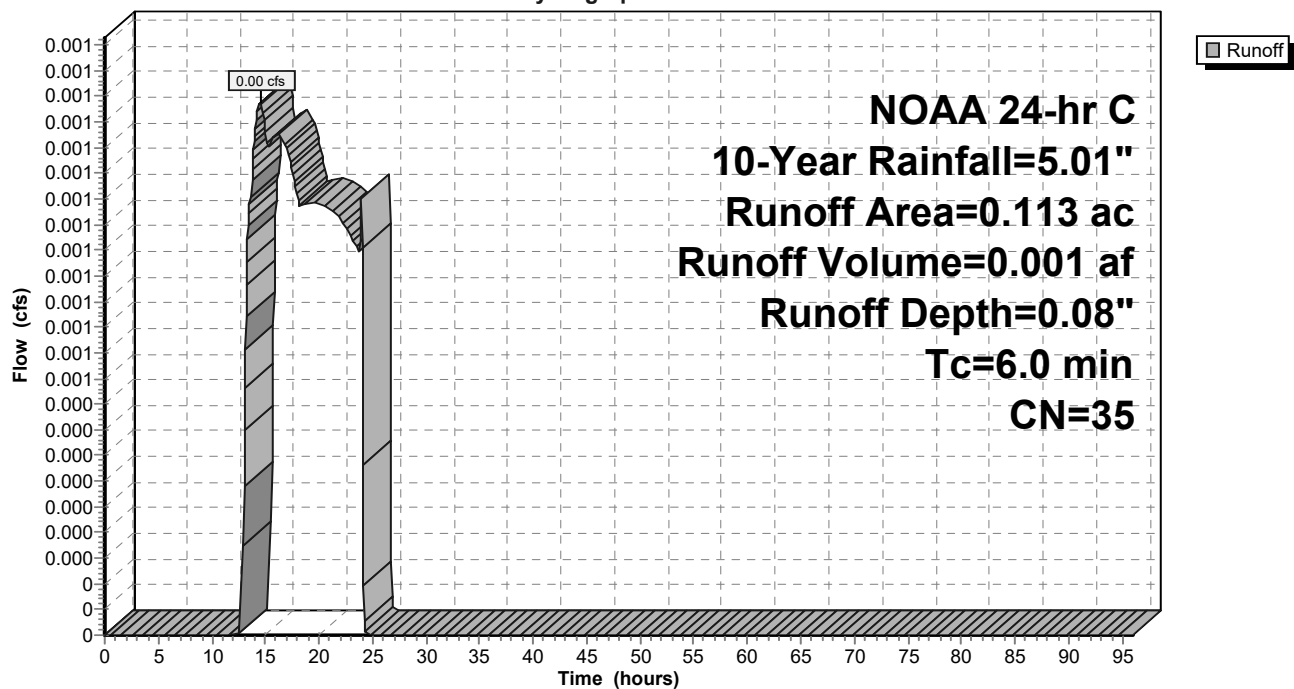
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.069	32	Woods/grass comb., Good, HSG A
0.044	39	>75% Grass cover, Good, HSG A
0.113	35	Weighted Average
0.113		100.00% Pervious Area

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

Subcatchment E4-OP*: E-40 PER

Hydrograph



Summary for Subcatchment P-5: P-5

Runoff = 7.20 cfs @ 12.13 hrs, Volume= 0.508 af, Depth= 4.10"

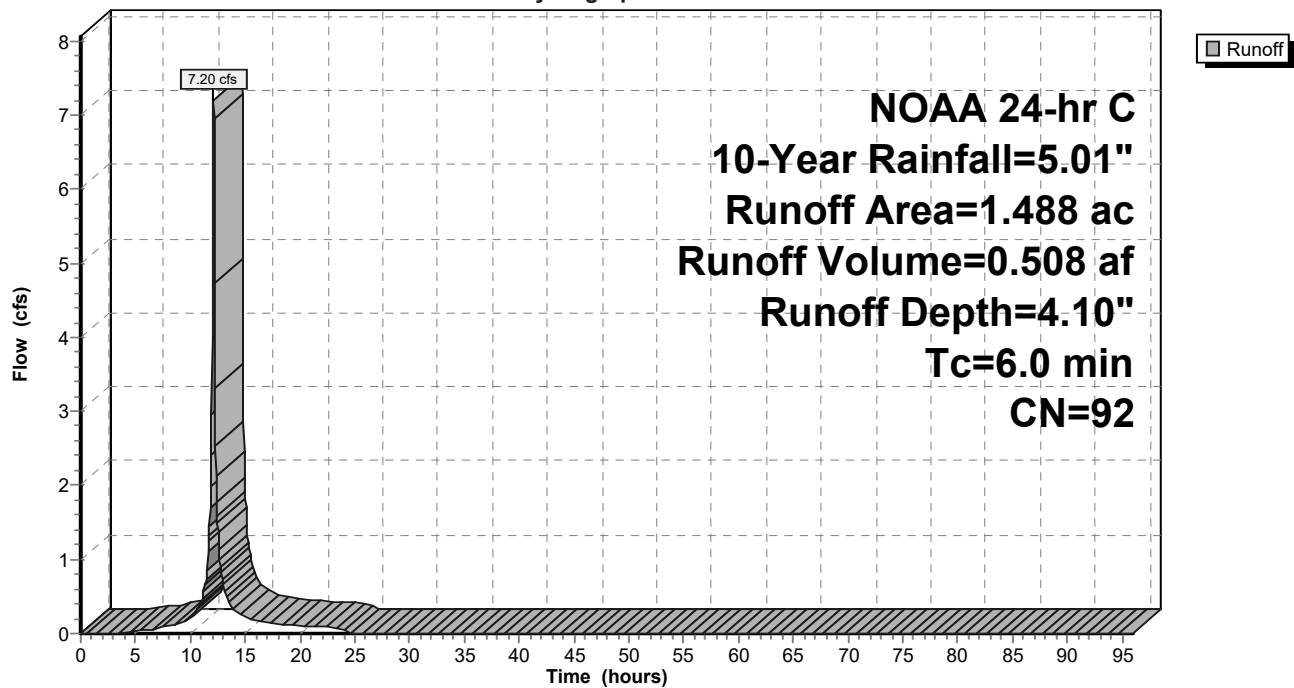
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
1.338	98	Paved parking, HSG A
0.150	39	>75% Grass cover, Good, HSG A
1.488	92	Weighted Average
0.150		10.08% Pervious Area
1.338		89.92% Impervious Area

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

Subcatchment P-5: P-5

Hydrograph



Summary for Subcatchment P-6: P-6

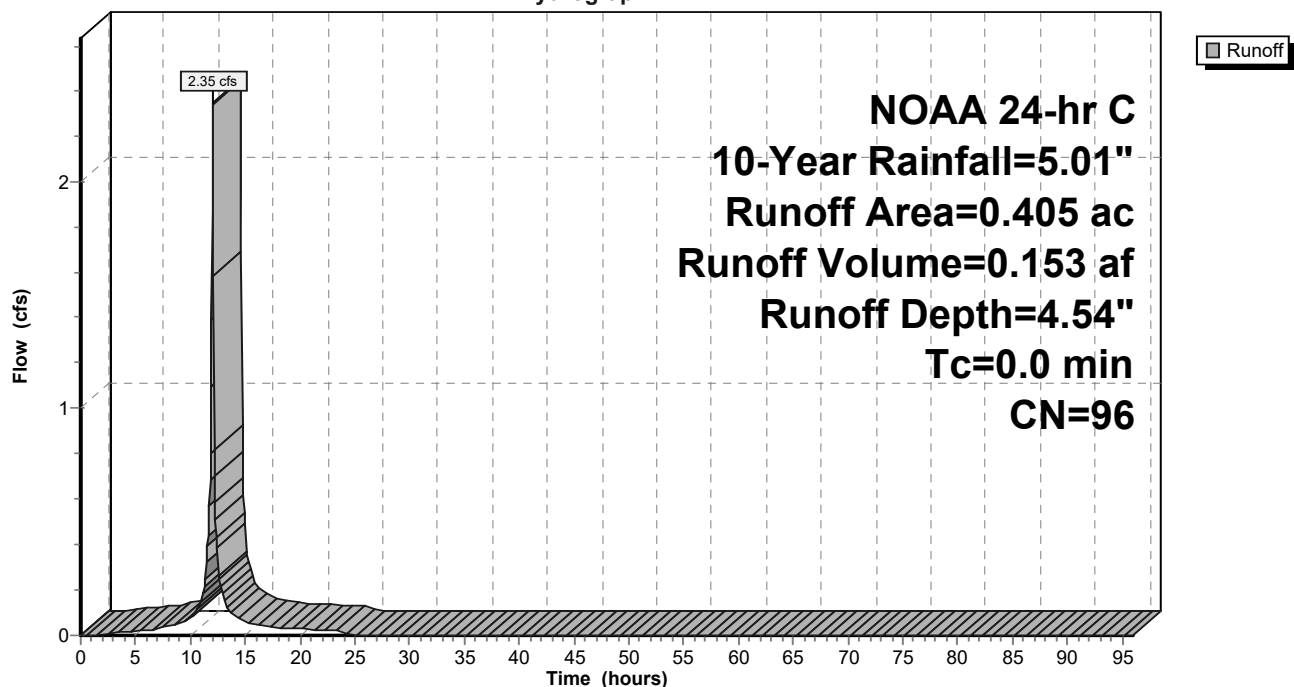
Runoff = 2.35 cfs @ 12.04 hrs, Volume= 0.153 af, Depth= 4.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.364	98	Paved parking, HSG D
0.041	80	>75% Grass cover, Good, HSG D
0.405	96	Weighted Average
0.041		10.12% Pervious Area
0.364		89.88% Impervious Area

Subcatchment P-6: P-6

Hydrograph



Summary for Subcatchment P3-I: P-3 IMP

Runoff = 3.19 cfs @ 12.17 hrs, Volume= 0.278 af, Depth= 4.77"

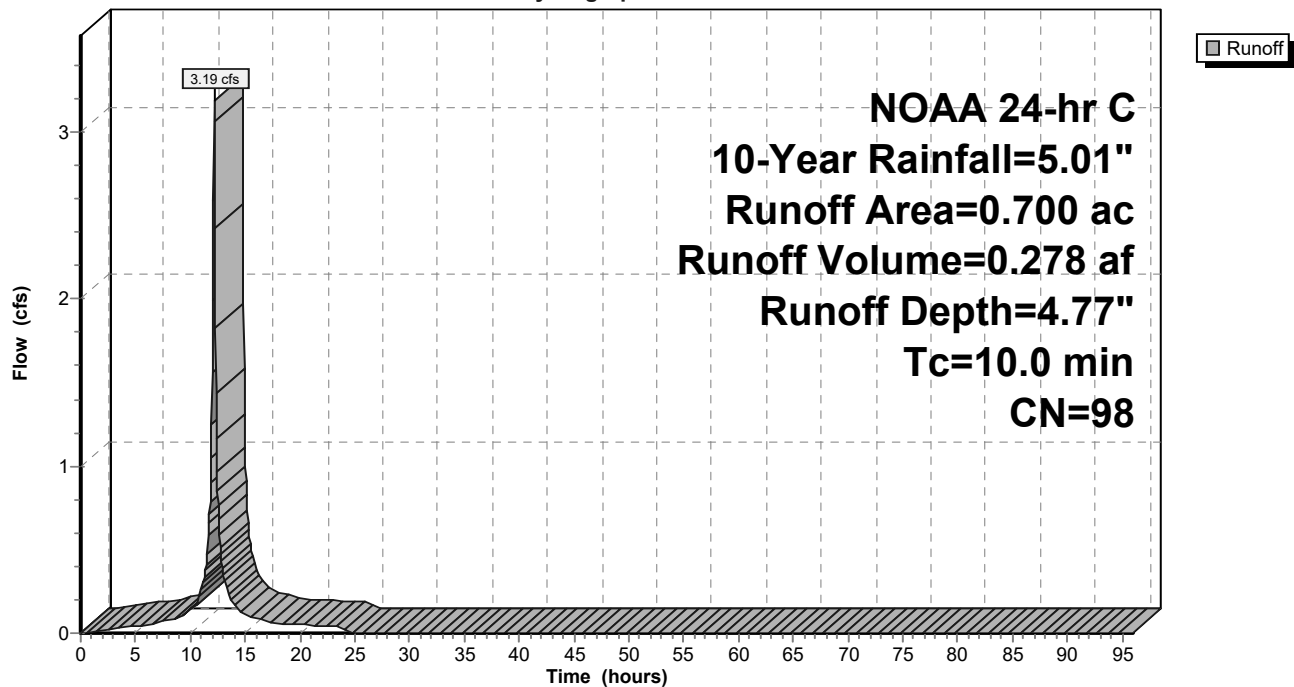
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
0.050	98	Paved parking, HSG A
0.650	98	Paved parking, HSG D
0.700	98	Weighted Average
0.700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Assumed 10 minutes

Subcatchment P3-I: P-3 IMP

Hydrograph



Summary for Subcatchment P3-P: P-3 PER

Runoff = 0.22 cfs @ 12.46 hrs, Volume= 0.057 af, Depth= 0.36"

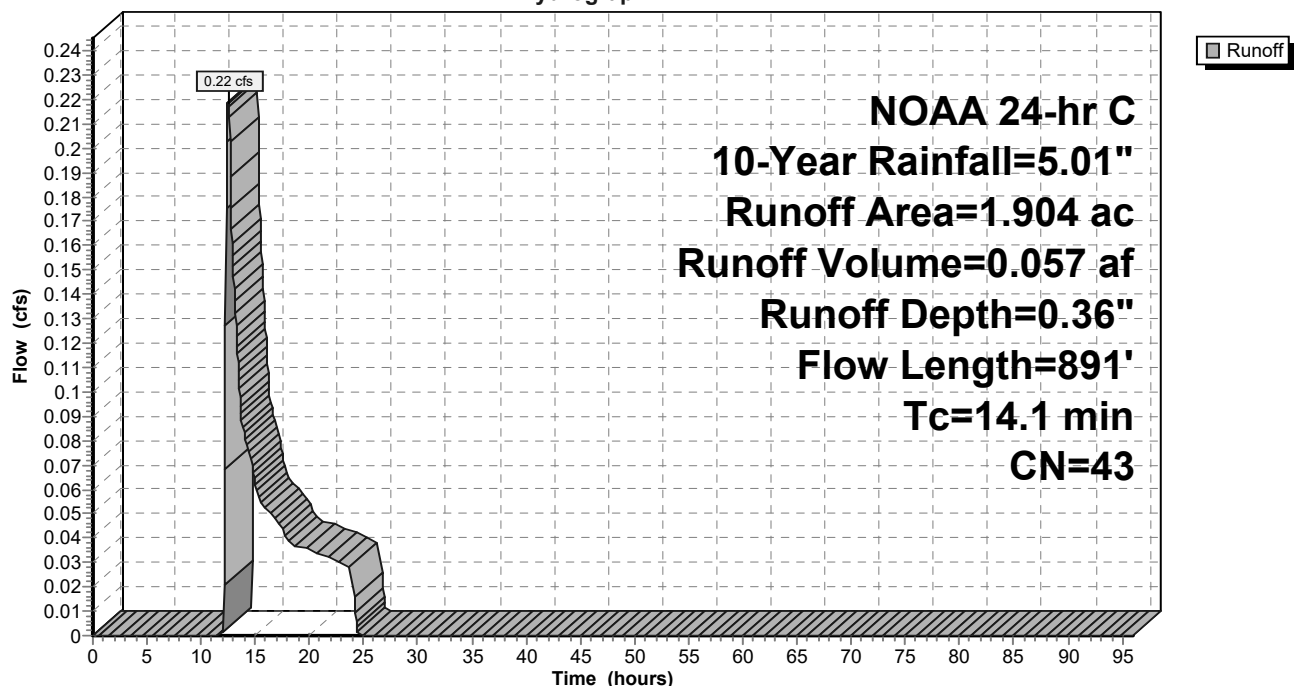
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 10-Year Rainfall=5.01"

Area (ac)	CN	Description
1.734	39	>75% Grass cover, Good, HSG A
0.170	80	>75% Grass cover, Good, HSG D
1.904	43	Weighted Average
1.904		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	32	0.0060	0.06		Sheet Flow, sheet lawn Grass: Dense n= 0.240 P2= 3.31"
1.5	174	0.0150	1.97		Shallow Concentrated Flow, Lawn shallow concentrated Unpaved Kv= 16.1 fps
1.3	155	0.0090	1.93		Shallow Concentrated Flow, shallow concentrated road Paved Kv= 20.3 fps
2.2	530	0.0080	4.07	7.18	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.017 Concrete sewer w/manholes & inlets
14.1	891	Total			

