Nelson Engineering Associates, Inc.

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Drainage Study

Pink Balloon, LLC

3536 Route 66
Tax Block 3601, Tax Lot 4
Township of Neptune
Monmouth County
New Jersey

Date:

November 17, 2023

Prepared By:

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Matthew R. DuBois, PE
File Number: 230205

Table of Contents

Introduction and Executive Summary:

The property at 3536 Route 66, Neptune, currently contains a one story commercial building, circular driveway and parking area on a 0.90 acre parcel known as Lot 4 in Block 3601. It is proposed to keep part of the existing foundation while constructing a new one story commercial building along with a larger parking lot and stormwater management system.

The project is not considered a 'major development" by the Ordinance of Neptune. The stormwater management has therefore been designed to meet the Standards for Soil Erosion and Sediment Control in New Jersey. The stormwater from the proposed building and the majority of the pavement area is directed to a subsurface basin to the rear of the building. The system is designed to reduce the peak rate of discharge and the total volume of stormwater leaving the property.

Applicability of Stormwater Regulations:

"Major Development" is defined in the ordinance as "Any 'development' that provides for ultimately disturbing one (1) or more acres of land or increasing regulated impervious surfaces and/or regulated motor vehicle surfaces by one-quarter (1/4) acre or more. The project as a whole proposes to disturb less than one acre including grading, clearing, driveways, utility connections, and construction of the stormwater management measures. The overall impervious cover is also only increased by 0.19 acres. Therefore the project is not a "Major Development" and will comply with the Standards for Soil Erosion and Sediment Control in New Jersey.

Stormwater Summary:

The following summarizes the stormwater runoff leaving the site, generated by both the existing pre-construction and the post-development conditions. Stormwater runoff is calculated using the NRCS method, with weighted CN values from TR-55 for hydrologic "A" type soils, the NOAA Atlas 14 curve D storm, and the precipitation values for Monmouth County, NJ.

Existing Runoff

	North Subwatershed		South Subwatershed	
	Peak Rate (cfs)	Total Volume (ft^3)	Peak Rate (cfs)	Total Volume (ft^3)
2 Year Storm	0.37	1,372	0.47	2,399
10 Year Storm	0.58	2,256	0.73	3,852
100 Year Storm	1.12	4,304	1.32	7,944

Proposed Runoff

	North Subwatershed		South Subwatershed	
	Peak Rate (cfs)	Total Volume (ft^3)	Peak Rate (cfs)	Total Volume (ft^3)
2 Year Storm	0.16	573	0	0
10 Year Storm	0.24	1,015	0.10	706
100 Year Storm	0.59	2,265	0.71	4,669

Compliance with the Standard for Off-Site Stability:

Point of Discharge Stability:

The Standard for Off-Site Stability provides several methods for demonstrating stability at the point of discharge. Method "1.a" states, where there is not a well defined waterway below the point of discharge, stability can be demonstrated by retaining pre-development runoff characteristics, specifically by not increasing the rate of runoff from the development. The project reduces the post construction peak rate of runoff to below existing levels for the 2 and 10 year storm events, while neglecting infiltration and assuming the basin is already filled to the lowest positive outlet. Additionally, a scour hole is designed to dissipate the energy from the system's discharge.

Failure Analysis Runoff

	North Subwatershed		South Subwatershed	
	Peak Rate (cfs)	Total Volume (ft^3)	Peak Rate (cfs)	Total Volume (ft^3)
2 Year Storm	0.16	573	0.32	5,354
10 Year Storm	0.24	1,015	0.70	8,589

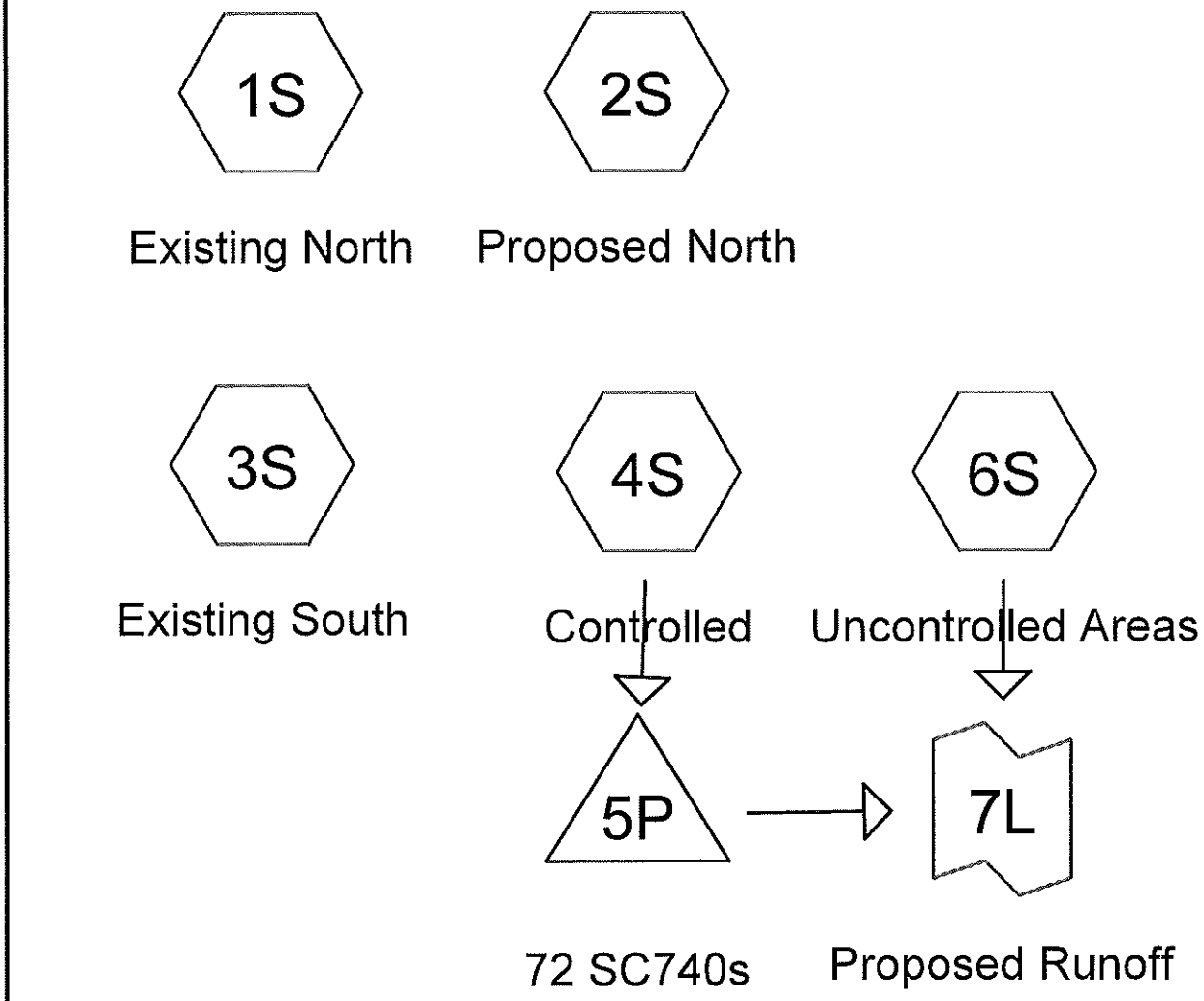
Downstream of Point of Discharge Stability (Off-Site Stability):

In lieu of performing a comprehensive watershed analysis, compliance with the standard for off-site stability downstream of the point of discharge can be demonstrated by reducing peak flows to 50% and 75% of existing levels for the 2 and 10 year storm events. The stormwater management system as designed meets these reduction thresholds, therefore there should be no negative effect to the areas downstream of the property as a result of the proposed construction. Infiltration is permitted for this analysis and the results are summarized above in the Proposed Runoff summary table.

Conclusion:

The project meets the requirements of the Township of Neptune and the Standards for Soil Erosion and Sediment Control in New Jersey by reducing the peak rate and total volume of stormwater runoff leaving the property as compared to the existing condition.

Hydrographs



Subcat Reach Pond Link

Routing Diagram for 230205 Drainage
Prepared by Nelson Engineering Associates, Printed 11/17/2023
HydroCAD® 10.20-2g s/n 12606 © 2022 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Existing North

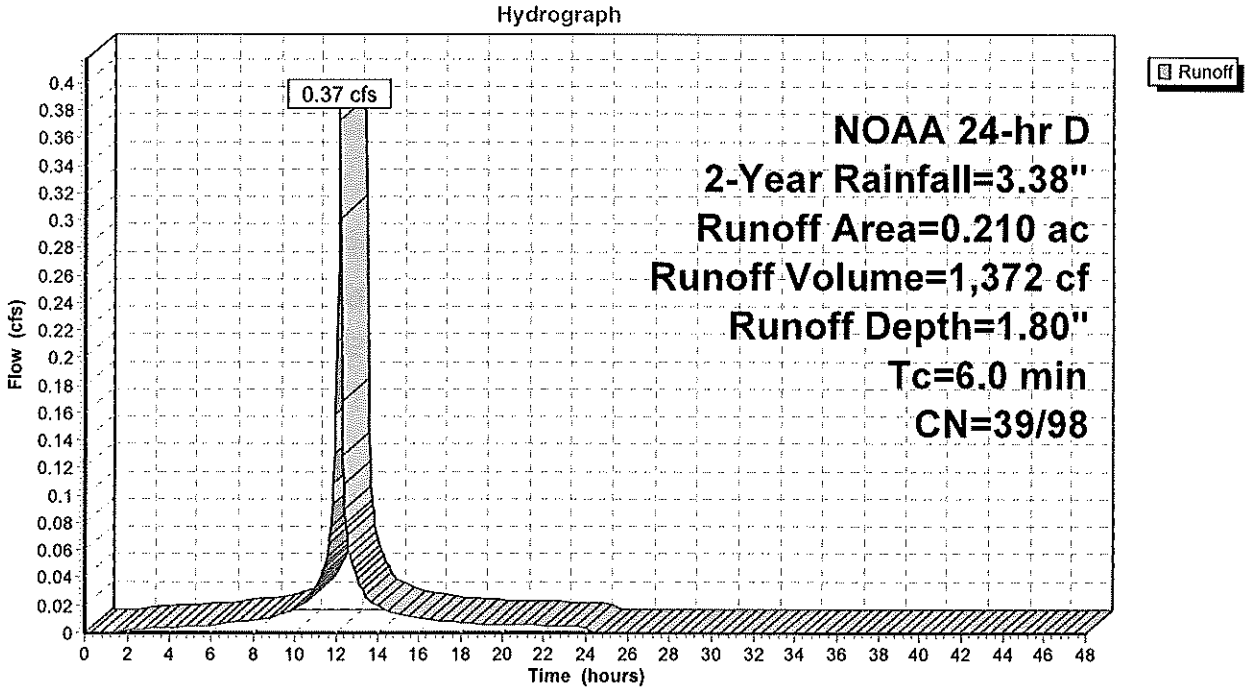
Runoff = 0.37 cfs @ 12.13 hrs, Volume= 1,372 cf, Depth= 1.80"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.120	98	Paved parking, HSG A
0.090	39	>75% Grass cover, Good, HSG A
0.210	73	Weighted Average
0.090	39	42.86% Pervious Area
0.120	98	57.14% Impervious Area

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

Subcatchment 1S: Existing North



Summary for Subcatchment 2S: Proposed North

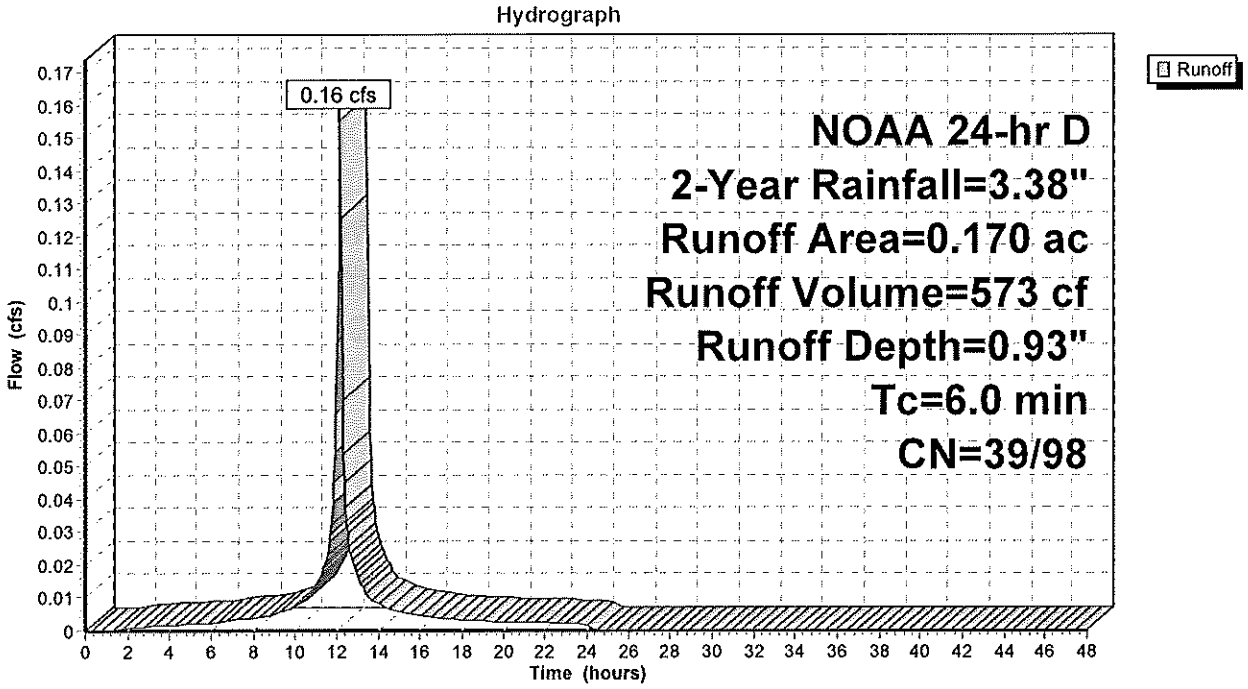
Runoff = 0.16 cfs @ 12.13 hrs, Volume= 573 cf, Depth= 0.93"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.050	98	Paved parking, HSG A
0.120	39	>75% Grass cover, Good, HSG A
0.170	56	Weighted Average
0.120	39	70.59% Pervious Area
0.050	98	29.41% Impervious Area

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

Subcatchment 2S: Proposed North



Summary for Subcatchment 3S: Existing South

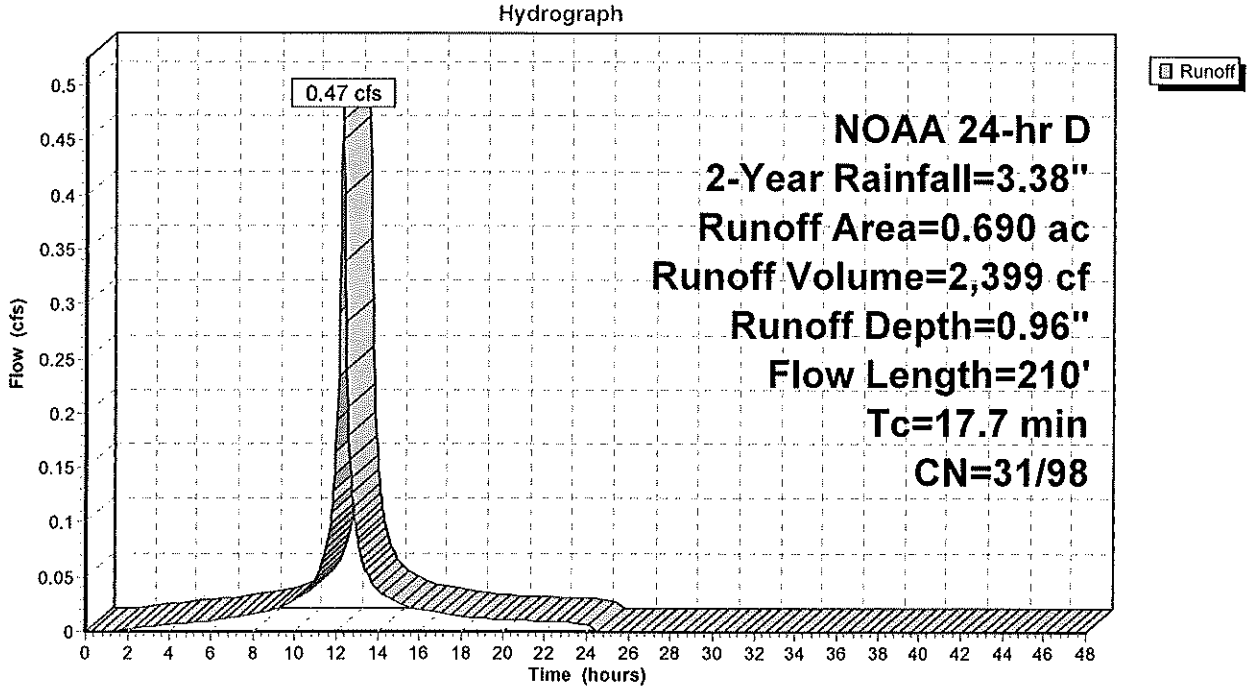
Runoff = 0.47 cfs @ 12.26 hrs, Volume= 2,399 cf, Depth= 0.96"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.210	98	Paved parking, HSG A
0.050	39	>75% Grass cover, Good, HSG A
0.430	30	Woods, Good, HSG A
0.690	51	Weighted Average
0.480	31	69.57% Pervious Area
0.210	98	30.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0330	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.6	110	0.0360	3.05		**Shallow Concentrated Flow, Shallow Concentrated** Unpaved Kv= 16.1 fps
17.7	210	Total			

Subcatchment 3S: Existing South



Summary for Subcatchment 4S: Controlled

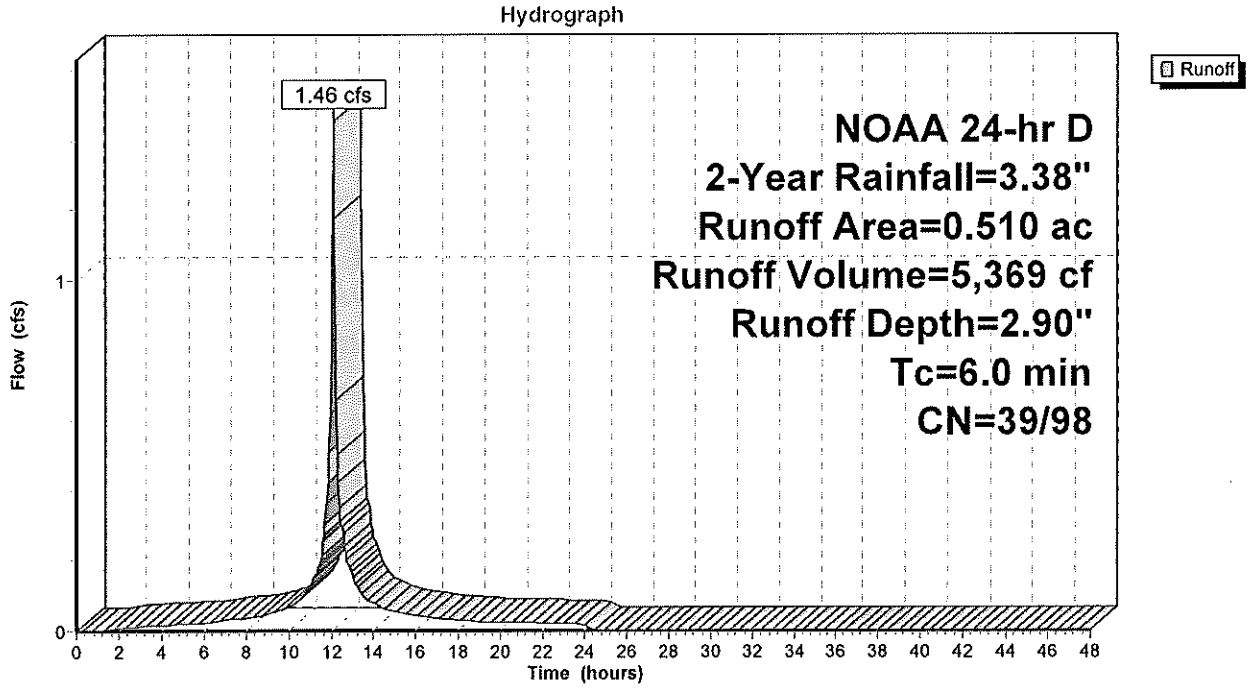
Runoff = 1.46 cfs @ 12.13 hrs, Volume= 5,369 cf, Depth= 2.90"
Routed to Pond 5P : 72 SC740s

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.470	98	Paved parking, HSG A
0.040	39	>75% Grass cover, Good, HSG A
0.510	93	Weighted Average
0.040	39	7.84% Pervious Area
0.470	98	92.16% Impervious Area

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

Subcatchment 4S: Controlled



Summary for Pond 5P: 72 SC740s

Inflow Area = 22,216 sf, 92.16% Impervious, Inflow Depth = 2.90" for 2-Year event
Inflow = 1.46 cfs @ 12.13 hrs, Volume= 5,369 cf
Outflow = 0.16 cfs @ 12.97 hrs, Volume= 5,369 cf, Atten= 89%, Lag= 50.5 min
Discarded = 0.16 cfs @ 12.97 hrs, Volume= 5,369 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Link 7L : Proposed Runoff

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 90.84'@ 12.97 hrs Surf.Area= 0.057 ac Storage= 0.040 af

Plug-Flow detention time=78.6 min calculated for 5,369 cf (100% of inflow)
Center-of-Mass det. time=78.5 min (835.7 - 757.2)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.71'	0.053 af	**77.50'W x 32.10'L x 3.50'H Field A** 0.200 af Overall - 0.067 af Embedded= 0.132 af x 40.0% Voids
#2A	90.21'	0.067 af	**ADS_StormTech SC-740 +Cap** x 64 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 64 Chambers in 16 Rows
		0.120 af	Total Available Storage

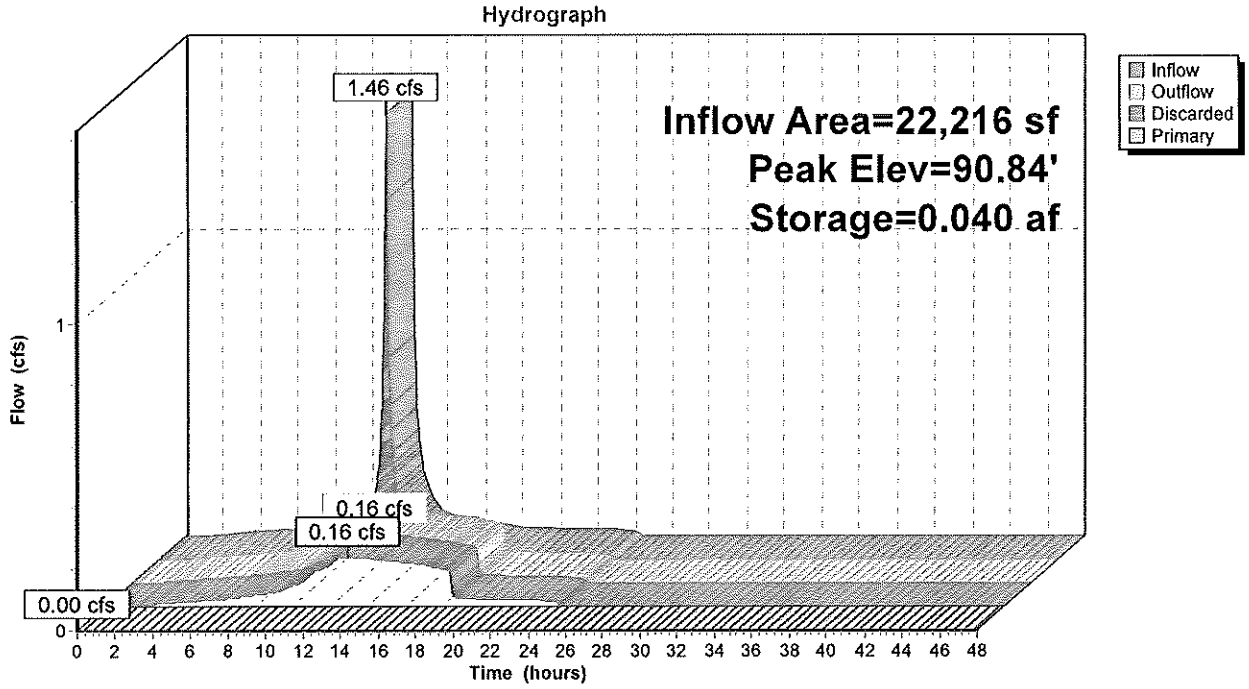
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#0	Primary	93.21'	**Automatic Storage Overflow**(Discharged without head)
#1	Discarded	89.71'	**2.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 85.80'
#2	Primary	91.06'	**12.0" Round RCP_Round 12"** L= 12.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 91.06' / 91.00' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#3	Device 2	91.06'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	92.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	93.15'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.16 cfs @ 12.97 hrs HW=90.84' (Free Discharge)
└**1=Exfiltration** (Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=89.71' (Free Discharge)
└**2=RCP_Round 12"**(Controls 0.00 cfs)
  ├**3=Orifice/Grate**(Controls 0.00 cfs)
  ├**4=Orifice/Grate**(Controls 0.00 cfs)
  └**5=Sharp-Crested Rectangular Weir**(Controls 0.00 cfs)

Pond 5P: 72 SC740s



Summary for Subcatchment 6S: Uncontrolled Areas

[45] Hint: Runoff=Zero

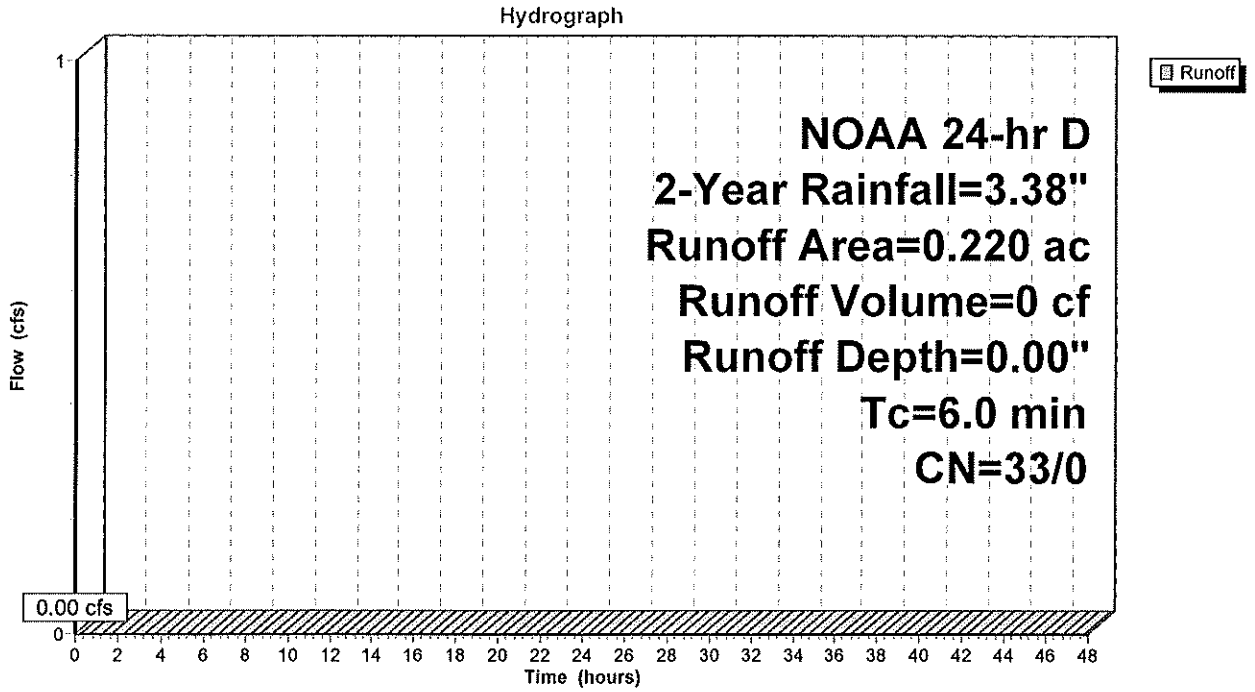
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Link 7L : Proposed Runoff

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
0.150	30	Woods, Good, HSG A
0.220	33	Weighted Average
0.220	33	100.00% Pervious Area

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

Subcatchment 6S: Uncontrolled Areas

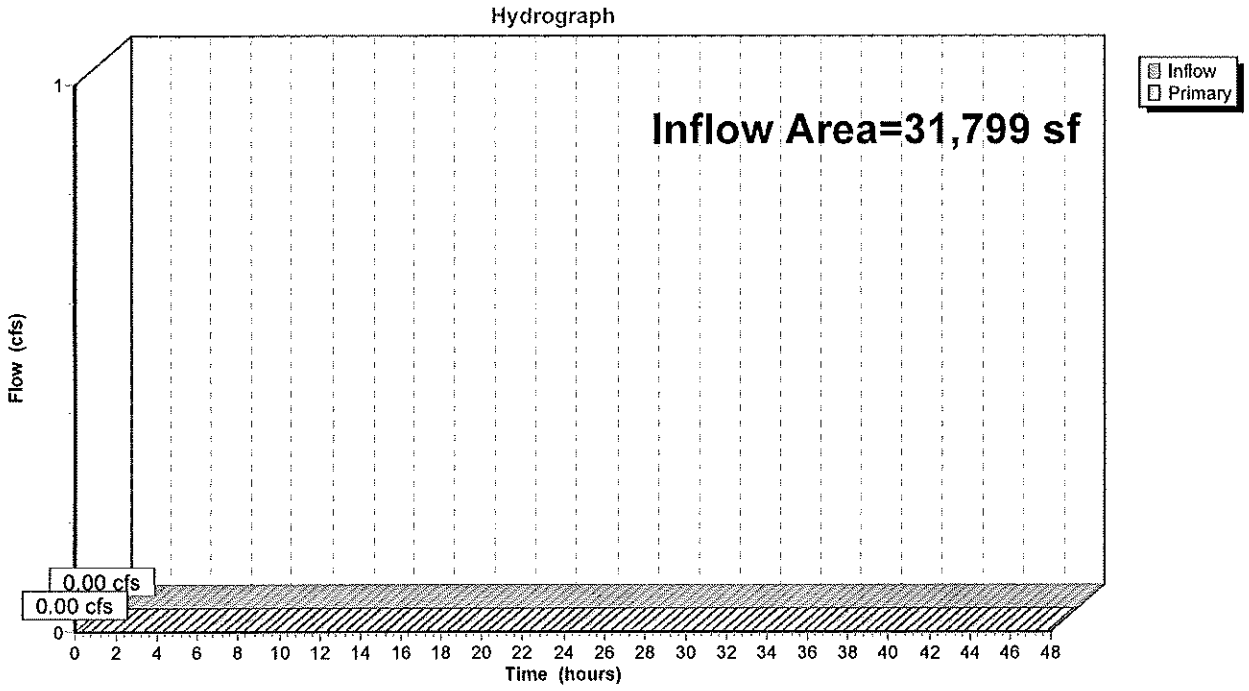


Summary for Link 7L: Proposed Runoff

Inflow Area = 31,799 sf, 64.38% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 7L: Proposed Runoff



Summary for Subcatchment 1S: Existing North

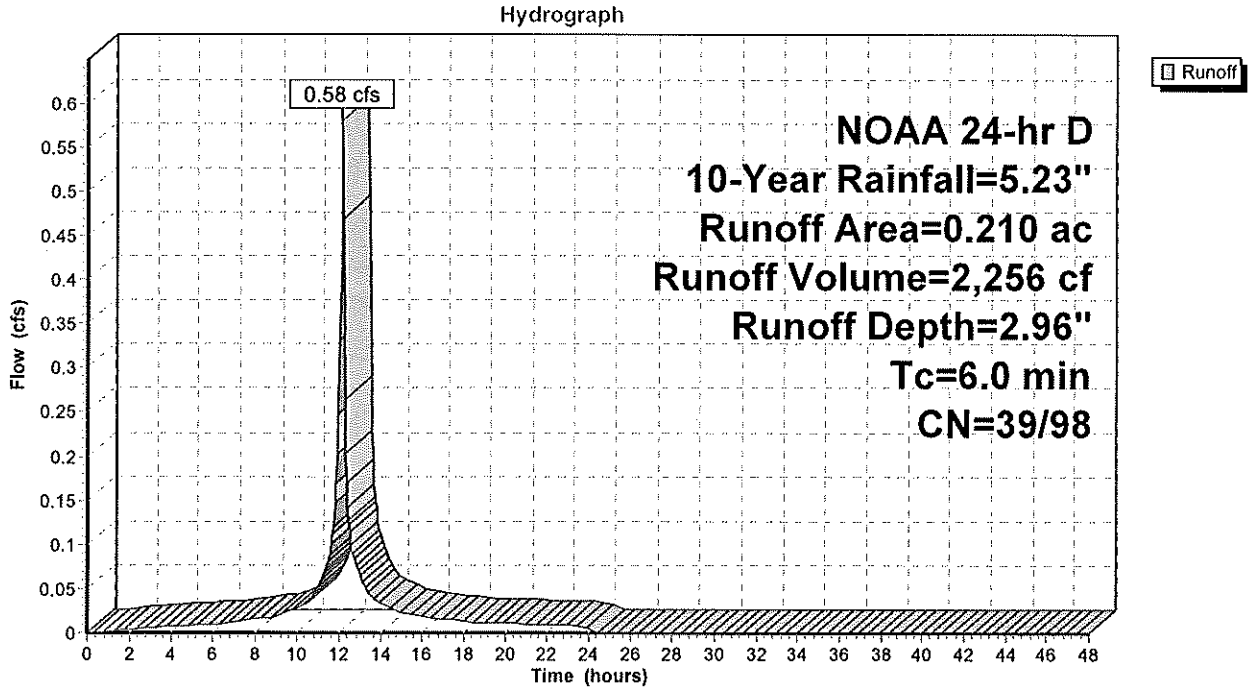
Runoff = 0.58 cfs @ 12.13 hrs, Volume= 2,256 cf, Depth= 2.96"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.120	98	Paved parking, HSG A
0.090	39	>75% Grass cover, Good, HSG A
0.210	73	Weighted Average
0.090	39	42.86% Pervious Area
0.120	98	57.14% Impervious Area

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

Subcatchment 1S: Existing North



Summary for Subcatchment 2S: Proposed North

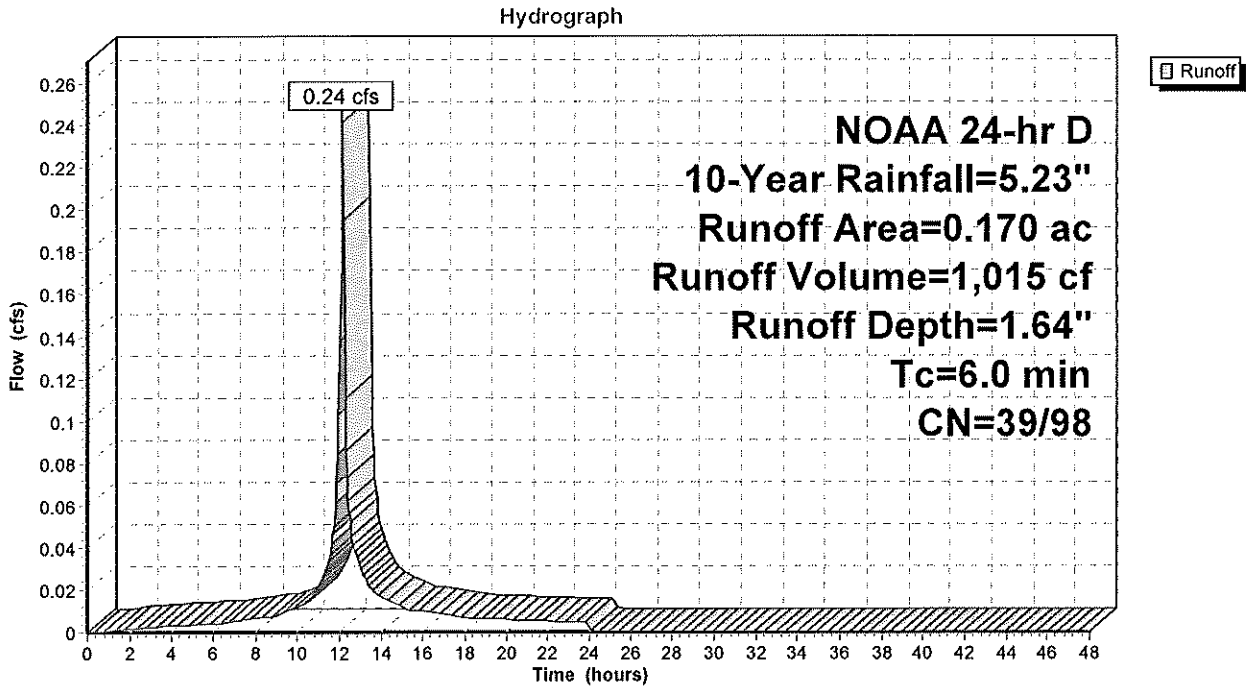
Runoff = 0.24 cfs @ 12.13 hrs, Volume= 1,015 cf, Depth= 1.64"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.050	98	Paved parking, HSG A
0.120	39	>75% Grass cover, Good, HSG A
0.170	56	Weighted Average
0.120	39	70.59% Pervious Area
0.050	98	29.41% Impervious Area