Subcatchment P3-P: P-3 PER

Hydrograph



Summary for Pond E: Basin E

Inflow Area = 0.405 ac, 89.88% Impervious, Inflow Depth = 4.54" for 10-Year event
 Inflow = 2.35 cfs @ 12.04 hrs, Volume= 0.153 af
 Outflow = 0.58 cfs @ 12.26 hrs, Volume= 0.153 af, Atten= 75%, Lag= 13.0 min
 Primary = 0.58 cfs @ 12.26 hrs, Volume= 0.153 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 61.12' @ 12.26 hrs Surf.Area= 0.107 ac Storage= 0.058 af

Plug-Flow detention time= 137.1 min calculated for 0.153 af (100% of inflow)
 Center-of-Mass det. time= 138.7 min (896.9 - 758.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	60.50'	0.000 af	21.79'W x 213.46'L x 2.50'H Field A 0.267 af Overall - 0.267 af Embedded = 0.000 af x 0.0% Voids
#2A	60.50'	0.185 af	StormTrap ST2 SingleTrap 2-0x 13 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 8.48' x 200.15' Core + 6.66' Border = 21.79' x 213.46' System
		0.185 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	59.15'	18.0" Round RCP_Round 18" L= 73.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 59.15' / 58.37' S= 0.0107 ' / Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	60.50'	6.0" Vert. 6" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	62.00'	4.0' long 4' Weir 2 End Contraction(s) 0.8' Crest Height

Primary OutFlow Max=0.58 cfs @ 12.26 hrs HW=61.12' (Free Discharge)

1=RCP_Round 18" (Passes 0.58 cfs of 10.28 cfs potential flow)

2=6" Orifice (Orifice Controls 0.58 cfs @ 2.94 fps)

3=4' Weir (Controls 0.00 cfs)

Pond E: Basin E - Chamber Wizard Field A**Chamber Model = StormTrapST2 SingleTrap 2-0 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf

Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

13 Chambers/Row x 15.40' Long = 200.15' Row Length +79.9" Border x 2 = 213.46' Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 = 21.79' Base Width

30.0" Chamber Height = 2.50' Field Height

13 Chambers x 231.7 cf + 5,051.4 cf Border = 8,063.1 cf Chamber Storage

13 Chambers x 326.4 cf + 7,386.4 cf Border = 11,629.0 cf Displacement

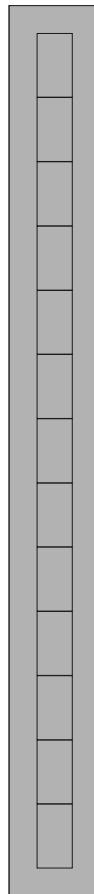
Chamber Storage = 8,063.1 cf = 0.185 af

Overall Storage Efficiency = 69.3%

Overall System Size = 213.46' x 21.79' x 2.50'

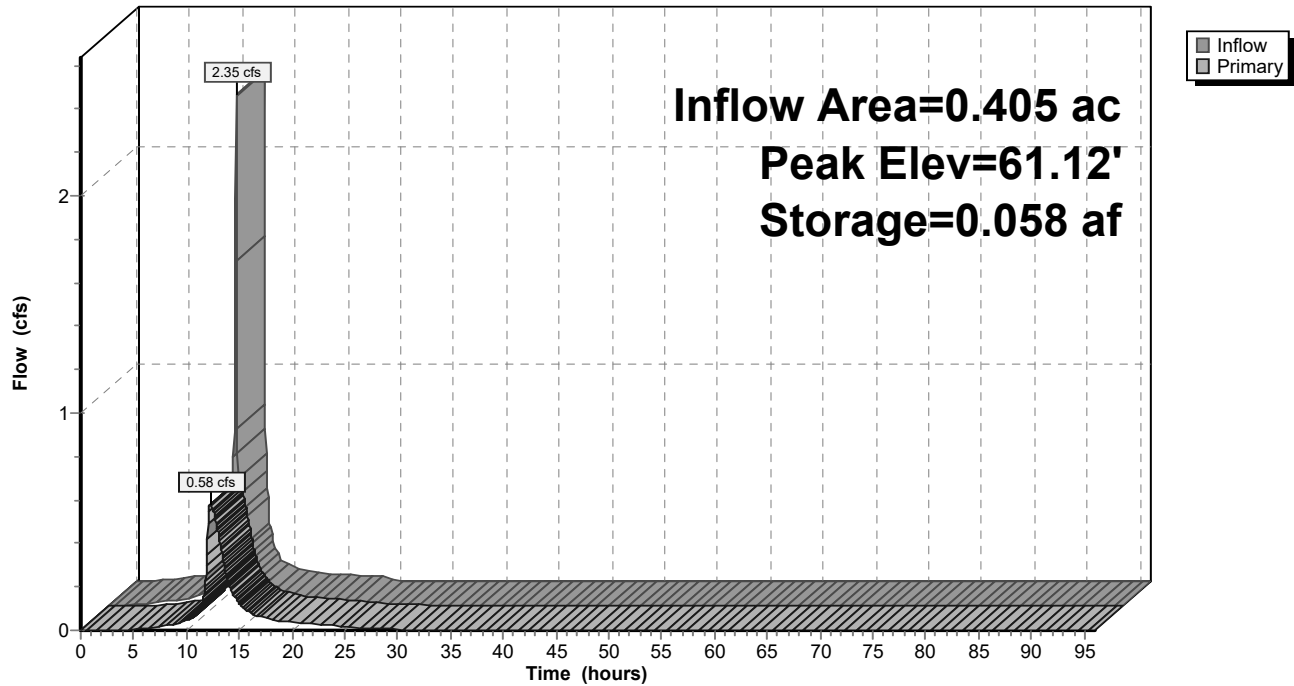
13 Chambers (plus border)

430.7 cy Field



Pond E: Basin E

Hydrograph



Summary for Pond F: Basin F

Inflow Area = 2.216 ac, 60.38% Impervious, Inflow Depth = 2.82" for 10-Year event
 Inflow = 7.20 cfs @ 12.13 hrs, Volume= 0.521 af
 Outflow = 0.68 cfs @ 13.03 hrs, Volume= 0.521 af, Atten= 90%, Lag= 54.4 min
 Primary = 0.68 cfs @ 13.03 hrs, Volume= 0.521 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 62.69' @ 13.03 hrs Surf.Area= 5,820 sf Storage= 11,215 cf

Plug-Flow detention time= 234.6 min calculated for 0.521 af (100% of inflow)
 Center-of-Mass det. time= 233.8 min (1,024.1 - 790.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	60.00'	51,500 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)
60.00	2,880	250.0	0	0	2,880
61.00	3,662	270.0	3,263	3,263	3,747
62.00	4,881	311.0	4,257	7,520	5,665
63.00	6,265	350.0	5,559	13,079	7,743
64.00	7,814	395.0	7,025	20,104	10,437
65.00	9,517	431.0	8,652	28,756	12,839
66.00	11,353	466.0	10,422	39,177	15,377
67.00	13,319	500.0	12,323	51,500	18,035

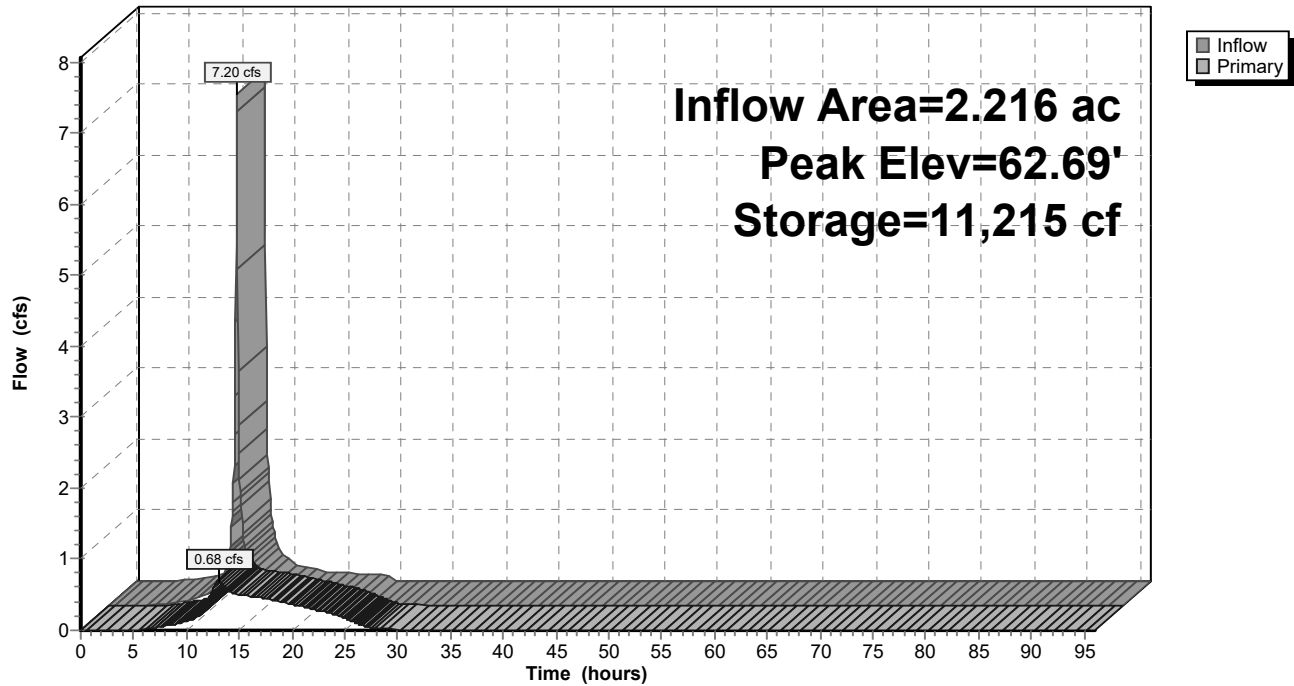
Device	Routing	Invert	Outlet Devices
#1	Primary	60.00'	18.0" Round RCP_Round 18" L= 44.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 60.00' / 59.75' S= 0.0057 ' S= 0.0057 ' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	60.00'	2.5" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	62.50'	4.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Device 1	65.00'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=0.68 cfs @ 13.03 hrs HW=62.69' (Free Discharge)

- ↑ **1=RCP_Round 18"** (Passes 0.68 cfs of 12.40 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.53 cfs @ 7.74 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.15 cfs @ 1.49 fps)
- ↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Pond F: Basin F

Hydrograph



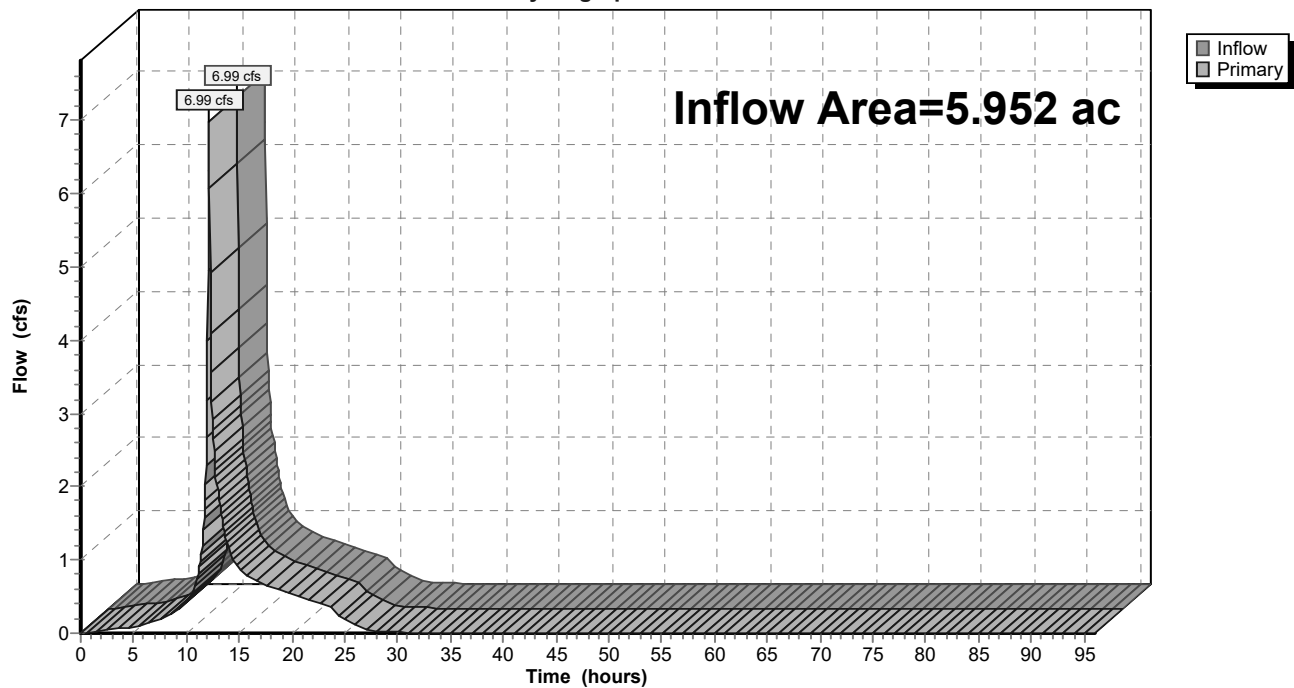
Summary for Link 7L: POA-2

Inflow Area = 5.952 ac, 49.75% Impervious, Inflow Depth = 2.49" for 10-Year event
Inflow = 6.99 cfs @ 12.15 hrs, Volume= 1.233 af
Primary = 6.99 cfs @ 12.15 hrs, Volume= 1.233 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link 7L: POA-2

Hydrograph



Summary for Subcatchment 1S: E-4 PER (No Basin)

Runoff = 0.01 cfs @ 14.25 hrs, Volume= 0.008 af, Depth= 0.13"

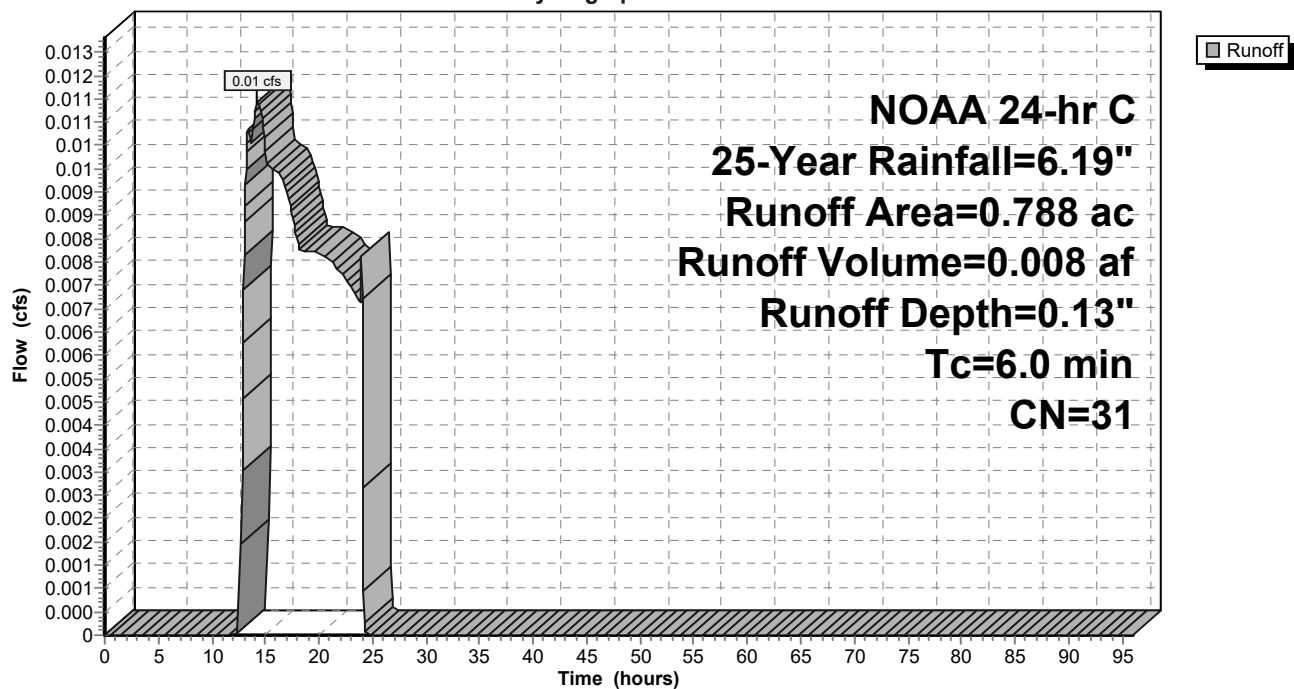
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (ac)	CN	Description
0.733	30	Woods, Good, HSG A
0.055	39	>75% Grass cover, Good, HSG A
0.788	31	Weighted Average
0.788		100.00% Pervious Area

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

Subcatchment 1S: E-4 PER (No Basin)

Hydrograph



Summary for Subcatchment E-4P*: E-4 PER

Runoff = 0.01 cfs @ 12.21 hrs, Volume= 0.002 af, Depth= 0.50"

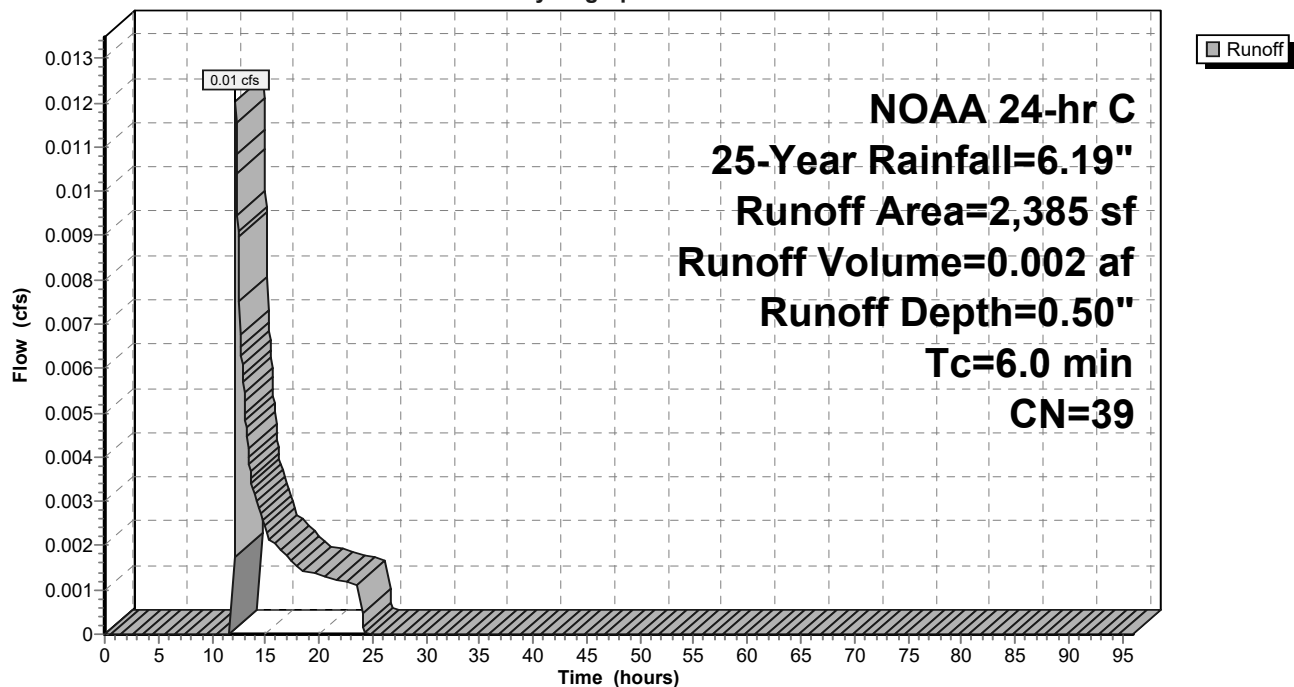
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (sf)	CN	Description
2,385	39	>75% Grass cover, Good, HSG A
2,385		100.00% Pervious Area

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

Subcatchment E-4P*: E-4 PER

Hydrograph



Summary for Subcatchment E4-B: E-4 Basin

Runoff = 0.16 cfs @ 12.21 hrs, Volume= 0.030 af, Depth= 0.50"

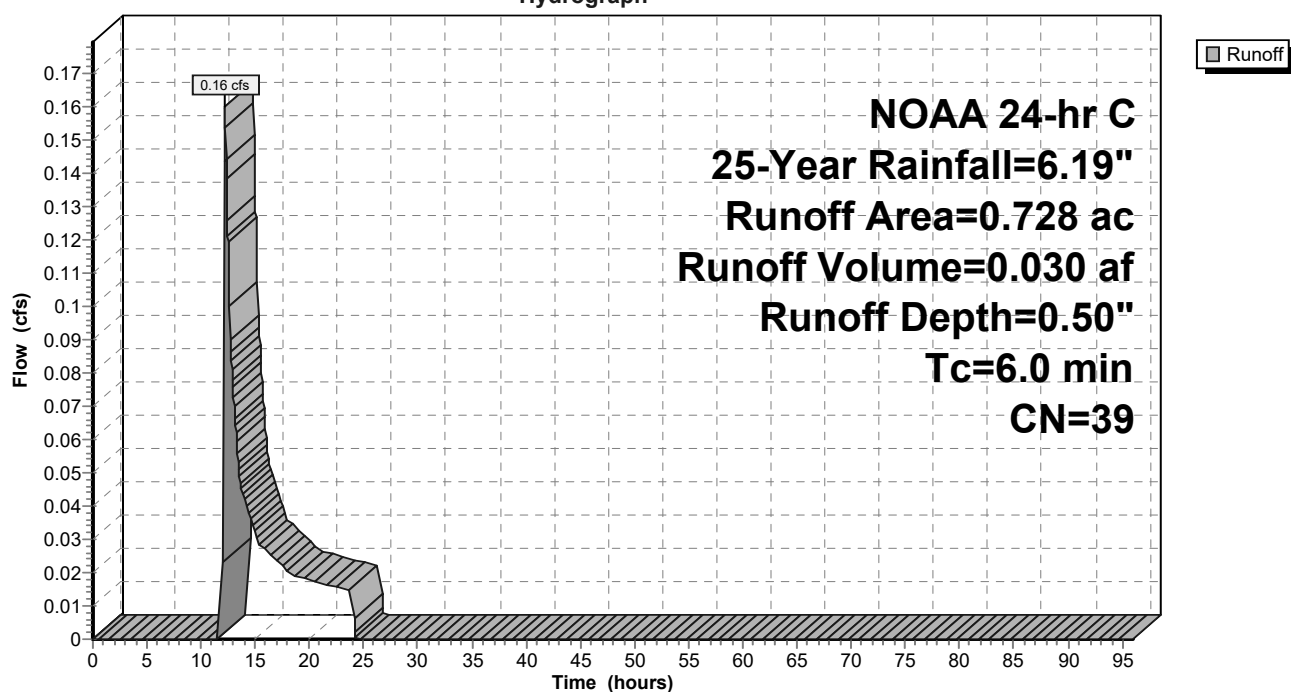
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (ac)	CN	Description
0.728	39	>75% Grass cover, Good, HSG A
0.728		100.00% Pervious Area

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

Subcatchment E4-B: E-4 Basin

Hydrograph



Summary for Subcatchment E4-I*: E-4 IMP

Runoff = 3.15 cfs @ 12.13 hrs, Volume= 0.244 af, Depth= 5.95"

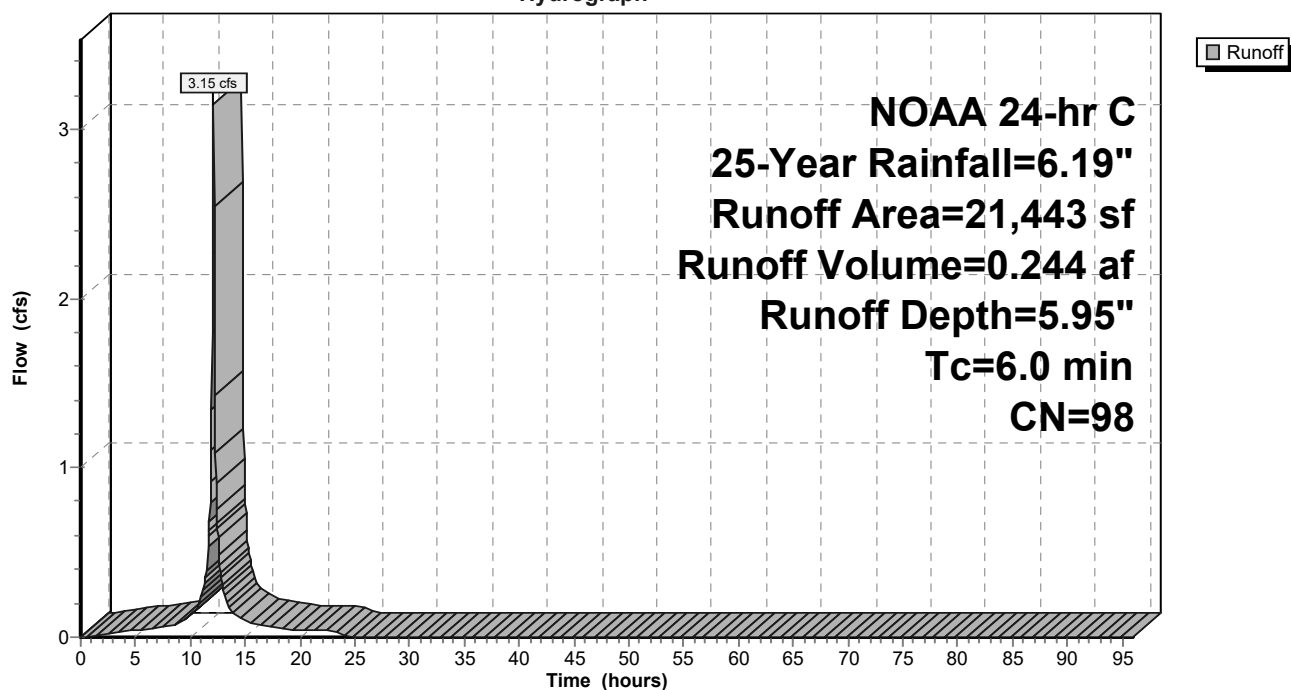
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (sf)	CN	Description
21,443	98	Paved parking, HSG A
21,443		100.00% Impervious Area

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

Subcatchment E4-I*: E-4 IMP

Hydrograph



Summary for Subcatchment E4-OI*: E-4O IMP

Runoff = 0.43 cfs @ 12.13 hrs, Volume= 0.033 af, Depth= 5.95"

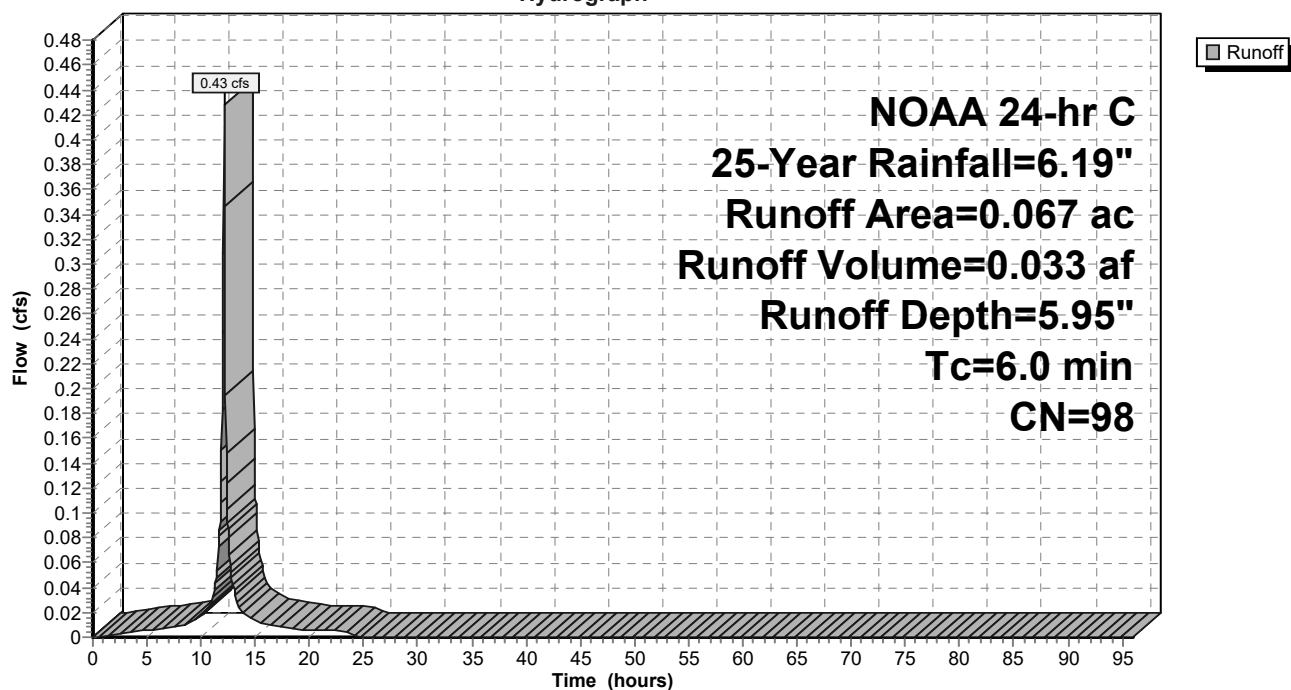
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG A
0.067		100.00% Impervious Area

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

Subcatchment E4-OI*: E-4O IMP

Hydrograph



Summary for Subcatchment E4-OP*: E-40 PER

Runoff = 0.01 cfs @ 12.53 hrs, Volume= 0.003 af, Depth= 0.29"

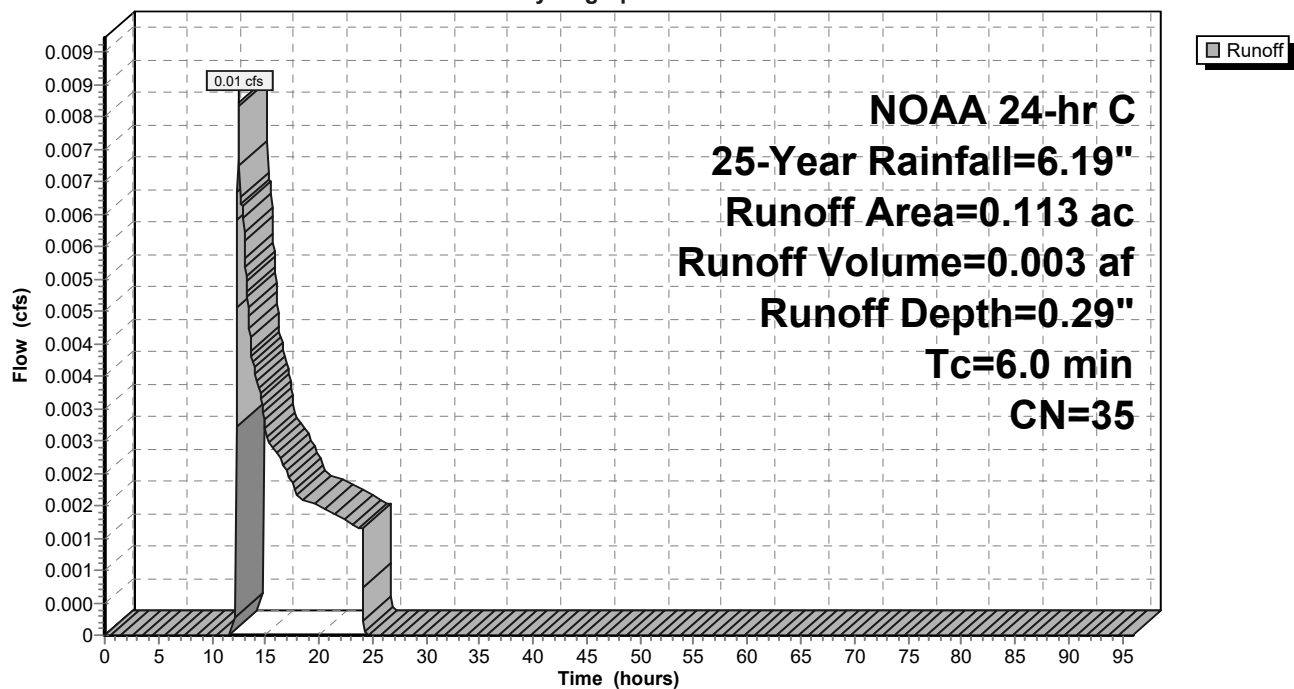
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (ac)	CN	Description
0.069	32	Woods/grass comb., Good, HSG A
0.044	39	>75% Grass cover, Good, HSG A
0.113	35	Weighted Average
0.113		100.00% Pervious Area

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

Subcatchment E4-OP*: E-40 PER

Hydrograph



Summary for Subcatchment P-5: P-5

Runoff = 9.09 cfs @ 12.13 hrs, Volume= 0.652 af, Depth= 5.26"