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

Subcatchment 2S: Proposed North



Summary for Subcatchment 3S: Existing South

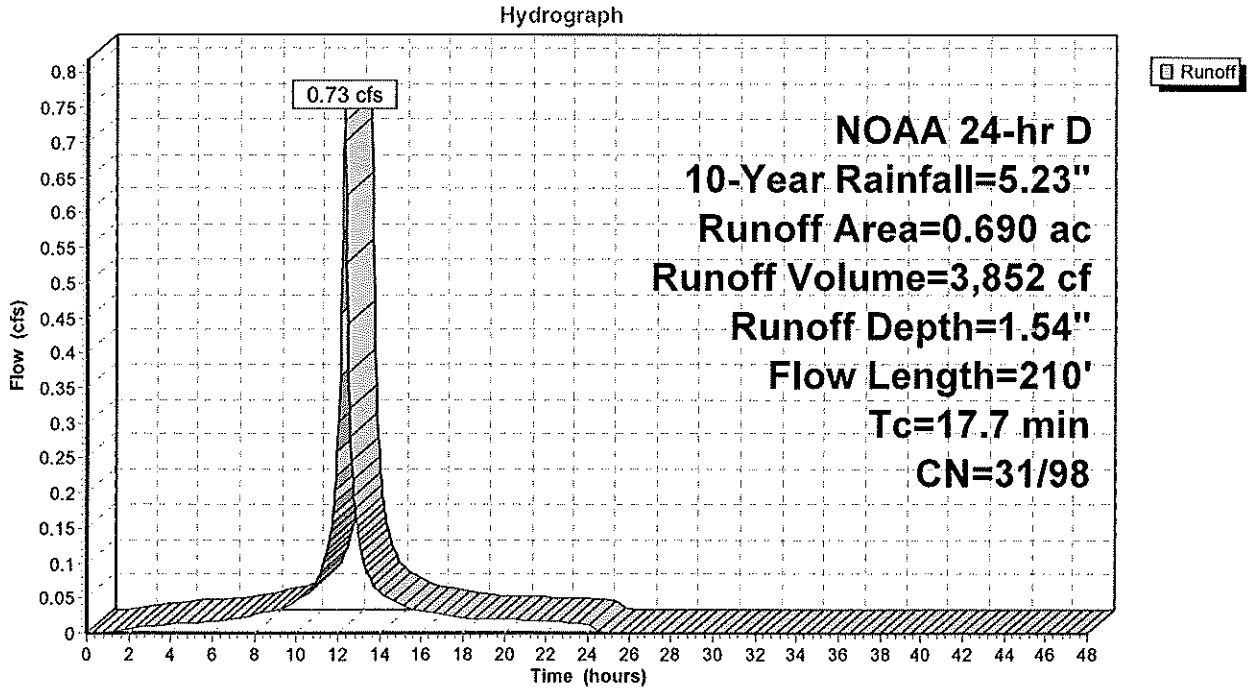
Runoff = 0.73 cfs @ 12.26 hrs, Volume= 3,852 cf, Depth= 1.54"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.210	98	Paved parking, HSG A
0.050	39	>75% Grass cover, Good, HSG A
0.430	30	Woods, Good, HSG A
0.690	51	Weighted Average
0.480	31	69.57% Pervious Area
0.210	98	30.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0330	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.6	110	0.0360	3.05		**Shallow Concentrated Flow, Shallow Concentrated** Unpaved Kv= 16.1 fps
17.7	210	Total			

Subcatchment 3S: Existing South



Summary for Subcatchment 4S: Controlled

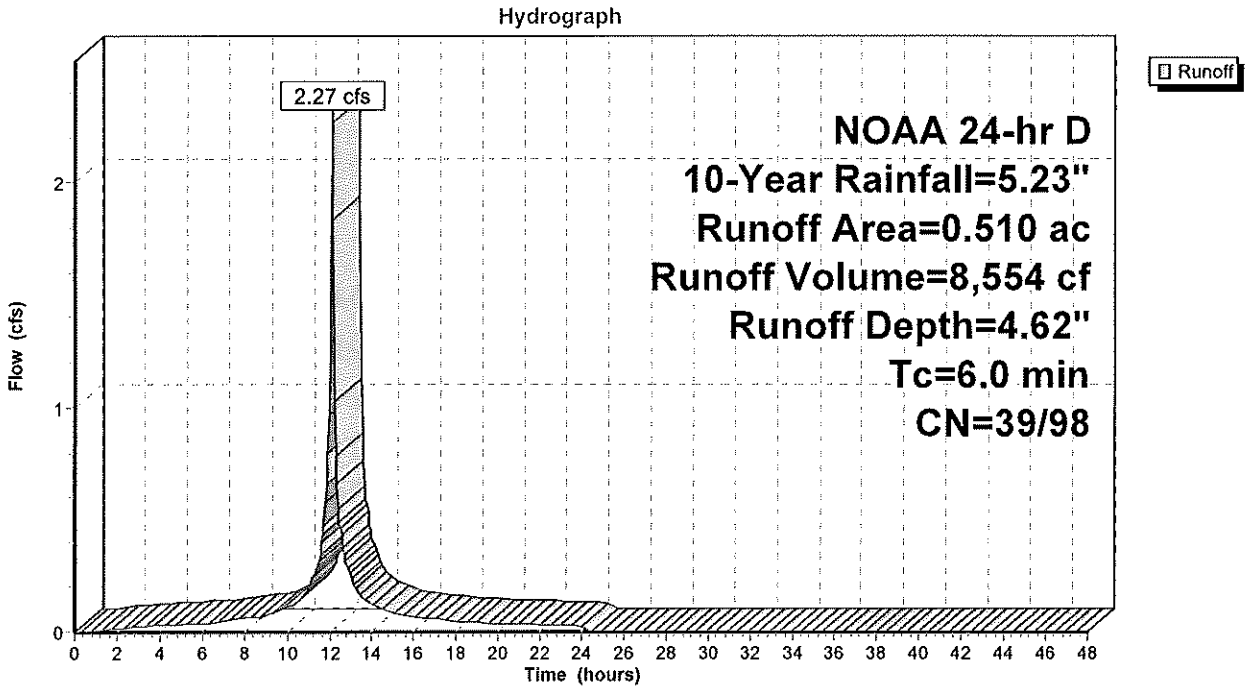
Runoff = 2.27 cfs @ 12.13 hrs, Volume= 8,554 cf, Depth= 4.62"
Routed to Pond 5P : 72 SC740s

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.470	98	Paved parking, HSG A
0.040	39	>75% Grass cover, Good, HSG A
0.510	93	Weighted Average
0.040	39	7.84% Pervious Area
0.470	98	92.16% Impervious Area

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

Subcatchment 4S: Controlled



Summary for Pond 5P: 72 SC740s

Inflow Area = 22,216 sf, 92.16% Impervious, Inflow Depth = 4.62" for 10-Year event
Inflow = 2.27 cfs @ 12.13 hrs, Volume= 8,554 cf
Outflow = 0.29 cfs @ 12.83 hrs, Volume= 8,554 cf, Atten= 87%, Lag= 42.2 min
Discarded = 0.19 cfs @ 12.83 hrs, Volume= 7,899 cf
Primary = 0.10 cfs @ 12.83 hrs, Volume= 655 cf
Routed to Link 7L : Proposed Runoff

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 91.51' @ 12.83 hrs Surf.Area= 0.057 ac Storage= 0.069 af

Plug-Flow detention time= 110.0 min calculated for 8,546 cf (100% of inflow)
Center-of-Mass det. time= 109.9 min (859.5 - 749.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.71'	0.053 af	**77.50'W x 32.10'L x 3.50'H Field A** 0.200 af Overall - 0.067 af Embedded = 0.132 af x 40.0% Voids
#2A	90.21'	0.067 af	**ADS_StormTech SC-740 +Cap** x 64 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 64 Chambers in 16 Rows
		0.120 af	Total Available Storage

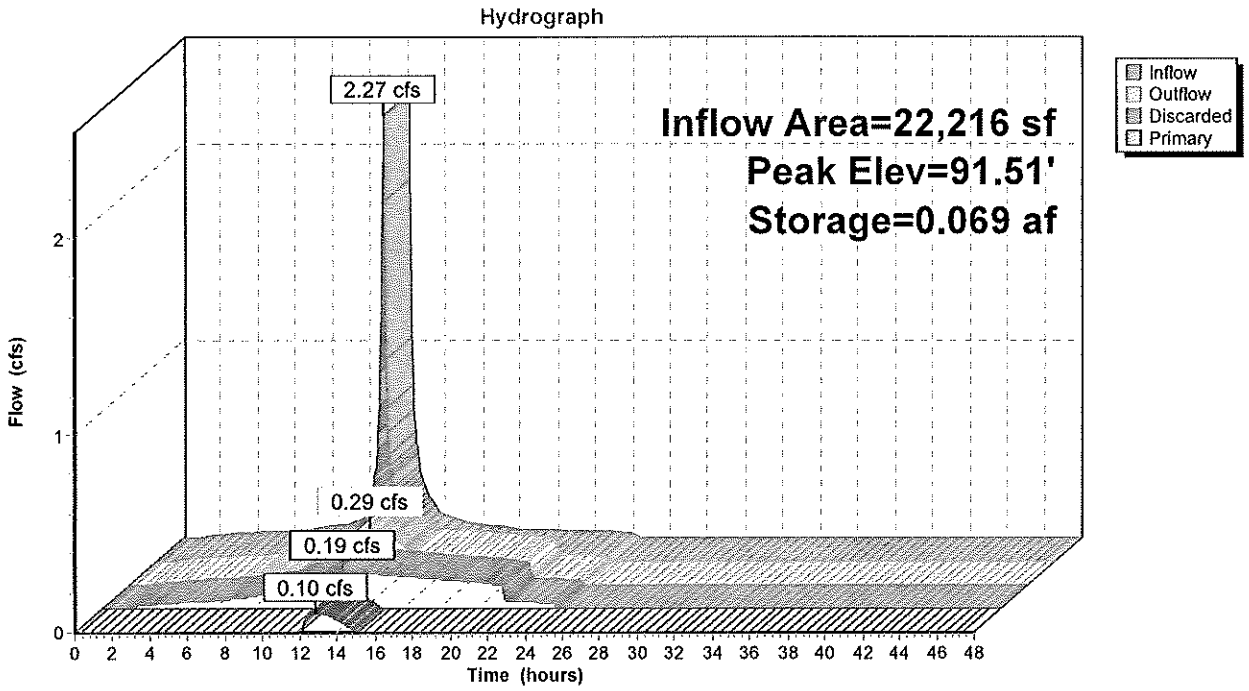
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#0	Primary	93.21'	**Automatic Storage Overflow**(Discharged without head)
#1	Discarded	89.71'	**2.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 85.80'
#2	Primary	91.06'	**12.0" Round RCP_Round 12"** L= 12.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 91.06' / 91.00' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#3	Device 2	91.06'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	92.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	93.15'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.19 cfs @ 12.83 hrs HW=91.51' (Free Discharge)
└**1=Exfiltration** (Controls 0.19 cfs)

Primary OutFlow Max=0.10 cfs @ 12.83 hrs HW=91.51' (Free Discharge)
└**2=RCP_Round 12"** (Passes 0.10 cfs of 0.57 cfs potential flow)
  ├**3=Orifice/Grate** (Orifice Controls 0.10 cfs @ 2.85 fps)
  ├**4=Orifice/Grate** (Controls 0.00 cfs)
  └**5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: 72 SC740s



Summary for Subcatchment 6S: Uncontrolled Areas

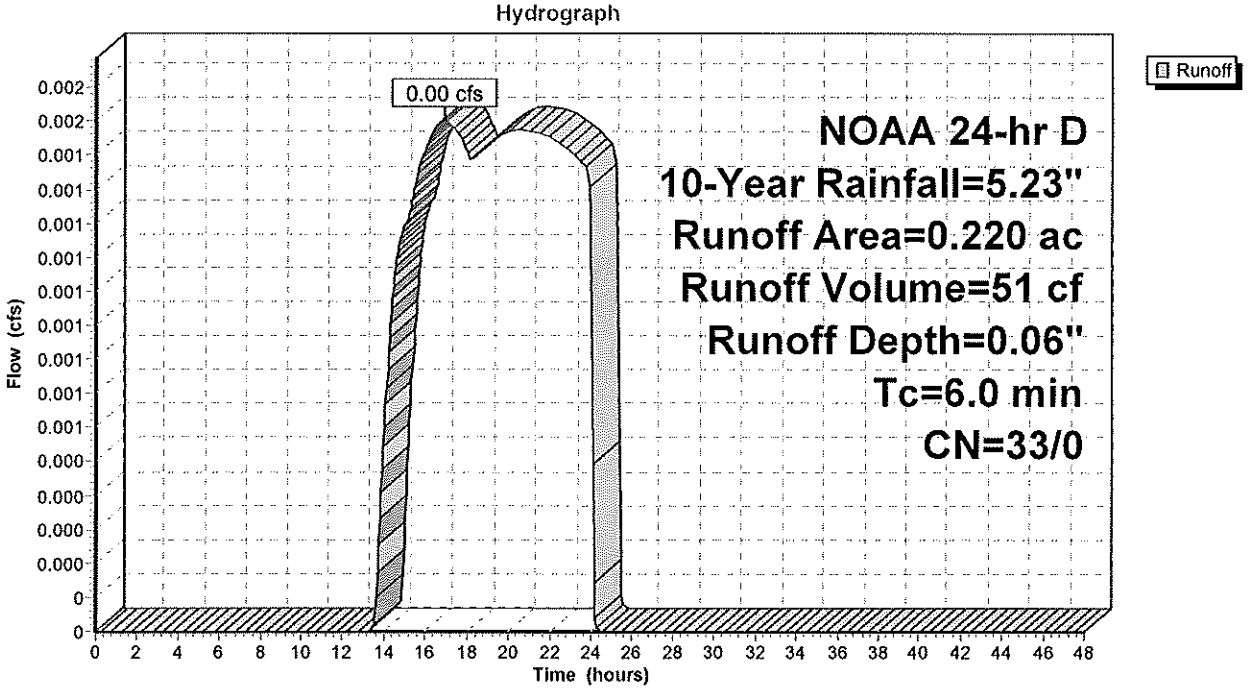
Runoff = 0.00 cfs @ 16.94 hrs, Volume= 51 cf, Depth= 0.06"
Routed to Link 7L : Proposed Runoff

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
0.150	30	Woods, Good, HSG A
0.220	33	Weighted Average
0.220	33	100.00% Pervious Area

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

Subcatchment 6S: Uncontrolled Areas

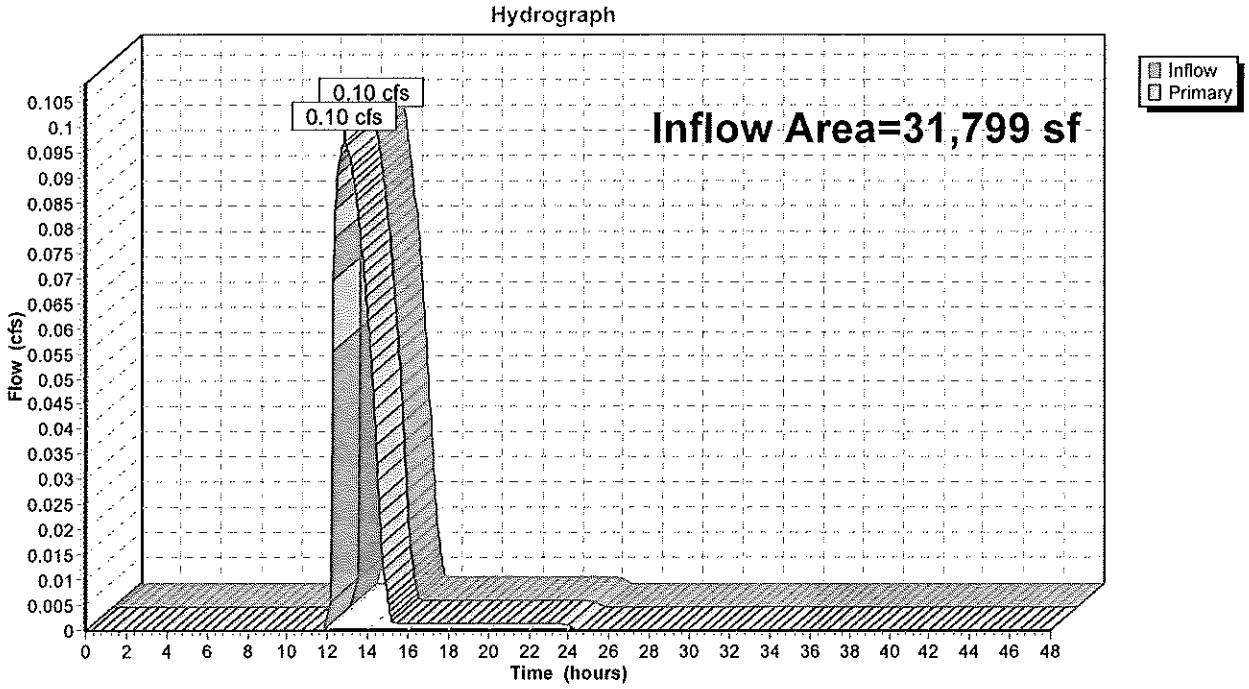


Summary for Link 7L: Proposed Runoff

Inflow Area = 31,799 sf, 64.38% Impervious, Inflow Depth = 0.27" for 10-Year event
Inflow = 0.10 cfs @ 12.83 hrs, Volume= 706 cf
Primary = 0.10 cfs @ 12.83 hrs, Volume= 706 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 7L: Proposed Runoff



Summary for Subcatchment 1S: Existing North

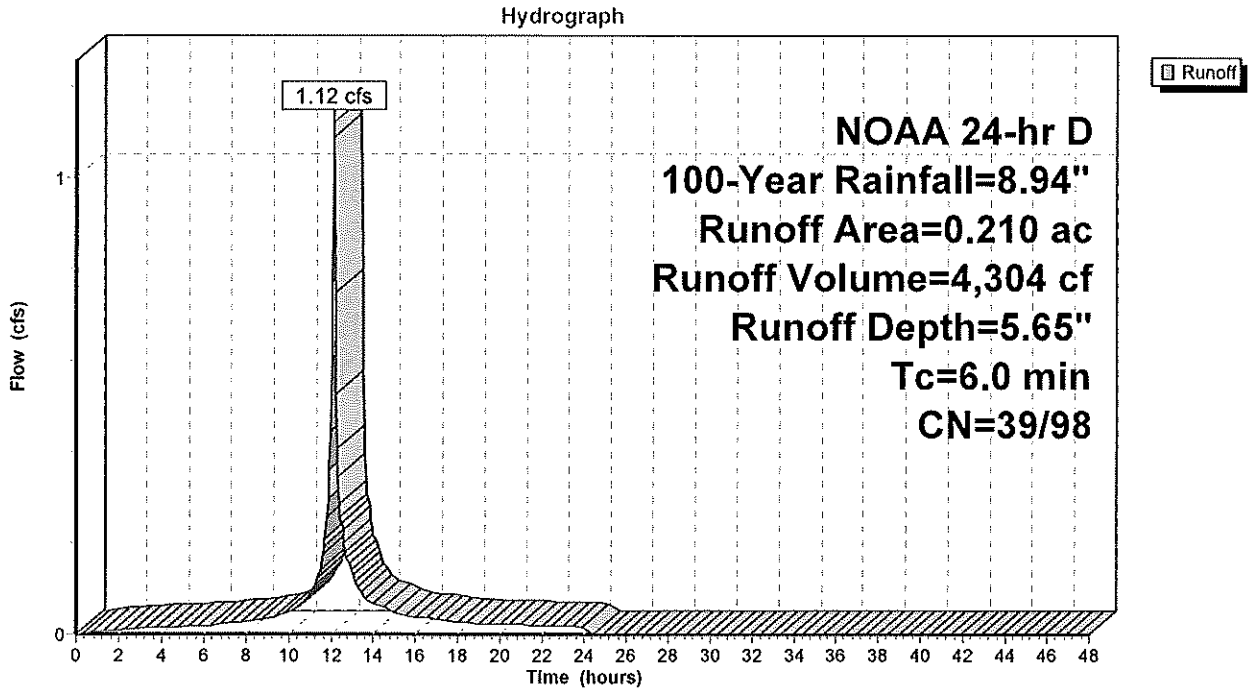
Runoff = 1.12 cfs @ 12.13 hrs, Volume= 4,304 cf, Depth= 5.65"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

Area (ac)	CN	Description
0.120	98	Paved parking, HSG A
0.090	39	>75% Grass cover, Good, HSG A
0.210	73	Weighted Average
0.090	39	42.86% Pervious Area
0.120	98	57.14% Impervious Area