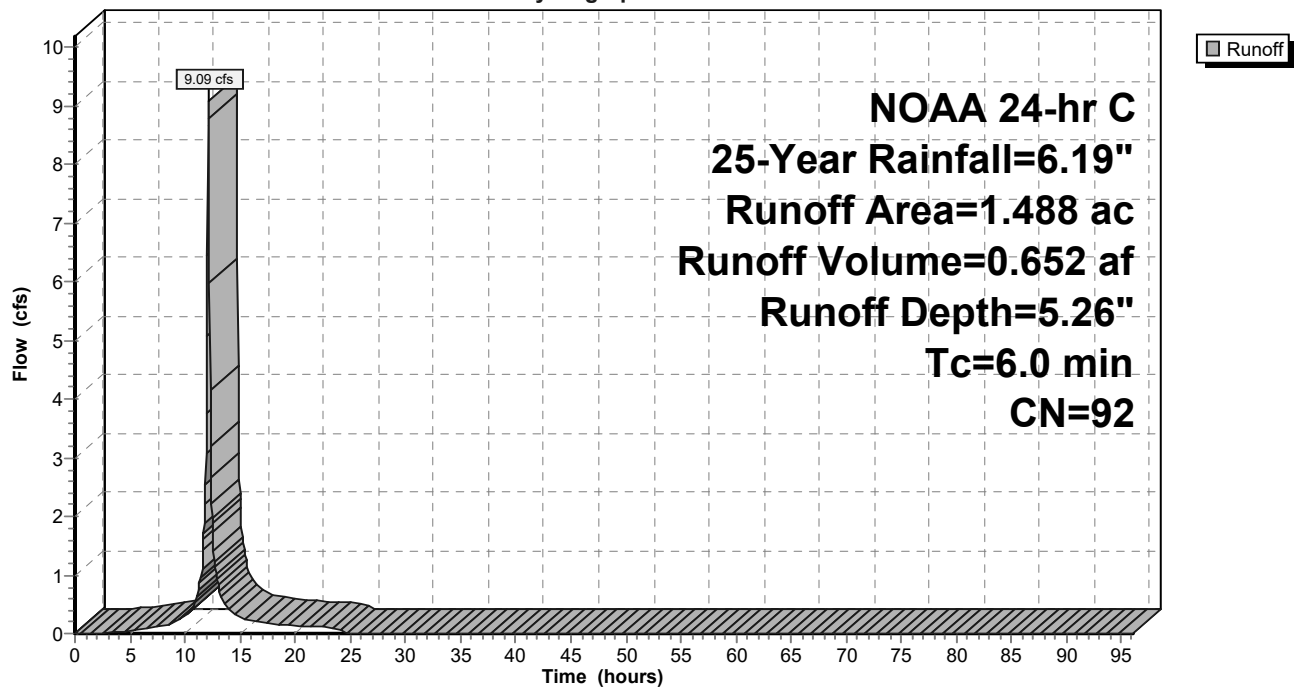
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (ac)	CN	Description
1.338	98	Paved parking, HSG A
0.150	39	>75% Grass cover, Good, HSG A
1.488	92	Weighted Average
0.150		10.08% Pervious Area
1.338		89.92% Impervious Area

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

Subcatchment P-5: P-5

Hydrograph



Summary for Subcatchment P-6: P-6

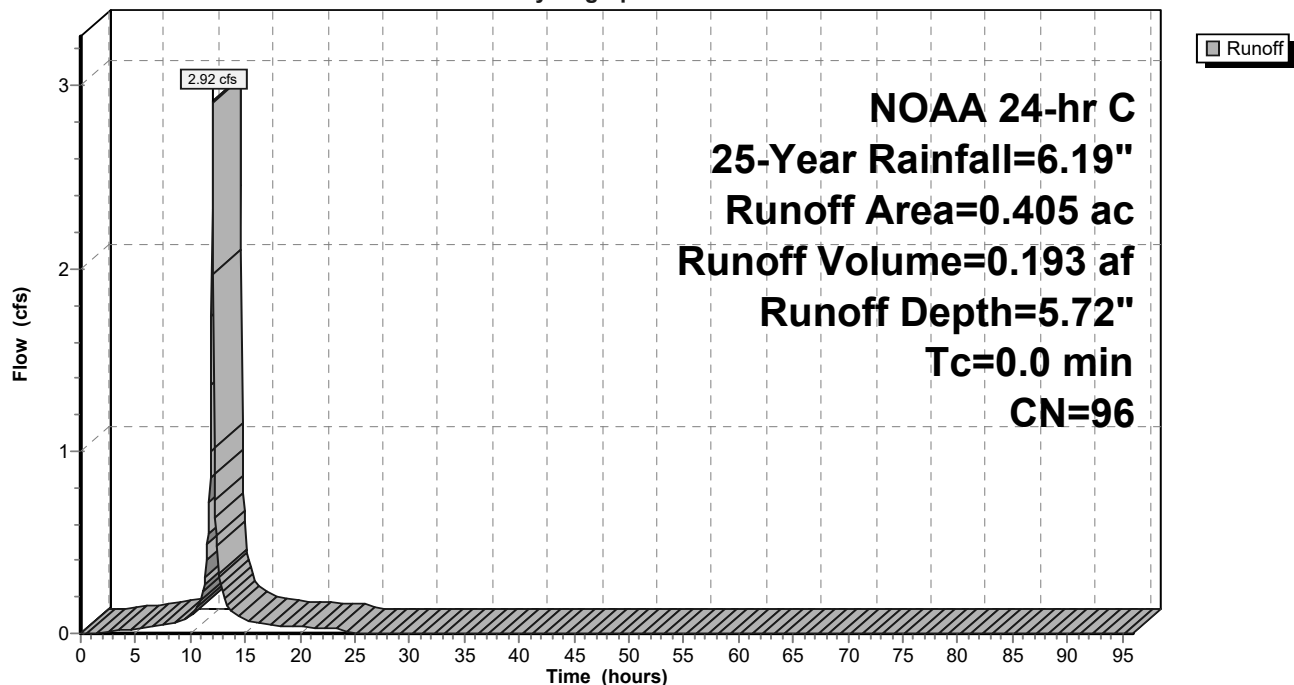
Runoff = 2.92 cfs @ 12.04 hrs, Volume= 0.193 af, Depth= 5.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (ac)	CN	Description
0.364	98	Paved parking, HSG D
0.041	80	>75% Grass cover, Good, HSG D
0.405	96	Weighted Average
0.041		10.12% Pervious Area
0.364		89.88% Impervious Area

Subcatchment P-6: P-6

Hydrograph



Summary for Subcatchment P3-I: P-3 IMP

Runoff = 3.95 cfs @ 12.17 hrs, Volume= 0.347 af, Depth= 5.95"

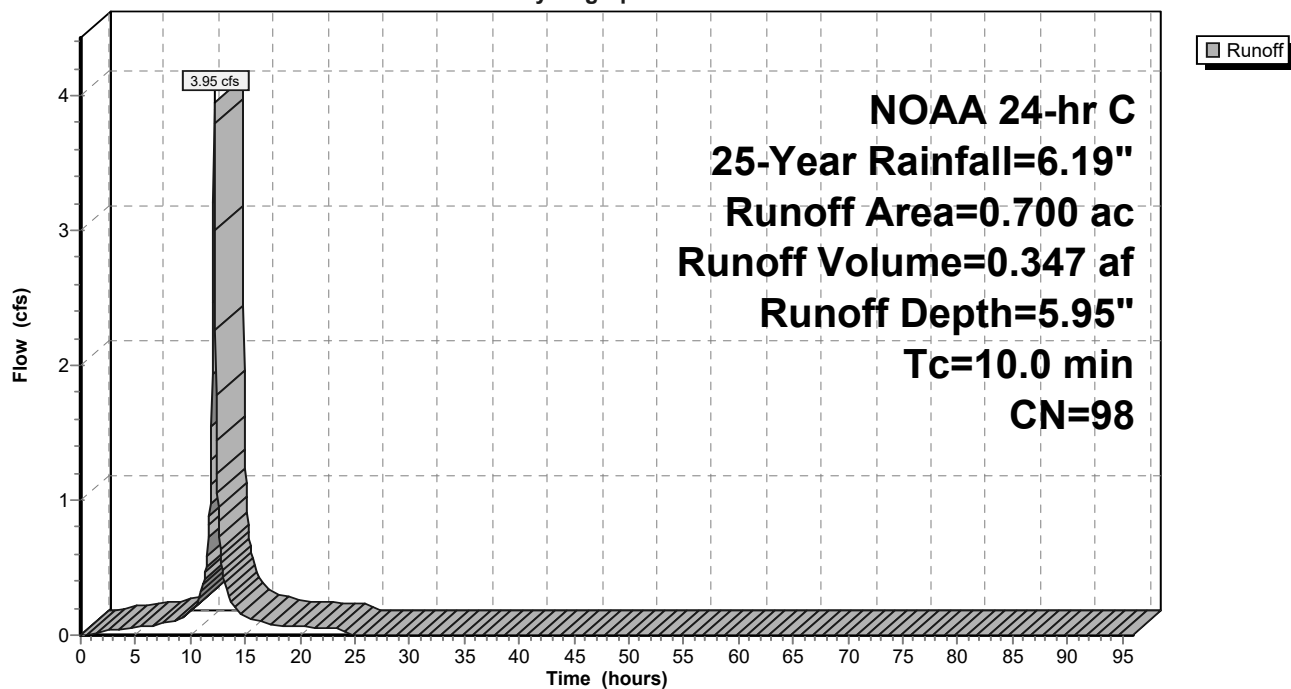
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (ac)	CN	Description
0.050	98	Paved parking, HSG A
0.650	98	Paved parking, HSG D
0.700	98	Weighted Average
0.700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Assumed 10 minutes

Subcatchment P3-I: P-3 IMP

Hydrograph



Summary for Subcatchment P3-P: P-3 PER

Runoff = 0.81 cfs @ 12.29 hrs, Volume= 0.118 af, Depth= 0.75"

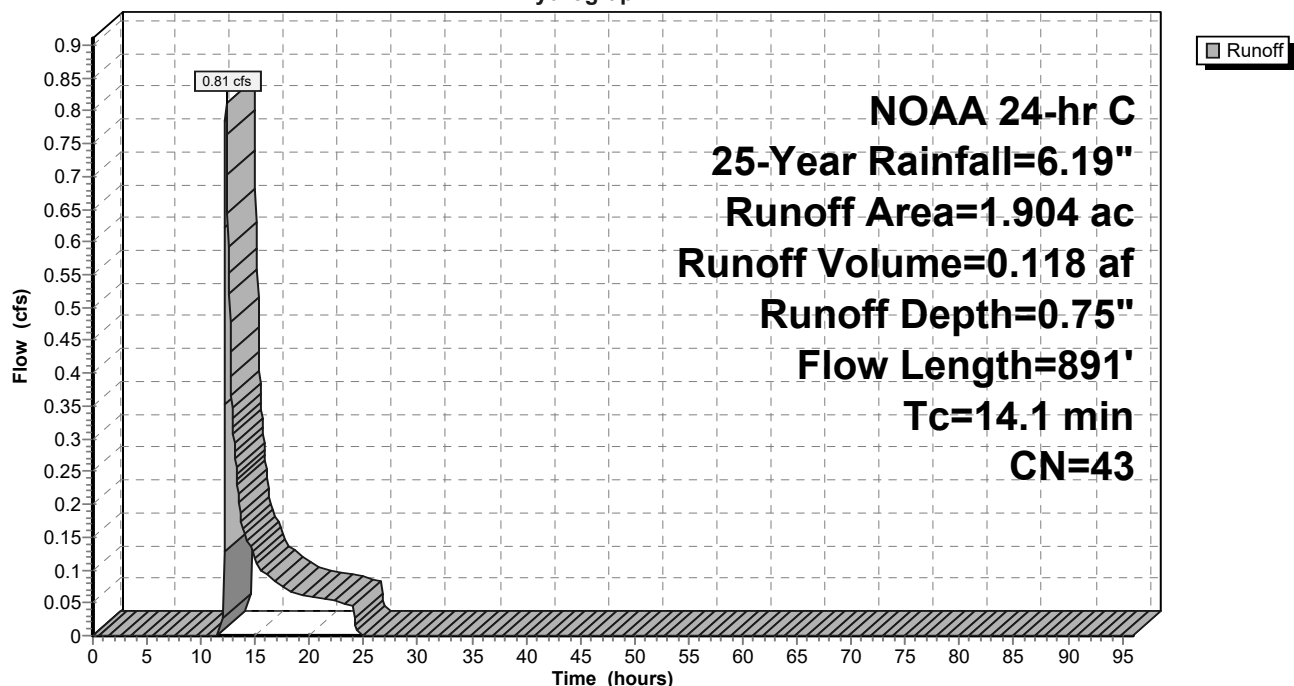
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 25-Year Rainfall=6.19"

Area (ac)	CN	Description
1.734	39	>75% Grass cover, Good, HSG A
0.170	80	>75% Grass cover, Good, HSG D
1.904	43	Weighted Average
1.904		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	32	0.0060	0.06		Sheet Flow, sheet lawn Grass: Dense n= 0.240 P2= 3.31"
1.5	174	0.0150	1.97		Shallow Concentrated Flow, Lawn shallow concentrated Unpaved Kv= 16.1 fps
1.3	155	0.0090	1.93		Shallow Concentrated Flow, shallow concentrated road Paved Kv= 20.3 fps
2.2	530	0.0080	4.07	7.18	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.017 Concrete sewer w/manholes & inlets
14.1	891	Total			

Subcatchment P3-P: P-3 PER

Hydrograph



Summary for Pond E: Basin E

Inflow Area = 0.405 ac, 89.88% Impervious, Inflow Depth = 5.72" for 25-Year event
 Inflow = 2.92 cfs @ 12.04 hrs, Volume= 0.193 af
 Outflow = 0.68 cfs @ 12.28 hrs, Volume= 0.193 af, Atten= 77%, Lag= 13.9 min
 Primary = 0.68 cfs @ 12.28 hrs, Volume= 0.193 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 61.27' @ 12.28 hrs Surf.Area= 0.107 ac Storage= 0.071 af

Plug-Flow detention time= 128.0 min calculated for 0.193 af (100% of inflow)
 Center-of-Mass det. time= 127.8 min (881.0 - 753.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	60.50'	0.000 af	21.79'W x 213.46'L x 2.50'H Field A 0.267 af Overall - 0.267 af Embedded = 0.000 af x 0.0% Voids
#2A	60.50'	0.185 af	StormTrap ST2 SingleTrap 2-0x 13 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 8.48' x 200.15' Core + 6.66' Border = 21.79' x 213.46' System
		0.185 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	59.15'	18.0" Round RCP_Round 18" L= 73.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 59.15' / 58.37' S= 0.0107 ' / Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	60.50'	6.0" Vert. 6" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	62.00'	4.0' long 4' Weir 2 End Contraction(s) 0.8' Crest Height

Primary OutFlow Max=0.68 cfs @ 12.28 hrs HW=61.26' (Free Discharge)

1=RCP_Round 18" (Passes 0.68 cfs of 10.52 cfs potential flow)

2=6" Orifice (Orifice Controls 0.68 cfs @ 3.46 fps)

3=4' Weir (Controls 0.00 cfs)

Pond E: Basin E - Chamber Wizard Field A**Chamber Model = StormTrapST2 SingleTrap 2-0 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf

Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

13 Chambers/Row x 15.40' Long = 200.15' Row Length +79.9" Border x 2 = 213.46' Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 = 21.79' Base Width

30.0" Chamber Height = 2.50' Field Height

13 Chambers x 231.7 cf + 5,051.4 cf Border = 8,063.1 cf Chamber Storage

13 Chambers x 326.4 cf + 7,386.4 cf Border = 11,629.0 cf Displacement

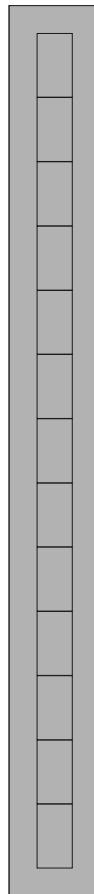
Chamber Storage = 8,063.1 cf = 0.185 af

Overall Storage Efficiency = 69.3%

Overall System Size = 213.46' x 21.79' x 2.50'