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

Subcatchment 1S: Existing North



Summary for Subcatchment 2S: Proposed North

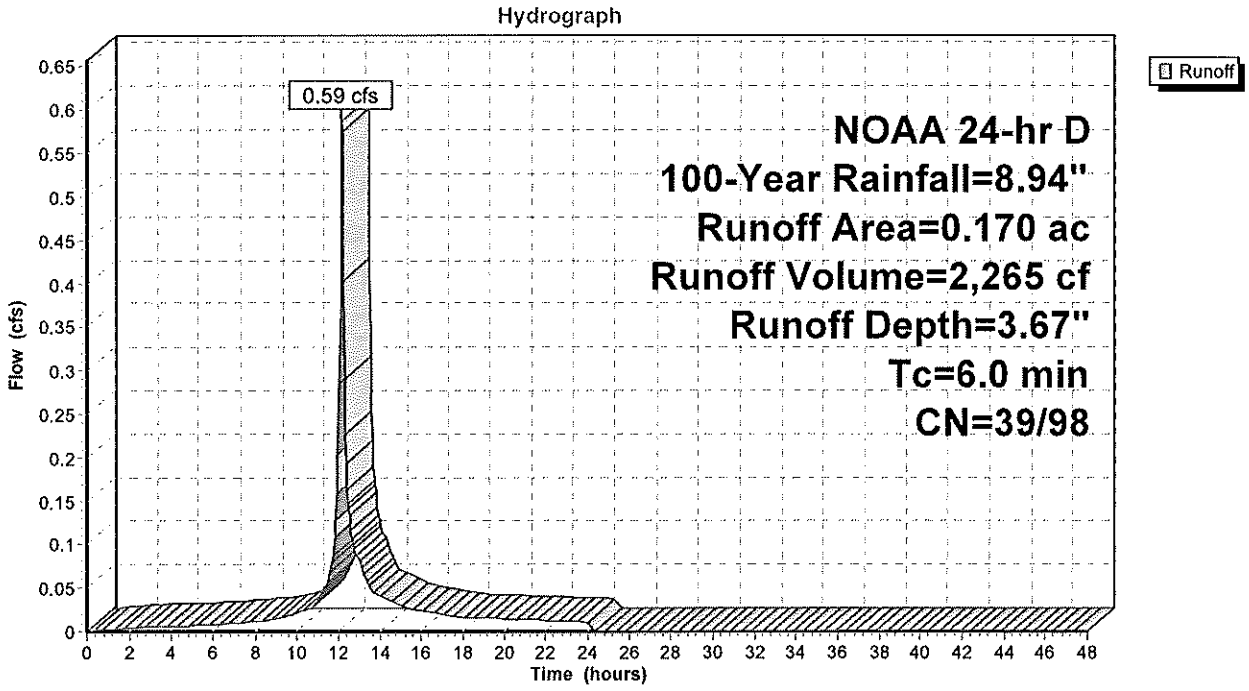
Runoff = 0.59 cfs @ 12.13 hrs, Volume= 2,265 cf, Depth= 3.67"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

Area (ac)	CN	Description
0.050	98	Paved parking, HSG A
0.120	39	>75% Grass cover, Good, HSG A
0.170	56	Weighted Average
0.120	39	70.59% Pervious Area
0.050	98	29.41% Impervious Area

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

Subcatchment 2S: Proposed North



Summary for Subcatchment 3S: Existing South

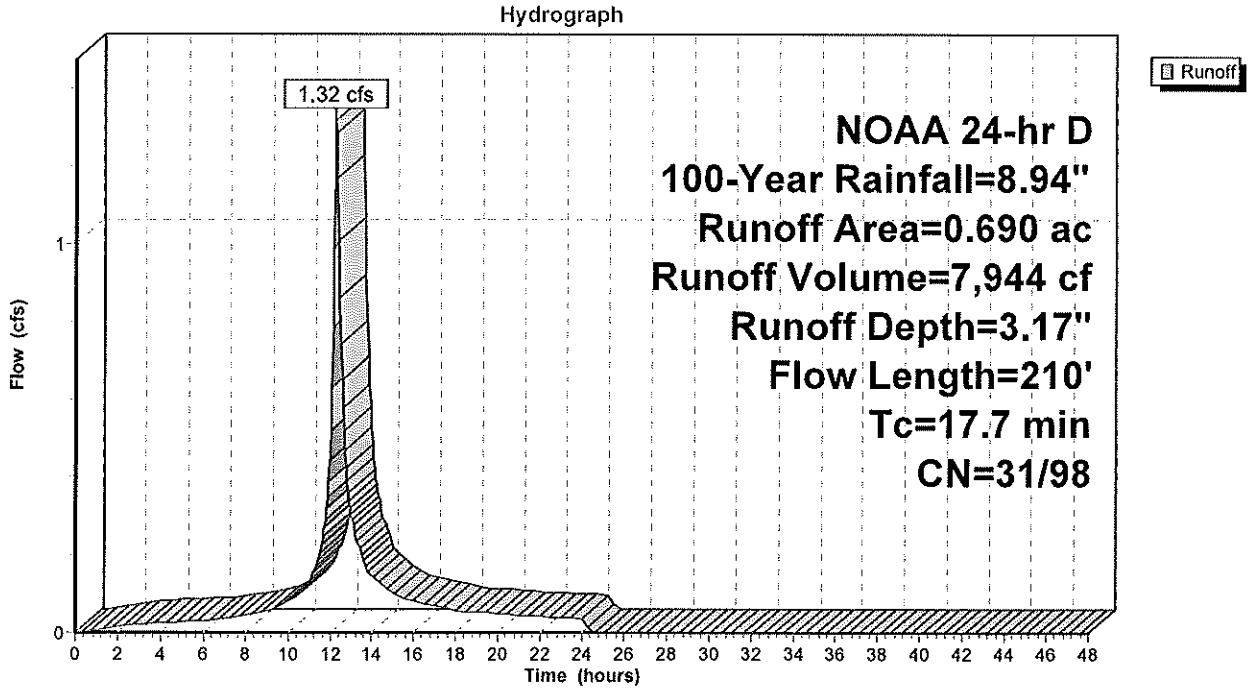
Runoff = 1.32 cfs @ 12.27 hrs, Volume= 7,944 cf, Depth= 3.17"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

Area (ac)	CN	Description
0.210	98	Paved parking, HSG A
0.050	39	>75% Grass cover, Good, HSG A
0.430	30	Woods, Good, HSG A
0.690	51	Weighted Average
0.480	31	69.57% Pervious Area
0.210	98	30.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0330	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.6	110	0.0360	3.05		**Shallow Concentrated Flow, Shallow Concentrated** Unpaved Kv= 16.1 fps
17.7	210	Total			

Subcatchment 3S: Existing South



Summary for Subcatchment 4S: Controlled

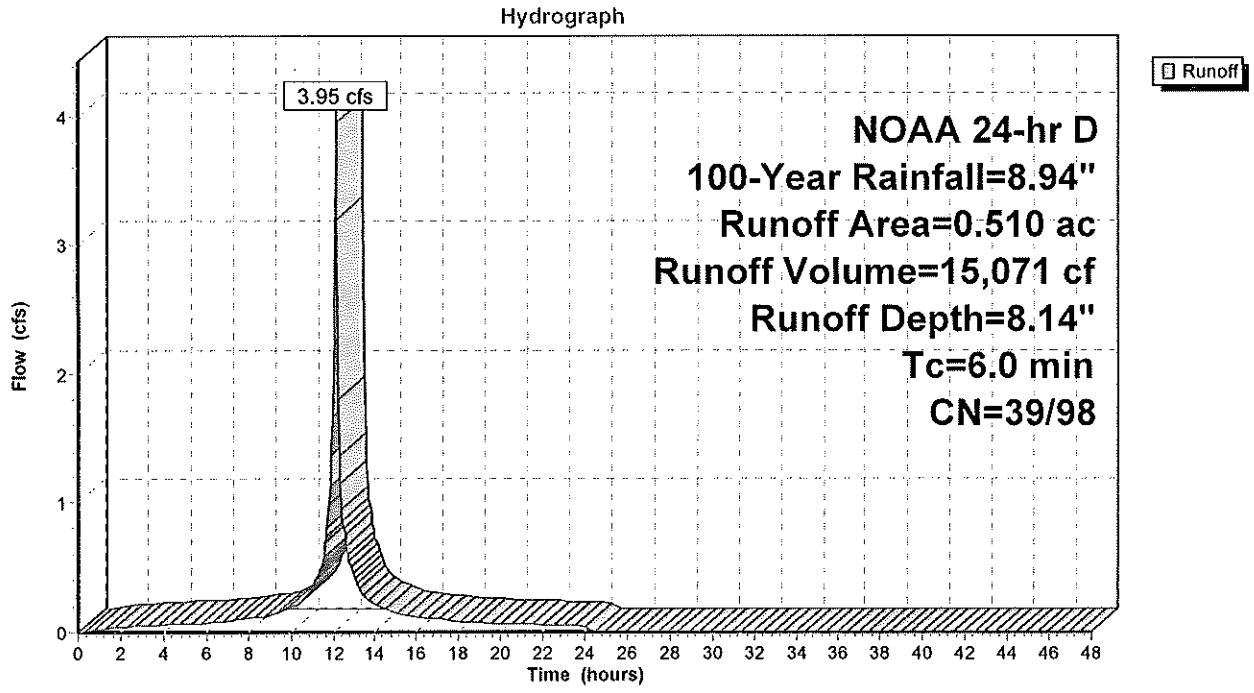
Runoff = 3.95 cfs @ 12.13 hrs, Volume= 15,071 cf, Depth= 8.14"
Routed to Pond 5P : 72 SC740s

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

Area (ac)	CN	Description
0.470	98	Paved parking, HSG A
0.040	39	>75% Grass cover, Good, HSG A
0.510	93	Weighted Average
0.040	39	7.84% Pervious Area
0.470	98	92.16% Impervious Area

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

Subcatchment 4S: Controlled



Summary for Pond 5P: 72 SC740s

Inflow Area = 22,216 sf, 92.16% Impervious, Inflow Depth = 8.14" for 100-Year event
Inflow = 3.95 cfs @ 12.13 hrs, Volume= 15,071 cf
Outflow = 0.91 cfs @ 12.42 hrs, Volume= 15,071 cf, Atten= 77%, Lag= 17.9 min
Discarded = 0.26 cfs @ 12.42 hrs, Volume= 11,157 cf
Primary = 0.65 cfs @ 12.42 hrs, Volume= 3,914 cf
Routed to Link 7L : Proposed Runoff

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 93.14' @ 12.42 hrs Surf.Area= 0.057 ac Storage= 0.119 af

Plug-Flow detention time= 114.1 min calculated for 15,071 cf (100% of inflow)
Center-of-Mass det. time= 114.1 min (857.4 - 743.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	89.71'	0.053 af	**77.50'W x 32.10'L x 3.50'H Field A** 0.200 af Overall - 0.067 af Embedded = 0.132 af x 40.0% Voids
#2A	90.21'	0.067 af	**ADS_StormTech SC-740 +Cap** x 64 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 64 Chambers in 16 Rows
		0.120 af	Total Available Storage

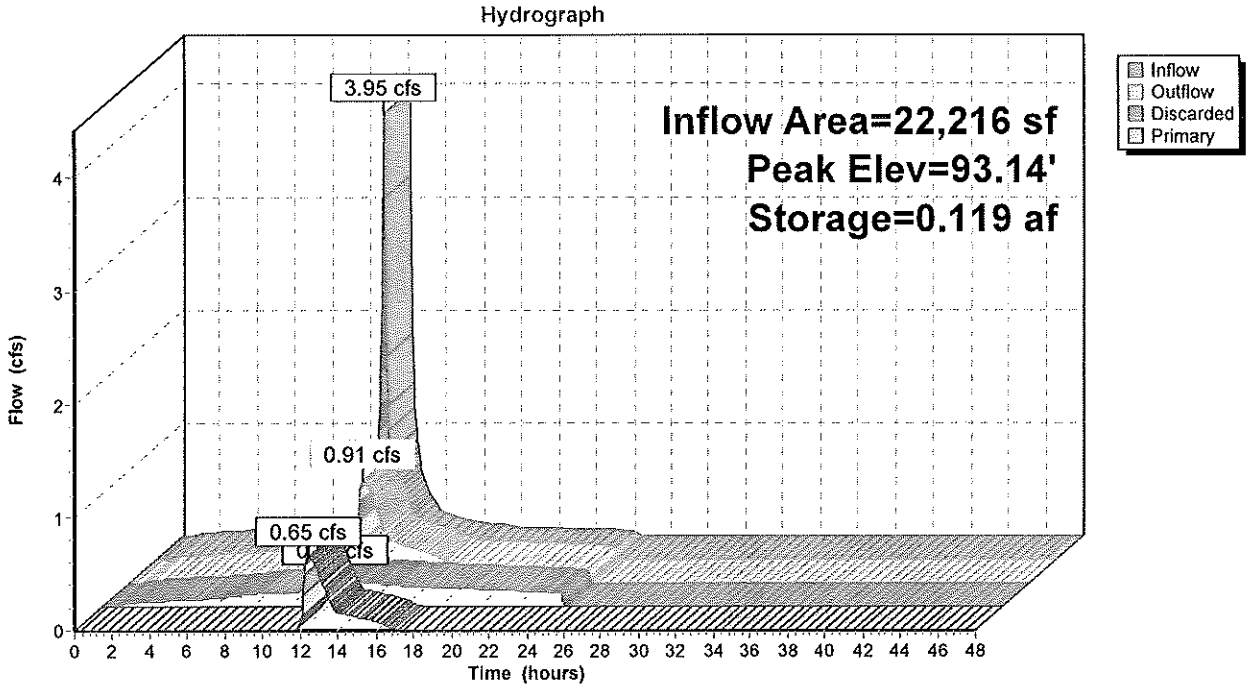
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#0	Primary	93.21'	**Automatic Storage Overflow** (Discharged without head)
#1	Discarded	89.71'	**2.000 in/hr Exfiltration over Wetted area** Conductivity to Groundwater Elevation = 85.80'
#2	Primary	91.06'	**12.0" Round RCP_Round 12"** L= 12.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 91.06' / 91.00' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#3	Device 2	91.06'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 2	92.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#5	Device 2	93.15'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Discarded OutFlow Max=0.26 cfs @ 12.42 hrs HW=93.14' (Free Discharge)
└**1=Exfiltration** (Controls 0.26 cfs)

Primary OutFlow Max=0.64 cfs @ 12.42 hrs HW=93.14' (Free Discharge)
└**2=RCP_Round 12"** (Passes 0.64 cfs of 4.75 cfs potential flow)
├**3=Orifice/Grate** (Orifice Controls 0.23 cfs @ 6.76 fps)
├**4=Orifice/Grate** (Orifice Controls 0.41 cfs @ 4.74 fps)
└**5=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: 72 SC740s



Summary for Subcatchment 6S: Uncontrolled Areas

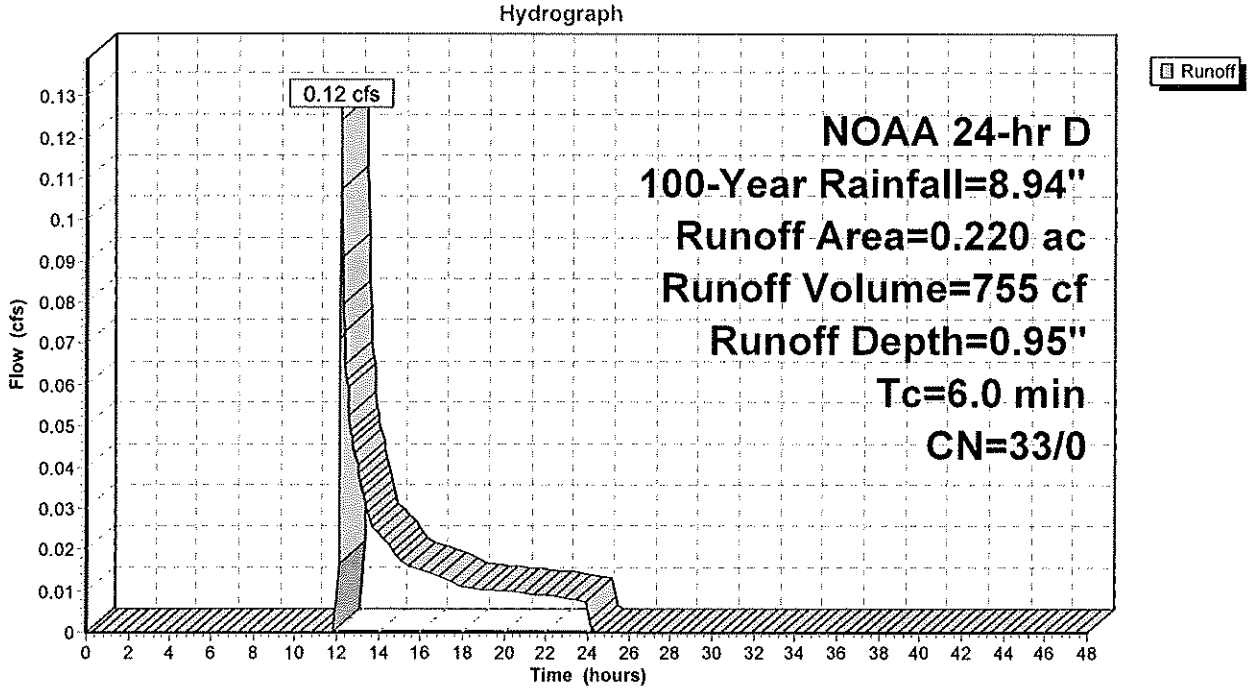
Runoff = 0.12 cfs @ 12.16 hrs, Volume= 755 cf, Depth= 0.95"
Routed to Link 7L : Proposed Runoff

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
0.150	30	Woods, Good, HSG A
0.220	33	Weighted Average
0.220	33	100.00% Pervious Area