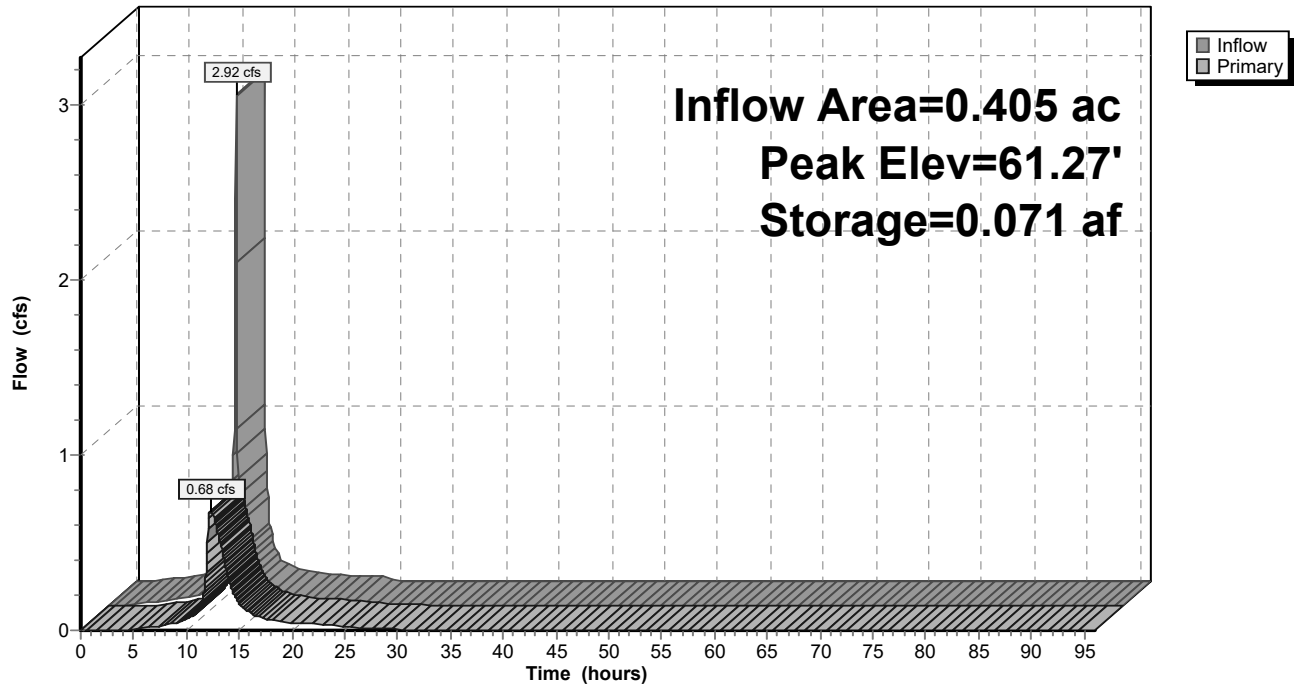
13 Chambers (plus border)

430.7 cy Field



Pond E: Basin E

Hydrograph



Summary for Pond F: Basin F

Inflow Area = 2.216 ac, 60.38% Impervious, Inflow Depth = 3.69" for 25-Year event
 Inflow = 9.20 cfs @ 12.13 hrs, Volume= 0.682 af
 Outflow = 1.15 cfs @ 12.79 hrs, Volume= 0.682 af, Atten= 88%, Lag= 39.5 min
 Primary = 1.15 cfs @ 12.79 hrs, Volume= 0.682 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 63.13' @ 12.79 hrs Surf.Area= 6,462 sf Storage= 13,927 cf

Plug-Flow detention time= 221.8 min calculated for 0.682 af (100% of inflow)
 Center-of-Mass det. time= 222.2 min (1,008.4 - 786.3)

Volume	Invert	Avail.Storage	Storage Description		
#1	60.00'	51,500 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)
60.00	2,880	250.0	0	0	2,880
61.00	3,662	270.0	3,263	3,263	3,747
62.00	4,881	311.0	4,257	7,520	5,665
63.00	6,265	350.0	5,559	13,079	7,743
64.00	7,814	395.0	7,025	20,104	10,437
65.00	9,517	431.0	8,652	28,756	12,839
66.00	11,353	466.0	10,422	39,177	15,377
67.00	13,319	500.0	12,323	51,500	18,035

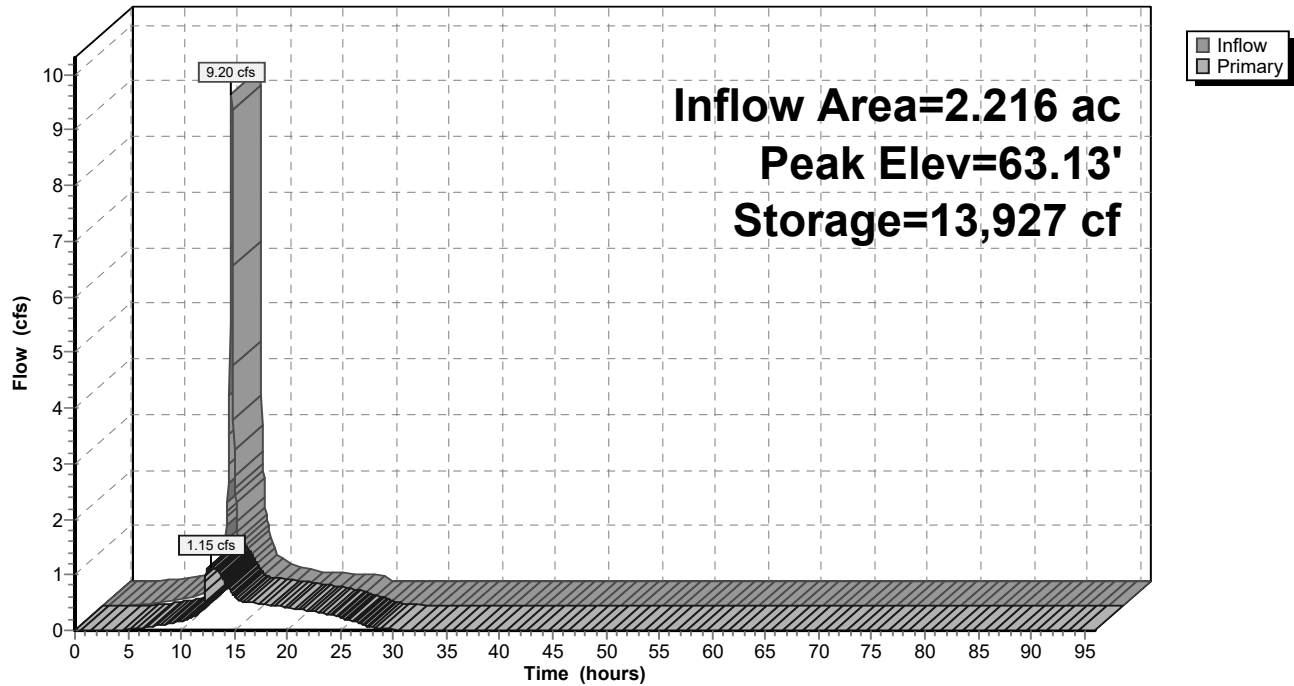
Device	Routing	Invert	Outlet Devices
#1	Primary	60.00'	18.0" Round RCP_Round 18" L= 44.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 60.00' / 59.75' S= 0.0057 ' S= 0.0057 ' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	60.00'	2.5" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	62.50'	4.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Device 1	65.00'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.15 cfs @ 12.79 hrs HW=63.13' (Free Discharge)

- ↑ **1=RCP_Round 18"** (Passes 1.15 cfs of 14.17 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.57 cfs @ 8.38 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.57 cfs @ 3.29 fps)
- ↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Pond F: Basin F

Hydrograph



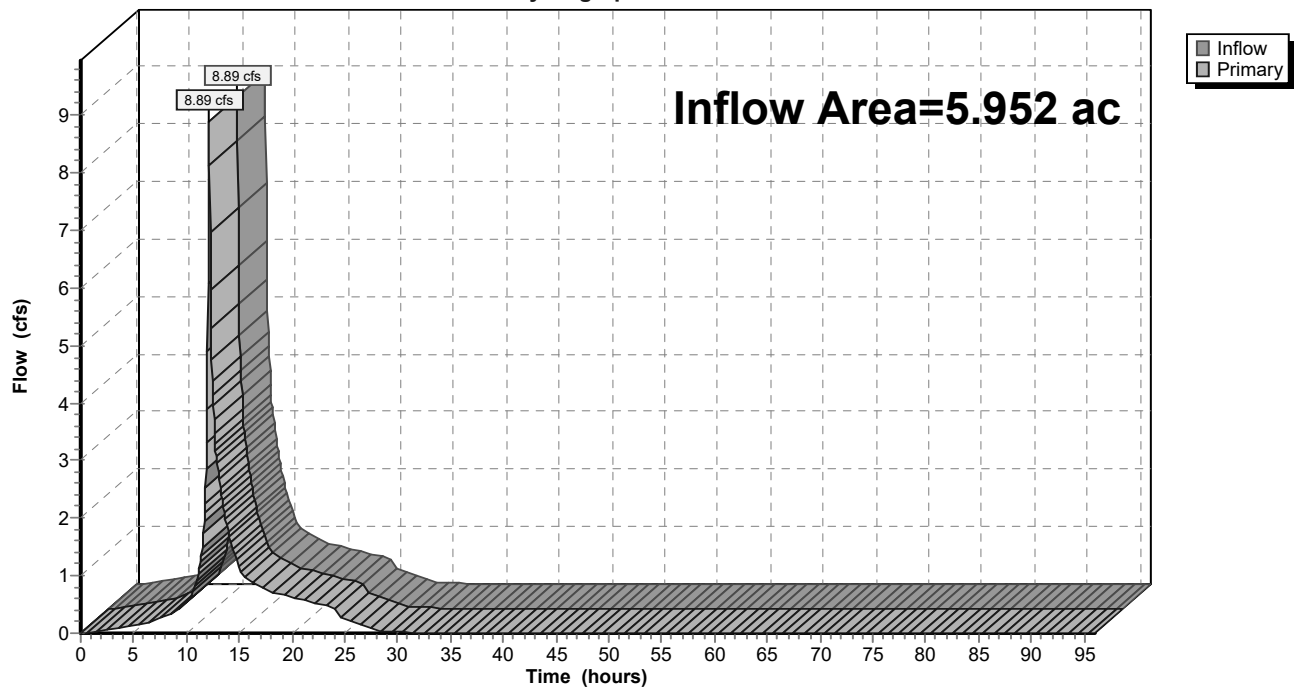
Summary for Link 7L: POA-2

Inflow Area = 5.952 ac, 49.75% Impervious, Inflow Depth = 3.27" for 25-Year event
Inflow = 8.89 cfs @ 12.15 hrs, Volume= 1.623 af
Primary = 8.89 cfs @ 12.15 hrs, Volume= 1.623 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link 7L: POA-2

Hydrograph



Summary for Subcatchment 1S: E-4 PER (No Basin)

Runoff = 0.15 cfs @ 12.28 hrs, Volume= 0.038 af, Depth= 0.58"

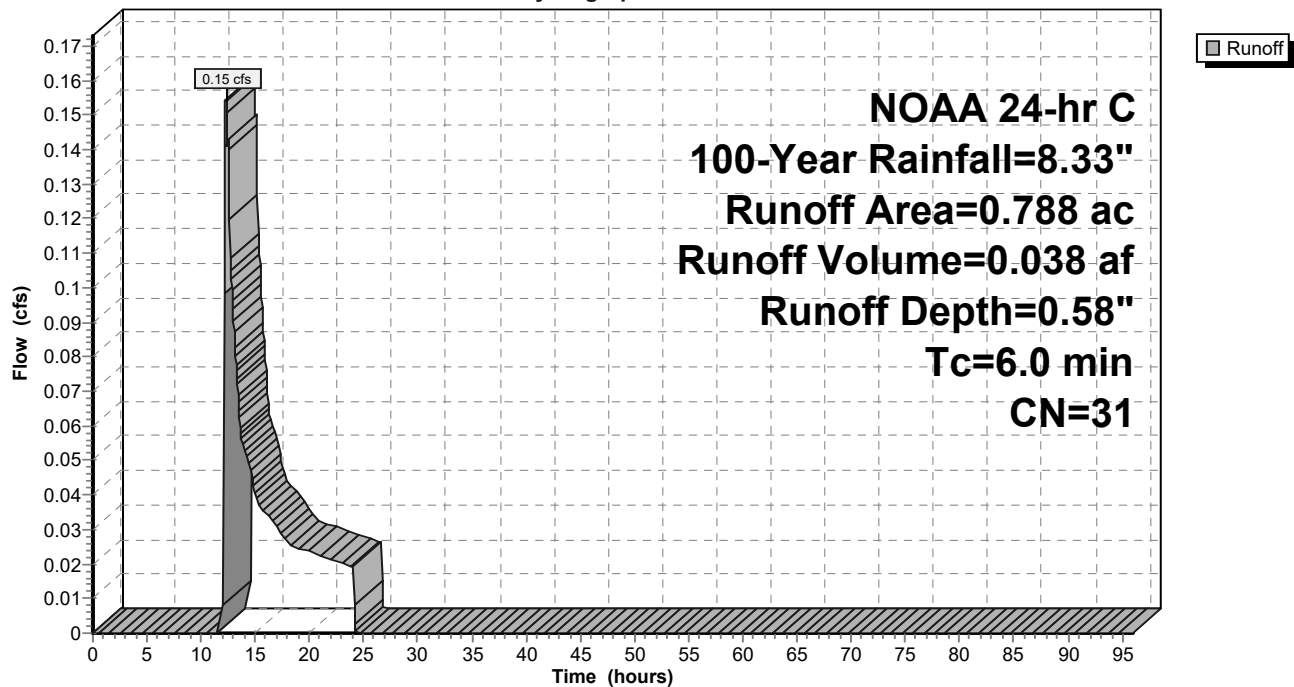
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.733	30	Woods, Good, HSG A
0.055	39	>75% Grass cover, Good, HSG A
0.788	31	Weighted Average
0.788		100.00% Pervious Area

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

Subcatchment 1S: E-4 PER (No Basin)

Hydrograph



Summary for Subcatchment E-4P*: E-4 PER

Runoff = 0.07 cfs @ 12.15 hrs, Volume= 0.006 af, Depth= 1.30"

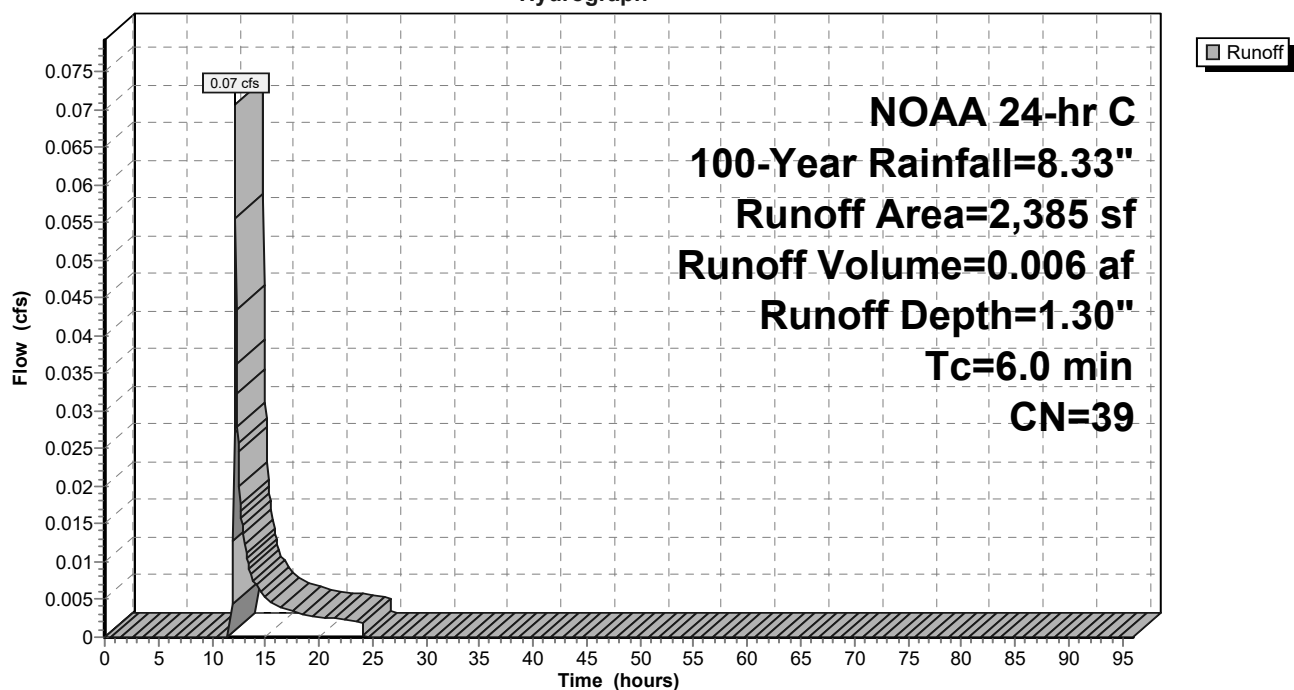
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (sf)	CN	Description
2,385	39	>75% Grass cover, Good, HSG A
2,385		100.00% Pervious Area