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

Subcatchment 6S: Uncontrolled Areas

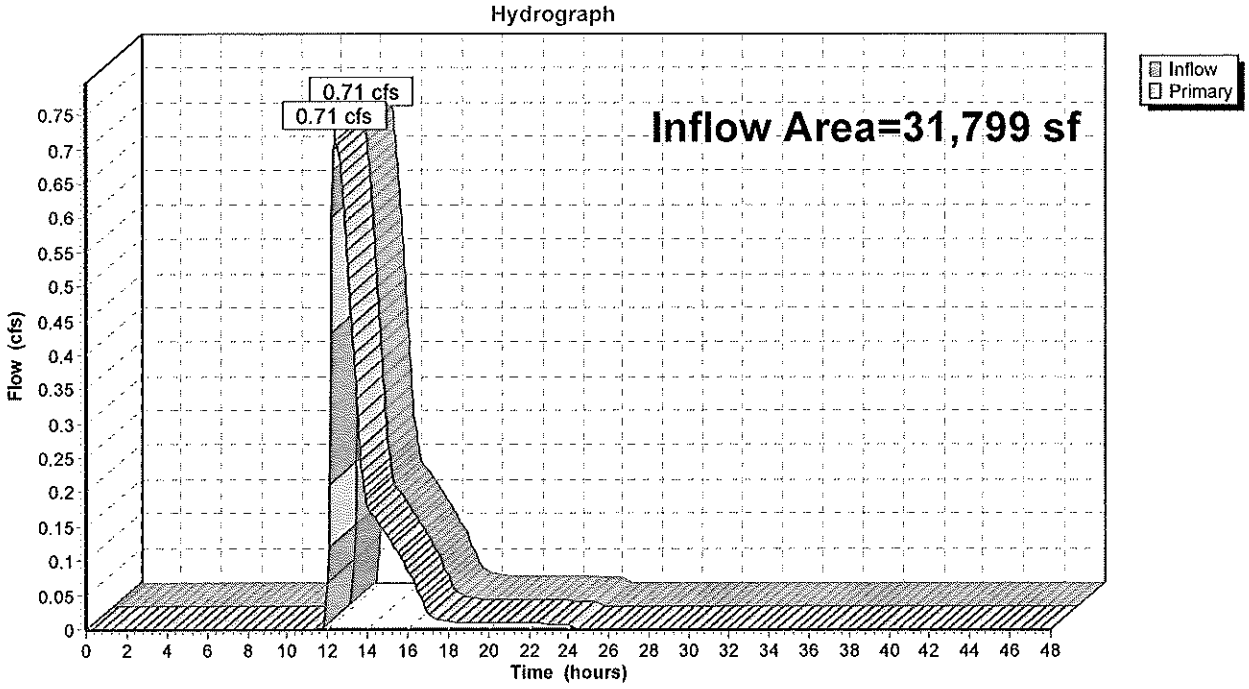


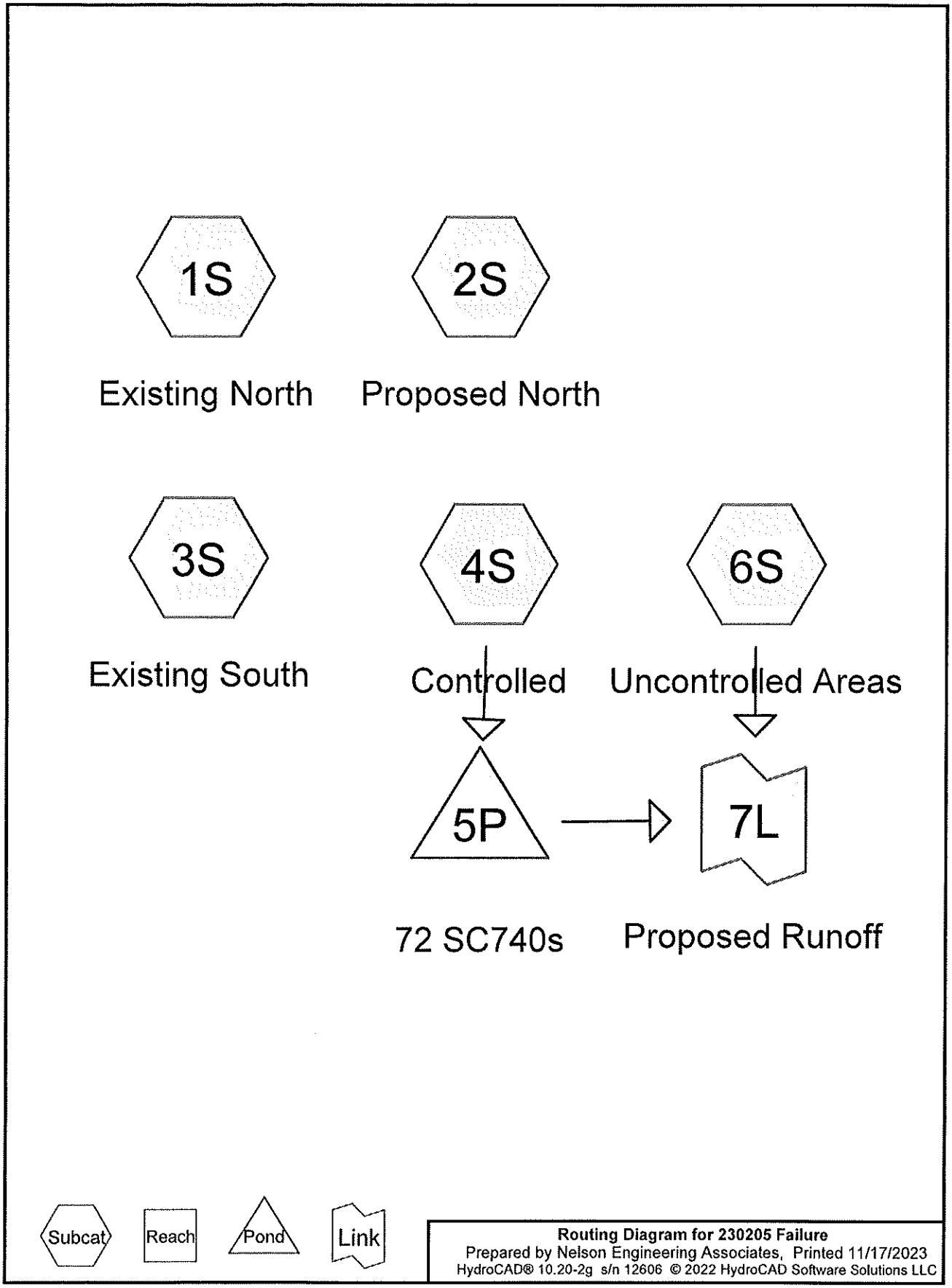
Summary for Link 7L: Proposed Runoff

Inflow Area = 31,799 sf, 64.38% Impervious, Inflow Depth = 1.76" for 100-Year event
Inflow = 0.71 cfs @ 12.37 hrs, Volume= 4,669 cf
Primary = 0.71 cfs @ 12.37 hrs, Volume= 4,669 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 7L: Proposed Runoff




1S
2S
Existing North
Proposed North
3S
4S
6S
Existing South
Controlled
Uncontrolled Areas
5P
7L
72 SC740s
Proposed Runoff
Subcat
Reach
Pond
Link
Routing Diagram for 230205 Failure
Prepared by Nelson Engineering Associates, Printed 11/17/2023
HydroCAD® 10.20-2g s/n 12606 © 2022 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: Existing North

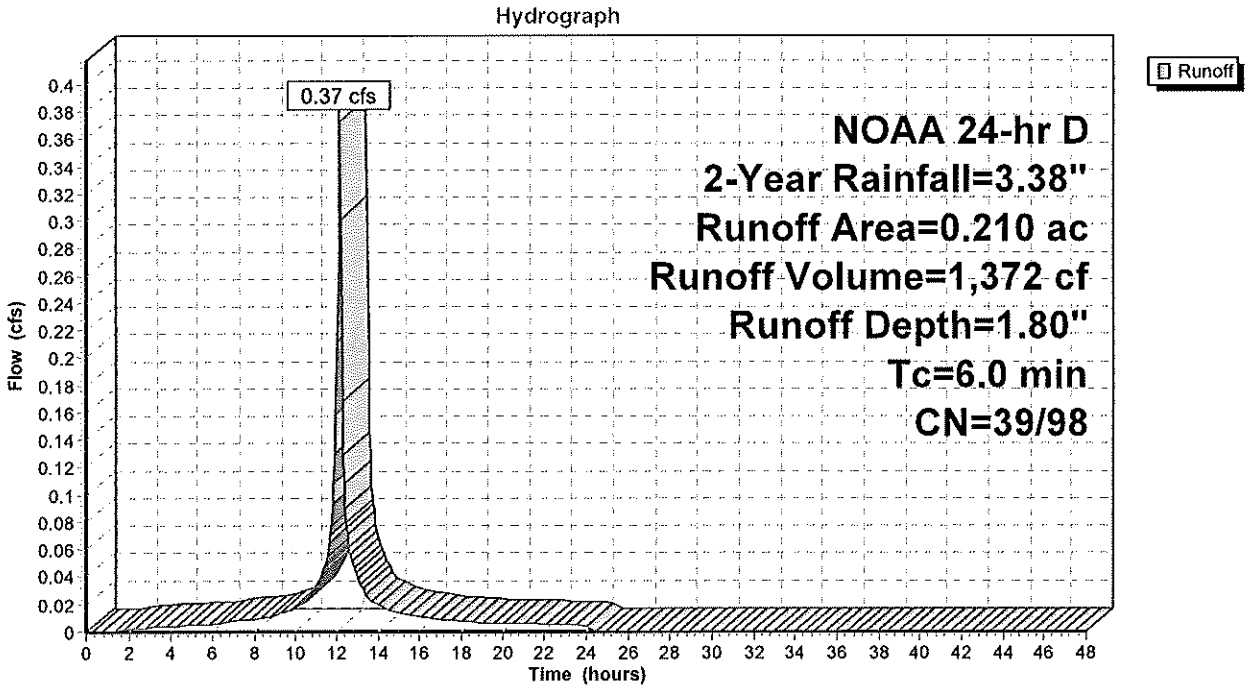
Runoff = 0.37 cfs @ 12.13 hrs, Volume= 1,372 cf, Depth= 1.80"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.120	98	Paved parking, HSG A
0.090	39	>75% Grass cover, Good, HSG A
0.210	73	Weighted Average
0.090	39	42.86% Pervious Area
0.120	98	57.14% Impervious Area

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

Subcatchment 1S: Existing North



Summary for Subcatchment 2S: Proposed North

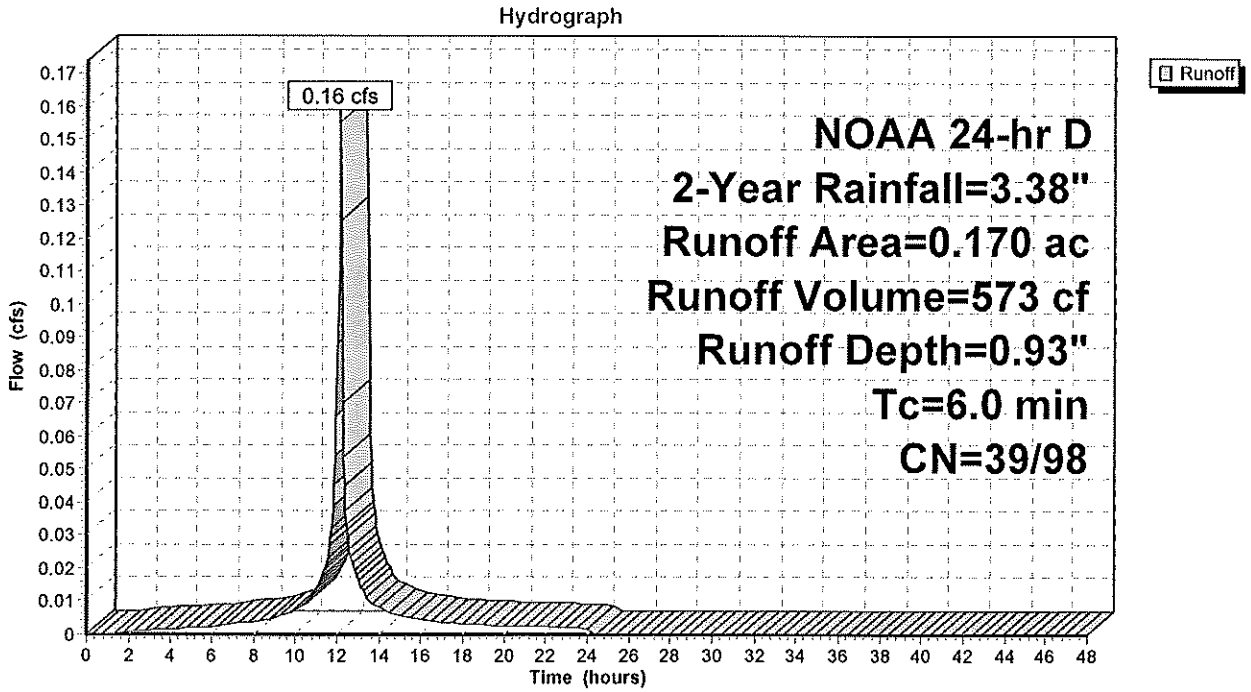
Runoff = 0.16 cfs @ 12.13 hrs, Volume= 573 cf, Depth= 0.93"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.050	98	Paved parking, HSG A
0.120	39	>75% Grass cover, Good, HSG A
0.170	56	Weighted Average
0.120	39	70.59% Pervious Area
0.050	98	29.41% Impervious Area

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

Subcatchment 2S: Proposed North



Summary for Subcatchment 3S: Existing South

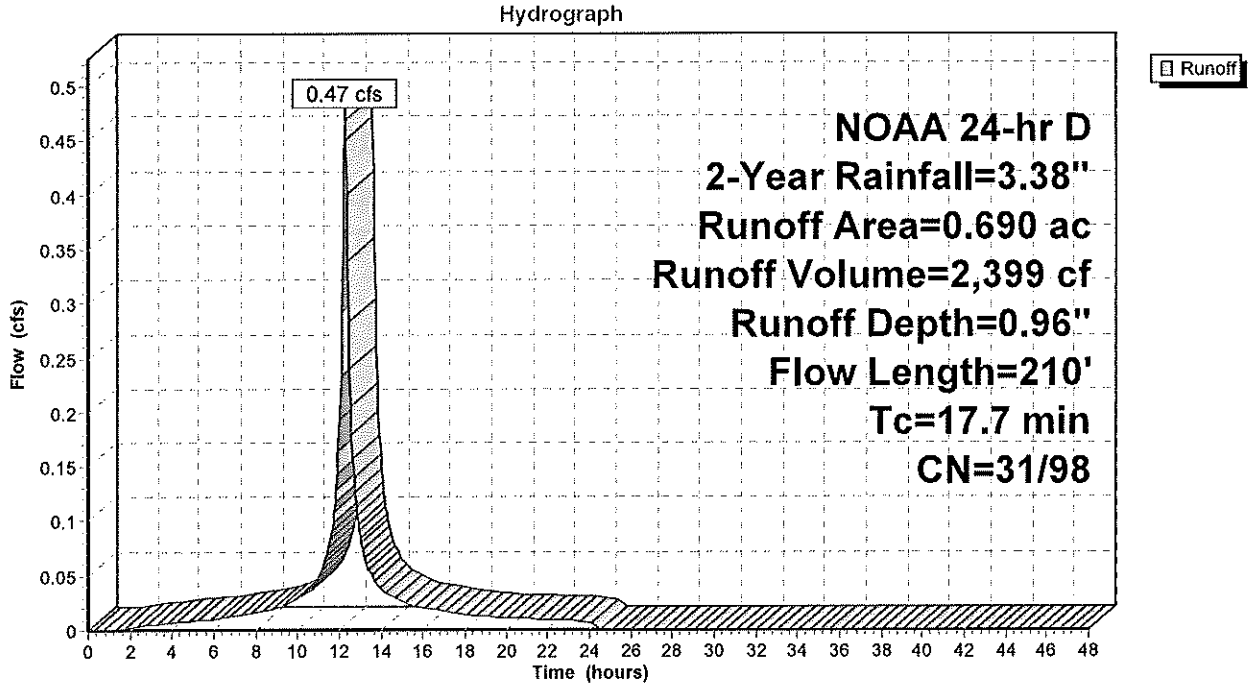
Runoff = 0.47 cfs @ 12.26 hrs, Volume= 2,399 cf, Depth= 0.96"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.210	98	Paved parking, HSG A
0.050	39	>75% Grass cover, Good, HSG A
0.430	30	Woods, Good, HSG A
0.690	51	Weighted Average
0.480	31	69.57% Pervious Area
0.210	98	30.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0330	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.6	110	0.0360	3.05		**Shallow Concentrated Flow, Shallow Concentrated** Unpaved Kv= 16.1 fps
17.7	210	Total			

Subcatchment 3S: Existing South



Summary for Subcatchment 4S: Controlled

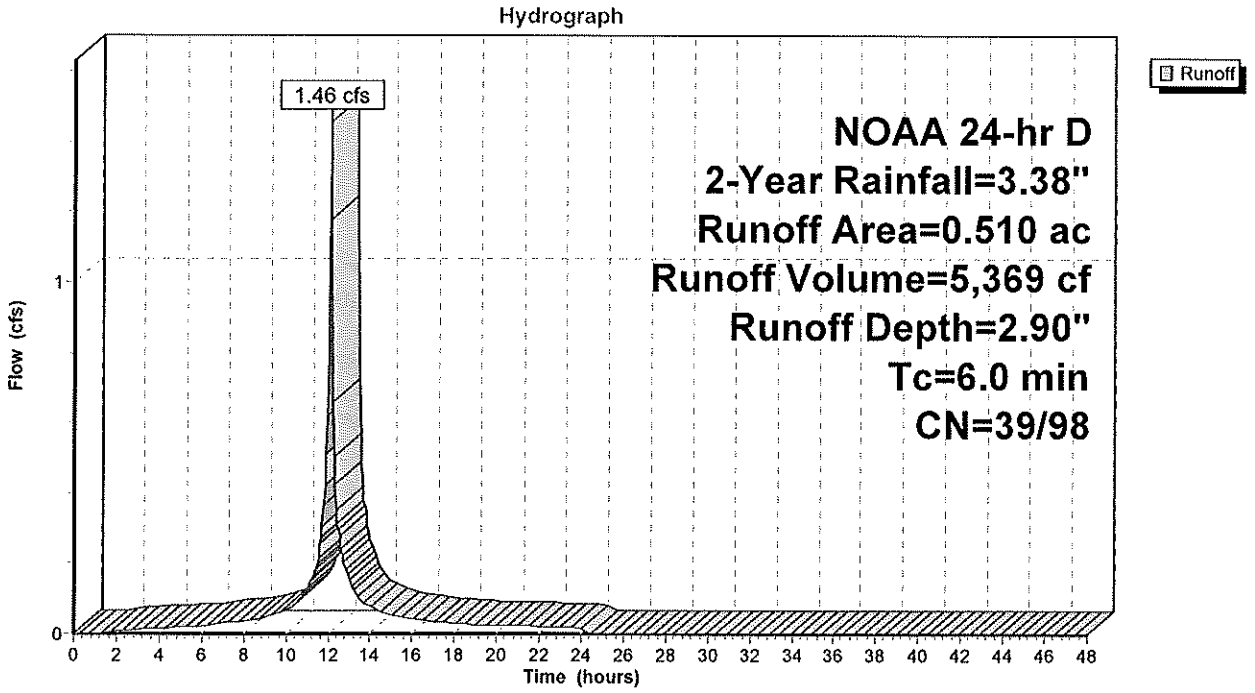
Runoff = 1.46 cfs @ 12.13 hrs, Volume= 5,369 cf, Depth= 2.90"
Routed to Pond 5P : 72 SC740s

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.470	98	Paved parking, HSG A
0.040	39	>75% Grass cover, Good, HSG A
0.510	93	Weighted Average
0.040	39	7.84% Pervious Area
0.470	98	92.16% Impervious Area

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

Subcatchment 4S: Controlled



Summary for Pond 5P: 72 SC740s

Inflow Area = 22,216 sf, 92.16% Impervious, Inflow Depth = 2.90" for 2-Year event
Inflow = 1.46 cfs @ 12.13 hrs, Volume= 5,369 cf
Outflow = 0.32 cfs @ 12.45 hrs, Volume= 5,354 cf, Atten= 78%, Lag= 19.2 min
Primary = 0.32 cfs @ 12.45 hrs, Volume= 5,354 cf
Routed to Link 7L : Proposed Runoff

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 91.06' Surf.Area= 0.057 ac Storage= 0.050 af
Peak Elev= 92.29'@ 12.45 hrs Surf.Area= 0.057 ac Storage= 0.098 af (0.048 af above start)

Plug-Flow detention time=420.8 min calculated for 3,184 cf (59% of inflow)
Center-of-Mass det. time=148.5 min (905.6 - 757.2)

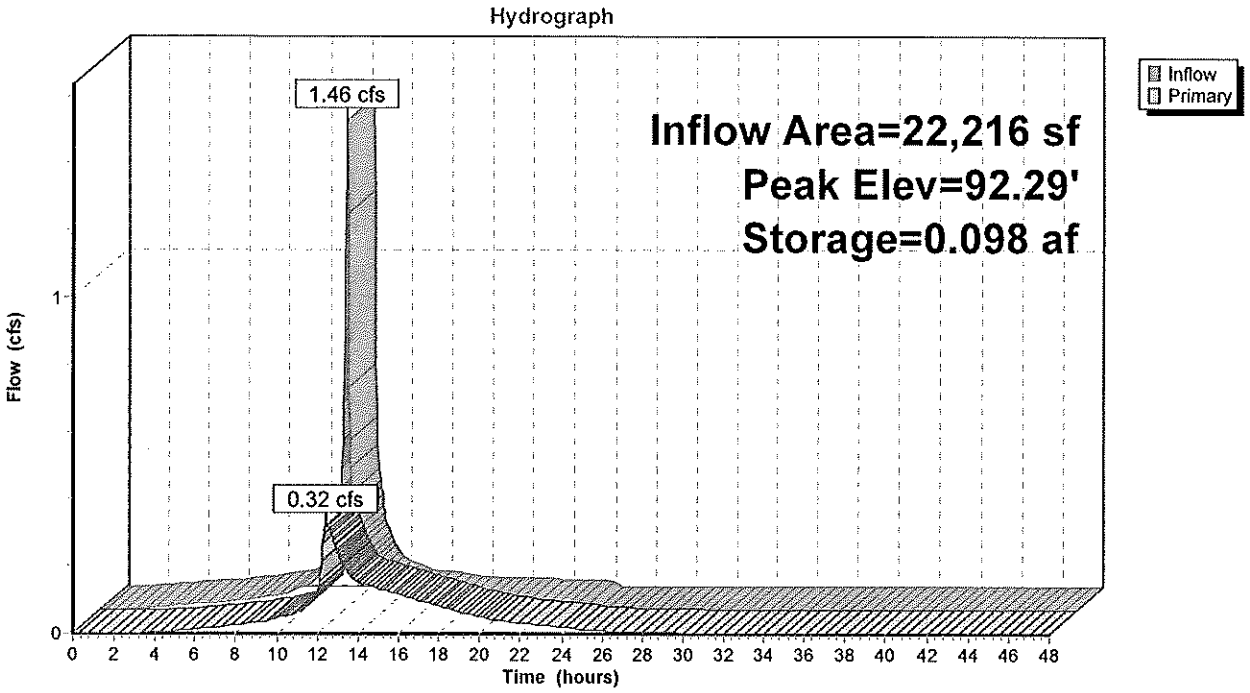
Volume	Invert	Avail.Storage	Storage Description
#1A	89.71'	0.053 af	**77.50'W x 32.10'L x 3.50'H Field A** 0.200 af Overall - 0.067 af Embedded= 0.132 af x 40.0% Voids
#2A	90.21'	0.067 af	**ADS_StormTech SC-740 +Cap** x 64 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 64 Chambers in 16 Rows
		0.120 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#0	Primary	93.21'	**Automatic Storage Overflow** (Discharged without head)
#1	Primary	91.06'	**12.0" Round RCP_Round 12"** L= 12.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 91.06' / 91.00' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	91.06'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	92.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	93.15'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.32 cfs @ 12.45 hrs HW=92.29' (Free Discharge)
└**1=RCP_Round 12"** (Passes 0.32 cfs of 2.81 cfs potential flow)
  ├**2=Orifice/Grate** (Orifice Controls 0.17 cfs @ 5.11 fps)
  ├**3=Orifice/Grate** (Orifice Controls 0.15 cfs @ 1.83 fps)
  └**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 5P: 72 SC740s



Summary for Subcatchment 6S: Uncontrolled Areas

[45] Hint: Runoff=Zero

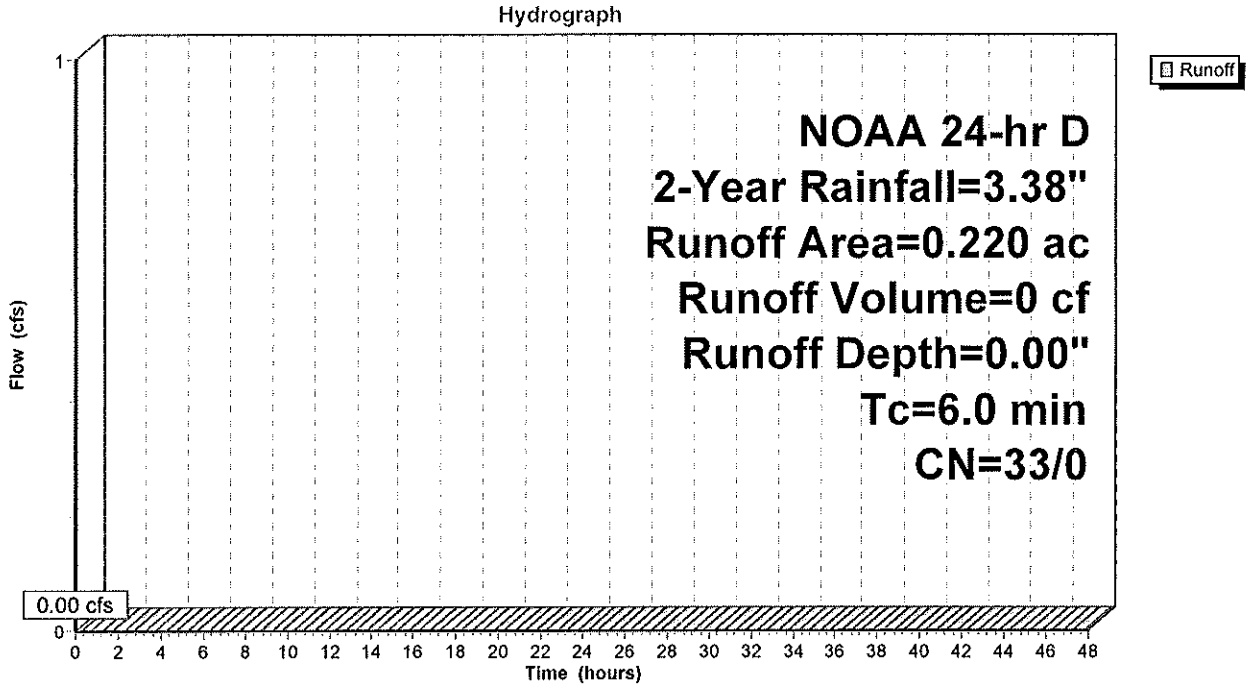
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0 cf, Depth= 0.00"
Routed to Link 7L : Proposed Runoff

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
0.150	30	Woods, Good, HSG A
0.220	33	Weighted Average
0.220	33	100.00% Pervious Area

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

Subcatchment 6S: Uncontrolled Areas

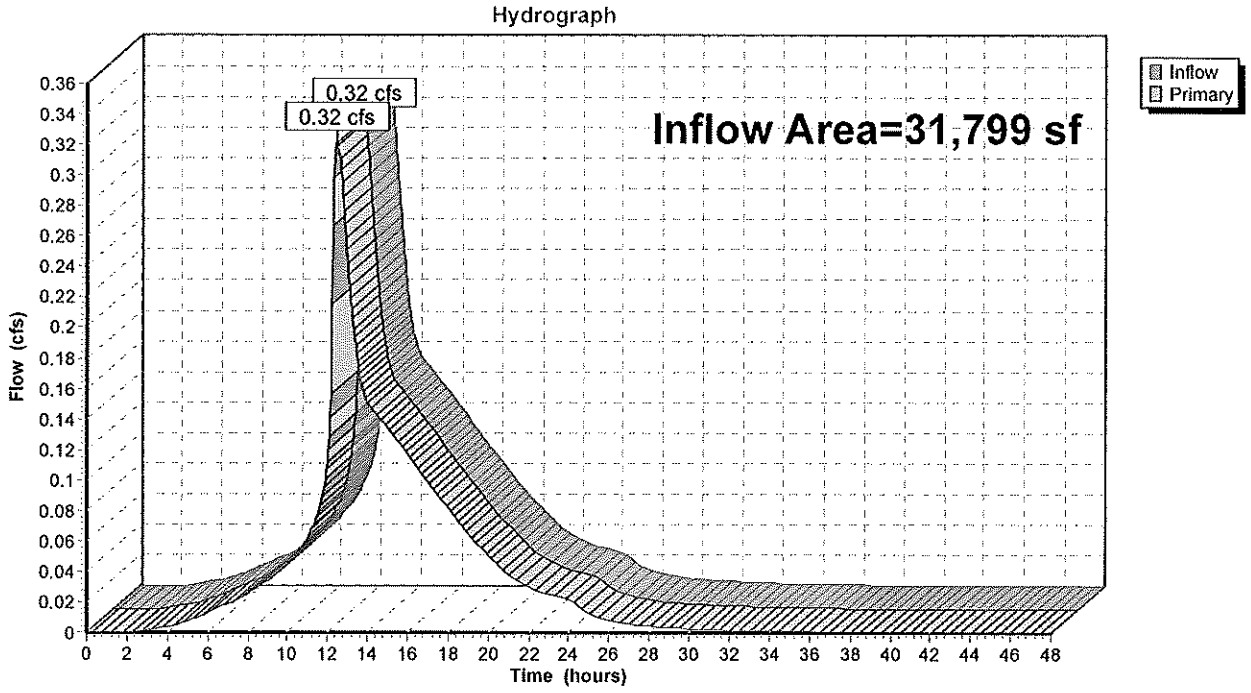


Summary for Link 7L: Proposed Runoff

Inflow Area = 31,799 sf, 64.38% Impervious, Inflow Depth > 2.02" for 2-Year event
Inflow = 0.32 cfs @ 12.45 hrs, Volume= 5,354 cf
Primary = 0.32 cfs @ 12.45 hrs, Volume= 5,354 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Link 7L: Proposed Runoff



Summary for Subcatchment 1S: Existing North

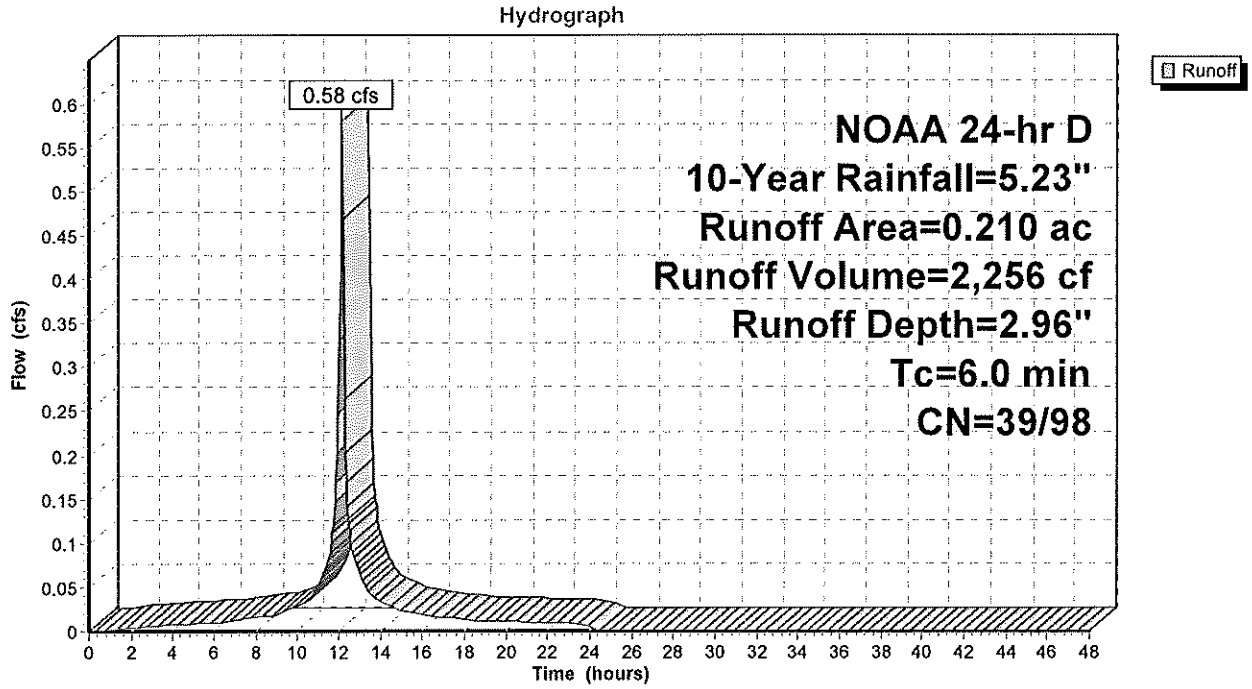
Runoff = 0.58 cfs @ 12.13 hrs, Volume= 2,256 cf, Depth= 2.96"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.120	98	Paved parking, HSG A
0.090	39	>75% Grass cover, Good, HSG A
0.210	73	Weighted Average
0.090	39	42.86% Pervious Area
0.120	98	57.14% Impervious Area

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

Subcatchment 1S: Existing North



Summary for Subcatchment 2S: Proposed North

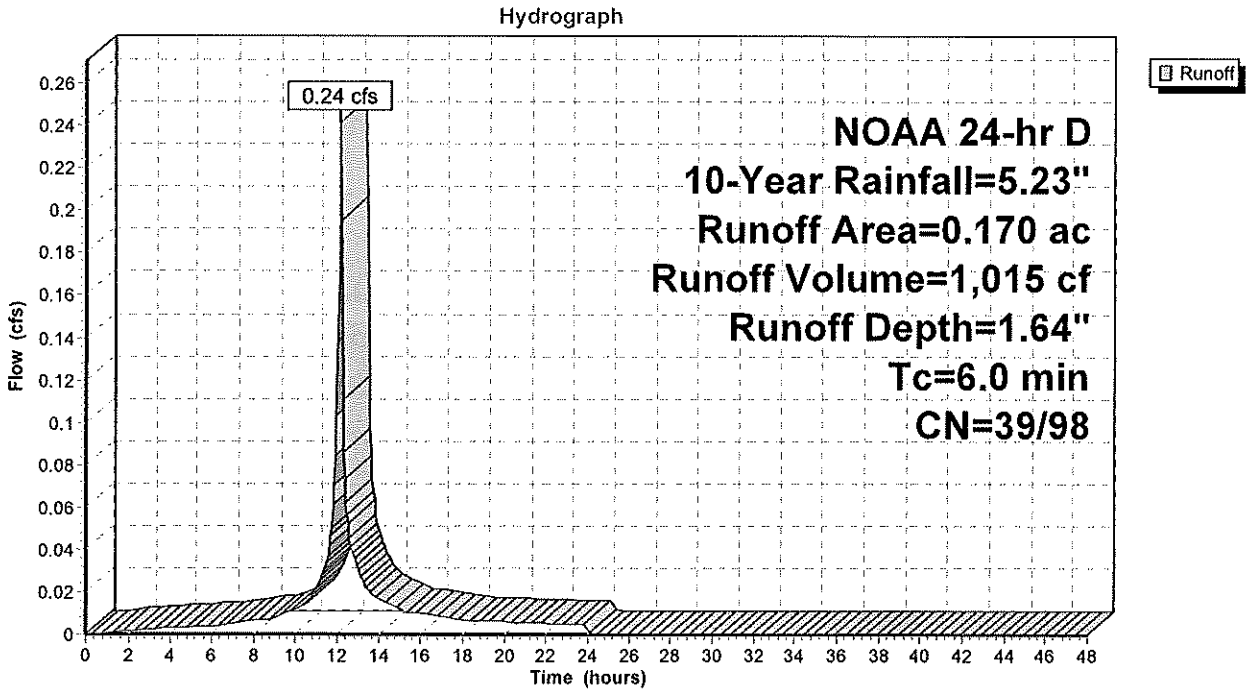
Runoff = 0.24 cfs @ 12.13 hrs, Volume= 1,015 cf, Depth= 1.64"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.050	98	Paved parking, HSG A
0.120	39	>75% Grass cover, Good, HSG A
0.170	56	Weighted Average
0.120	39	70.59% Pervious Area
0.050	98	29.41% Impervious Area

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

Subcatchment 2S: Proposed North



Summary for Subcatchment 3S: Existing South

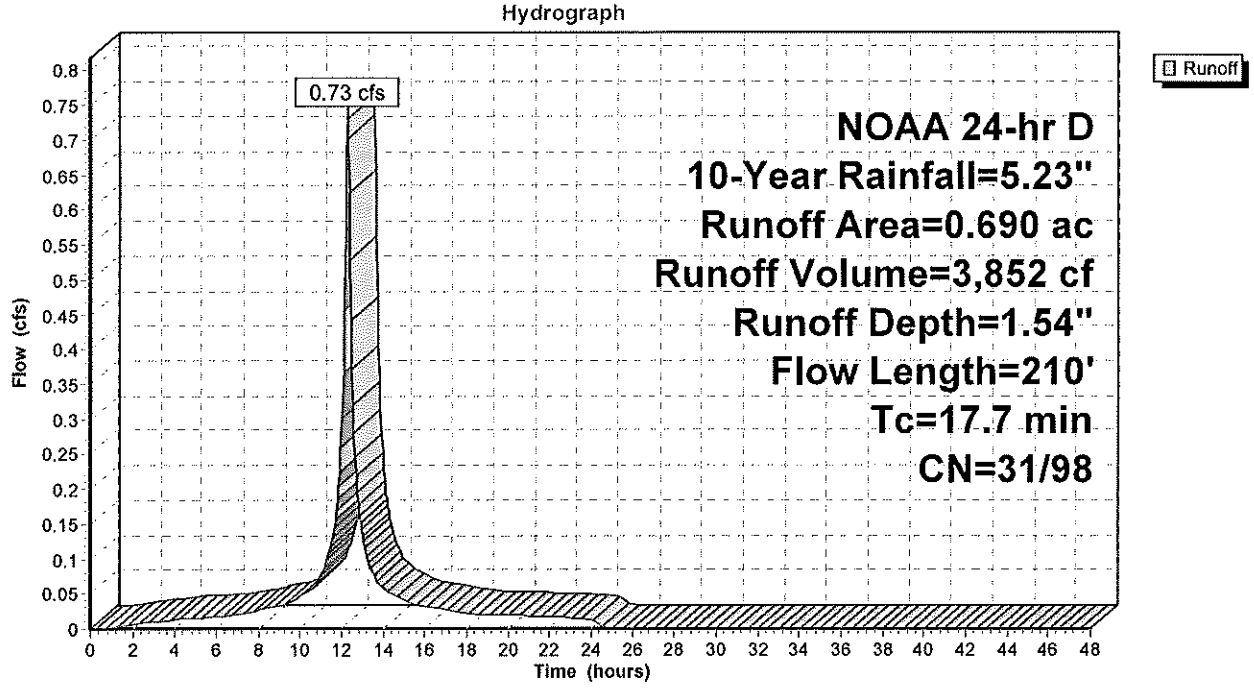
Runoff = 0.73 cfs @ 12.26 hrs, Volume= 3,852 cf, Depth= 1.54"
Routed to nonexistent node 3L

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.210	98	Paved parking, HSG A
0.050	39	>75% Grass cover, Good, HSG A
0.430	30	Woods, Good, HSG A
0.690	51	Weighted Average
0.480	31	69.57% Pervious Area
0.210	98	30.43% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.1	100	0.0330	0.10		**Sheet Flow, Sheet Flow** Woods: Light underbrush n= 0.400 P2= 3.38"
0.6	110	0.0360	3.05		**Shallow Concentrated Flow, Shallow Concentrated** Unpaved Kv= 16.1 fps
17.7	210	Total			