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

Subcatchment E-4P*: E-4 PER

Hydrograph



Summary for Subcatchment E4-B: E-4 Basin

Runoff = 0.94 cfs @ 12.15 hrs, Volume= 0.079 af, Depth= 1.30"

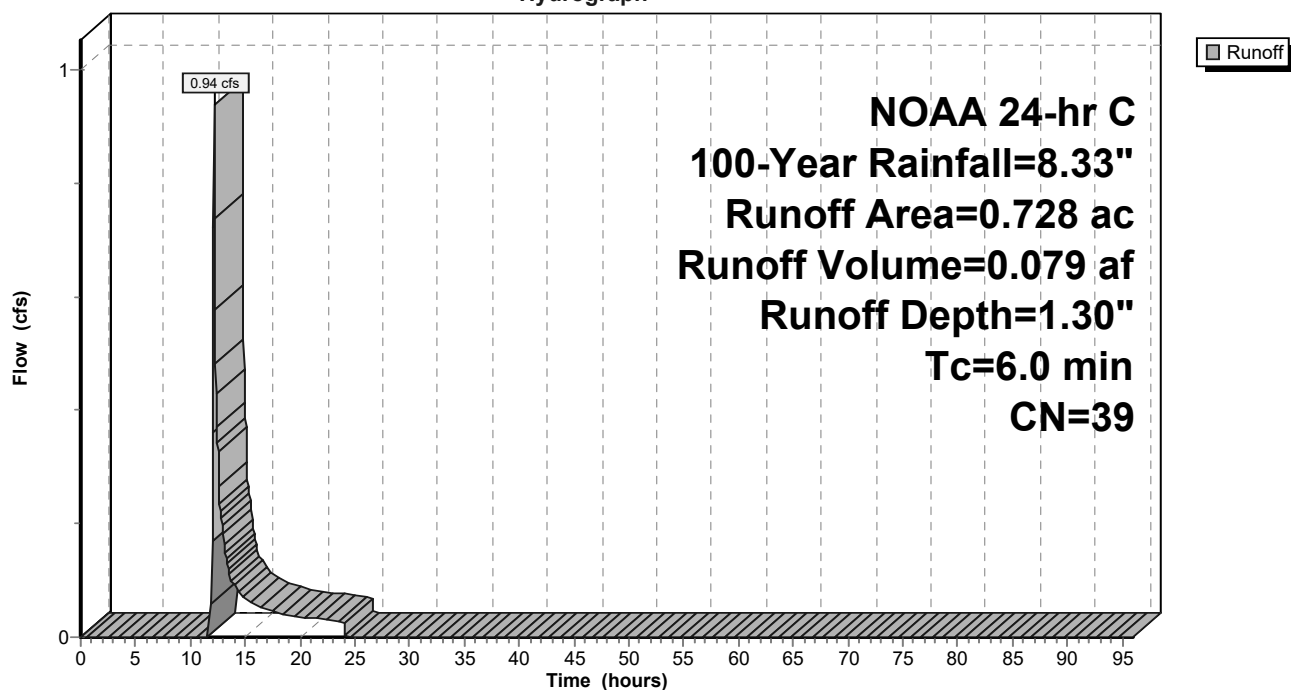
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.728	39	>75% Grass cover, Good, HSG A
0.728		100.00% Pervious Area

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

Subcatchment E4-B: E-4 Basin

Hydrograph



Summary for Subcatchment E4-I*: E-4 IMP

Runoff = 4.25 cfs @ 12.13 hrs, Volume= 0.332 af, Depth= 8.09"

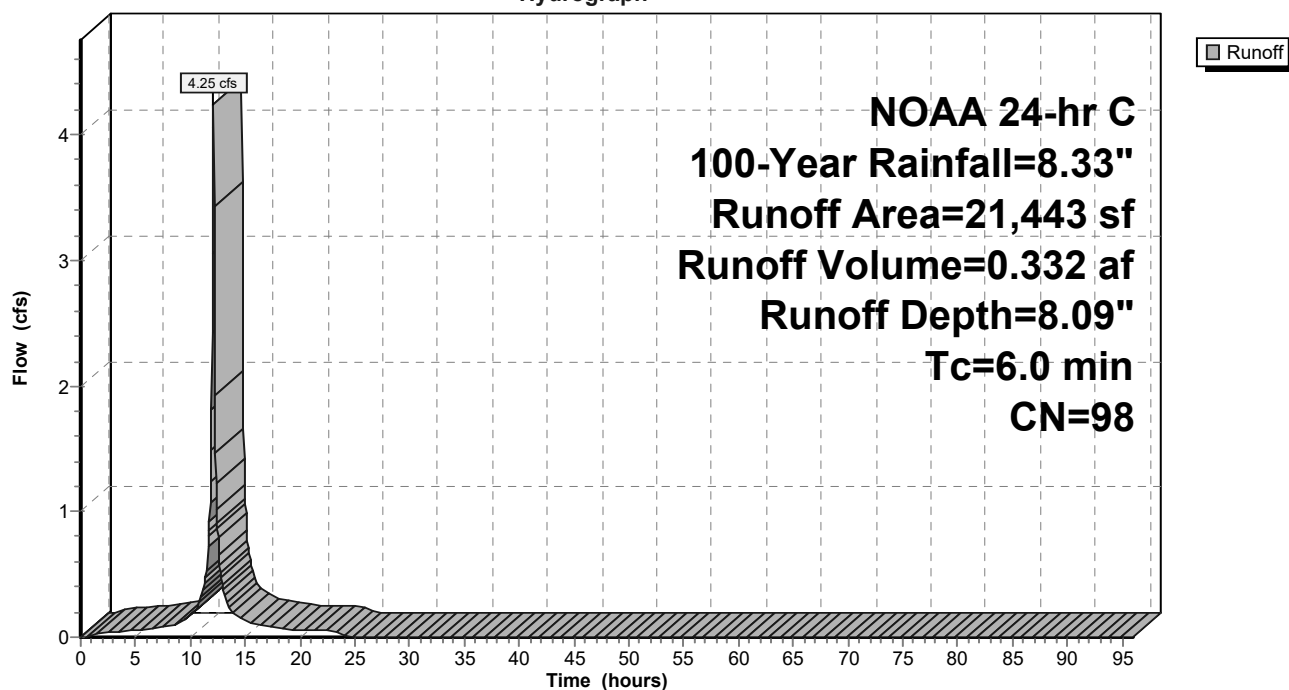
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (sf)	CN	Description
21,443	98	Paved parking, HSG A
21,443		100.00% Impervious Area

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

Subcatchment E4-I*: E-4 IMP

Hydrograph



Summary for Subcatchment E4-OI*: E-4O IMP

Runoff = 0.58 cfs @ 12.13 hrs, Volume= 0.045 af, Depth= 8.09"

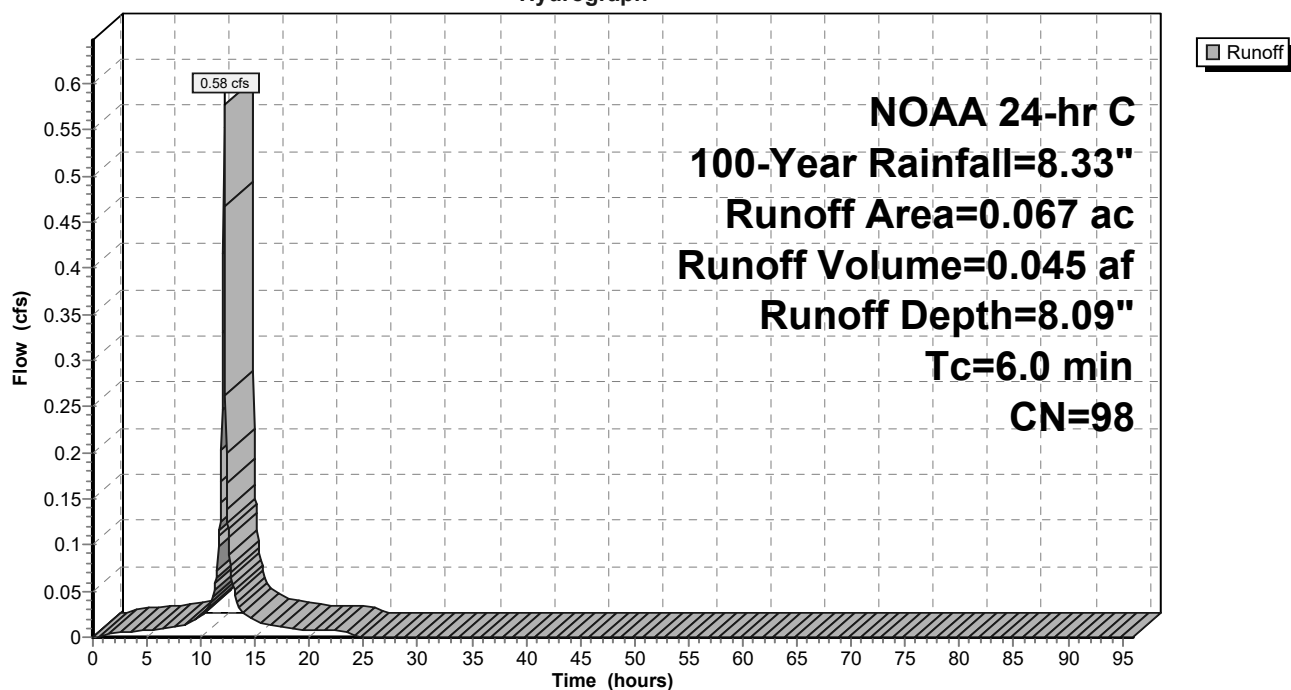
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.067	98	Paved parking, HSG A
0.067		100.00% Impervious Area

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

Subcatchment E4-OI*: E-4O IMP

Hydrograph



Summary for Subcatchment E4-OP*: E-40 PER

Runoff = 0.08 cfs @ 12.16 hrs, Volume= 0.009 af, Depth= 0.92"

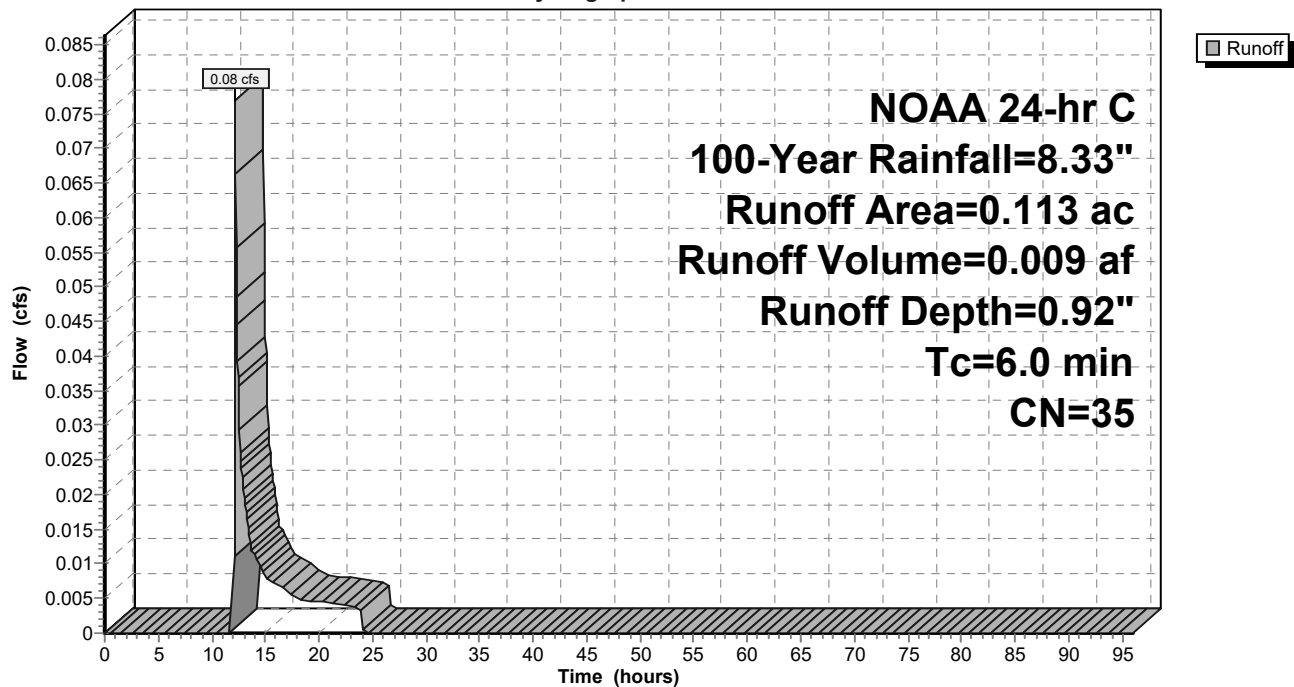
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.069	32	Woods/grass comb., Good, HSG A
0.044	39	>75% Grass cover, Good, HSG A
0.113	35	Weighted Average
0.113		100.00% Pervious Area

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

Subcatchment E4-OP*: E-40 PER

Hydrograph



Summary for Subcatchment P-5: P-5

Runoff = 12.48 cfs @ 12.13 hrs, Volume= 0.914 af, Depth= 7.37"

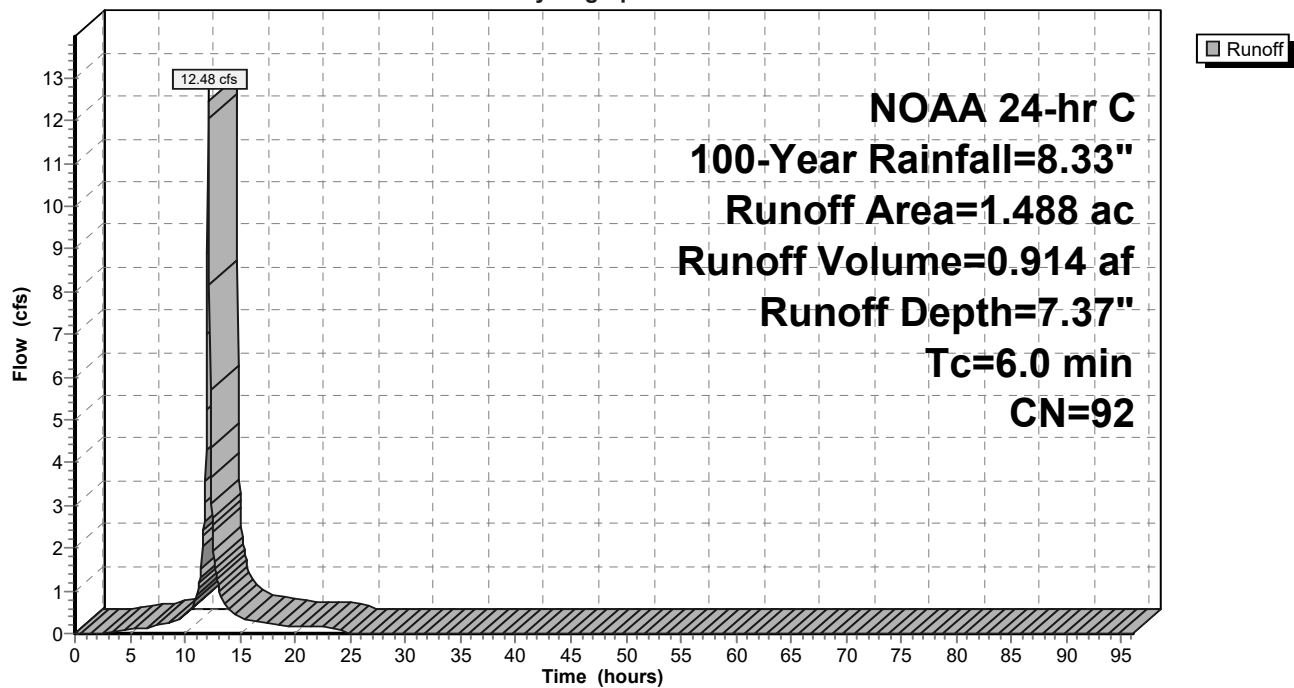
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
1.338	98	Paved parking, HSG A
0.150	39	>75% Grass cover, Good, HSG A
1.488	92	Weighted Average
0.150		10.08% Pervious Area
1.338		89.92% Impervious Area

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

Subcatchment P-5: P-5

Hydrograph



Summary for Subcatchment P-6: P-6

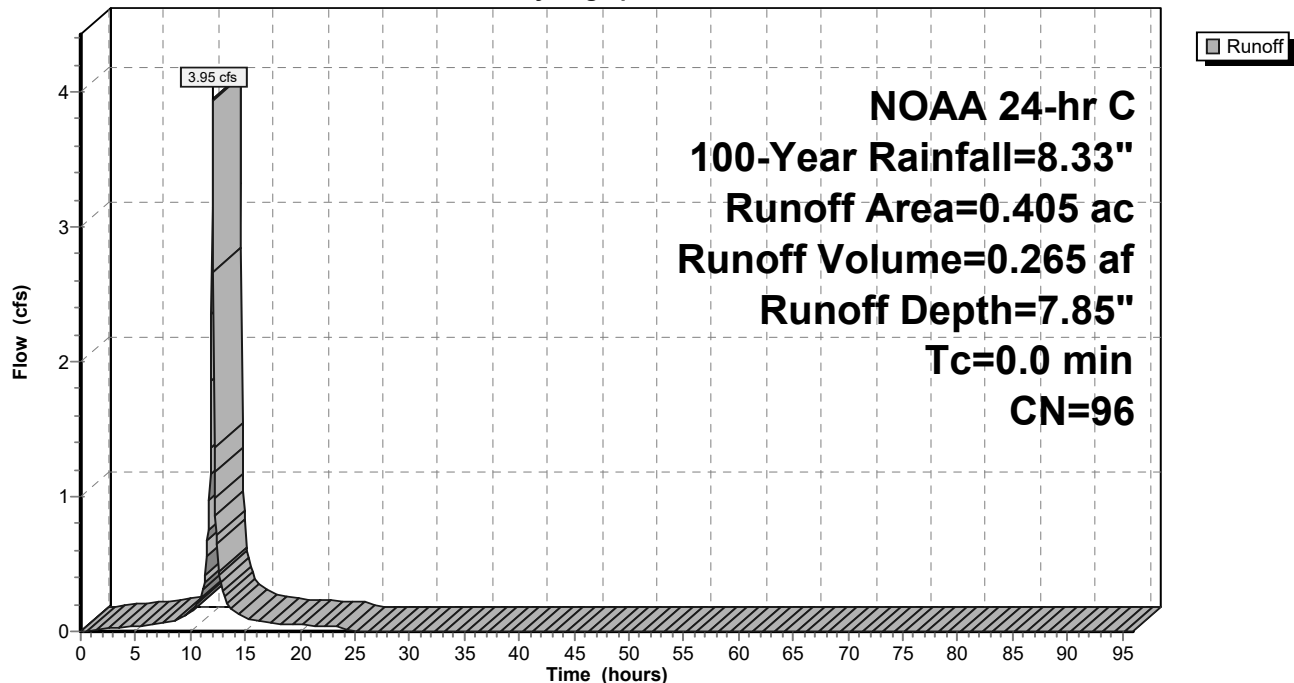
Runoff = 3.95 cfs @ 12.04 hrs, Volume= 0.265 af, Depth= 7.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.364	98	Paved parking, HSG D
0.041	80	>75% Grass cover, Good, HSG D
0.405	96	Weighted Average
0.041		10.12% Pervious Area
0.364		89.88% Impervious Area

Subcatchment P-6: P-6

Hydrograph



Summary for Subcatchment P3-I: P-3 IMP

Runoff = 5.33 cfs @ 12.17 hrs, Volume= 0.472 af, Depth= 8.09"

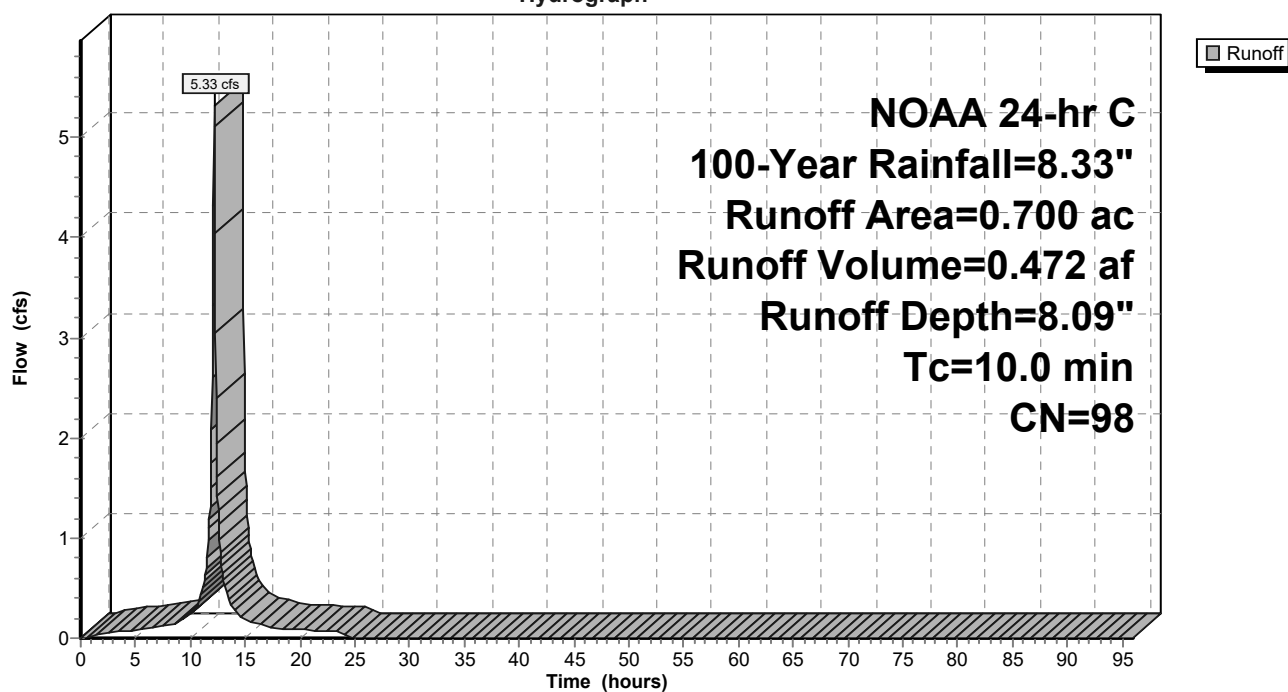
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
0.050	98	Paved parking, HSG A
0.650	98	Paved parking, HSG D
0.700	98	Weighted Average
0.700		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.0					Direct Entry, Assumed 10 minutes

Subcatchment P3-I: P-3 IMP

Hydrograph



Summary for Subcatchment P3-P: P-3 PER

Runoff = 2.67 cfs @ 12.25 hrs, Volume= 0.270 af, Depth= 1.70"

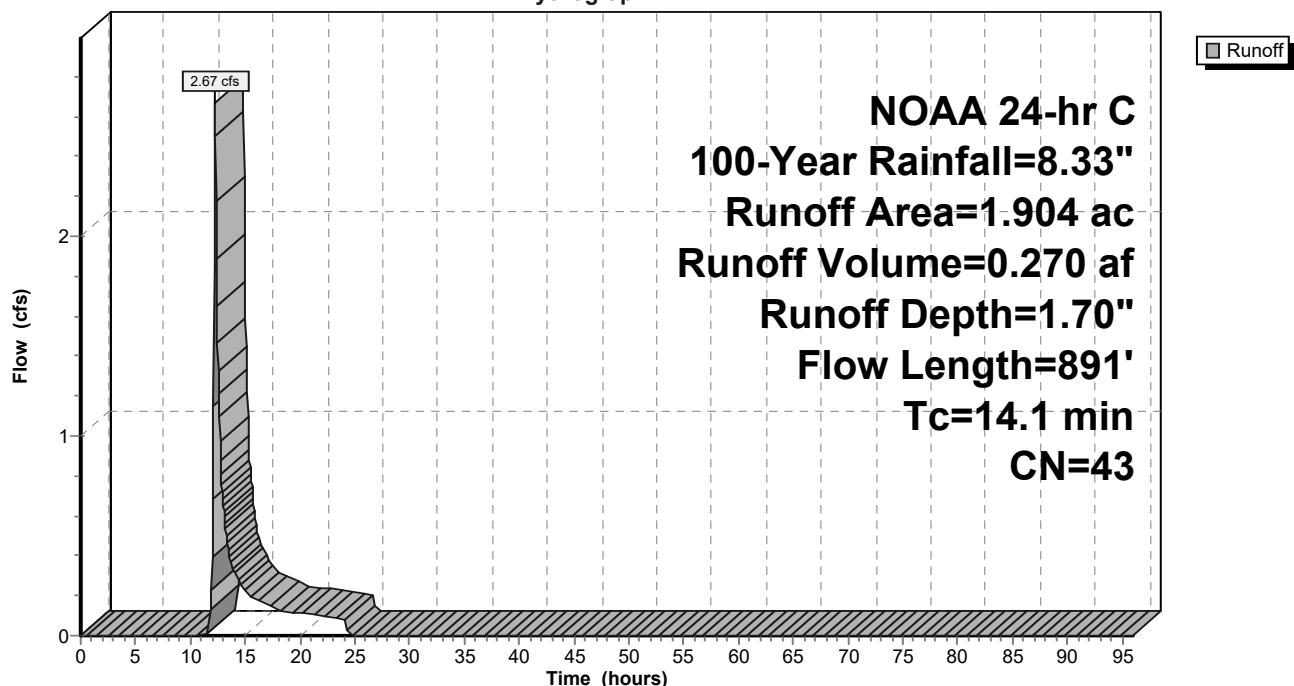
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs
 NOAA 24-hr C 100-Year Rainfall=8.33"

Area (ac)	CN	Description
1.734	39	>75% Grass cover, Good, HSG A
0.170	80	>75% Grass cover, Good, HSG D
1.904	43	Weighted Average
1.904		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.1	32	0.0060	0.06		Sheet Flow, sheet lawn Grass: Dense n= 0.240 P2= 3.31"
1.5	174	0.0150	1.97		Shallow Concentrated Flow, Lawn shallow concentrated Unpaved Kv= 16.1 fps
1.3	155	0.0090	1.93		Shallow Concentrated Flow, shallow concentrated road Paved Kv= 20.3 fps
2.2	530	0.0080	4.07	7.18	Pipe Channel, RCP_Round 18" 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.017 Concrete sewer w/manholes & inlets
14.1	891	Total			

Subcatchment P3-P: P-3 PER

Hydrograph



Summary for Pond E: Basin E

Inflow Area = 0.405 ac, 89.88% Impervious, Inflow Depth = 7.85" for 100-Year event
 Inflow = 3.95 cfs @ 12.04 hrs, Volume= 0.265 af
 Outflow = 0.83 cfs @ 12.31 hrs, Volume= 0.265 af, Atten= 79%, Lag= 15.8 min
 Primary = 0.83 cfs @ 12.31 hrs, Volume= 0.265 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 61.53' @ 12.31 hrs Surf.Area= 0.107 ac Storage= 0.095 af

Plug-Flow detention time= 116.6 min calculated for 0.265 af (100% of inflow)
 Center-of-Mass det. time= 116.4 min (863.4 - 747.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	60.50'	0.000 af	21.79'W x 213.46'L x 2.50'H Field A 0.267 af Overall - 0.267 af Embedded = 0.000 af x 0.0% Voids
#2A	60.50'	0.185 af	StormTrap ST2 SingleTrap 2-0x13 Inside #1 Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf 8.48' x 200.15' Core + 6.66' Border = 21.79' x 213.46' System
		0.185 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	59.15'	18.0" Round RCP_Round 18" L= 73.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 59.15' / 58.37' S= 0.0107 ' / Cc= 0.900 n= 0.013, Flow Area= 1.77 sf
#2	Device 1	60.50'	6.0" Vert. 6" Orifice C= 0.600 Limited to weir flow at low heads
#3	Device 1	62.00'	4.0' long 4' Weir 2 End Contraction(s) 0.8' Crest Height

Primary OutFlow Max=0.83 cfs @ 12.31 hrs HW=61.53' (Free Discharge)

1=RCP_Round 18" (Passes 0.83 cfs of 11.47 cfs potential flow)

2=6" Orifice (Orifice Controls 0.83 cfs @ 4.25 fps)

3=4' Weir (Controls 0.00 cfs)

Pond E: Basin E - Chamber Wizard Field A**Chamber Model = StormTrapST2 SingleTrap 2-0 (StormTrapST2 SingleTrap®Type II+IV)**

Inside= 101.7"W x 24.0"H => 15.05 sf x 15.40'L = 231.7 cf

Outside= 101.7"W x 30.0"H => 21.20 sf x 15.40'L = 326.4 cf

13 Chambers/Row x 15.40' Long = 200.15' Row Length +79.9" Border x 2 = 213.46' Base Length

1 Rows x 101.7" Wide + 79.9" Side Border x 2 = 21.79' Base Width

30.0" Chamber Height = 2.50' Field Height

13 Chambers x 231.7 cf + 5,051.4 cf Border = 8,063.1 cf Chamber Storage

13 Chambers x 326.4 cf + 7,386.4 cf Border = 11,629.0 cf Displacement

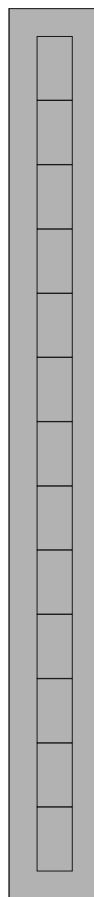
Chamber Storage = 8,063.1 cf = 0.185 af

Overall Storage Efficiency = 69.3%

Overall System Size = 213.46' x 21.79' x 2.50'

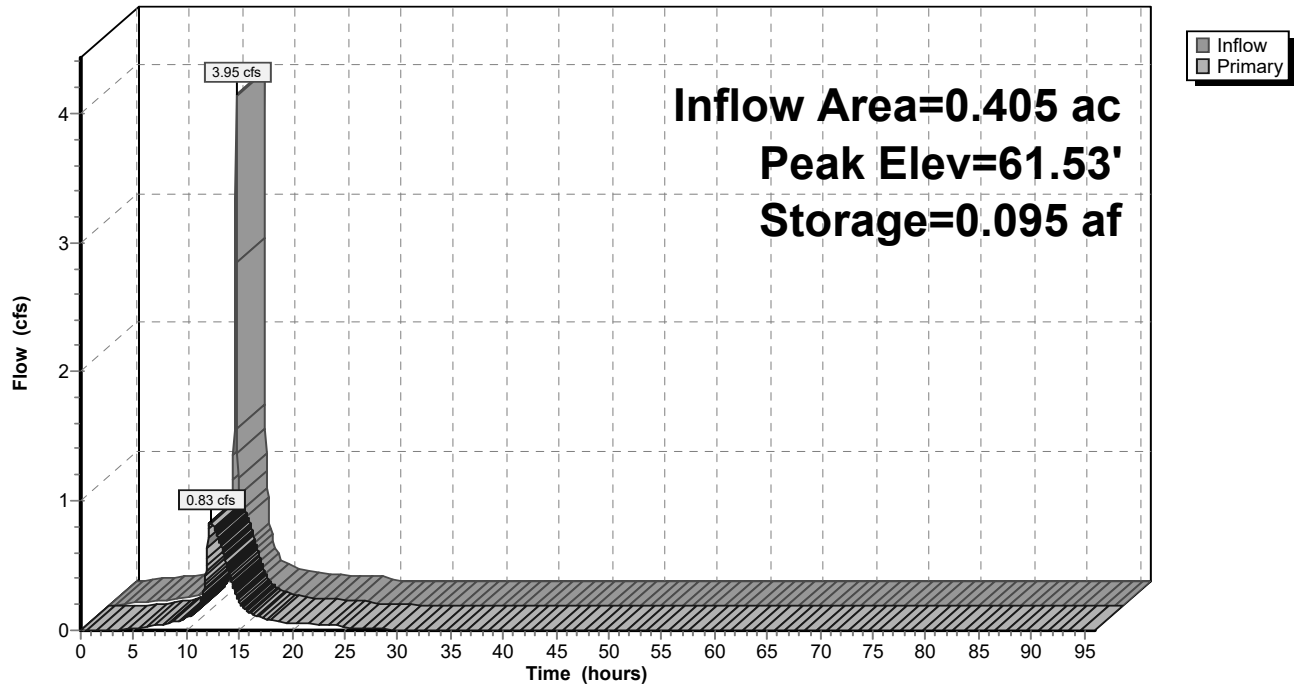
13 Chambers (plus border)

430.7 cy Field



Pond E: Basin E

Hydrograph



Summary for Pond F: Basin F

Inflow Area = 2.216 ac, 60.38% Impervious, Inflow Depth = 5.38" for 100-Year event
 Inflow = 13.38 cfs @ 12.13 hrs, Volume= 0.993 af
 Outflow = 1.63 cfs @ 12.81 hrs, Volume= 0.993 af, Atten= 88%, Lag= 40.6 min
 Primary = 1.63 cfs @ 12.81 hrs, Volume= 0.993 af

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs / 2
 Peak Elev= 64.02' @ 12.81 hrs Surf.Area= 7,845 sf Storage= 20,253 cf

Plug-Flow detention time= 217.4 min calculated for 0.993 af (100% of inflow)
 Center-of-Mass det. time= 216.5 min (997.5 - 780.9)

Volume	Invert	Avail.Storage	Storage Description		
#1	60.00'	51,500 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)
60.00	2,880	250.0	0	0	2,880
61.00	3,662	270.0	3,263	3,263	3,747
62.00	4,881	311.0	4,257	7,520	5,665
63.00	6,265	350.0	5,559	13,079	7,743
64.00	7,814	395.0	7,025	20,104	10,437
65.00	9,517	431.0	8,652	28,756	12,839
66.00	11,353	466.0	10,422	39,177	15,377
67.00	13,319	500.0	12,323	51,500	18,035

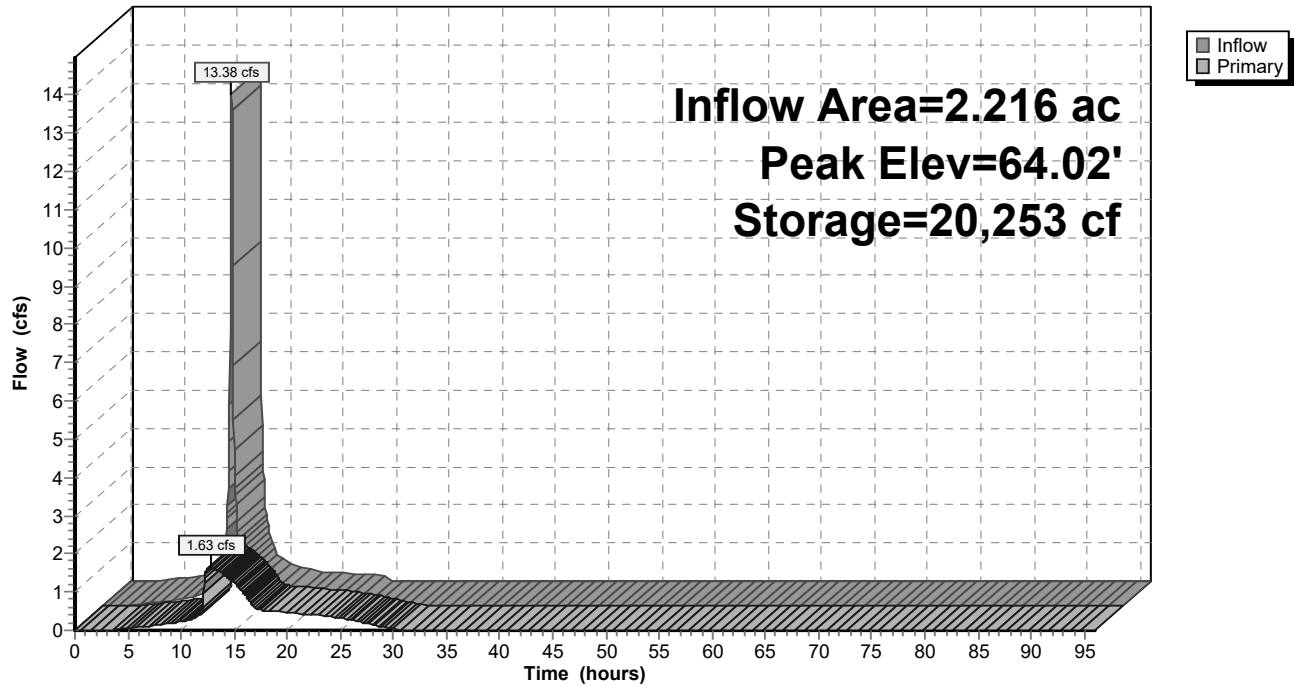
Device	Routing	Invert	Outlet Devices
#1	Primary	60.00'	18.0" Round RCP_Round 18" L= 44.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 60.00' / 59.75' S= 0.0057 ' S= 0.0057 ' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Device 1	60.00'	2.5" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#3	Device 1	62.50'	4.0" Vert. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads
#4	Device 1	65.00'	36.0" Horiz. Orifice/Grate C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=1.63 cfs @ 12.81 hrs HW=64.02' (Free Discharge)

- ↑ **1=RCP_Round 18"** (Passes 1.63 cfs of 17.18 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.65 cfs @ 9.53 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.98 cfs @ 5.60 fps)
- ↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Pond F: Basin F

Hydrograph



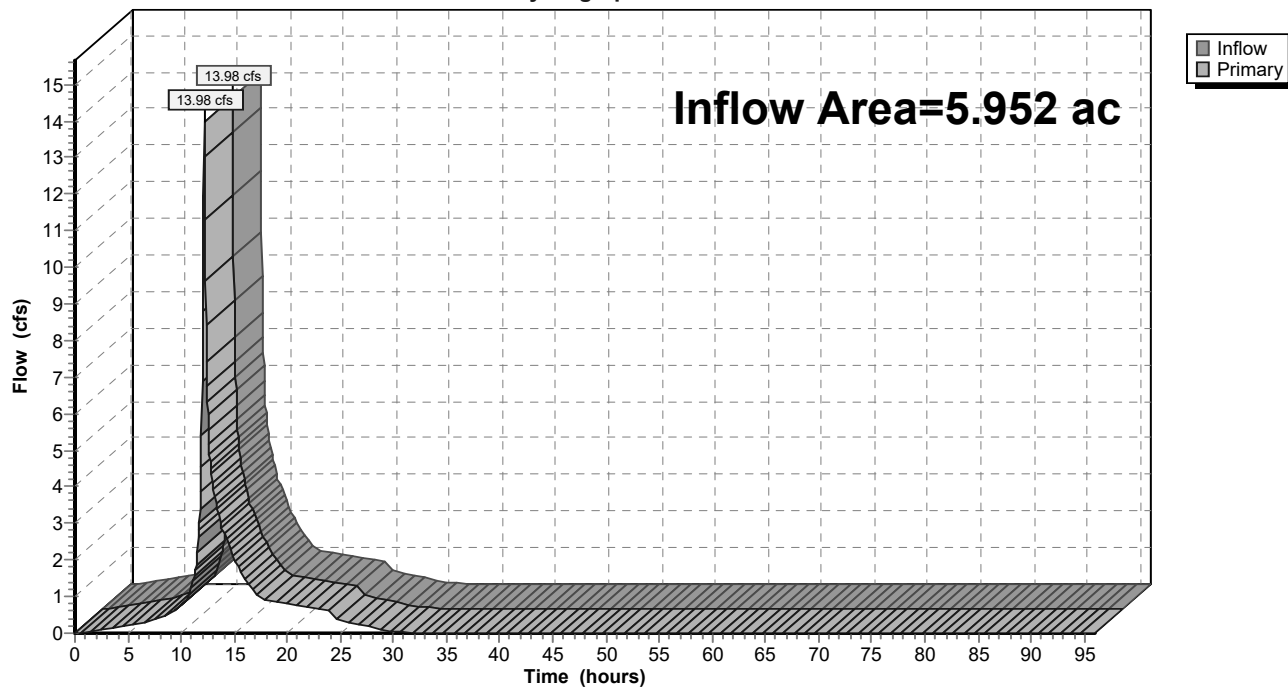
Summary for Link 7L: POA-2

Inflow Area = 5.952 ac, 49.75% Impervious, Inflow Depth = 4.82" for 100-Year event
Inflow = 13.98 cfs @ 12.16 hrs, Volume= 2.391 af
Primary = 13.98 cfs @ 12.16 hrs, Volume= 2.391 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-96.00 hrs, dt= 0.05 hrs

Link 7L: POA-2

Hydrograph





APPENDIX C

RIP RAP CALCULATIONS



Consulting, Municipal & Environmental Engineers
Planners • Surveyors • Landscape Architects

PROJECT- Avalon West Windsor
NUMBER- 1600081A
BY- TL
DATE- 11/22/2021

CONDUIT OUTLET PROTECTION CALCULATIONS

TAILWATER > 0.5 x Do

18 " HDPE Pipe

$$\begin{aligned} D_o &= 1.50 \\ Q_{(25)} &= 9.09 \text{ CFS} \\ TW &= 1.77 \text{ (100-yr Tailwater)} \\ W_o &= 3.00 \text{ (Width of culvert @ widest point)} \\ q &= 3.03 \text{ CFS/ft (Q/Wo)} \end{aligned}$$

LENGTH OF APRON

$$L_a = \frac{3 \times q}{D_o^{1/2}} = 7.42 \text{ FEET}$$

USE 8.0 FEET

WIDTH OF APRON

$$W = (3 \times W_o) + 0.4 \times L_a = 11.97 \text{ FEET}$$

USE 12.0 FEET

RIPRAP SIZE

$$D_{(50)} = \frac{0.016}{Tw} q^{4/3} = 0.48 \text{ INCHES}$$

USE 6.0 INCHES

APRON THICKNESS

$$\begin{aligned} T &= 2 \times D(50) \text{ w/ FILTER FABRIC} & T &= 3 \times D(50) \\ &= 1.00 \text{ FEET} & &= 1.50 \text{ FEET} \end{aligned}$$

USE X USE 0.00

RIP RAP QUANTITY

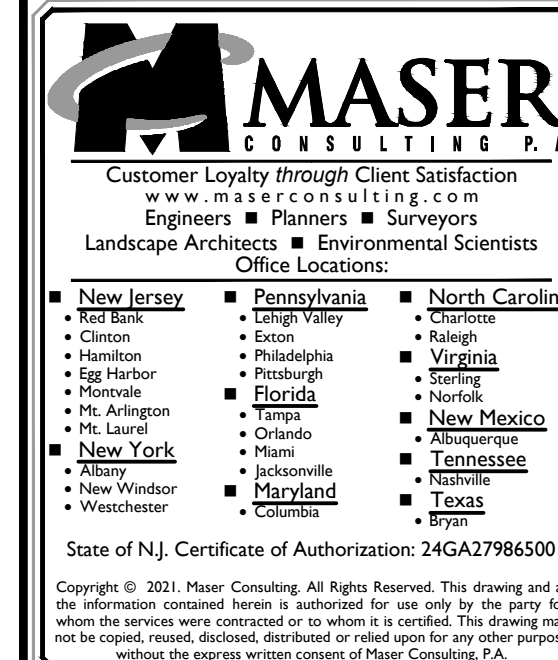
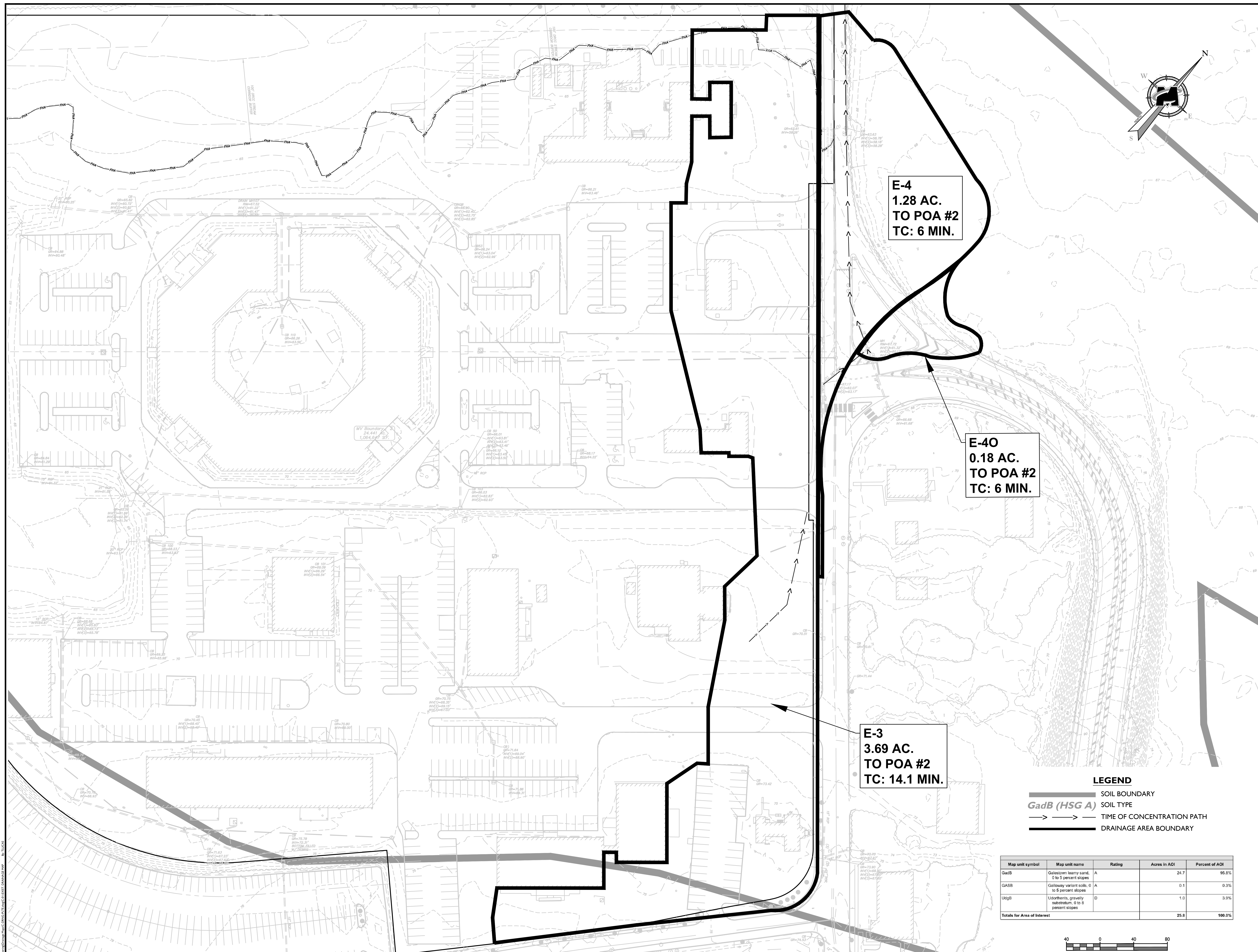
$$\text{VOLUME} = \frac{(1/2)(3W_o + W)(L_a)(T)}{27} =$$

3 CUBIC YARDS 5 CUBIC YARDS



APPENDIX D

DRAINAGE AREA MAPS

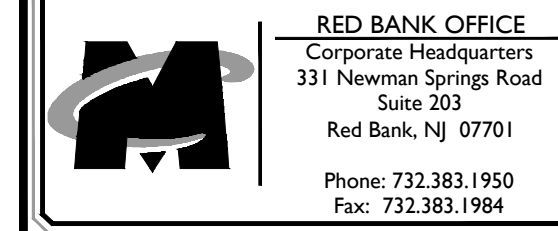
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PRELIMINARY AND FINAL MAJOR SITE PLAN

FOR
AVALON
WEST WINDSOR

BLOCK 6
LOTS 8, 54, 55 AND 76

TOWNSHIP OF WEST
WINDSOR
MERCER COUNTY
NEW JERSEY

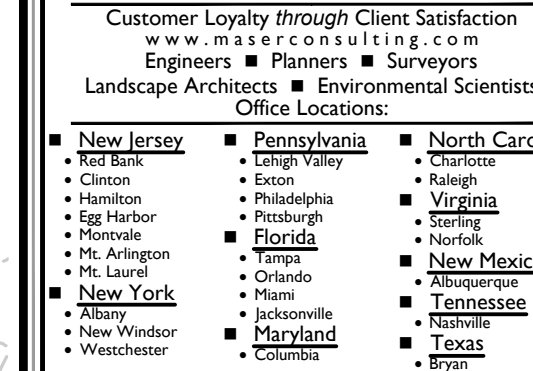


SCALE: AS SHOWN	DATE: 11/22/2021	DRAWN BY: TL	CHECKED BY: JBB
PROJECT NUMBER: 16000081A		DRAWING NAME: C-DRNG-PLTE	

SHEET TITLE:

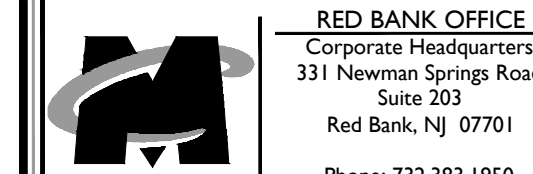
EXISTING TEMPORARY
DRAINAGE MAP

SHEET NUMBER:
1 of 2

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FOR
AVALON
WEST WINDSOR

TOWNSHIP OF WEST
WINDSOR
MERCER COUNTY
NEW JERSEY



SCALE: AS SHOWN	DATE: 11/22/2021	DRAWN BY: TL	CHECKED JBB
PROJECT NUMBER: 16000081A		DRAWING NAME: C-DRNG-PLTE	

SHEET TITLE:

PROPOSED TEMPORARY
DRAINAGE MAP

SHEET NUMBER:
2 of 2