Subcatchment 3S: Existing South



Summary for Subcatchment 4S: Controlled

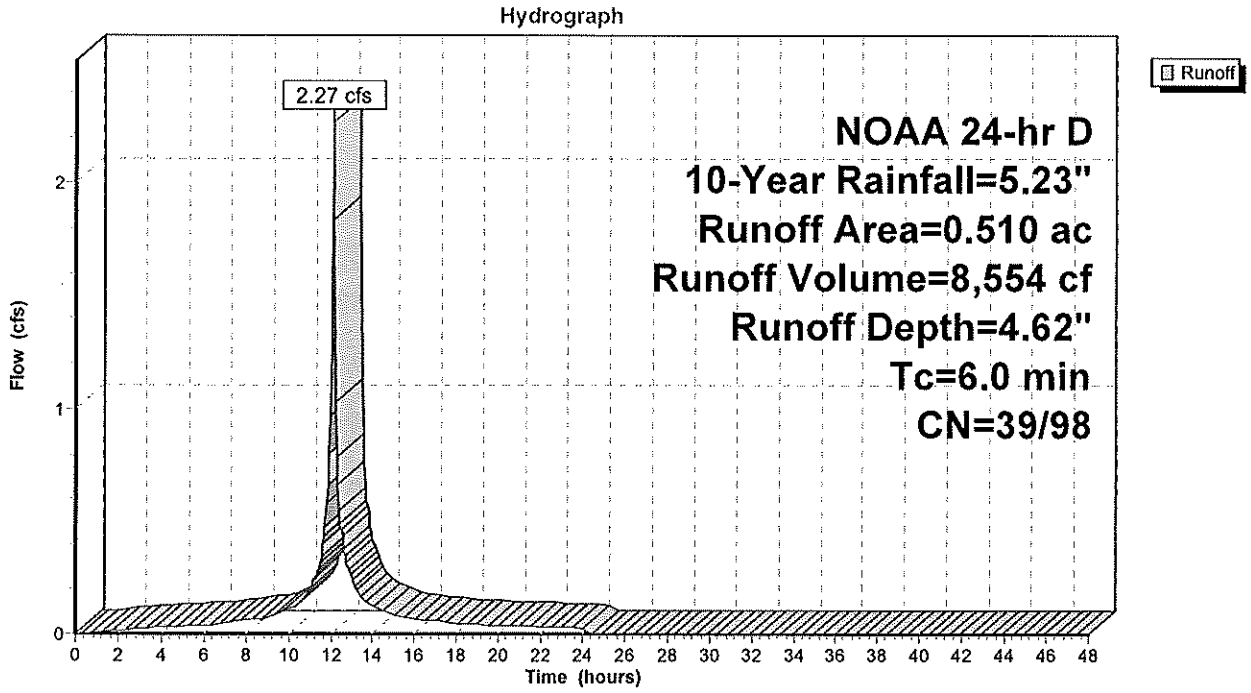
Runoff = 2.27 cfs @ 12.13 hrs, Volume= 8,554 cf, Depth= 4.62"
Routed to Pond 5P : 72 SC740s

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.470	98	Paved parking, HSG A
0.040	39	>75% Grass cover, Good, HSG A
0.510	93	Weighted Average
0.040	39	7.84% Pervious Area
0.470	98	92.16% Impervious Area

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

Subcatchment 4S: Controlled



Summary for Pond 5P: 72 SC740s

Inflow Area = 22,216 sf, 92.16% Impervious, Inflow Depth = 4.62" for 10-Year event
Inflow = 2.27 cfs @ 12.13 hrs, Volume= 8,554 cf
Outflow = 0.70 cfs @ 12.34 hrs, Volume= 8,539 cf, Atten= 69%, Lag= 12.8 min
Primary = 0.70 cfs @ 12.34 hrs, Volume= 8,539 cf
Routed to Link 7L : Proposed Runoff

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Starting Elev= 91.06' Surf.Area= 0.057 ac Storage= 0.050 af
Peak Elev= 93.17' @ 12.34 hrs Surf.Area= 0.057 ac Storage= 0.120 af (0.070 af above start)

Plug-Flow detention time=319.6 min calculated for 6,371 cf (74% of inflow)
Center-of-Mass det. time=127.7 min (877.3 - 749.6)

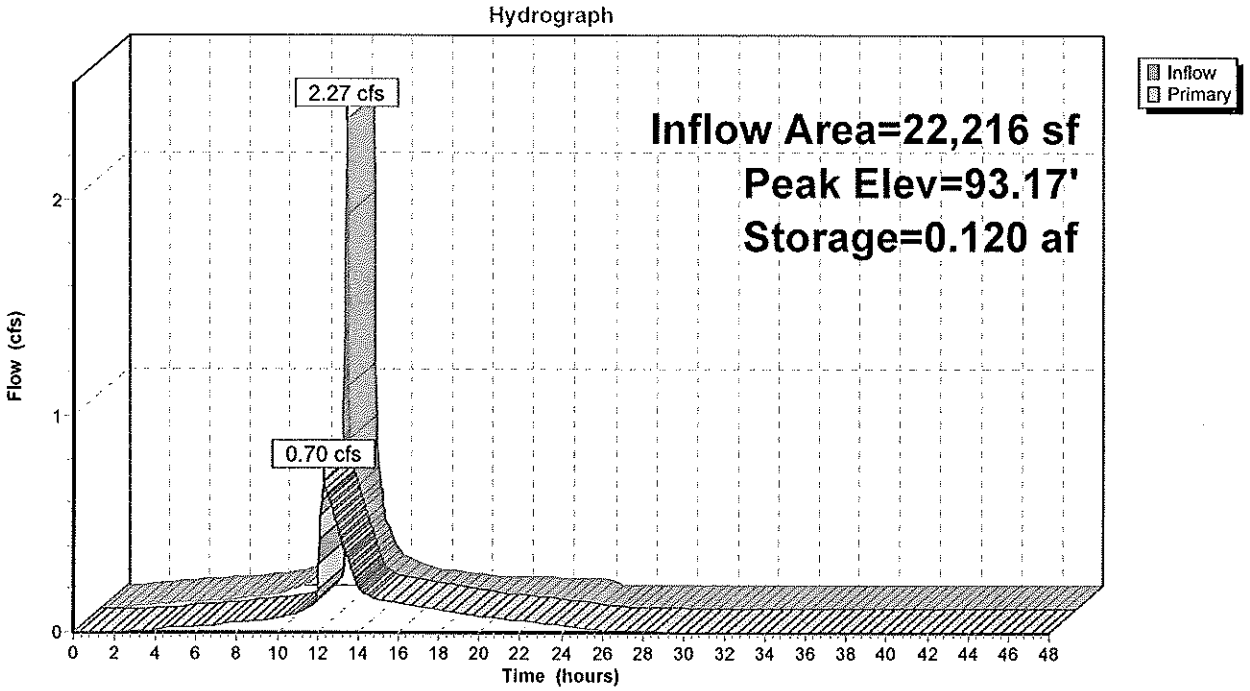
Volume	Invert	Avail.Storage	Storage Description
#1A	89.71'	0.053 af	**77.50'W x 32.10'L x 3.50'H Field A** 0.200 af Overall - 0.067 af Embedded= 0.132 af x 40.0% Voids
#2A	90.21'	0.067 af	**ADS_StormTech SC-740 +Cap** x 64 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 64 Chambers in 16 Rows
		0.120 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#0	Primary	93.21'	**Automatic Storage Overflow** (Discharged without head)
#1	Primary	91.06'	**12.0" Round RCP_Round 12"** L= 12.0' RCP, sq.cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 91.06' / 91.00' S= 0.0050 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	91.06'	**2.5" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#3	Device 1	92.00'	**4.0" Vert. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#4	Device 1	93.15'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)

Primary OutFlow Max=0.69 cfs @ 12.34 hrs HW=93.17' (Free Discharge)
└─**1=RCP_Round 12"** (Passes 0.69 cfs of 4.80 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.23 cfs @ 6.82 fps)
  ├─**3=Orifice/Grate** (Orifice Controls 0.42 cfs @ 4.82 fps)
  └─**4=Sharp-Crested Rectangular Weir** (Weir Controls 0.04 cfs @ 0.47 fps)

Pond 5P: 72 SC740s



Summary for Subcatchment 6S: Uncontrolled Areas

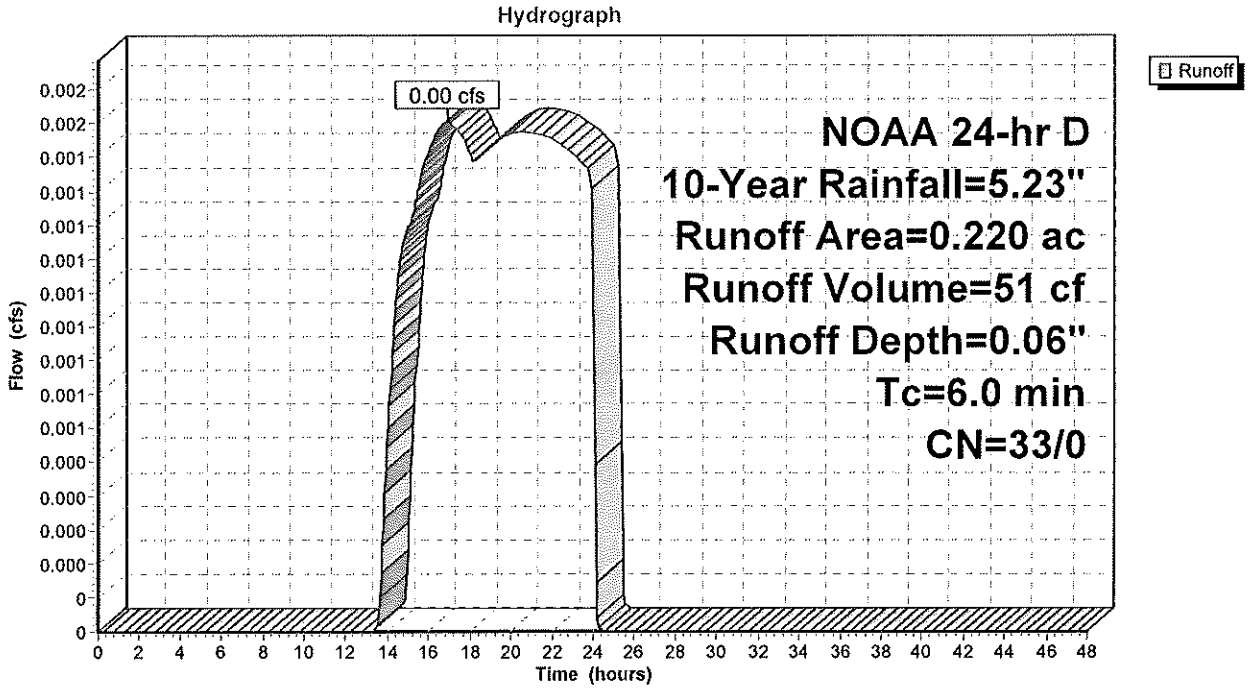
Runoff = 0.00 cfs @ 16.94 hrs, Volume= 51 cf, Depth= 0.06"
Routed to Link 7L : Proposed Runoff

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
0.150	30	Woods, Good, HSG A
0.220	33	Weighted Average
0.220	33	100.00% Pervious Area

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

Subcatchment 6S: Uncontrolled Areas

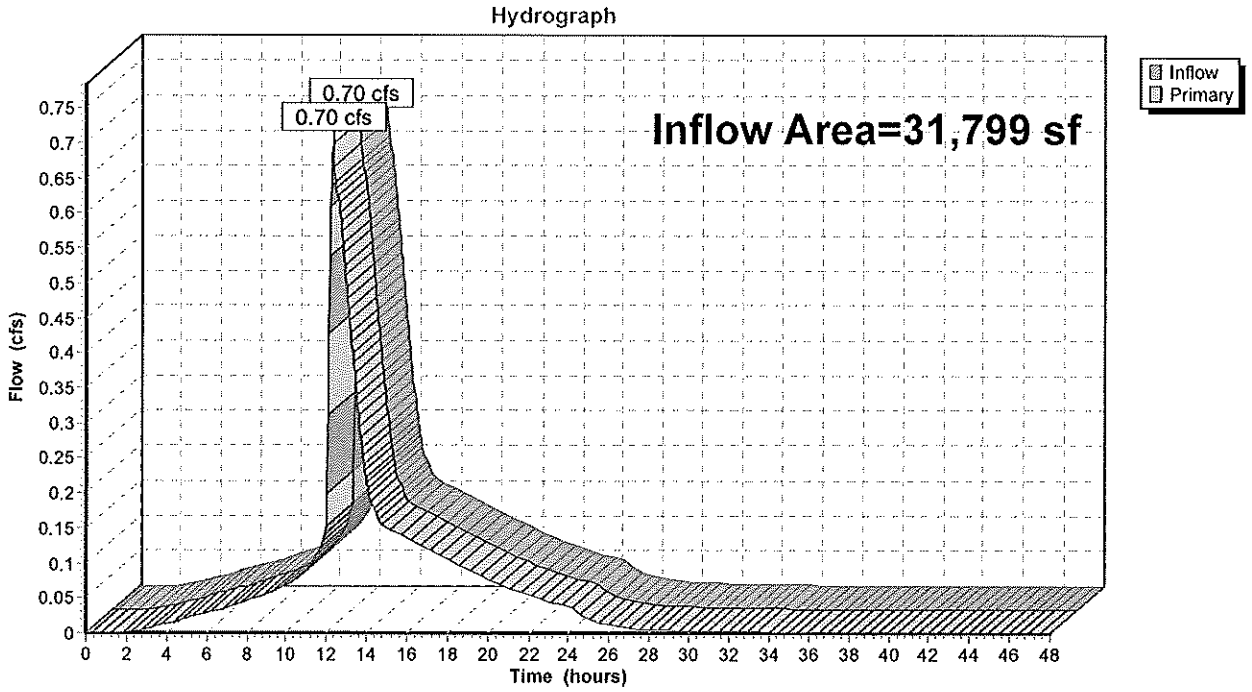


Summary for Link 7L: Proposed Runoff

Inflow Area = 31,799 sf, 64.38% Impervious, Inflow Depth > 3.24" for 10-Year event
Inflow = 0.70 cfs @ 12.34 hrs, Volume= 8,589 cf
Primary = 0.70 cfs @ 12.34 hrs, Volume= 8,589 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

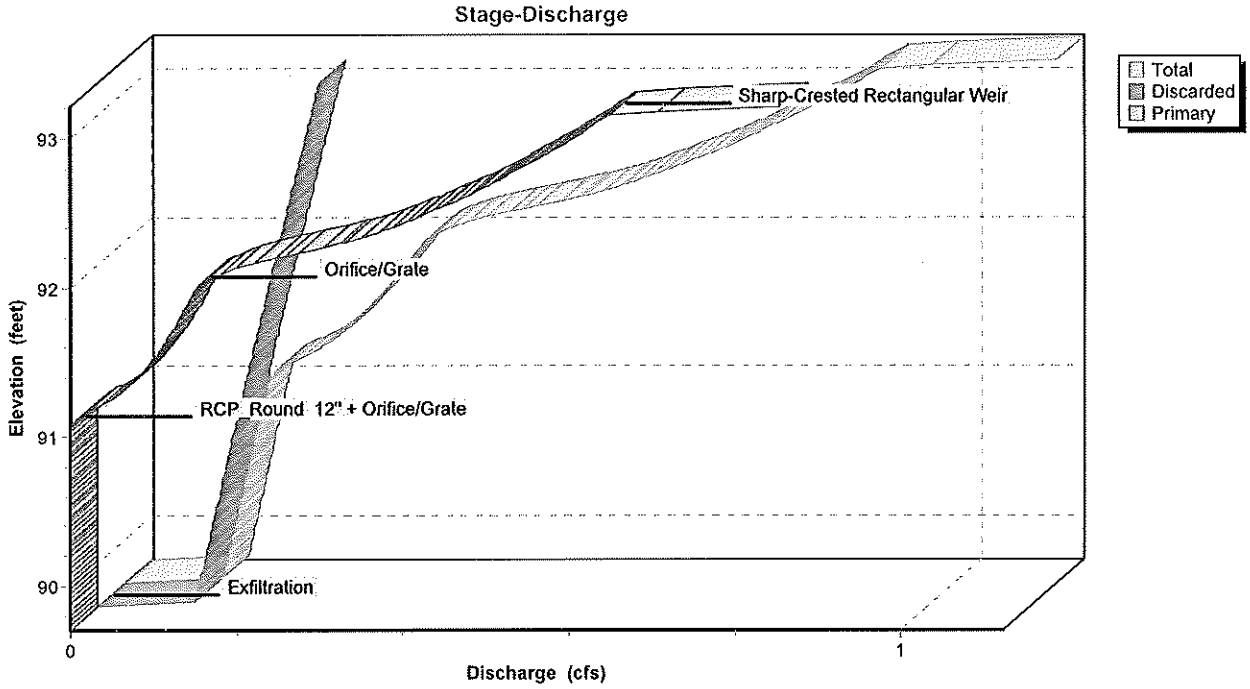
Link 7L: Proposed Runoff



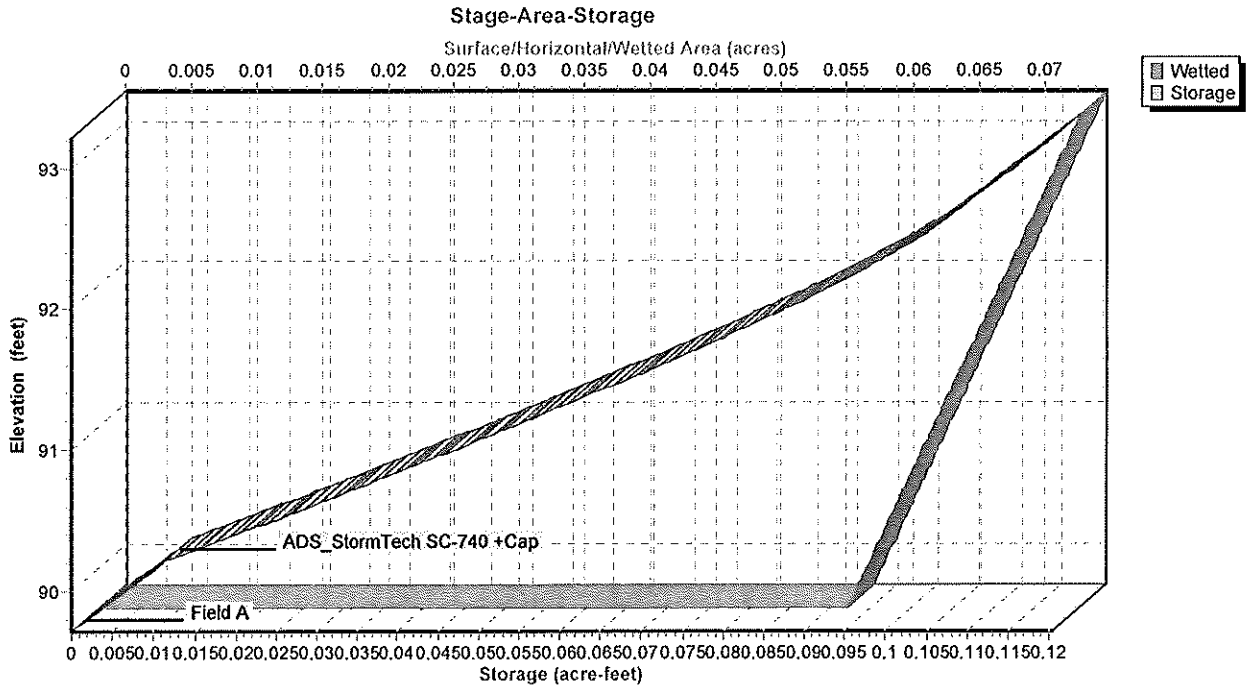
Appendix

	PROJECT NAME:		Pink Balloon, LLC														
	MUNICIPALITY:		Neptune Township														
	JOB NUMBER:		230205														
		DATE:		11/17/2023													
INLET No.	TO No.	Tc TO INLET (MIN.)	Tc + PIPE Tc (MIN.)	i (IN./HR.)	INLET c	SYSTEM c	INLET AREA (ACRES)	SYSTEM AREA (ACRES)	Q-25 INLET (CFS)	Q-25 SYSTEM (CFS)	PIPE SIZE (INCHES)	PIPE LENGTH (FEET)	PIPE SLOPE (FT./FT.)	UPPER INVERT (ELEV.)	LOWER INVERT (ELEV.)	PIPE Q (CFS)	PIPE V (FT./SEC.)
Roof	6	6.00	6.19	6.98	0.99	0.99	0.030	0.030	0.21	0.21	4	32	0.0150	94.07	93.59	0.25	2.87
8	6	6.00	6.20	6.98	0.99	0.99	0.010	0.010	0.07	0.07	4	34	0.0150	94.10	93.59	0.25	2.87
7	6	6.00	6.35	6.98	0.99	0.99	0.060	0.060	0.41	0.41	12	72	0.0050	93.95	93.59	2.72	3.46
6	4	6.35	6.50	6.65	0.99	0.99	0.000	0.100	0.00	0.66	12	32	0.0050	93.59	93.43	2.72	3.46
5	4	6.00	6.23	6.98	0.99	0.99	0.410	0.410	2.83	2.83	12	68	0.0100	92.72	92.04	3.84	4.89
4	WQD	6.50	6.58	6.65	0.99	0.99	0.000	0.510	0.00	3.36	12	24	0.0100	92.04	91.80	3.84	4.89
WQD	STC	6.23	6.28	6.98	0.99	0.99	0.000	0.510	0.00	3.52	12	14	0.0100	91.55	91.41	3.84	4.89

Pond 5P: 72 SC740s



Pond 5P: 72 SC740s



Nelson Engineering Associates, Inc.

444 Neptune Boulevard, Suite 4 • Neptune, NJ 07753
(732) 918-2180

Block(s): 3601; Lot(s); 4 **NEAI File # 230205**
Township of Neptune, Monmouth County, NJ **3536 Highway 66**

Date & Time: Friday November 3, 2023 at 9:00 AM Weather conditions at time of test: 32° F., clear

Soil Log Ground Surface Elevation: 95.0± **SB#1** Soil boring at northeast of proposed parking

Depth	Description	Munsell
0" - 20"	Very dark gray sandy clay loam, subangular structure, moist, firm, and with an abrupt (1" Max.) boundary	10 YR 3/1
20" - 28"	Light brownish gray sand with some silt, fine granular structure, moist, friable, and with an abrupt (1" Max.) boundary	10 YR 6/2
28" - 66"	Brownish yellow sandy clay loam, subangular structure, moist, friable, and with a gradual (5" Max.) boundary	10 YR 6/6
66" - 79"	Very pale brown sand with some silt, fine granular structure, moist, friable, and with a clear (2.5" Max.) boundary	10 YR 7/3
79" - 108"	Yellowish brown sand with some silt and 20% gravel throughout, medium to fine granular structure, moist and loose	10 YR 5/6

No water seepage encountered Expected seasonal high water table (SHWT) elevation: deeper than 86.0
Depth to expected seasonal high water table (SHWT): deeper than 108" (9.0') Samples taken at 50" & 90"

11/3/2023
Matthew R. DuBois, P.E., C.M.E. Date
(SEAL)

Nelson Engineering Associates, Inc.

444 Neptune Boulevard, Suite 4 • Neptune, NJ 07753
(732) 918-2180

Block(s): 3601; Lot(s); 4 **NEAI File # 230205**
Township of Neptune, Monmouth County, NJ **3536 Highway 66**

Date & Time: Friday November 3, 2023 at 9:45 AM Weather conditions at time of test: 36° F., clear

Soil Log Ground Surface Elevation: 92.5± **SB#2** Soil boring at southeast of proposed parking

Depth	Description	Munsell
0" - 13"	Gray loamy sand, medium to fine granular structure, moist, loose, and with a clear (2.5" Max.) boundary	10 YR 5/1
13" - 22"	Dark yellowish brown silt and sand, fine granular structure, moist, firm, and with an abrupt (1" Max.) boundary	10 YR 4/6
22" - 48"	Light yellowish brown silty sand, fine granular structure, moist, friable, and with a gradual (5" Max.) boundary	10 YR 6/4
48" - 78"	Yellowish brown sand with some silt and 20% gravel throughout, medium to fine granular structure, moist, friable, and with a clear (2.5" Max.) boundary	10 YR 5/4
78" - 84"	Pale brown sand with some silt, fine granular structure, moist, friable, with 10 YR 4/2 mottles from 80" and an abrupt (1" Max.) boundary	10 YR 6/3
84" - 90"	Brownish yellow sandy clay, fine granular structure, moist, plastic, and with a clear (2.5" Max.) boundary	10 YR 6/6
90" - 112"	Gray clay, massive structure, moist, plastic, and with an abrupt (1" Max.) boundary	10 YR 6/1
112" - 126"	Pale brown sand with some silt, fine granular structure, moist and friable	10 YR 6/3

No water seepage encountered Expected seasonal high water table (SHWT) elevation: 85.8
Depth to expected seasonal high water table (SHWT): 80" (6.7') Samples taken at 80", 86" & 115"

11/3/2023

Matthew R. DuBois, P.E., C.M.E. Date
(SEAL)

Nelson Engineering Associates, Inc.

444 Neptune Boulevard, Suite 4 • Neptune, NJ 07753
(732) 918-2180

Block(s): 3601; Lot(s); 4 **NEAI File # 230205**
Township of Neptune, Monmouth County, NJ **3536 Highway 66**

Date & Time: Friday November 3, 2023 at 10:30 AM Weather conditions at time of test: 40° F., clear

Soil Log Ground Surface Elevation: 94.0± **SB#3** Soil boring at southwest of proposed parking

Depth	Description	Munsell
0" - 14"	Gray loamy sand, medium to fine granular structure, moist, loose, and with a clear (2.5" Max.) boundary	10 YR 5/1
14" - 20"	Dark yellowish brown silt and sand, fine granular structure, moist, firm, and with an abrupt (1" Max.) boundary	10 YR 4/6
20" - 37"	Light yellowish brown silty sand, fine granular structure, moist, friable, and with a gradual (5" Max.) boundary	10 YR 6/4
37" - 61"	Yellowish brown sand with some silt and 20% gravel throughout, medium to fine granular structure, moist, friable, and with a clear (2.5" Max.) boundary	10 YR 5/4
61" - 79"	Pale brown sand with some silt, fine granular structure, moist, friable, and with an abrupt (1" Max.) boundary	10 YR 6/3
79" - 86"	Gray clay, massive structure, moist, plastic, and with an abrupt (1" Max.) boundary	10 YR 6/1
86" - 108"	Pale brown sand with some silt, fine granular structure, moist, friable, and with 10 YR 6/6 mottles throughout	10 YR 6/2

No water seepage encountered Expected seasonal high water table (SHWT) elevation: 86.8
Depth to expected seasonal high water table (SHWT): 86" (7.2') Samples taken at 70" & 95"

11/3/2023

Matthew R. DuBois, P.E., C.M.E. Date
(SEAL)

Nelson Engineering Associates, Inc.

444 Neptune Boulevard, Suite 4 • Neptune, NJ 07753
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Block(s): 3601; Lot(s); 4 **NEAI File # 230205**
Township of Neptune, Monmouth County, NJ **3536 Highway 66**

Date & Time: Friday November 3, 2023 at 8:00 AM Weather conditions at time of test: 30° F., clear

Soil Log Ground Surface Elevation: 95.5± **SB#4** Soil boring at northwest of proposed parking

Depth	Description	Munsell
0" - 28"	Gray loamy sand, medium to fine granular structure, moist, loose, and with a gradual (5" Max.) boundary	10 YR 5/1
28" - 37"	Dark yellowish brown silt and sand, fine granular structure, moist, firm, and with an abrupt (1" Max.) boundary	10 YR 4/6
37" - 52"	Light yellowish brown silty sand, fine granular structure, moist, friable, and with a gradual (5" Max.) boundary	10 YR 6/4
52" - 63"	Brown silty sand, fine granular structure, moist, friable, and with a clear (2.5" Max.) boundary	10 YR 4/3
63" - 70"	Yellowish brown sand with some silt and 20% gravel throughout, medium to fine granular structure, moist, friable, and with a clear (2.5" Max.) boundary	10 YR 5/4
70" - 77"	Light brownish gray silty sand with 40% gravel throughout, fine granular structure, moist, friable, and unable to advance auger below 77" due to coarse fragments	10 YR 6/2

No water seepage encountered Expected seasonal high water table (SHWT) elevation: 86.8
Depth to expected seasonal high water table (SHWT): 86" (7.2') Samples taken at 55" & 72"

11/3/2023
Matthew R. DuBois, P.E., C.M.E. Date
(SEAL)

Nelson Engineering Associates, Inc.

444 Neptune Boulevard, Suite 4 • Neptune, NJ 07753
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CONSTANT HEAD TUBE PERMEAMETER TEST
Block(s): 3601; Lot(s); 4
Township of Neptune, Monmouth County, NJ

NEAI File # 230205
Date of test: Monday November 6, 2023

SB#1 **Sample Depth: 50"**

	Undisturbed REPLICATE A	**Disturbed** REPLICATE B
SAMPLE LENGTH (CM) =	7.5	7.5
SAMPLE AREA (CM2) =	31.65	31.65
TIME (SEC) =	600	600
VOLUME (ML) =	20	20
HEAD (CM) =	51.5	51.5
PERMEABILITY (CM/SEC) =	0.0002	0.0002
PERMEABILITY (IN/HR) =	0.2	0.2
PERMEABILITY CLASS =	K-1	K-1

SB#1 **Sample Depth:** 90"

	REPLICATE A	REPLICATE B
SAMPLE LENGTH (CM) =	7.5	7.5
SAMPLE AREA (CM2) =	31.65	31.65
TIME (SEC) =	60	60
VOLUME (ML) =	275	260
HEAD (CM) =	51.5	51.5
PERMEABILITY (CM/SEC) =	0.0211	0.0199
PERMEABILITY (IN/HR) =	30	28
PERMEABILITY CLASS =	K-5	K-5

I hereby certify, to the best of my professional knowledge and belief, that the above information is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58: 10A- et. Seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

11/6/2023
Matthew R. DuBois, P.E., C.M.E. Date
(SEAL)

MORE THAN 20 IN/HR = **K-5**
6 - 20 IN/HR = **K-4**
2 - 6 IN/HR = **K-3**
0.6 - 2 IN/HR = **K-2**
0.2 - 0.6 IN/HR = **K-1**
LESS THAN 0.2 IN/HR = **K-0**

Nelson Engineering Associates, Inc.

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CONSTANT HEAD TUBE PERMEAMETER TEST
Block(s): 3601; Lot(s); 4 **NEAI File # 230205**
Township of Neptune, Monmouth County, NJ Date of test: Monday November 6, 2023

SB#2 **Sample Depth: 115"**

	Undisturbed REPLICATE A	Disturbed REPLICATE B
SAMPLE LENGTH (CM) =	7.5	7.5
SAMPLE AREA (CM2) =	31.65	31.65
TIME (SEC) =	300	300
VOLUME (ML) =	200	185
HEAD (CM) =	51.5	51.5
PERMEABILITY (CM/SEC) =	0.0031	0.0028
PERMEABILITY (IN/HR) =	4	4
PERMEABILITY CLASS =	K-3	K-3

I hereby certify, to the best of my professional knowledge and belief, that the above information is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58: 10A- et. Seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

11/6/2023
Matthew R. DuBois, P.E., C.M.E. Date
(SEAL)

MORE THAN 20 IN/HR = **K-5**
6 - 20 IN/HR = **K-4**
2 - 6 IN/HR = **K-3**
0.6 - 2 IN/HR = **K-2**
0.2 - 0.6 IN/HR = **K-1**
LESS THAN 0.2 IN/HR = **K-0**

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CONSTANT HEAD TUBE PERMEAMETER TEST
Block(s): 3601; Lot(s); 4
Township of Neptune, Monmouth County, NJ

NEAI File # 230205
Date of test: Monday November 6, 2023

SB#3 **Sample Depth: 95"**

	Undisturbed REPLICATE A	Disturbed REPLICATE B
SAMPLE LENGTH (CM) =	7.5	7.5
SAMPLE AREA (CM2) =	31.65	31.65
TIME (SEC) =	600	600
VOLUME (ML) =	105	95
HEAD (CM) =	51.5	51.5
PERMEABILITY (CM/SEC) =	0.0008	0.0007
PERMEABILITY (IN/HR) =	1.1	1
PERMEABILITY CLASS =	K-2	K-2

I hereby certify, to the best of my professional knowledge and belief, that the above information is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58: 10A-et. Seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

Matthew R. DuBois, P.E., C.M.E. — 11/6/2023 Date
(SEAL)

MORE THAN 20 IN/HR = **K-5**
6 - 20 IN/HR = **K-4**
2 - 6 IN/HR = **K-3**
0.6 - 2 IN/HR = **K-2**
0.2 - 0.6 IN/HR = **K-1**
LESS THAN 0.2 IN/HR = **K-0**

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CONSTANT HEAD TUBE PERMEAMETER TEST
Block(s): 3601; Lot(s); 4 **NEAI File # 230205**
Township of Neptune, Monmouth County, NJ Date of test: Monday November 6, 2023

SB#4 **Sample Depth: 72"**

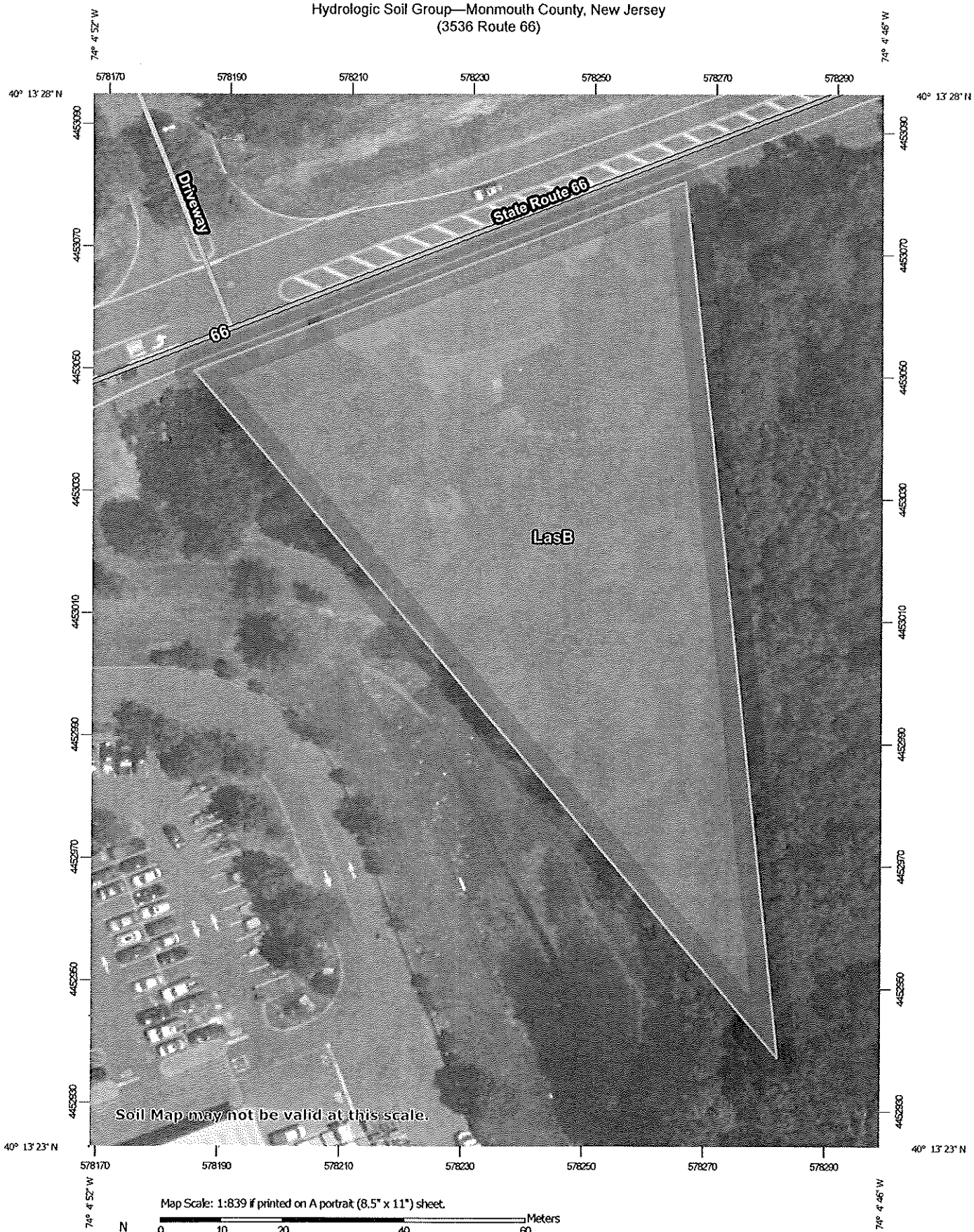
	Undisturbed REPLICATE A	Disturbed REPLICATE B
SAMPLE LENGTH (CM) =	7.5	7.5
SAMPLE AREA (CM2) =	31.65	31.65
TIME (SEC) =	600	600
VOLUME (ML) =	85	90
HEAD (CM) =	51.5	51.5
PERMEABILITY (CM/SEC) =	0.0007	0.0007
PERMEABILITY (IN/HR) =	0.9	1.0
PERMEABILITY CLASS =	K-2	K-5

I hereby certify, to the best of my professional knowledge and belief, that the above information is true and accurate. I am aware that falsification of data is a violation of the Water Pollution Control Act (N.J.S.A. 58: 10A-et. Seq.) and is subject to penalties as prescribed in N.J.A.C. 7:14-8.

11/6/2023
Matthew R. DuBois, P.E., C.M.E. Date
(SEAL)

MORE THAN 20 IN/HR = **K-5**
6 - 20 IN/HR = **K-4**
2 - 6 IN/HR = **K-3**
0.6 - 2 IN/HR = **K-2**
0.2 - 0.6 IN/HR = **K-1**
LESS THAN 0.2 IN/HR = **K-0**

Hydrologic Soil Group—Monmouth County, New Jersey
(3536 Route 66)



Map Scale: 1:839 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 10 20 40 60

Feet
0 40 80 160 240

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points
- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Monmouth County, New Jersey
Survey Area Data: Version 17, Aug 29, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 4, 2022—Jul 22, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
LasB	Lakewood sand, 0 to 5 percent slopes	A	1.5	100.0%
Totals for Area of Interest			**1.5**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher