# STORMWATER MANAGEMENT REPORT

*for*

**PROPOSED MIXED-USE DEVELOPMENT**

*located at*

**160 FIRST AVENUE**
**BLOCK 101, LOT 4.01**

*in the*

**BOROUGH OF ATLANTIC HIGHLANDS**
**MONMOUTH COUNTY, NJ**

*has been prepared for*

## KALIAN MANAGEMENT LLC

**2 HENESSEY BOULEVARD, SUITE 1**
**ATLANTIC HIGHLANDS, NJ 07716**

*on*

**January 30, 2023**
***Last Revised September 1, 2023***

**InSite Project No. 22-756-10**

**Patrick R. Ward, PE, PP**
**NJPE #50790**

**InSite Engineering, LLC**
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## APPENDICES

## 1 INTRODUCTION

The subject property is known and designated as Block 101, Lot 4.01 as shown on Tax Map #22 of the Borough of Atlantic Highlands. The existing site encompasses 19,905 SF (approximately 0.46 acres). The Preliminary and Final Major Site Plan and Stormwater Management Report have been prepared by this office on behalf of the Applicant, Kalian Management, LLC.

## 2 PROJECT SCOPE

The site is located on the northeastern corner of First Avenue and East Garfield Avenue, in the Borough of Atlantic Highlands. It is bound to the south by East Garfield Avenue with an office building beyond; to the west by First Avenue with existing commercial buildings beyond; to the north by a new mixed-use development; and to the east by a vacant lot. The site is located within the CBD (Commercial Business District) Zone as indicated on the Borough's zoning map. The lot is currently developed with a liquor store use. The site has a high point of 22.98 located at the northeast property corner and a low point of 18.57 located at the southwest driveway entrance. The existing grade is gentle sloping at an overall rate of approximately 3% from southeast to northwest.

The Applicant is proposing to develop the property with a four-story, 12,700 square foot residential/retail building with associated parking. Additional improvements include supplemental lighting and landscaping measures around the proposed parking facilities. A permeable asphalt paving system will be used to infiltrate and offset the runoff generated by the minor increase in impervious surfaces.

## 3 BASIS OF COMPARISON

The rules and regulations of the Borough of Atlantic Highlands mimic the NJDEP stormwater regulations. This project falls under the Borough's and State's definition of a minor development which states that projects not generating one or more acres of land disturbance or one quarter or more acres of impervious surface are exempt. Therefore, water quality and recharge BMP's are not required as a part of this application. However, with the development of the residential/retail building and the increase in impervious area, stormwater runoff rates and volumes will increase.

The Borough of Atlantic Highlands requires stormwater management to mitigate the increased runoff generated by the development. The summary below and attached calculations will show how the proposed permeable asphalt system is adequate to handle any extra runoff generated by the proposed development.

## 4 METHODOLOGY & DESIGN

The pre- and post-development stormwater runoff calculations follow the methodology outlined in Soil Conservation Service Technical Release No.'s 55 and 20 (TR-55 and TR-20). The data to support these calculations was obtained from field survey data, the applicable USGS mapping for the site, and the applicable Soil `Survey for the site. The calculations were performed using HydroCAD 10.10-7a.

Prior to the design, a detailed soils investigation was performed on the property by Whitestone Associates, Inc. Soil permeability testing was performed on soil to determine infiltration rates. A factor of safety of two (2) is applied to the lower limits of the soils permeability results to determine the design infiltration rate. The results of these test ratings are included with detailed soil profile logs as an appendix to this report.

Under existing conditions all runoff generated on site flows to the south and western property lines, where it is collected in the municipal right-of-way via sheet flow. Under proposed conditions all roof area and parking area is collected and conveyed to the recharge pipe to infiltrate the increase in runoff for the 25-year storm event.

Runoff generated by the roof is conveyed through an six (6") inch PVC exterior downspout collection system and into the storage system via E-inlets in the parking area and 6" perforated pvc. A summary analysis of the existing and proposed flow rates which leave the site are summarized as follows:



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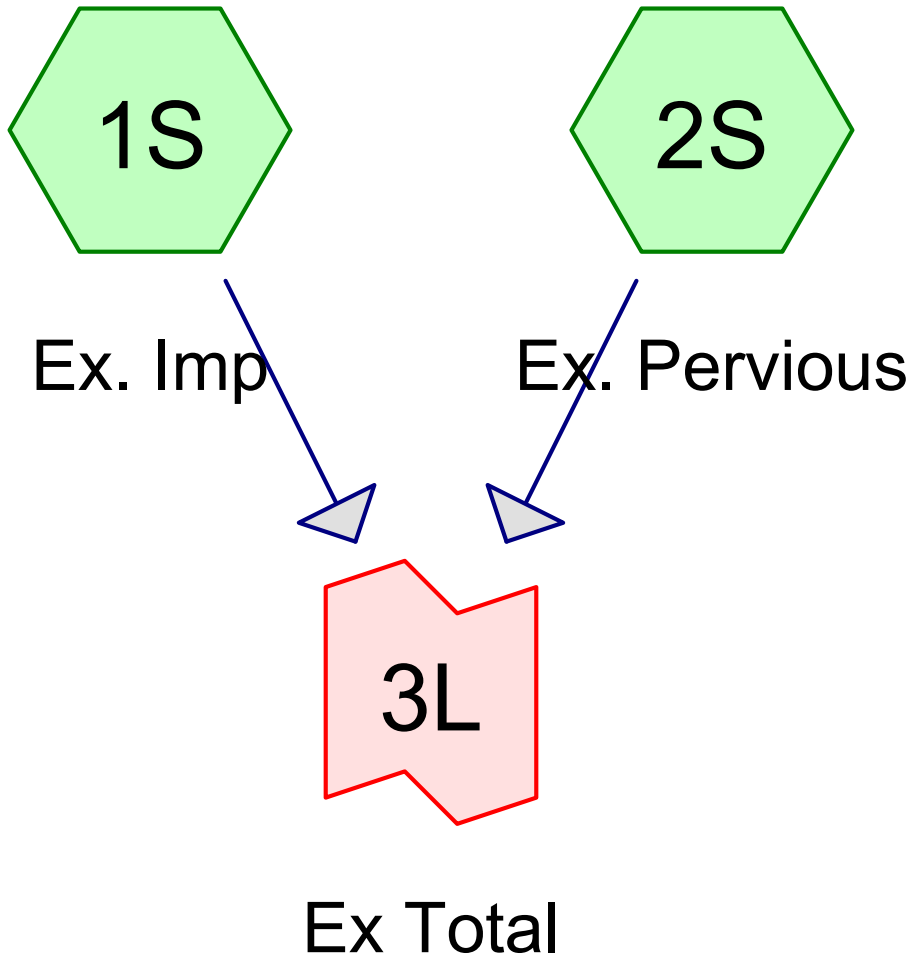
| Storm Event | Existing Conditions | Proposed Conditions |
|---|---|---|
| 2-Year | 1.53 cfs | 0.28 cfs |
| 10-Year | 2.38 cfs | 0.44 cfs |
| 25-Year | 2.97 cfs | 0.55 cfs |
| 100-Year | 4.10 cfs | 0.77 cfs |

## 5 CONCLUSION

As indicated within the attached calculations and described above, the peak runoff rate for the 25-year storm event will decrease from existing to proposed conditions. Therefore the proposed development is not anticipated to have adverse hydrologic impacts on the subject property or surrounding community.

# APPENDICES

# A. EXISTING CONDITIONS RUNOFF CALCULATIONS




Subcat Reach Pond Link

**Routing Diagram for r3 Monmouth County**
Prepared by Insite Engineering, LLC, Printed 8/30/2023

## Summary for Subcatchment 1S: Ex. Imp

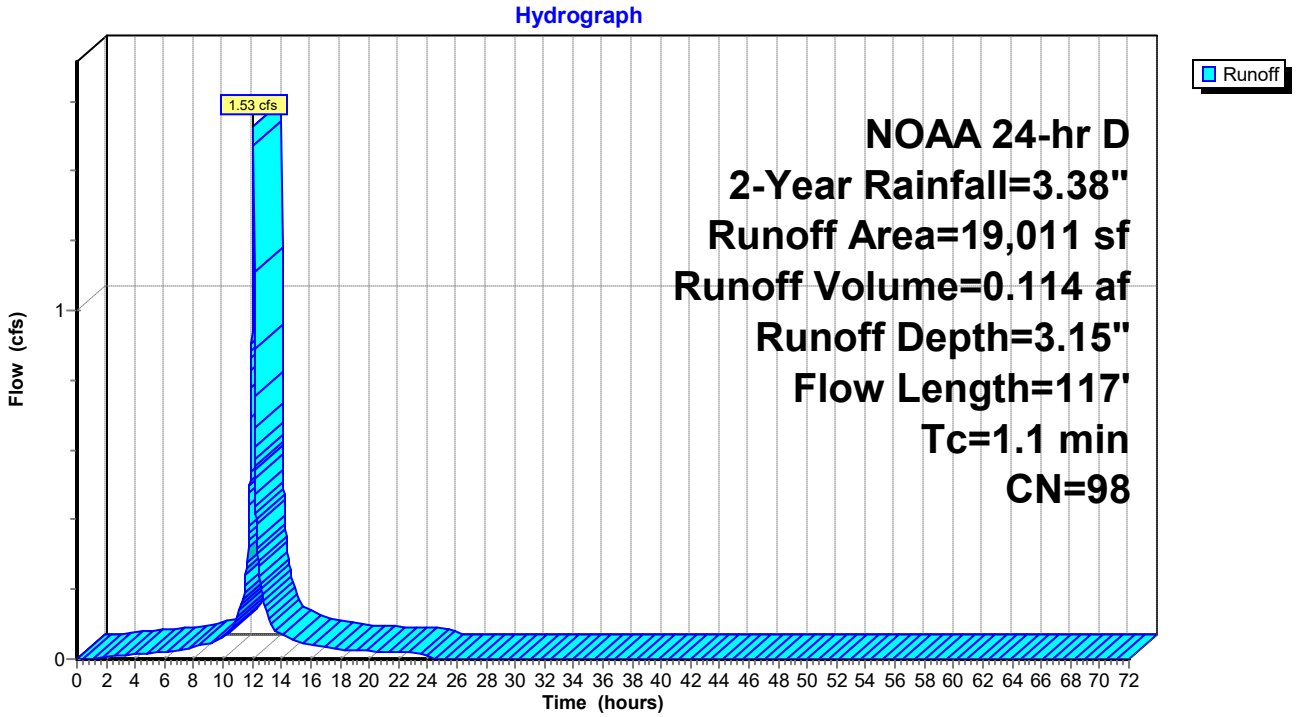
Runoff = 1.53 cfs @ 12.10 hrs, Volume= 0.114 af, Depth= 3.15"
Routed to Link 3L : Ex Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

| Area (sf) | CN | Description |
|---|---|---|
| 19,011 | 98 | Paved parking, HSG A |
| 19,011 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.0 | 100 | 0.0285 | 1.63 | | **Sheet Flow, 22.30-19.45** Smooth surfaces n= 0.011 P2= 3.40" |
| 0.1 | 17 | 0.0353 | 3.81 | | **Shallow Concentrated Flow, 19.45-18.85** Paved Kv= 20.3 fps |
| 1.1 | 117 | Total | | | |

## Subcatchment 1S: Ex. Imp



## Summary for Subcatchment 2S: Ex. Pervious

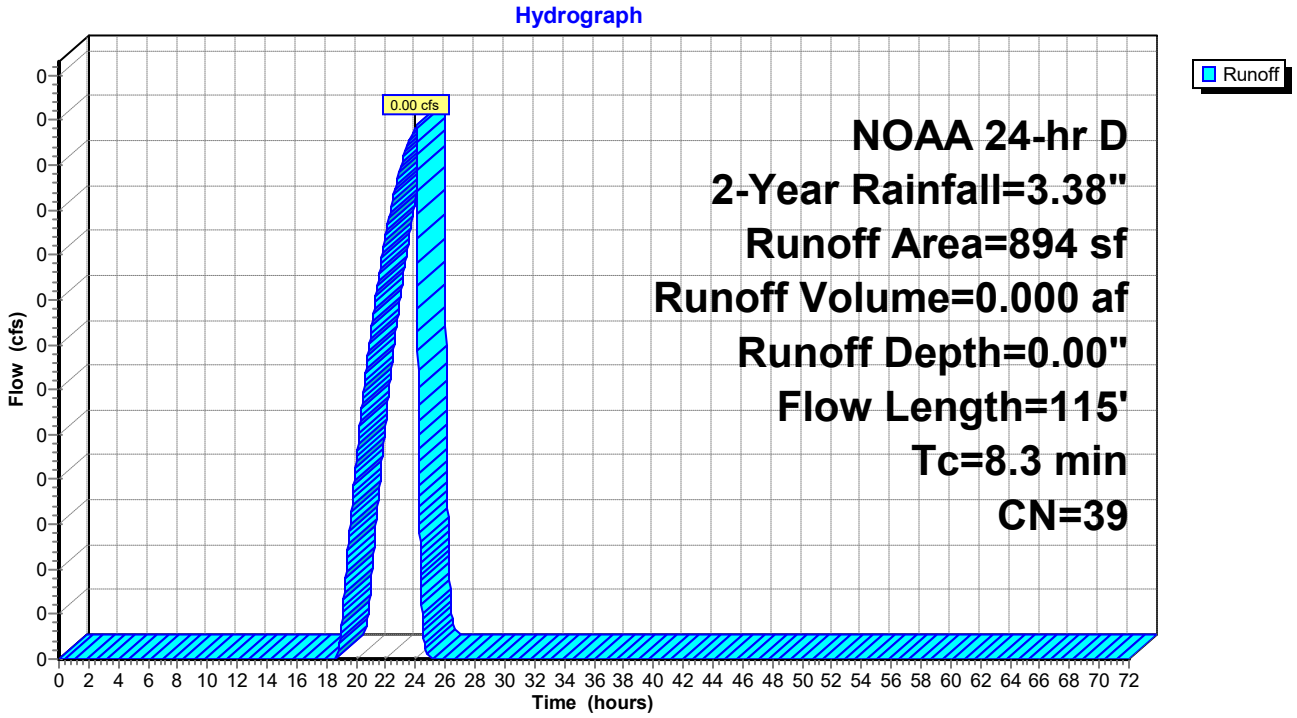
Runoff = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link 3L : Ex Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

| Area (sf) | CN | Description |
|---|---|---|
| 894 | 39 | >75% Grass cover, Good, HSG A |
| 894 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.2 | 100 | 0.0293 | 0.20 | | **Sheet Flow, 23.00-20.07** Grass: Short n= 0.150 P2= 3.40" |
| 0.1 | 15 | 0.0680 | 4.20 | | **Shallow Concentrated Flow, 20.07-19.05** Unpaved Kv= 16.1 fps |
| 8.3 | 115 | Total | | | |

## Subcatchment 2S: Ex. Pervious

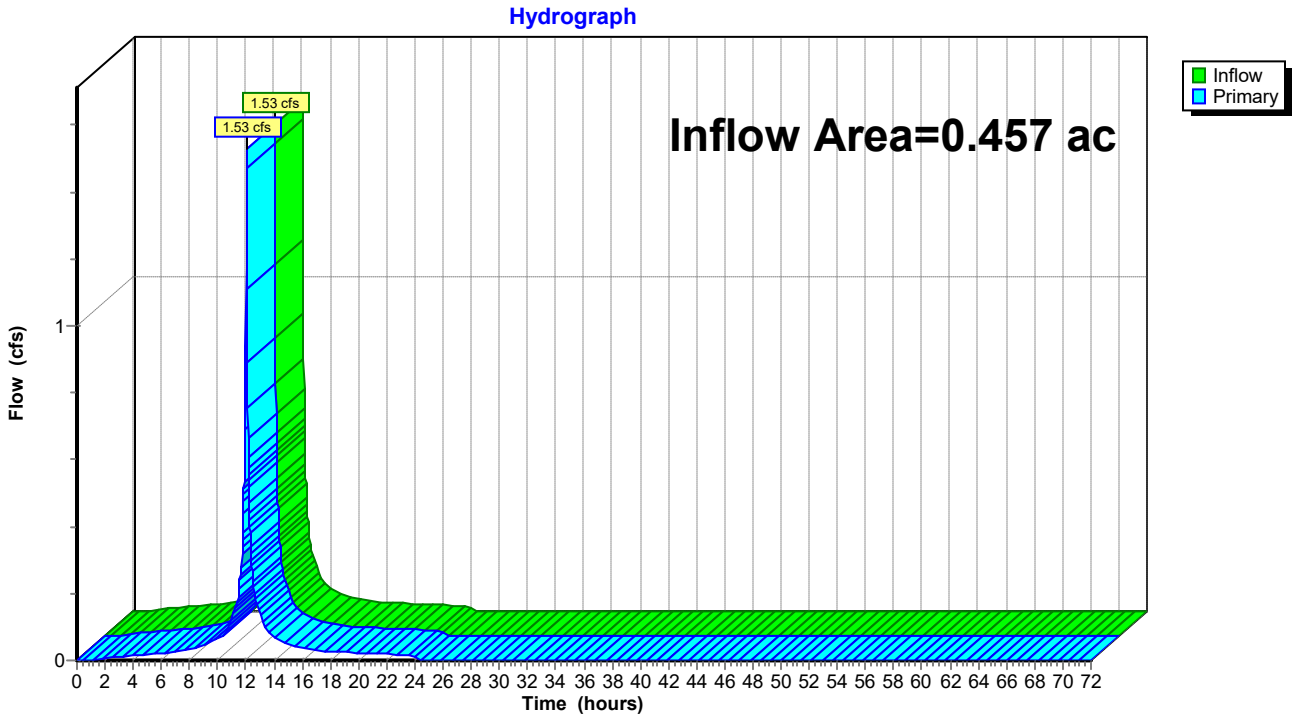


## Summary for Link 3L: Ex Total

Inflow Area = 0.457 ac, 95.51% Impervious, Inflow Depth = 3.01" for 2-Year event
Inflow = 1.53 cfs @ 12.10 hrs, Volume= 0.114 af
Primary = 1.53 cfs @ 12.10 hrs, Volume= 0.114 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Link 3L: Ex Total



## Summary for Subcatchment 1S: Ex. Imp

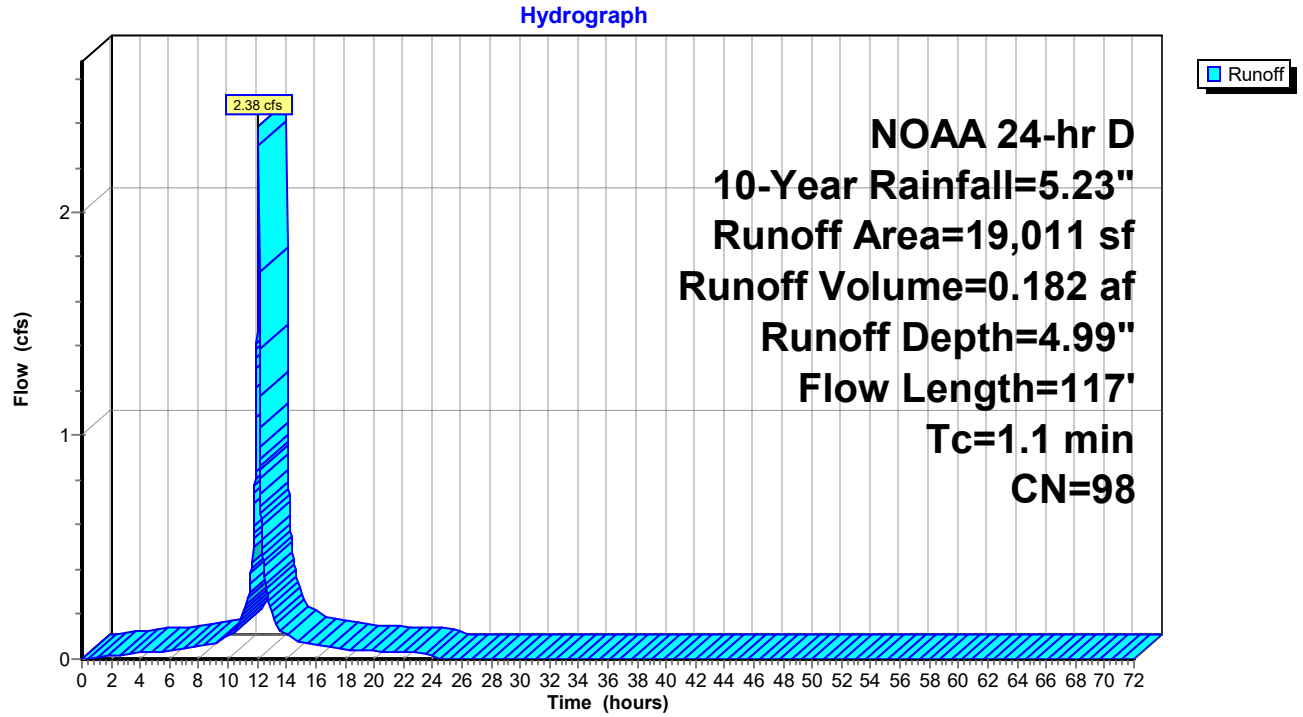
Runoff = 2.38 cfs @ 12.10 hrs, Volume= 0.182 af, Depth= 4.99"
Routed to Link 3L : Ex Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

| Area (sf) | CN | Description |
|---|---|---|
| 19,011 | 98 | Paved parking, HSG A |
| 19,011 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.0 | 100 | 0.0285 | 1.63 | | **Sheet Flow, 22.30-19.45** Smooth surfaces n= 0.011 P2= 3.40" |
| 0.1 | 17 | 0.0353 | 3.81 | | **Shallow Concentrated Flow, 19.45-18.85** Paved Kv= 20.3 fps |
| 1.1 | 117 | Total | | | |

## Subcatchment 1S: Ex. Imp



## Summary for Subcatchment 2S: Ex. Pervious

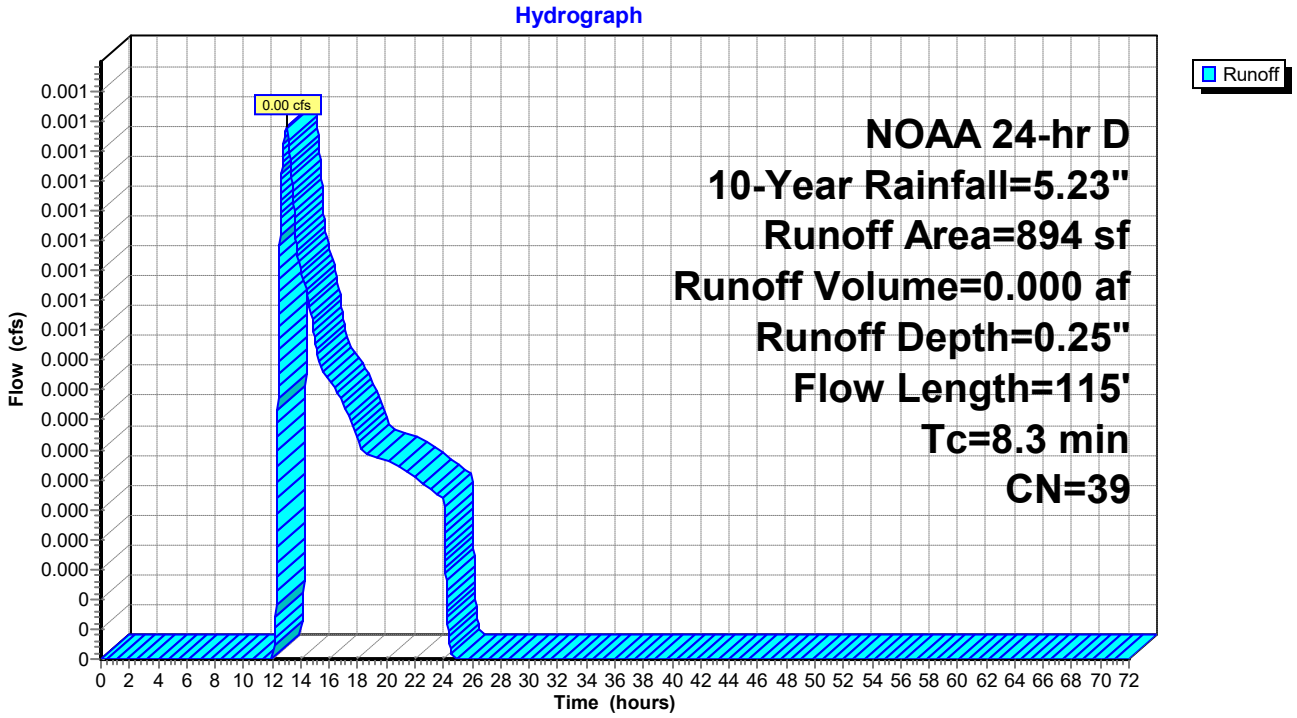
Runoff = 0.00 cfs @ 12.96 hrs, Volume= 0.000 af, Depth= 0.25"
Routed to Link 3L : Ex Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

| Area (sf) | CN | Description |
|---|---|---|
| 894 | 39 | >75% Grass cover, Good, HSG A |
| 894 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.2 | 100 | 0.0293 | 0.20 | | **Sheet Flow, 23.00-20.07**<br>Grass: Short n= 0.150 P2= 3.40" |
| 0.1 | 15 | 0.0680 | 4.20 | | **Shallow Concentrated Flow, 20.07-19.05**<br>Unpaved Kv= 16.1 fps |
| 8.3 | 115 | Total | | | |

## Subcatchment 2S: Ex. Pervious

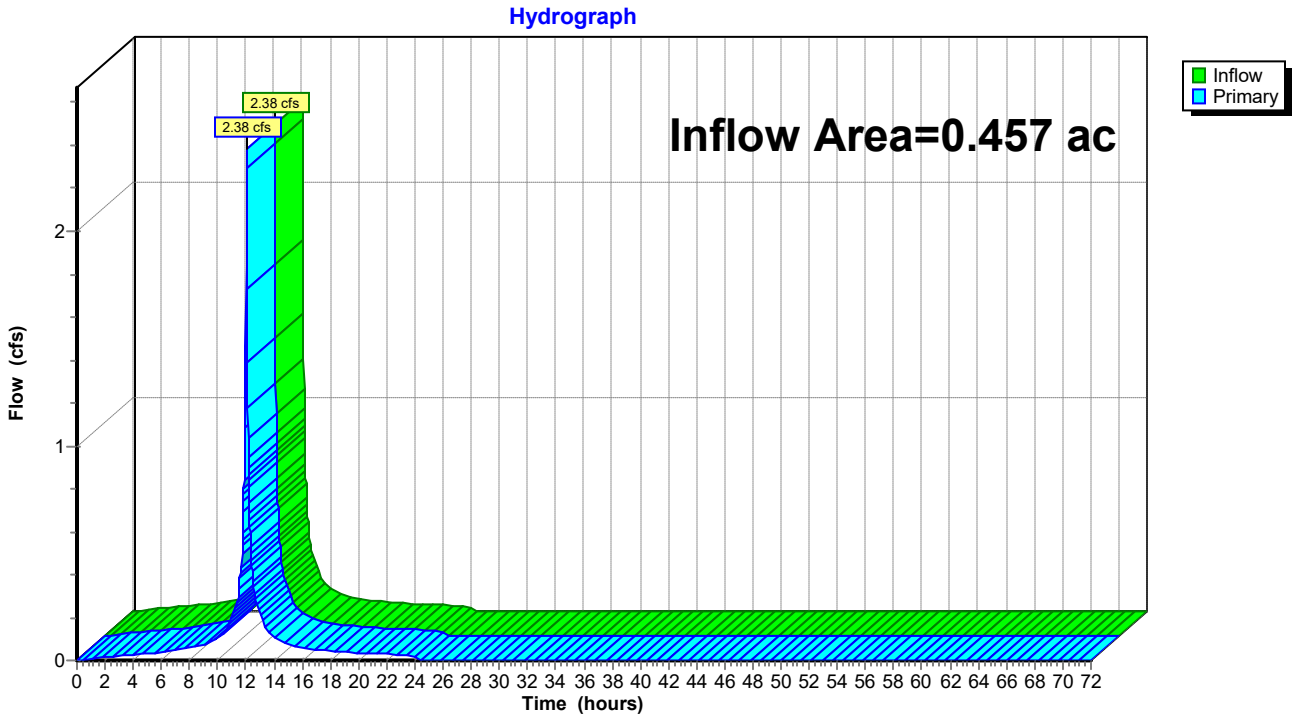


## Summary for Link 3L: Ex Total

Inflow Area = 0.457 ac, 95.51% Impervious, Inflow Depth = 4.78" for 10-Year event
Inflow = 2.38 cfs @ 12.10 hrs, Volume= 0.182 af
Primary = 2.38 cfs @ 12.10 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Link 3L: Ex Total



## Summary for Subcatchment 1S: Ex. Imp

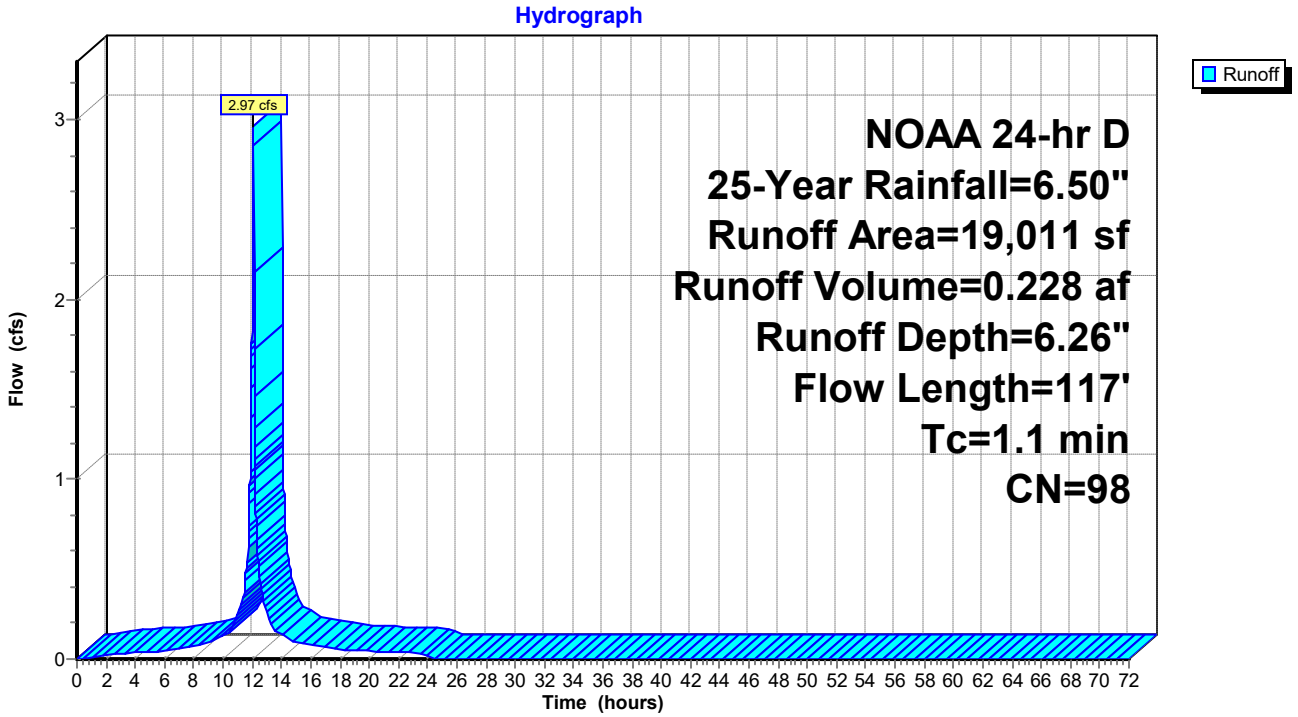
Runoff = 2.97 cfs @ 12.10 hrs, Volume= 0.228 af, Depth= 6.26"
Routed to Link 3L : Ex Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.50"

| Area (sf) | CN | Description |
|---|---|---|
| 19,011 | 98 | Paved parking, HSG A |
| 19,011 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.0 | 100 | 0.0285 | 1.63 | | **Sheet Flow, 22.30-19.45** Smooth surfaces n= 0.011 P2= 3.40" |
| 0.1 | 17 | 0.0353 | 3.81 | | **Shallow Concentrated Flow, 19.45-18.85** Paved Kv= 20.3 fps |
| 1.1 | 117 | Total | | | |

### Subcatchment 1S: Ex. Imp



## Summary for Subcatchment 2S: Ex. Pervious

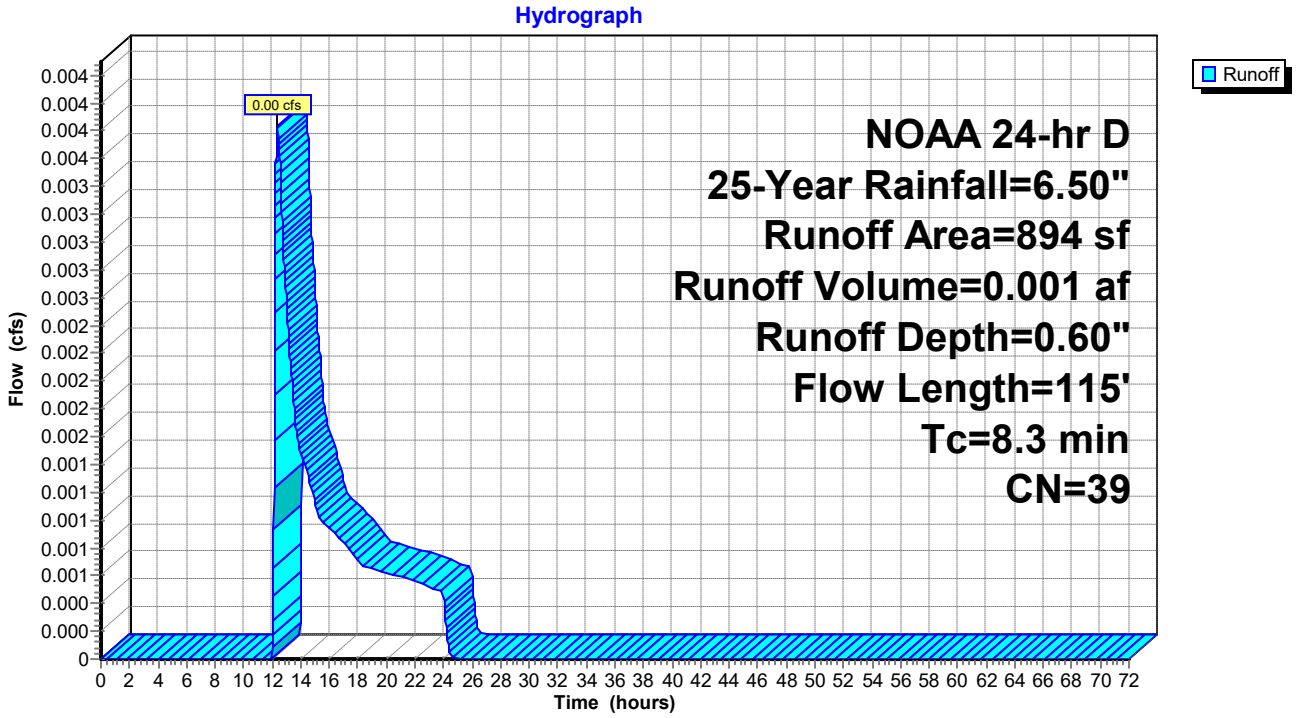
Runoff = 0.00 cfs @ 12.36 hrs, Volume= 0.001 af, Depth= 0.60"
Routed to Link 3L : Ex Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.50"

| Area (sf) | CN | Description |
|---|---|---|
| 894 | 39 | >75% Grass cover, Good, HSG A |
| 894 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.2 | 100 | 0.0293 | 0.20 | | **Sheet Flow, 23.00-20.07** Grass: Short n= 0.150 P2= 3.40" |
| 0.1 | 15 | 0.0680 | 4.20 | | **Shallow Concentrated Flow, 20.07-19.05** Unpaved Kv= 16.1 fps |
| 8.3 | 115 | Total | | | |

## Subcatchment 2S: Ex. Pervious

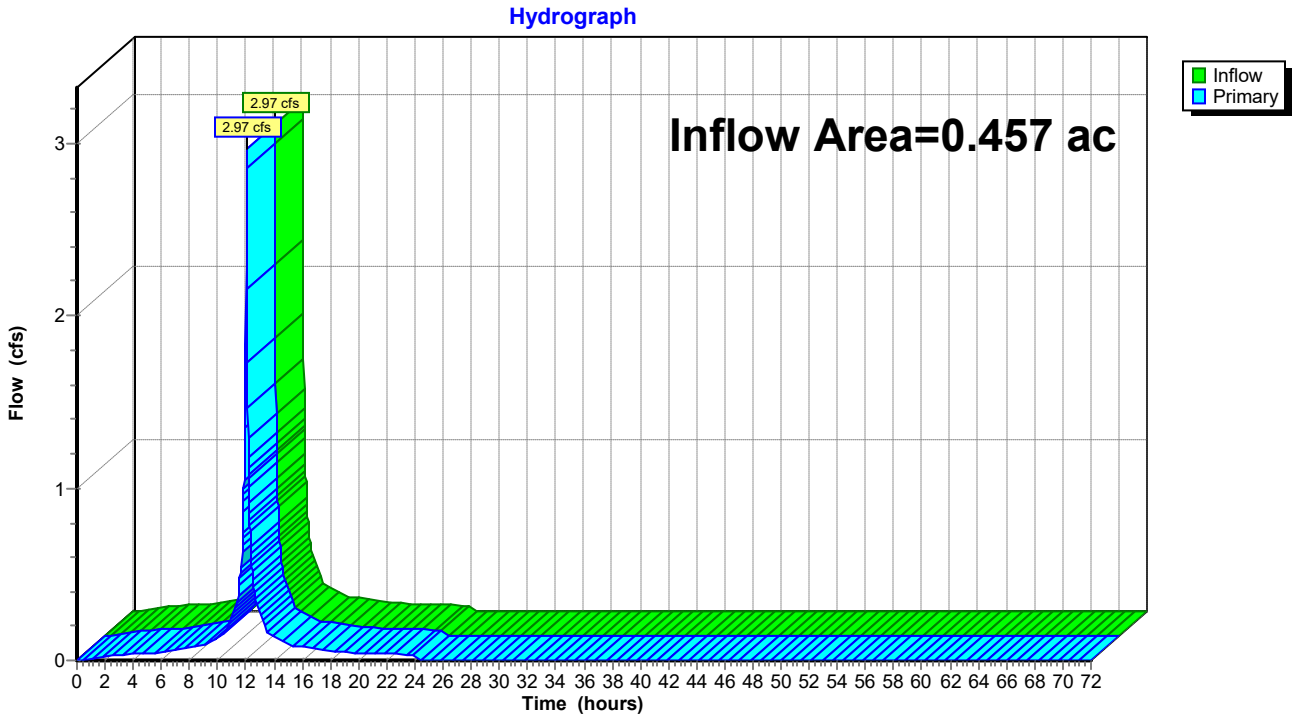


## Summary for Link 3L: Ex Total

Inflow Area = 0.457 ac, 95.51% Impervious, Inflow Depth = 6.01" for 25-Year event
Inflow = 2.97 cfs @ 12.10 hrs, Volume= 0.229 af
Primary = 2.97 cfs @ 12.10 hrs, Volume= 0.229 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Link 3L: Ex Total



## Summary for Subcatchment 1S: Ex. Imp

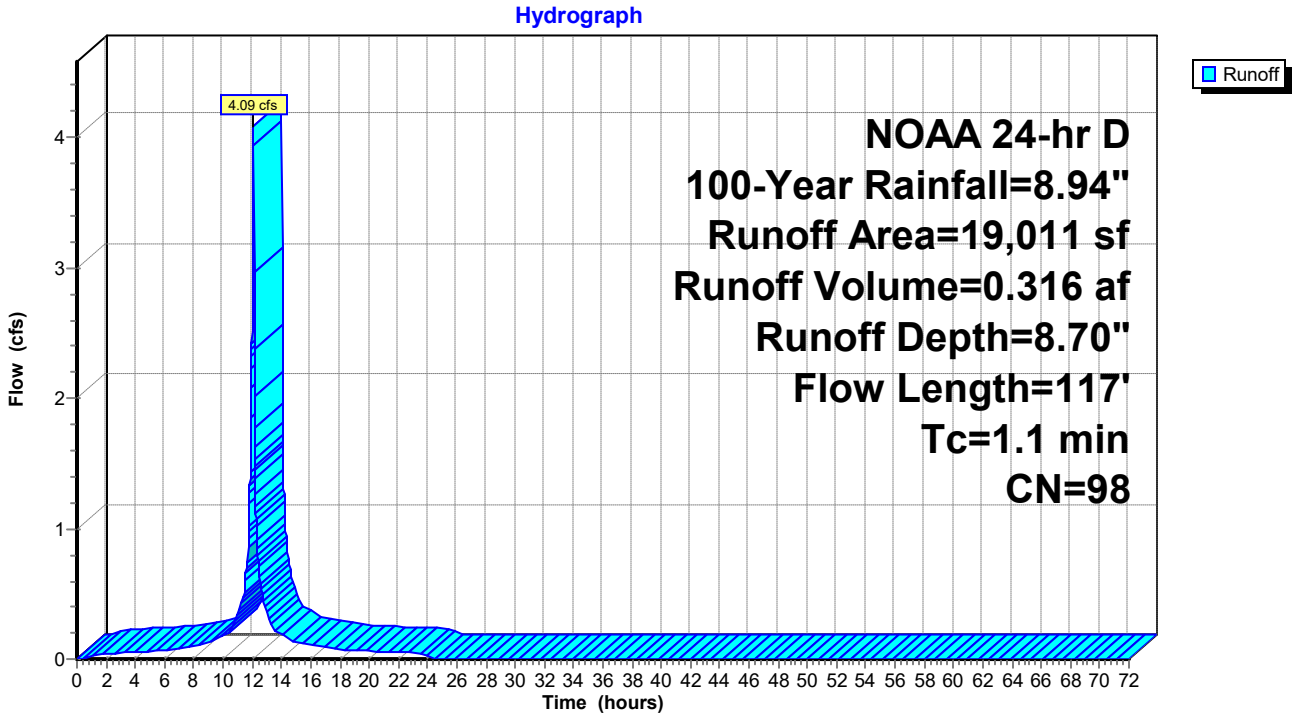
Runoff = 4.09 cfs @ 12.10 hrs, Volume= 0.316 af, Depth= 8.70"
Routed to Link 3L : Ex Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

| Area (sf) | CN | Description |
|---|---|---|
| 19,011 | 98 | Paved parking, HSG A |
| 19,011 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.0 | 100 | 0.0285 | 1.63 | | **Sheet Flow, 22.30-19.45** Smooth surfaces n= 0.011 P2= 3.40" |
| 0.1 | 17 | 0.0353 | 3.81 | | **Shallow Concentrated Flow, 19.45-18.85** Paved Kv= 20.3 fps |
| 1.1 | 117 | Total | | | |

### Subcatchment 1S: Ex. Imp



## Summary for Subcatchment 2S: Ex. Pervious

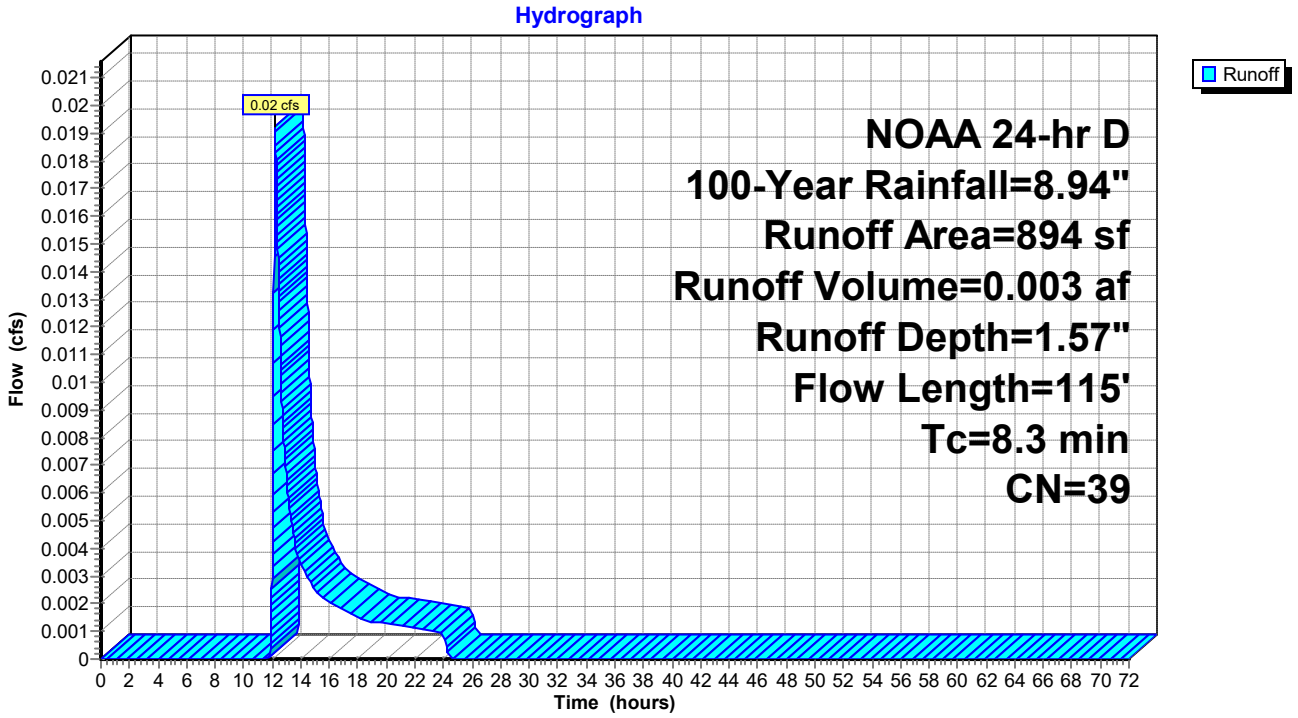
Runoff = 0.02 cfs @ 12.19 hrs, Volume= 0.003 af, Depth= 1.57"
Routed to Link 3L : Ex Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

| Area (sf) | CN | Description |
|---|---|---|
| 894 | 39 | >75% Grass cover, Good, HSG A |
| 894 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 8.2 | 100 | 0.0293 | 0.20 | | **Sheet Flow, 23.00-20.07**<br>Grass: Short n= 0.150 P2= 3.40" |
| 0.1 | 15 | 0.0680 | 4.20 | | **Shallow Concentrated Flow, 20.07-19.05**<br>Unpaved Kv= 16.1 fps |
| 8.3 | 115 | Total | | | |

## Subcatchment 2S: Ex. Pervious

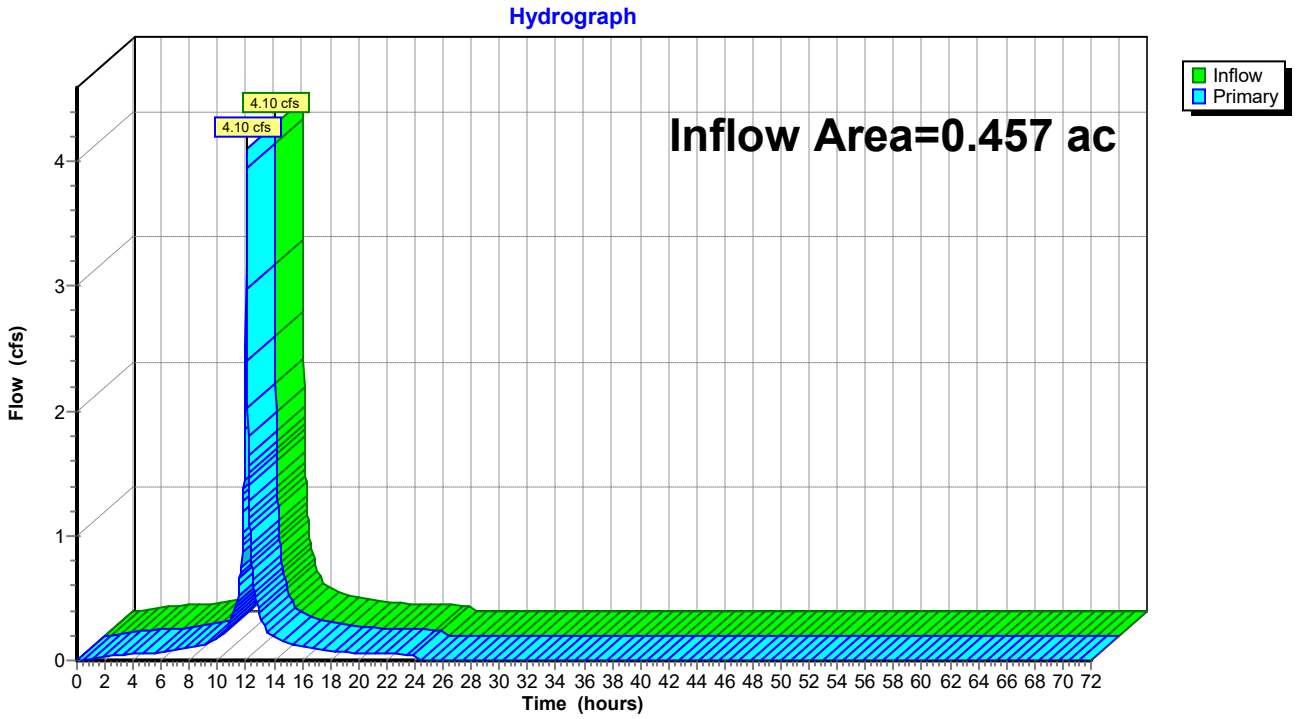


## Summary for Link 3L: Ex Total

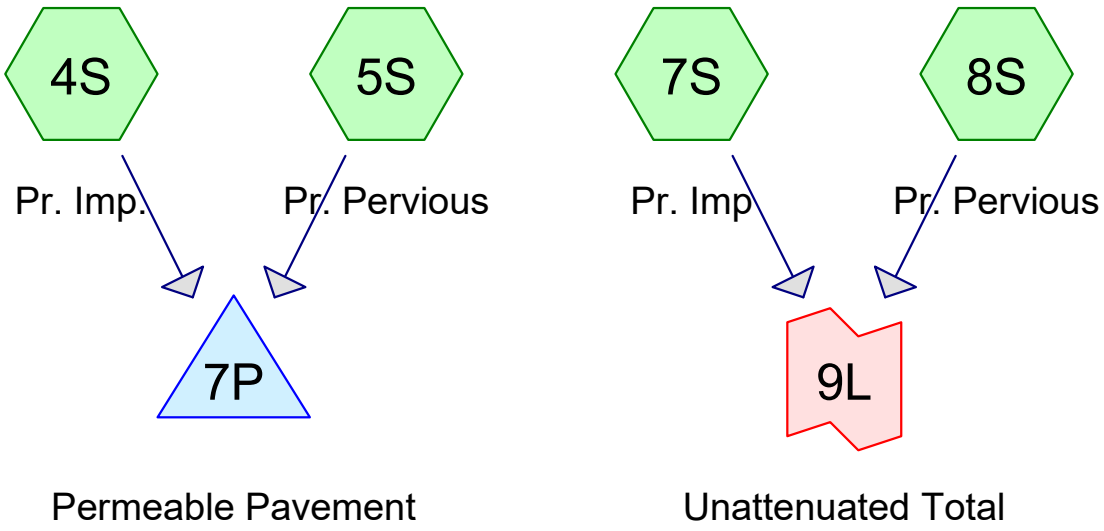
Inflow Area = 0.457 ac, 95.51% Impervious, Inflow Depth = 8.38" for 100-Year event
Inflow = 4.10 cfs @ 12.10 hrs, Volume= 0.319 af
Primary = 4.10 cfs @ 12.10 hrs, Volume= 0.319 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Link 3L: Ex Total



# B. PROPOSED CONDITIONS RUNOFF CALCULATIONS




Subcat Reach Pond Link

**Routing Diagram for r3 Monmouth County**
Prepared by Insite Engineering, LLC, Printed 8/30/2023

## Summary for Subcatchment 4S: Pr. Imp.

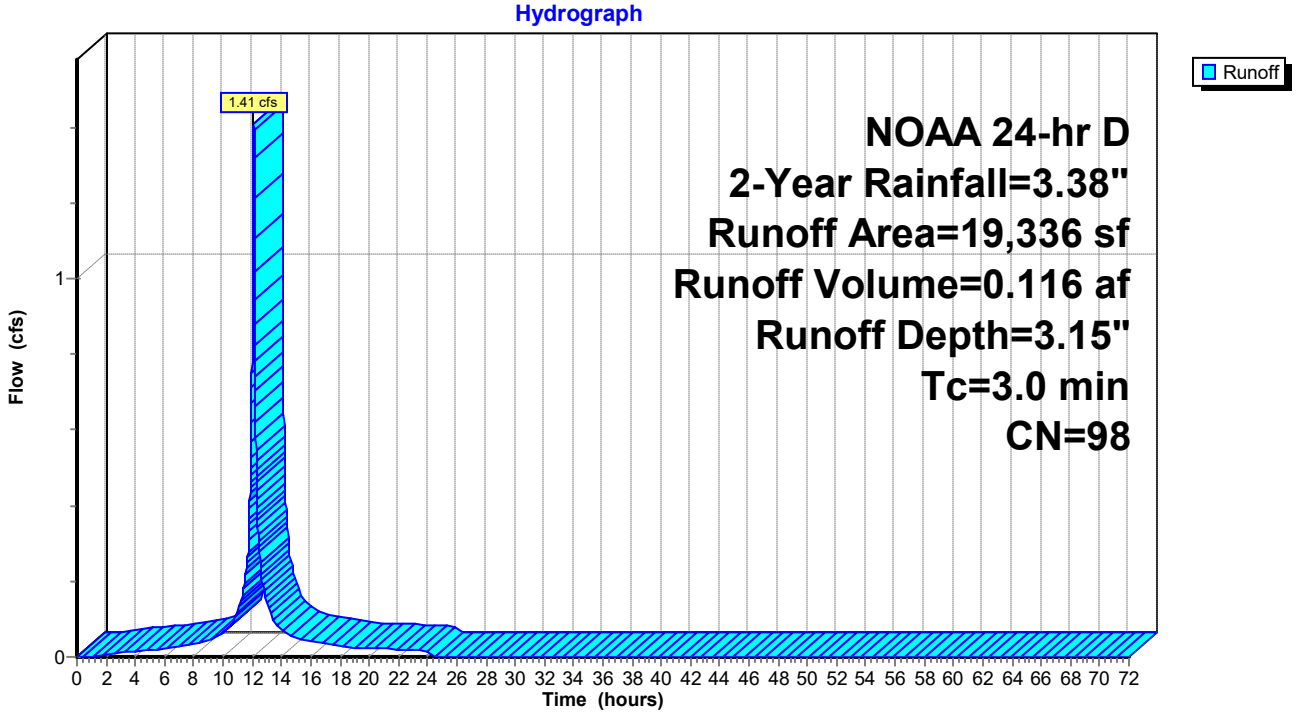
Runoff = 1.41 cfs @ 12.11 hrs, Volume= 0.116 af, Depth= 3.15"
Routed to Pond 7P : Permeable Pavement

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

| Area (sf) | CN | Description |
|---|---|---|
| 19,336 | 98 | Paved parking, HSG A |
| 19,336 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | | | | | **Direct Entry,** |

## Subcatchment 4S: Pr. Imp.



## Summary for Subcatchment 5S: Pr. Pervious

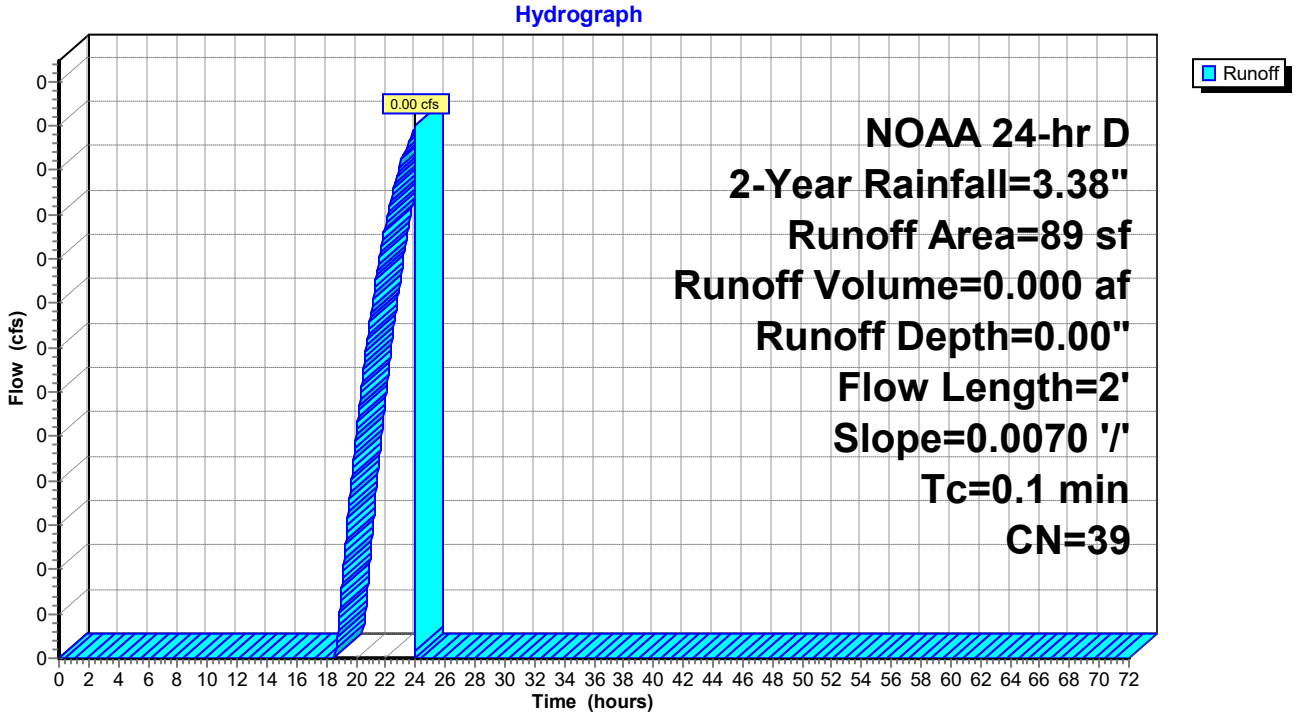
Runoff = 0.00 cfs @ 23.99 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Pond 7P : Permeable Pavement

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

| Area (sf) | CN | Description |
|---|---|---|
| 89 | 39 | >75% Grass cover, Good, HSG A |
| 89 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 2 | 0.0070 | 0.43 | | **Sheet Flow, 20.08-19.94** Smooth surfaces n= 0.011 P2= 3.40" |

## Subcatchment 5S: Pr. Pervious



## Summary for Subcatchment 7S: Pr. Imp

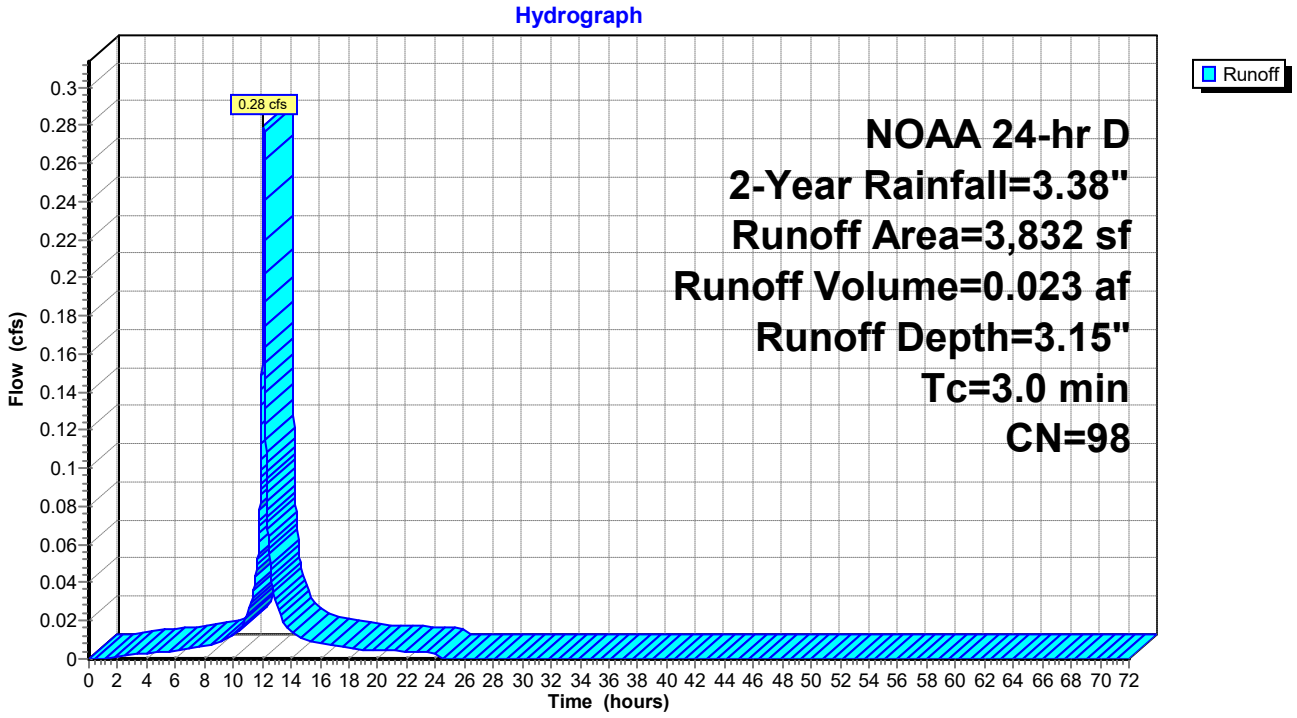
Runoff = 0.28 cfs @ 12.11 hrs, Volume= 0.023 af, Depth= 3.15"
Routed to Link 9L : Unattenuated Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

| Area (sf) | CN | Description |
|---|---|---|
| 3,832 | 98 | Paved parking, HSG A |
| 3,832 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | | | | | **Direct Entry,** |

### Subcatchment 7S: Pr. Imp



## Summary for Subcatchment 8S: Pr. Pervious

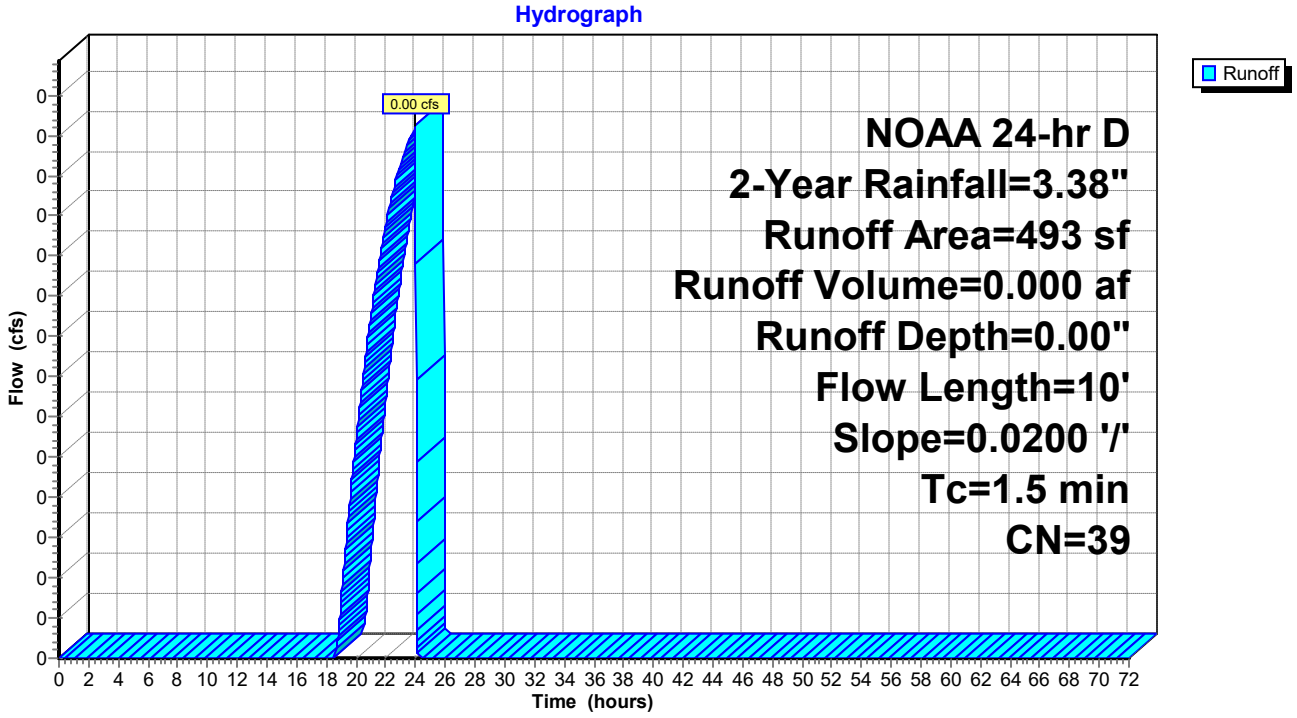
Runoff = 0.00 cfs @ 24.00 hrs, Volume= 0.000 af, Depth= 0.00"
Routed to Link 9L : Unattenuated Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-Year Rainfall=3.38"

| Area (sf) | CN | Description |
|---|---|---|
| 493 | 39 | >75% Grass cover, Good, HSG A |
| 493 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.5 | 10 | 0.0200 | 0.11 | | **Sheet Flow, 18.65-18.58** Grass: Short n= 0.150 P2= 3.40" |

## Subcatchment 8S: Pr. Pervious



## Summary for Pond 7P: Permeable Pavement

Inflow Area = 0.446 ac, 99.54% Impervious, Inflow Depth = 3.13" for 2-Year event
Inflow = 1.41 cfs @ 12.11 hrs, Volume= 0.116 af
Outflow = 1.41 cfs @ 12.12 hrs, Volume= 0.116 af, Atten= 0%, Lag= 0.3 min
Discarded = 1.41 cfs @ 12.12 hrs, Volume= 0.116 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 18.52' @ 12.12 hrs Surf.Area= 6,951 sf Storage= 24 cf

Plug-Flow detention time= 0.3 min calculated for 0.116 af (100% of inflow)
Center-of-Mass det. time= 0.3 min ( 756.5 - 756.2 )

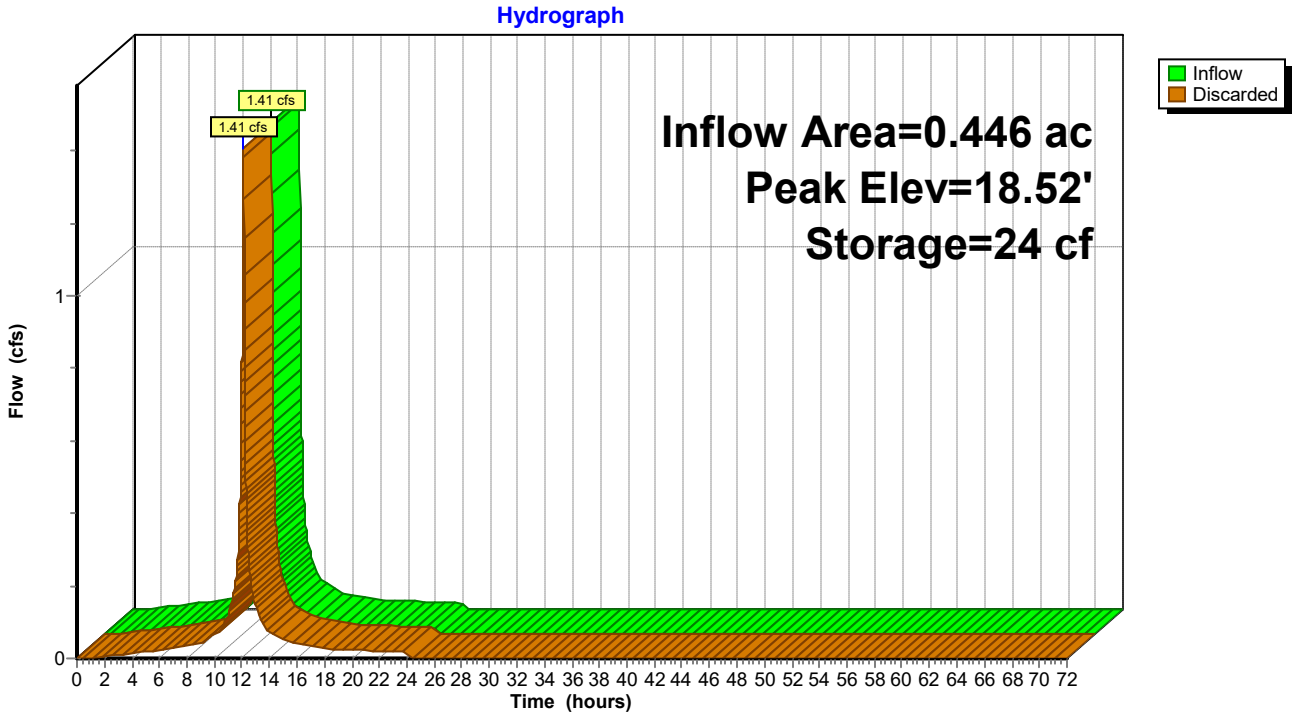
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 18.51' | 2,752 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>6,951 cf Overall - 71 cf Embedded = 6,880 cf x 40.0% Voids |
| #2 | 18.76' | 59 cf | **6.0" Round Pipe Storage** x 6 Inside #1<br>L= 50.0'<br>71 cf Overall - 0.3" Wall Thickness = 59 cf |
| | | 2,811 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 18.51 | 6,951 | 0 | 0 |
| 19.51 | 6,951 | 6,951 | 6,951 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 18.51' | **10.000 in/hr Exfiltration over Surface area** |

**Discarded OutFlow** Max=1.61 cfs @ 12.12 hrs HW=18.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.61 cfs)

## Pond 7P: Permeable Pavement

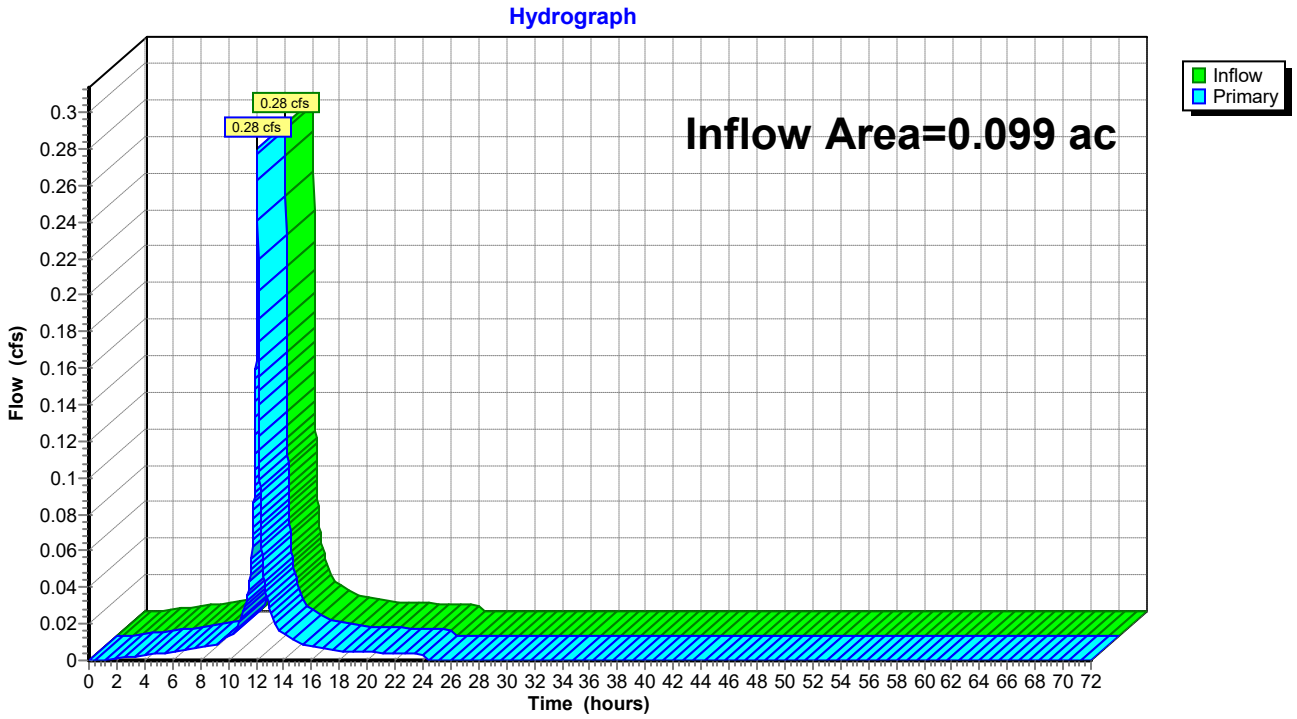


## Summary for Link 9L: Unattenuated Total

Inflow Area = 0.099 ac, 88.60% Impervious, Inflow Depth = 2.79" for 2-Year event
Inflow = 0.28 cfs @ 12.11 hrs, Volume= 0.023 af
Primary = 0.28 cfs @ 12.11 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Link 9L: Unattenuated Total



## Summary for Subcatchment 4S: Pr. Imp.

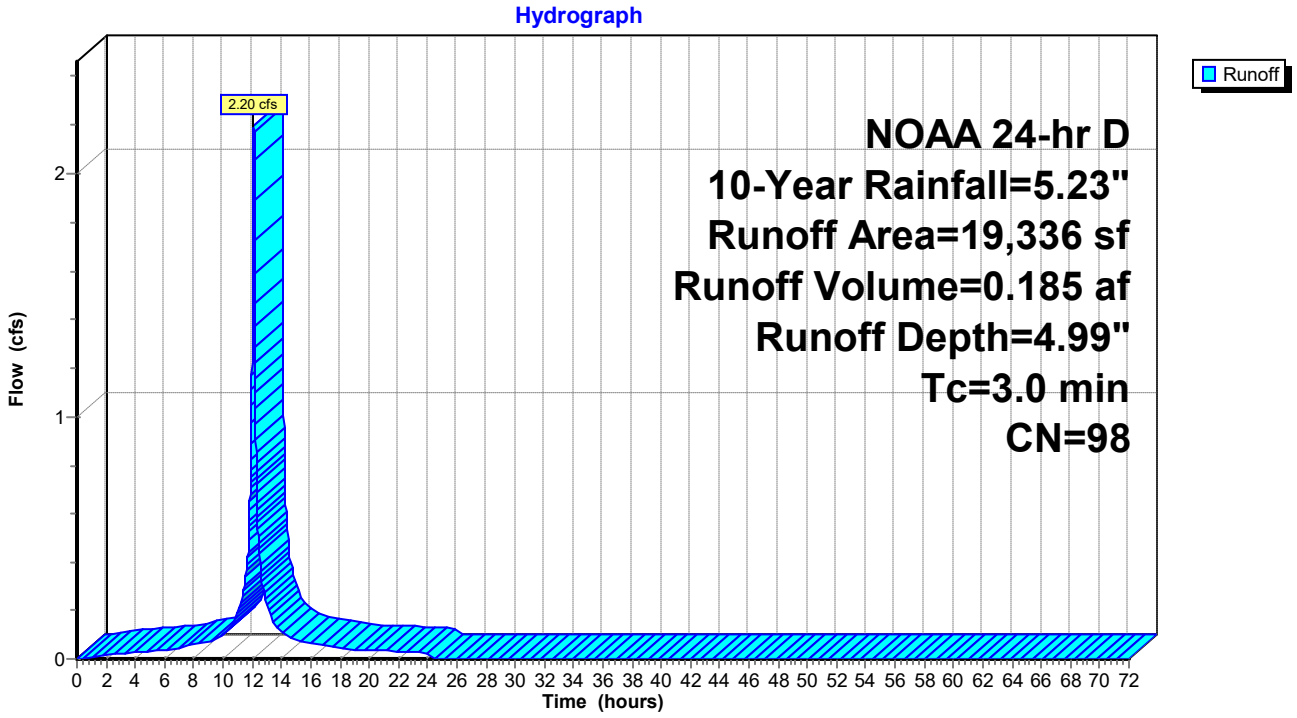
Runoff = 2.20 cfs @ 12.11 hrs, Volume= 0.185 af, Depth= 4.99"
Routed to Pond 7P : Permeable Pavement

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

| Area (sf) | CN | Description |
|---|---|---|
| 19,336 | 98 | Paved parking, HSG A |
| 19,336 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | | | | | **Direct Entry,** |

### Subcatchment 4S: Pr. Imp.



## Summary for Subcatchment 5S: Pr. Pervious

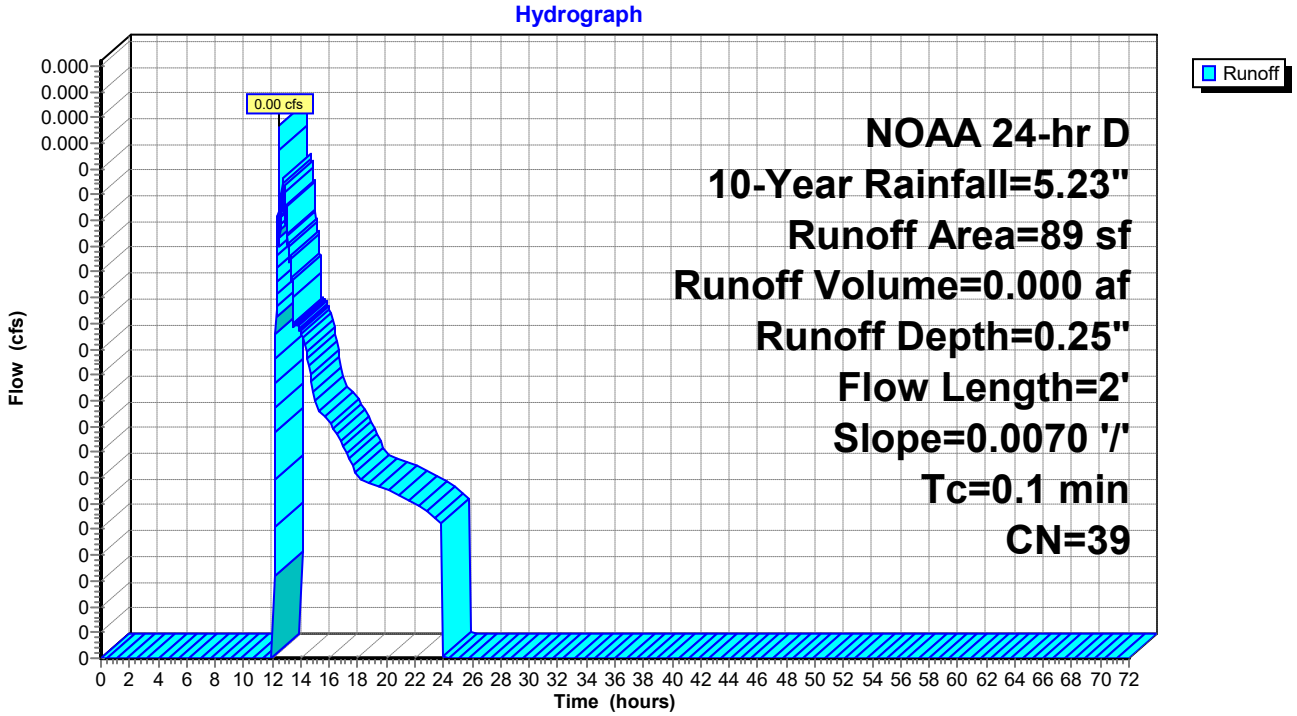
Runoff = 0.00 cfs @ 12.49 hrs, Volume= 0.000 af, Depth= 0.25"
Routed to Pond 7P : Permeable Pavement

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

| Area (sf) | CN | Description |
|---|---|---|
| 89 | 39 | >75% Grass cover, Good, HSG A |
| 89 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 2 | 0.0070 | 0.43 | | **Sheet Flow, 20.08-19.94** Smooth surfaces n= 0.011 P2= 3.40" |

## Subcatchment 5S: Pr. Pervious



## Summary for Subcatchment 7S: Pr. Imp

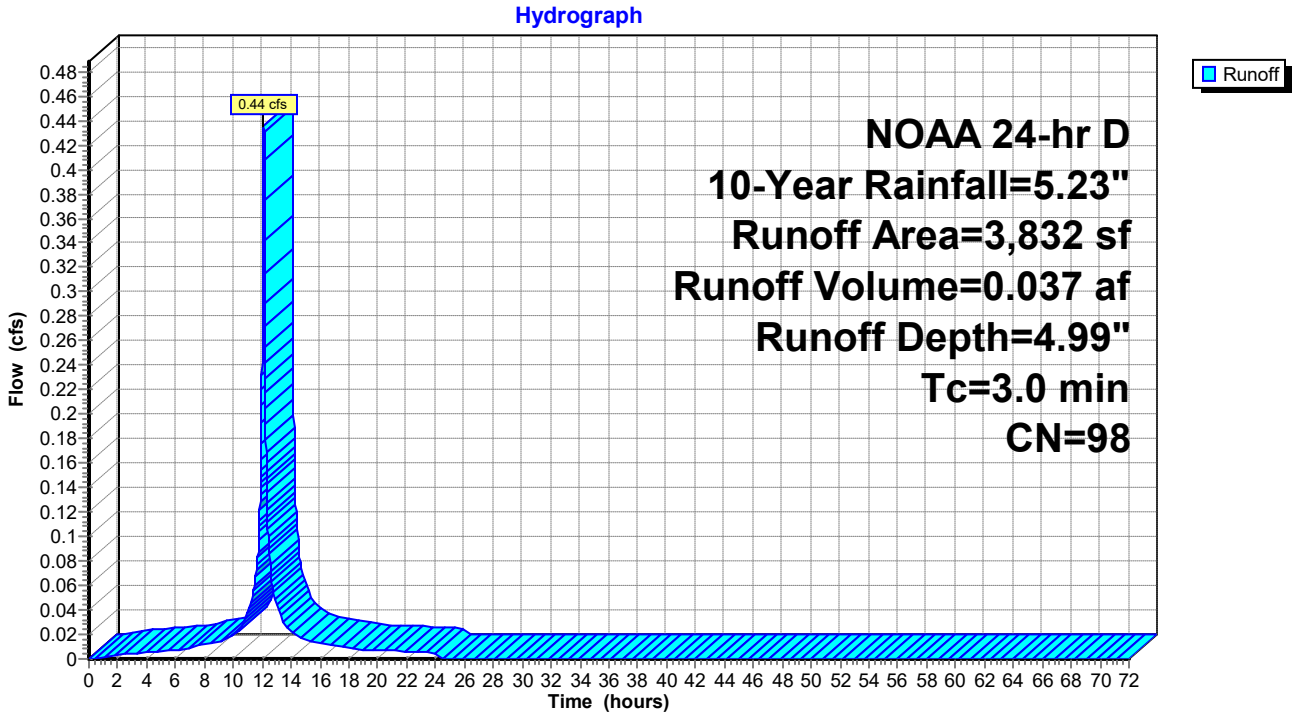
Runoff = 0.44 cfs @ 12.11 hrs, Volume= 0.037 af, Depth= 4.99"
Routed to Link 9L : Unattenuated Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

| Area (sf) | CN | Description |
|---|---|---|
| 3,832 | 98 | Paved parking, HSG A |
| 3,832 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | | | | | **Direct Entry,** |

### Subcatchment 7S: Pr. Imp



## Summary for Subcatchment 8S: Pr. Pervious

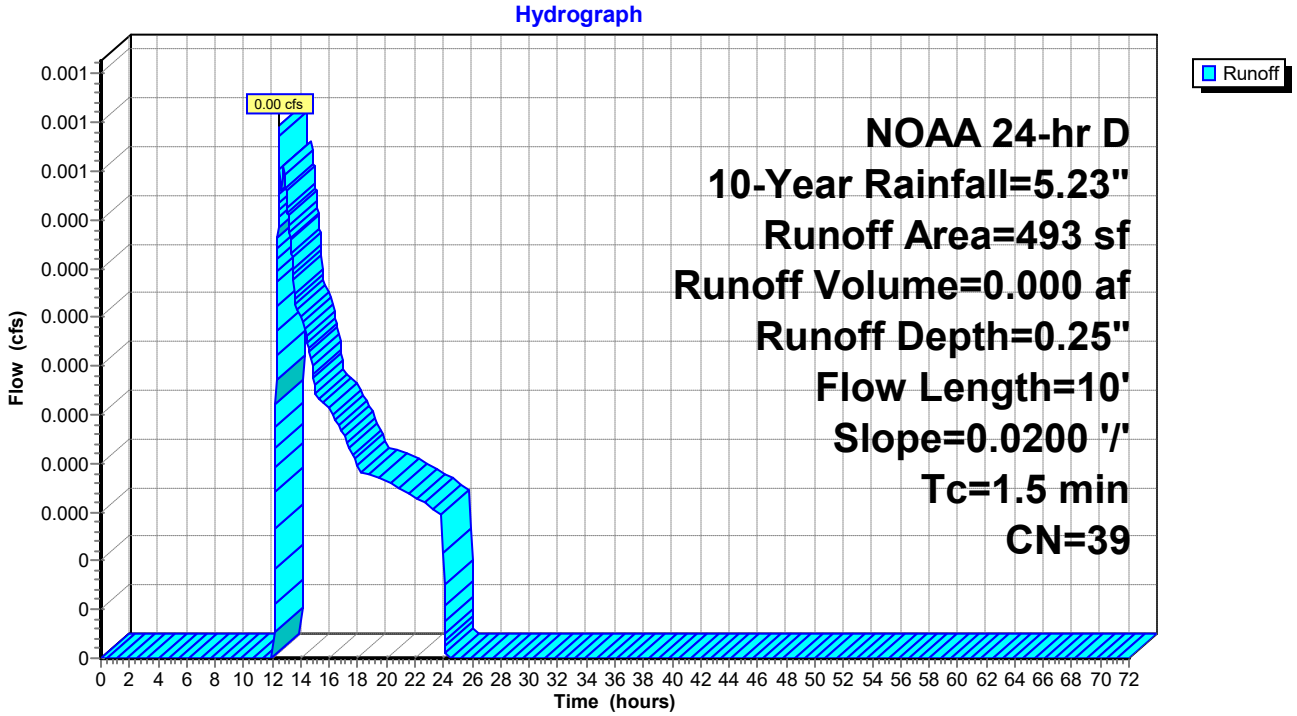
Runoff = 0.00 cfs @ 12.51 hrs, Volume= 0.000 af, Depth= 0.25"
Routed to Link 9L : Unattenuated Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-Year Rainfall=5.23"

| Area (sf) | CN | Description |
|---|---|---|
| 493 | 39 | >75% Grass cover, Good, HSG A |
| 493 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.5 | 10 | 0.0200 | 0.11 | | **Sheet Flow, 18.65-18.58**<br>Grass: Short n= 0.150 P2= 3.40" |

## Subcatchment 8S: Pr. Pervious



## Summary for Pond 7P: Permeable Pavement

Inflow Area = 0.446 ac, 99.54% Impervious, Inflow Depth = 4.97" for 10-Year event
Inflow = 2.20 cfs @ 12.11 hrs, Volume= 0.185 af
Outflow = 1.61 cfs @ 12.05 hrs, Volume= 0.185 af, Atten= 27%, Lag= 0.0 min
Discarded = 1.61 cfs @ 12.05 hrs, Volume= 0.185 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 18.58' @ 12.16 hrs Surf.Area= 6,951 sf Storage= 181 cf

Plug-Flow detention time= 0.4 min calculated for 0.185 af (100% of inflow)
Center-of-Mass det. time= 0.4 min ( 748.0 - 747.6 )

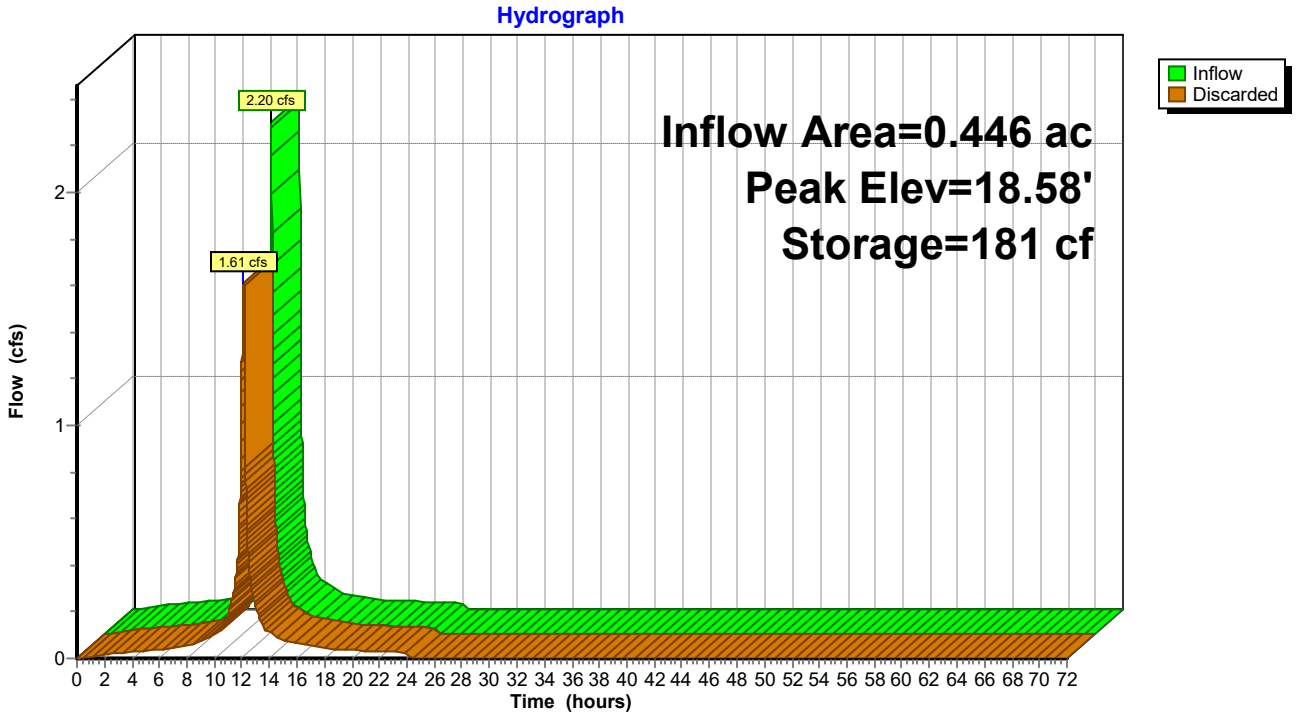
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 18.51' | 2,752 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>6,951 cf Overall - 71 cf Embedded = 6,880 cf x 40.0% Voids |
| #2 | 18.76' | 59 cf | **6.0" Round Pipe Storage** x 6 Inside #1<br>L= 50.0'<br>71 cf Overall - 0.3" Wall Thickness = 59 cf |
| | | 2,811 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 18.51 | 6,951 | 0 | 0 |
| 19.51 | 6,951 | 6,951 | 6,951 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 18.51' | **10.000 in/hr Exfiltration over Surface area** |

**Discarded OutFlow** Max=1.61 cfs @ 12.05 hrs HW=18.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.61 cfs)

## Pond 7P: Permeable Pavement

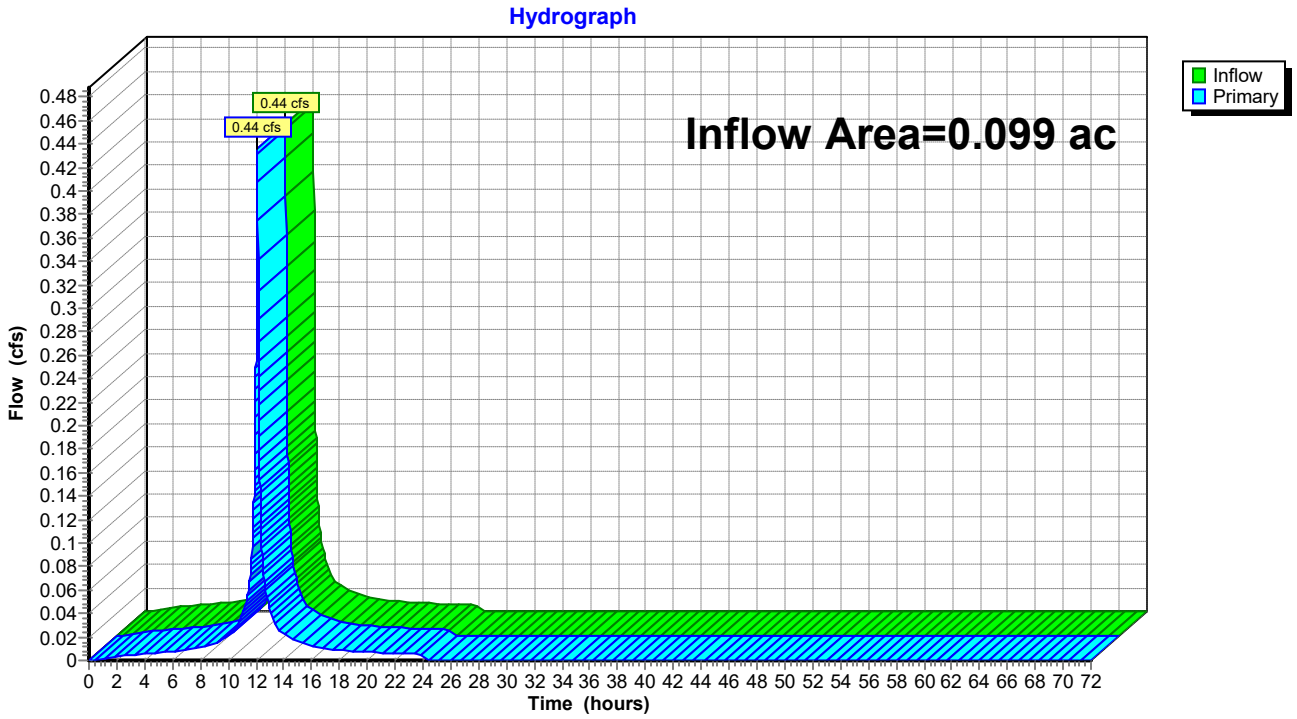


## Summary for Link 9L: Unattenuated Total

Inflow Area = 0.099 ac, 88.60% Impervious, Inflow Depth = 4.45" for 10-Year event
Inflow = 0.44 cfs @ 12.11 hrs, Volume= 0.037 af
Primary = 0.44 cfs @ 12.11 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Link 9L: Unattenuated Total



## Summary for Subcatchment 4S: Pr. Imp.

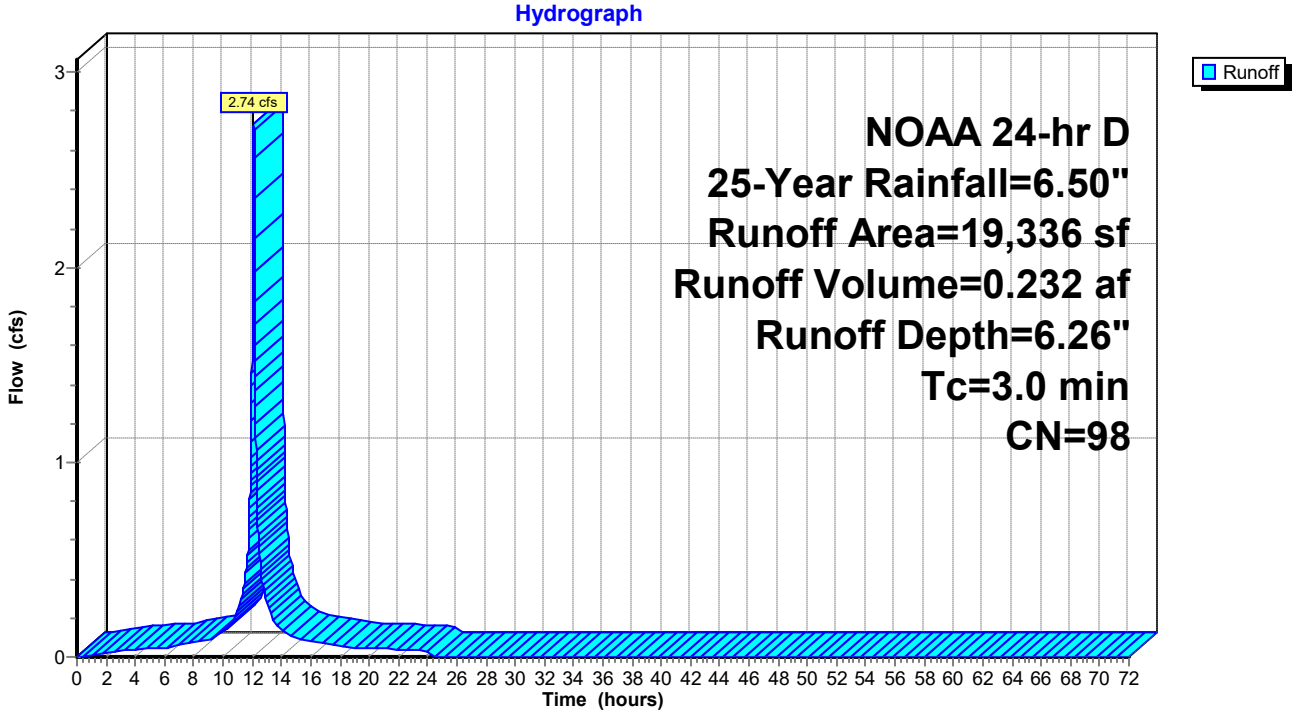
Runoff = 2.74 cfs @ 12.11 hrs, Volume= 0.232 af, Depth= 6.26"
Routed to Pond 7P : Permeable Pavement

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.50"

| Area (sf) | CN | Description |
|---|---|---|
| 19,336 | 98 | Paved parking, HSG A |
| 19,336 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | | | | | **Direct Entry,** |

### Subcatchment 4S: Pr. Imp.



## Summary for Subcatchment 5S: Pr. Pervious

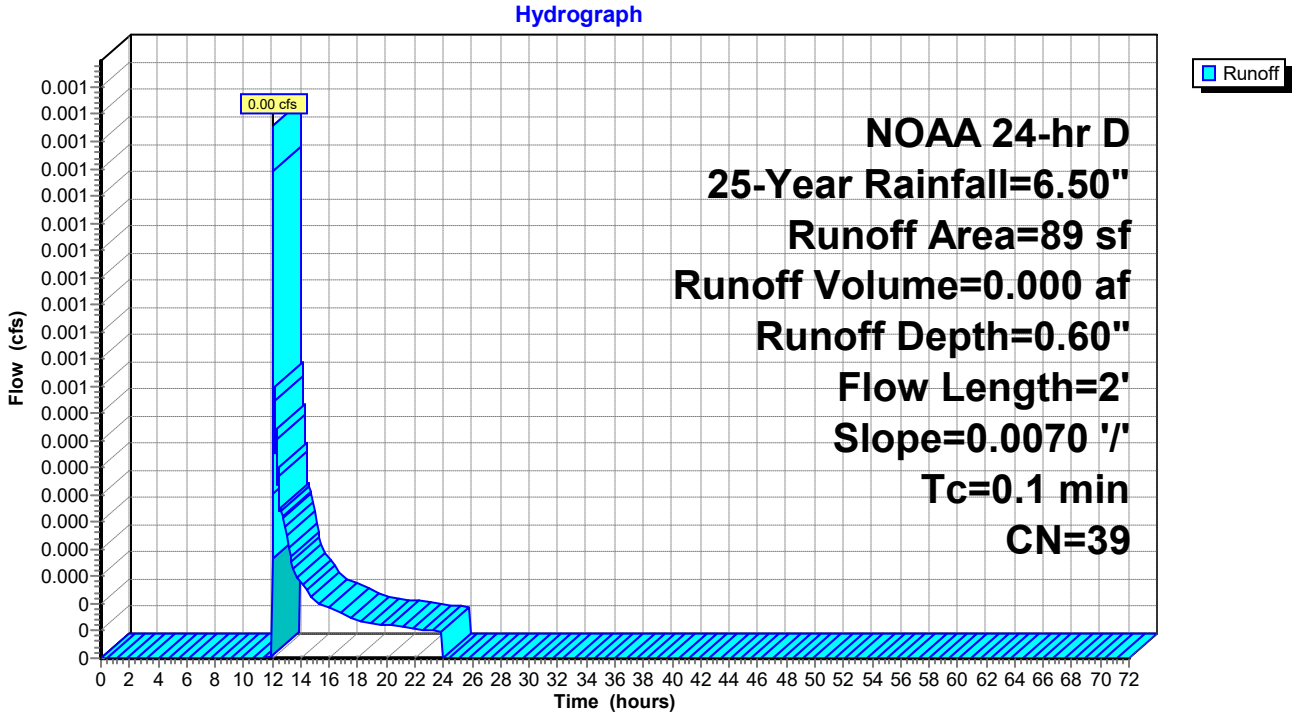
Runoff = 0.00 cfs @ 12.09 hrs, Volume= 0.000 af, Depth= 0.60"
Routed to Pond 7P : Permeable Pavement

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.50"

| Area (sf) | CN | Description |
|---|---|---|
| 89 | 39 | >75% Grass cover, Good, HSG A |
| 89 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 2 | 0.0070 | 0.43 | | **Sheet Flow, 20.08-19.94** Smooth surfaces n= 0.011 P2= 3.40" |

## Subcatchment 5S: Pr. Pervious



## Summary for Subcatchment 7S: Pr. Imp

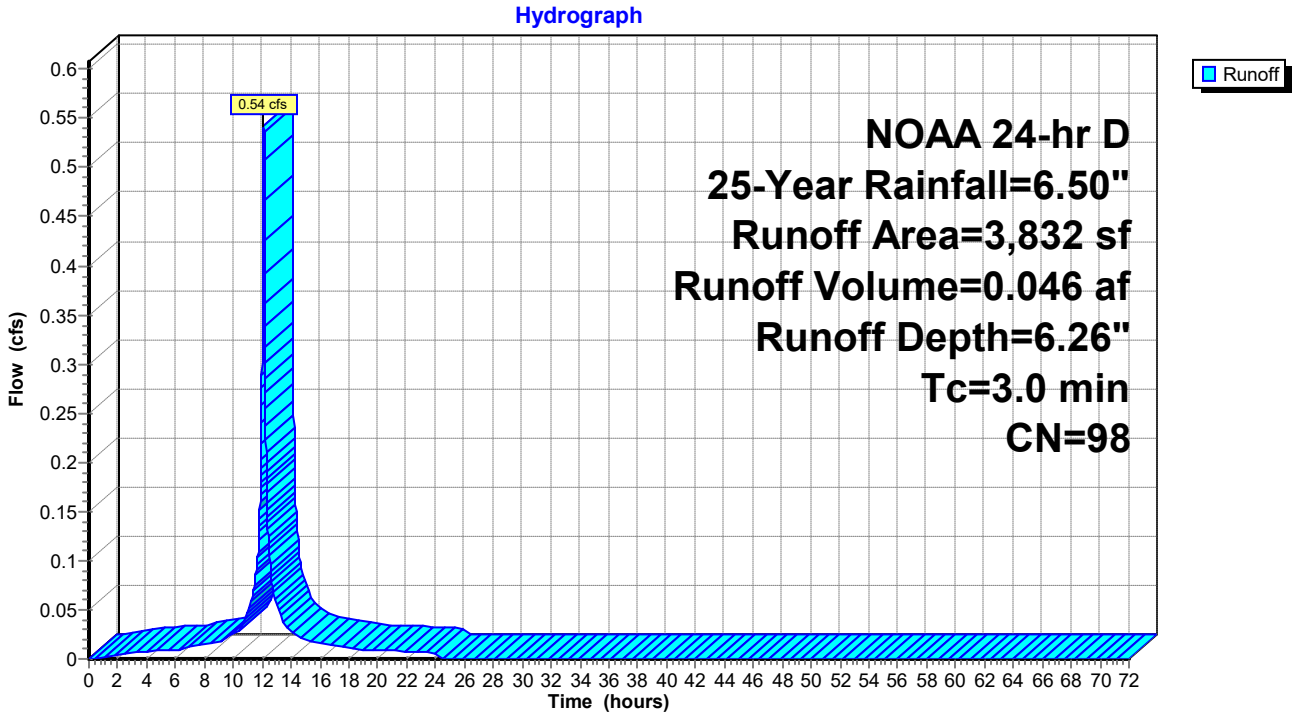
Runoff = 0.54 cfs @ 12.11 hrs, Volume= 0.046 af, Depth= 6.26"
Routed to Link 9L : Unattenuated Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.50"

| Area (sf) | CN | Description |
|---|---|---|
| 3,832 | 98 | Paved parking, HSG A |
| 3,832 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | | | | | **Direct Entry,** |

### Subcatchment 7S: Pr. Imp



## Summary for Subcatchment 8S: Pr. Pervious

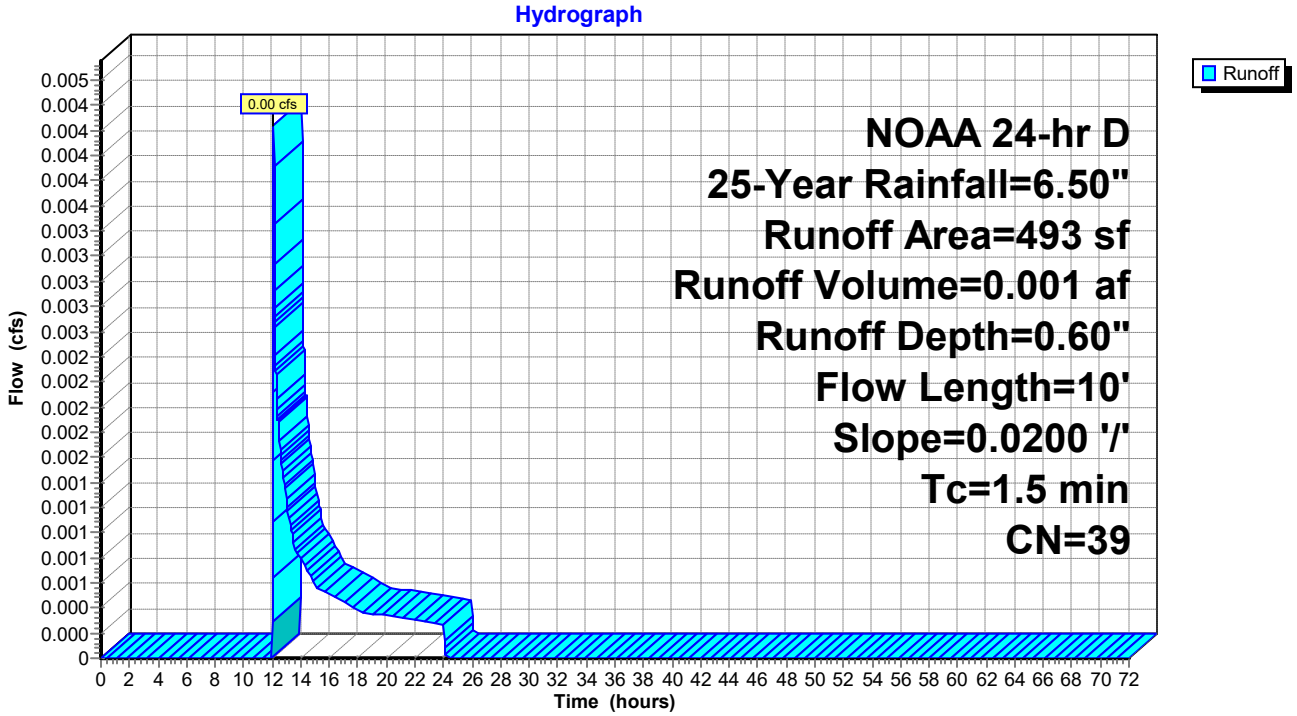
Runoff = 0.00 cfs @ 12.11 hrs, Volume= 0.001 af, Depth= 0.60"
Routed to Link 9L : Unattenuated Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-Year Rainfall=6.50"

| Area (sf) | CN | Description |
|---|---|---|
| 493 | 39 | >75% Grass cover, Good, HSG A |
| 493 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.5 | 10 | 0.0200 | 0.11 | | **Sheet Flow, 18.65-18.58**<br>Grass: Short n= 0.150 P2= 3.40" |

## Subcatchment 8S: Pr. Pervious



## Summary for Pond 7P: Permeable Pavement

Inflow Area = 0.446 ac, 99.54% Impervious, Inflow Depth = 6.24" for 25-Year event
Inflow = 2.74 cfs @ 12.11 hrs, Volume= 0.232 af
Outflow = 1.61 cfs @ 12.01 hrs, Volume= 0.232 af, Atten= 41%, Lag= 0.0 min
Discarded = 1.61 cfs @ 12.01 hrs, Volume= 0.232 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 18.66' @ 12.19 hrs Surf.Area= 6,951 sf Storage= 430 cf

Plug-Flow detention time= 0.8 min calculated for 0.232 af (100% of inflow)
Center-of-Mass det. time= 0.8 min ( 744.9 - 744.1 )

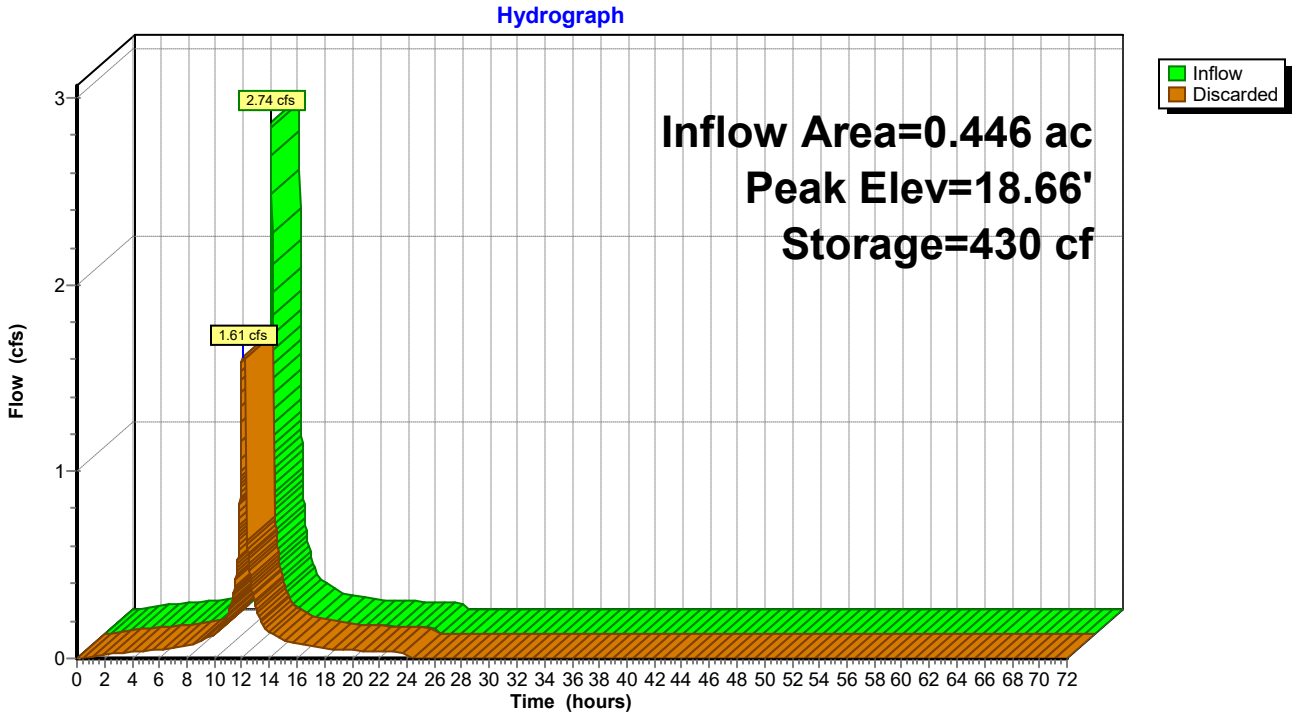
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 18.51' | 2,752 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>6,951 cf Overall - 71 cf Embedded = 6,880 cf x 40.0% Voids |
| #2 | 18.76' | 59 cf | **6.0" Round Pipe Storage** x 6 Inside #1<br>L= 50.0'<br>71 cf Overall - 0.3" Wall Thickness = 59 cf |
| | | 2,811 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 18.51 | 6,951 | 0 | 0 |
| 19.51 | 6,951 | 6,951 | 6,951 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 18.51' | **10.000 in/hr Exfiltration over Surface area** |

**Discarded OutFlow** Max=1.61 cfs @ 12.01 hrs HW=18.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.61 cfs)

## Pond 7P: Permeable Pavement

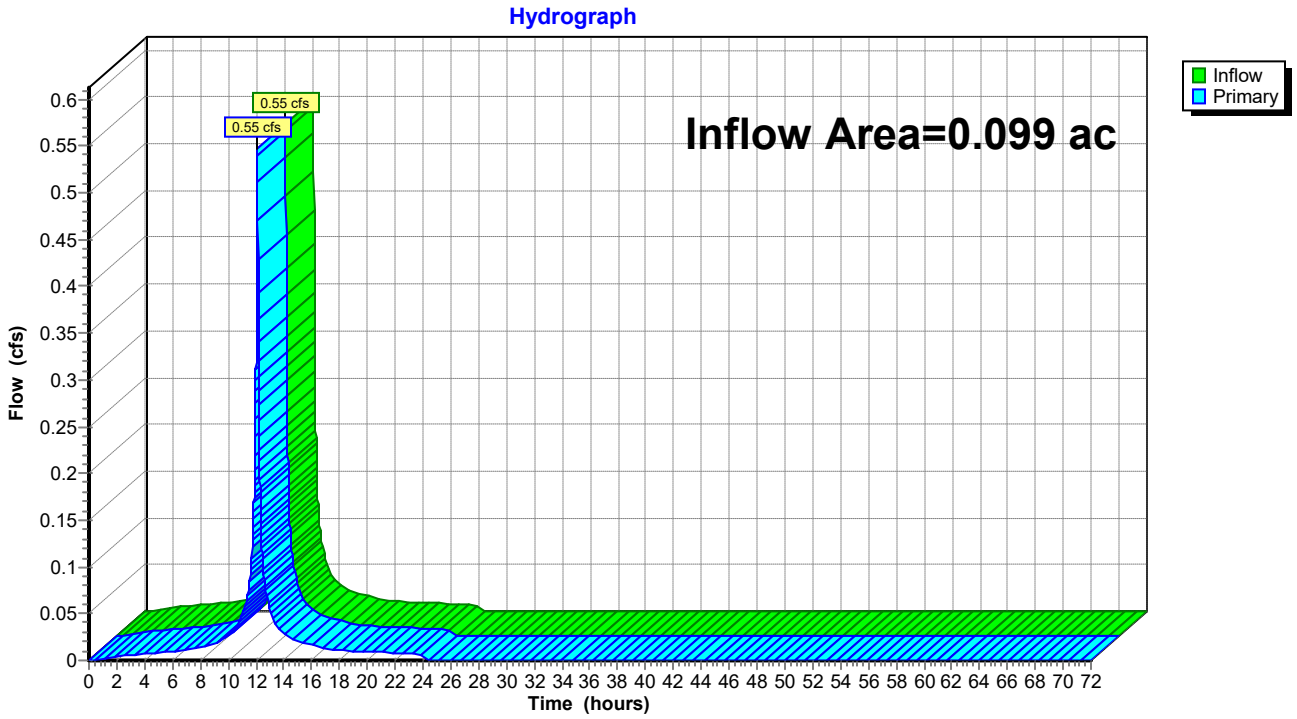


## Summary for Link 9L: Unattenuated Total

Inflow Area = 0.099 ac, 88.60% Impervious, Inflow Depth = 5.62" for 25-Year event
Inflow = 0.55 cfs @ 12.11 hrs, Volume= 0.046 af
Primary = 0.55 cfs @ 12.11 hrs, Volume= 0.046 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Link 9L: Unattenuated Total



## Summary for Subcatchment 4S: Pr. Imp.

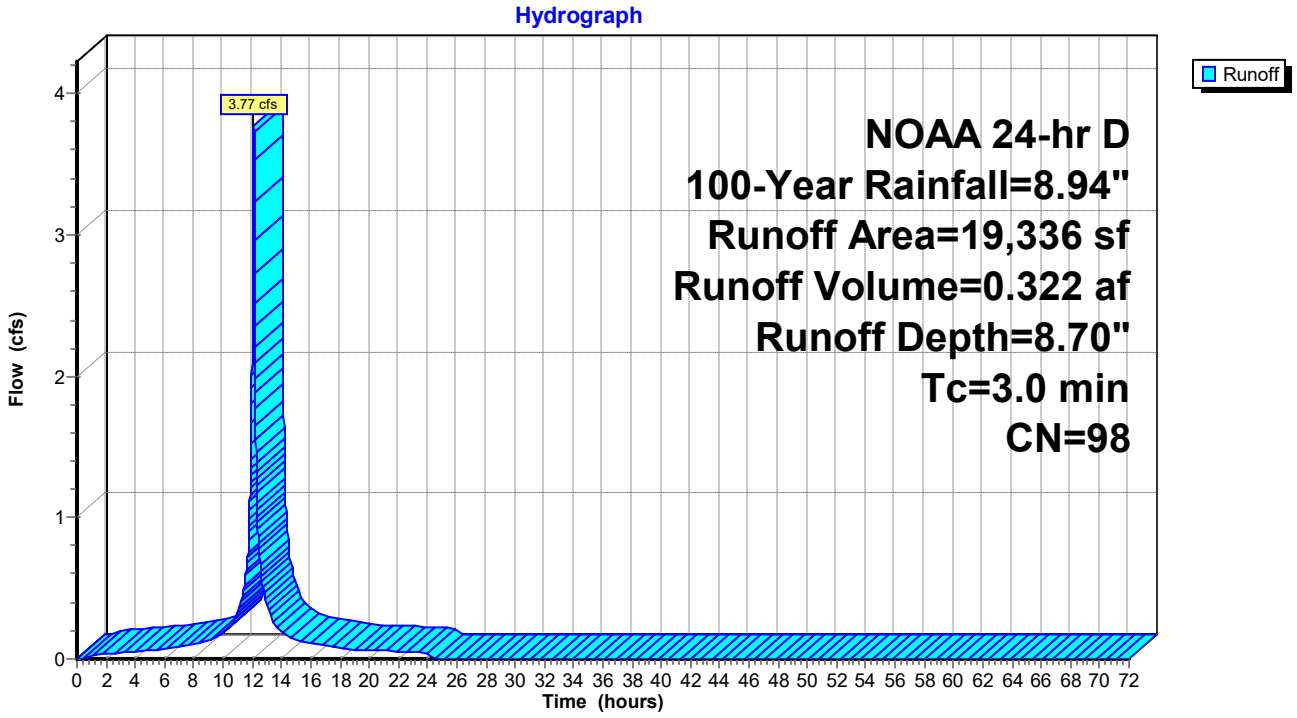
Runoff = 3.77 cfs @ 12.11 hrs, Volume= 0.322 af, Depth= 8.70"
Routed to Pond 7P : Permeable Pavement

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

| Area (sf) | CN | Description |
|---|---|---|
| 19,336 | 98 | Paved parking, HSG A |
| 19,336 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | | | | | **Direct Entry,** |

### Subcatchment 4S: Pr. Imp.



## Summary for Subcatchment 5S: Pr. Pervious

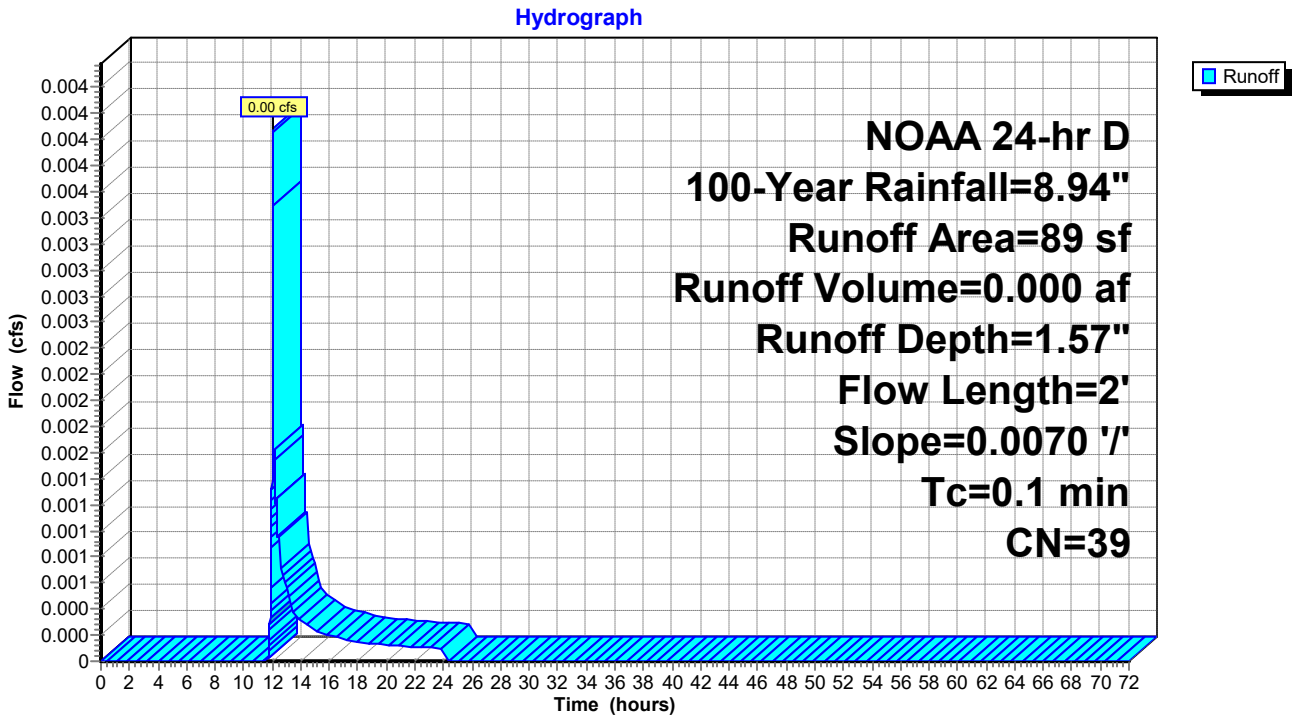
Runoff = 0.00 cfs @ 12.09 hrs, Volume= 0.000 af, Depth= 1.57"
Routed to Pond 7P : Permeable Pavement

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

| Area (sf) | CN | Description |
|---|---|---|
| 89 | 39 | >75% Grass cover, Good, HSG A |
| 89 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 0.1 | 2 | 0.0070 | 0.43 | | **Sheet Flow, 20.08-19.94** Smooth surfaces n= 0.011 P2= 3.40" |

## Subcatchment 5S: Pr. Pervious



## Summary for Subcatchment 7S: Pr. Imp

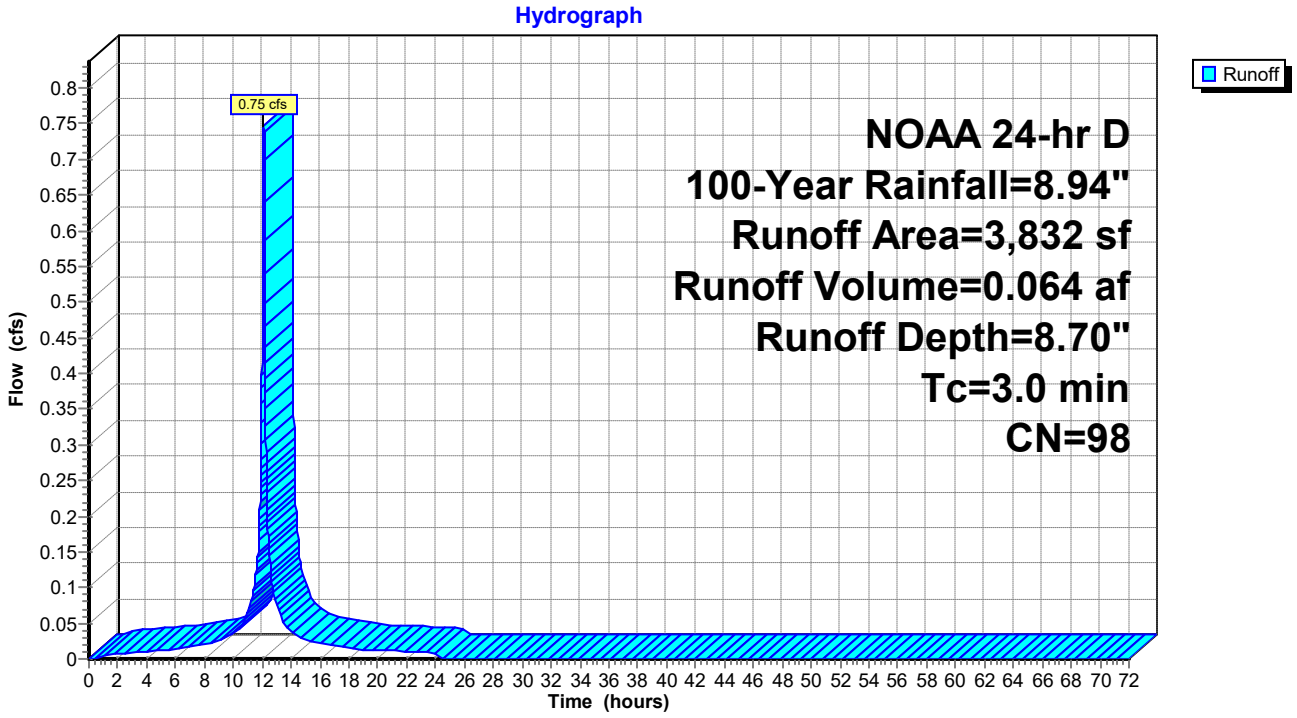
Runoff = 0.75 cfs @ 12.11 hrs, Volume= 0.064 af, Depth= 8.70"
Routed to Link 9L : Unattenuated Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

| Area (sf) | CN | Description |
|---|---|---|
| 3,832 | 98 | Paved parking, HSG A |
| 3,832 | | 100.00% Impervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 3.0 | | | | | **Direct Entry,** |

### Subcatchment 7S: Pr. Imp



## Summary for Subcatchment 8S: Pr. Pervious

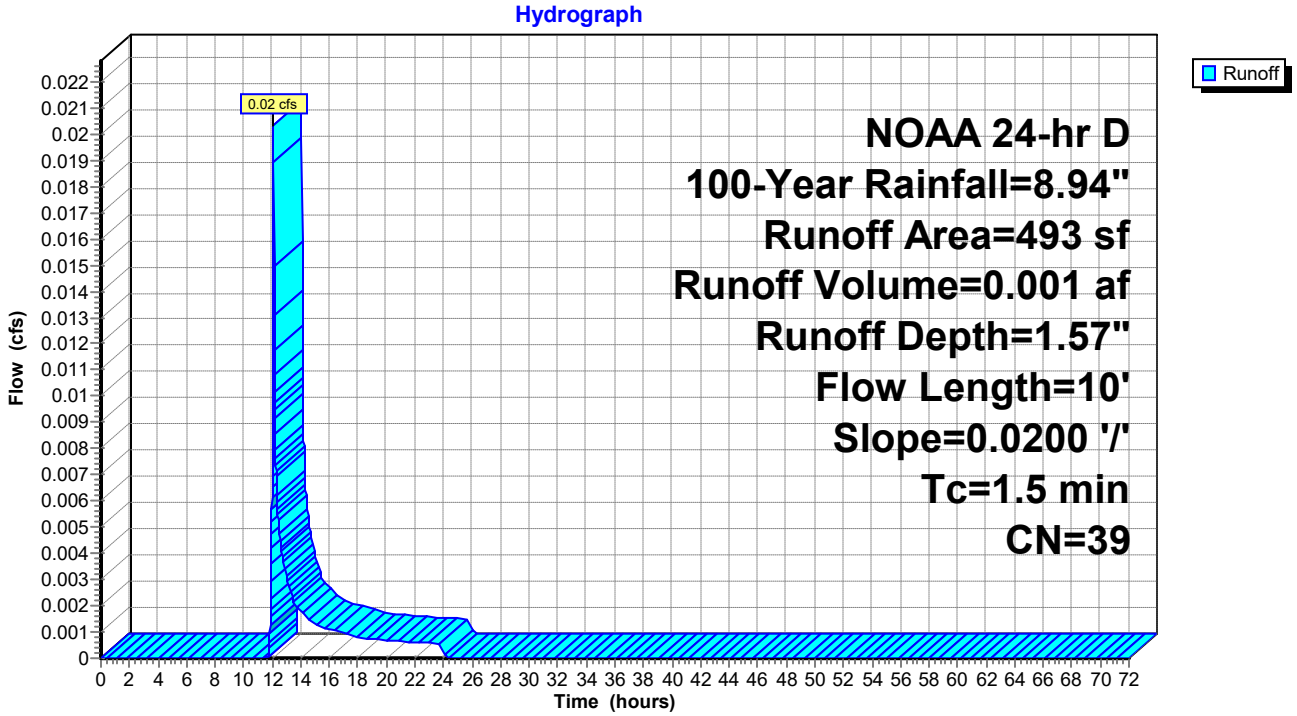
Runoff = 0.02 cfs @ 12.11 hrs, Volume= 0.001 af, Depth= 1.57"
Routed to Link 9L : Unattenuated Total

Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-Year Rainfall=8.94"

| Area (sf) | CN | Description |
|---|---|---|
| 493 | 39 | >75% Grass cover, Good, HSG A |
| 493 | | 100.00% Pervious Area |

| Tc (min) | Length (feet) | Slope (ft/ft) | Velocity (ft/sec) | Capacity (cfs) | Description |
|---|---|---|---|---|---|
| 1.5 | 10 | 0.0200 | 0.11 | | **Sheet Flow, 18.65-18.58** Grass: Short n= 0.150 P2= 3.40" |

## Subcatchment 8S: Pr. Pervious



## Summary for Pond 7P: Permeable Pavement

Inflow Area = 0.446 ac, 99.54% Impervious, Inflow Depth = 8.67" for 100-Year event
Inflow = 3.77 cfs @ 12.11 hrs, Volume= 0.322 af
Outflow = 1.61 cfs @ 11.95 hrs, Volume= 0.322 af, Atten= 57%, Lag= 0.0 min
Discarded = 1.61 cfs @ 11.95 hrs, Volume= 0.322 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 18.92' @ 12.24 hrs Surf.Area= 6,951 sf Storage= 1,138 cf

Plug-Flow detention time= 2.2 min calculated for 0.322 af (100% of inflow)
Center-of-Mass det. time= 2.2 min ( 742.0 - 739.8 )

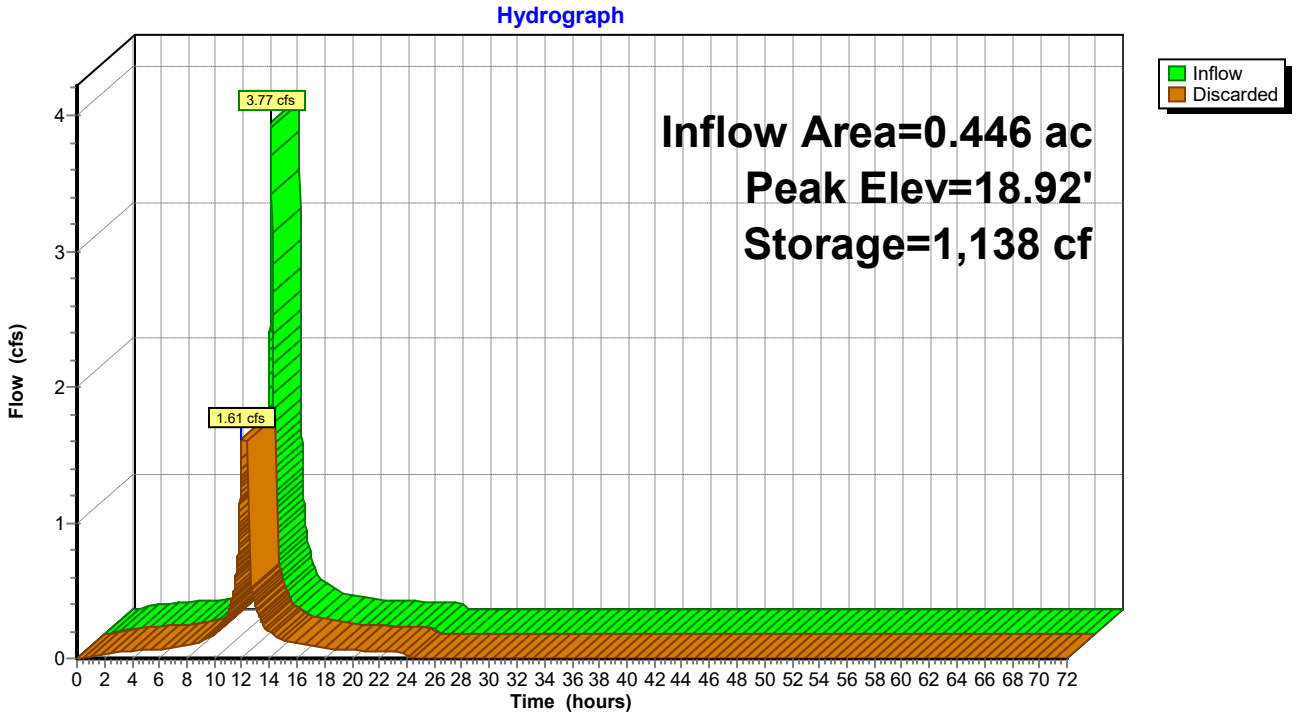
| Volume | Invert | Avail.Storage | Storage Description |
|---|---|---|---|
| #1 | 18.51' | 2,752 cf | **Custom Stage Data (Prismatic)** Listed below (Recalc)<br>6,951 cf Overall - 71 cf Embedded = 6,880 cf x 40.0% Voids |
| #2 | 18.76' | 59 cf | **6.0" Round Pipe Storage** x 6 Inside #1<br>L= 50.0'<br>71 cf Overall - 0.3" Wall Thickness = 59 cf |
| | | 2,811 cf | Total Available Storage |

| Elevation (feet) | Surf.Area (sq-ft) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) |
|---|---|---|---|
| 18.51 | 6,951 | 0 | 0 |
| 19.51 | 6,951 | 6,951 | 6,951 |

| Device | Routing | Invert | Outlet Devices |
|---|---|---|---|
| #1 | Discarded | 18.51' | **10.000 in/hr Exfiltration over Surface area** |

**Discarded OutFlow** Max=1.61 cfs @ 11.95 hrs HW=18.52' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 1.61 cfs)

## Pond 7P: Permeable Pavement

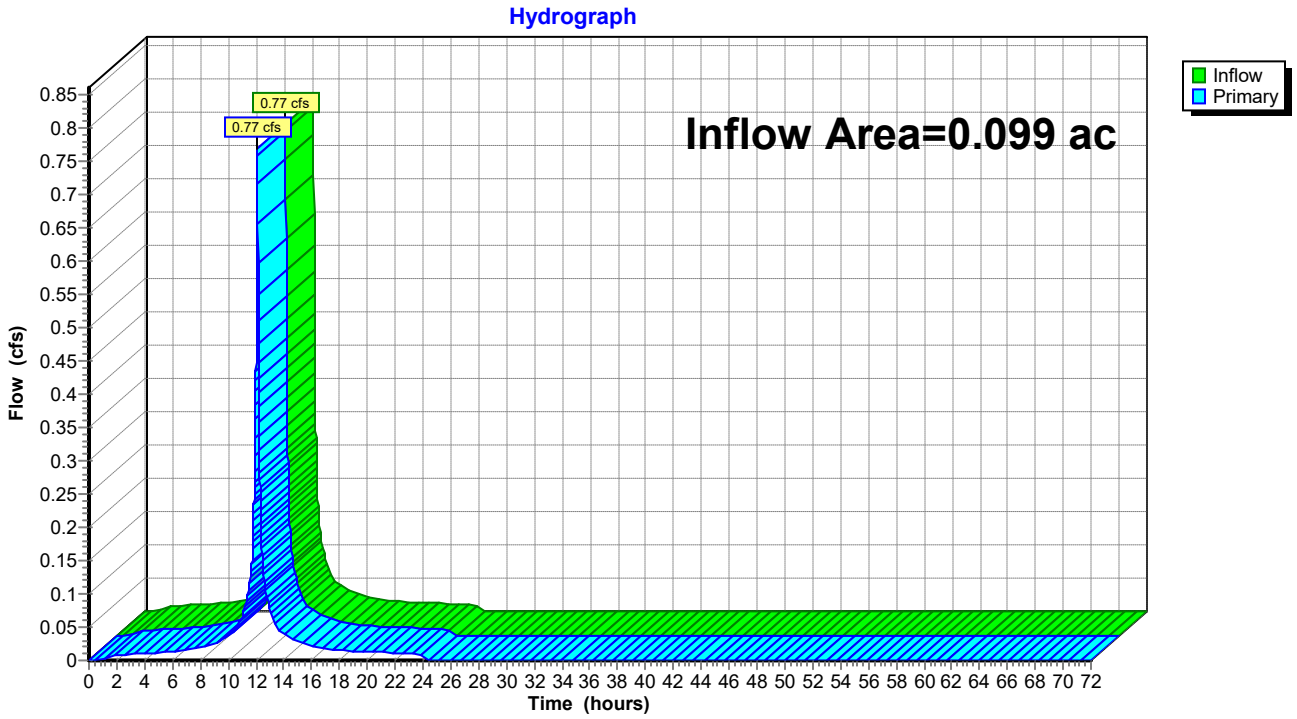


## Summary for Link 9L: Unattenuated Total

Inflow Area = 0.099 ac, 88.60% Impervious, Inflow Depth = 7.89" for 100-Year event
Inflow = 0.77 cfs @ 12.11 hrs, Volume= 0.065 af
Primary = 0.77 cfs @ 12.11 hrs, Volume= 0.065 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

## Link 9L: Unattenuated Total



# C. GEOTECHNICAL INFORMATION

WHITESTONE
An Employee-Owned Company

1959 HIGHWAY 34
BUILDING A, SUITE 102
WALL, NJ 07719
732.592.2101
whitestoneassoc.com

December 13, 2022

*via InSite Engineering, LLC*

**KALIAN COMPANIES**
Two Hennessey Boulevard
Suite One
Atlantic Highlands, New Jersey 07716

Attention: Mr. Patrick Kalian
President & CEO

**Regarding: STORMWATER MANAGEMENT AREA EVALUATION**
**PROPOSED MIXED-USE BUILDING**
**160 FIRST AVENUE**
**BLOCK 101, LOT 4.01**
**ATLANTIC HIGHLANDS, MONMOUTH COUNTY, NEW JERSEY**
**WHITESTONE PROJECT NO.: GS2219785.000**

Dear Mr. Kalian:

Whitestone Associates, Inc. (Whitestone) is pleased to submit this *Stormwater Management* (SWM) *Area Evaluation* report in support of the proposed site improvements referenced above. This report is based on preliminary project information provided InSite Engineering, LLC (InSite) including the June 23, 2022 *Boundary and Topographic Survey*, correspondence with InSite, and available internet aerial photography.

## *1.0 PROJECT DESCRIPTION*

The subject site located at 160 First Avenue (Block 101, Lot 4.01) in Atlantic Highlands, Monmouth County, New Jersey currently houses a commercial building with associated pavements, landscaped areas, and utilities.

The proposed redevelopment will include demolition of the existing site structures and construction of an approximately 12,100-square feet (footprint), four-story mixed-use development with a new SWM facility and pavements. Based on information provided by InSite, the proposed SWM facilities will be situated up to four feet below existing site grades. Due to site access restrictions, soil borings were conducted in lieu of test pits.

## *2.0 FIELD INVESTIGATION*

The investigation and infiltration testing were conducted in general accordance with standards presented in the *New Jersey Stormwater Best Management Practices Manual* (BMP Manual). Specifically, the investigation included drilling six soil borings (identified as B-1 through B-6), and conducting six in-situ

infiltration tests adjacent to the soil boring locations (identified as I-1 through I-6) within proposed SWM locations provided by InSite. The subsurface tests were conducted in the presence of a Whitestone engineer who conducted field tests, recorded visual classifications, and collected samples of the various strata encountered. The tests were located in the field using normal taping procedures and estimated right angles. These locations are presumed to be accurate within a few feet. The subsurface tests were terminated at an approximate depth of 12 feet below ground surface (fbgs). The infiltration test locations are shown on the *Testing Location Plan* included as Figure 1. Detailed descriptions of the subsurface conditions encountered are presented on the enclosed *Records of Subsurface Exploration* included in Appendix A and infiltration test results are provided in Appendix B.

## *2.0 SUMMARY OF FINDINGS*

**Subsurface Profile:** The subsurface conditions encountered at and below the proposed level of infiltration included natural coastal plains deposits consisting of United States Department of Agriculture (USDA) classifications loamy sand and sand with various amounts of gravel. The natural soils were encountered to a maximum explored depth of 12.0 fbgs.

**Estimated Seasonal High Groundwater Levels & Infiltration Test Results:** The methods used in determining the seasonal high groundwater level include evaluating the soil morphology within a test excavation and identifying irregular spots or blotches of different colors or minerals unlike that of the surrounding soil (mottles). A summary of the estimated seasonal high groundwater observations as well as tested soil hydraulic conductivity results associated with the supplemental investigation are included in the following table.

| INFILTRATION/PERMEABILITY TEST SUMMARY | | | | |
|---|---|---|---|---|
| **Infiltration Test No. @ Boring No.** | **ESHGW (fbgs/NAVD 88)** | **USDA Classification @ Test Depth** | **Field Tested Infiltration Test Results** | |
| | | | **Depth (fbgs/NAVD 88)** | **Infiltration Rate (in/hour)** |
| I-1 @ B-1 | 11.0 / 11.0 | Sand | 4.0 / 18.0 | > 20 |
| I-2 @ B-2 | 11.5 / 10.5 | Sand | 4.0 / 18.0 | > 20 |
| I-3 @ B-3 | 11.0 / 11.0 | Sand | 4.0 / 18.0 | > 20 |
| I-4 @ B-4 | 11.5 / 10.5 | Sand | 4.0 / 18.0 | > 20 |
| I-5 @ B-5 | 11.0 / 10.0 | Sand | 4.0 / 17.0 | > 20 |
| I-6 @ B-6 | 11.0 / 10.0 | Sand | 4.0 / 17.0 | > 20 |

NE: not encountered within the depth explored; NAVD 88: North American Vertical Datum of 1988

**Tested Soil Infiltration Rates:** In-situ infiltration tests were conducted at the anticipated levels of infiltration within the proposed SWM areas in conformance with methodologies detailed in the *New Jersey Stormwater Best Practices Manual*. In-situ infiltration testing indicated infiltration rates greater than 20 inches per hour (iph). In-situ infiltration test results associated with the investigation are provided in Appendix B, *Record of Subsurface Exploration* are included in Appendix A.

## *3.0 CLOSING*

Whitestone appreciates the opportunity to be of service to Kalian Companies. Please contact us with any questions or comments regarding the information herein.

Sincerely,

**WHITESTONE ASSOCIATES, INC.**

Kyle J. Kopacz, P.E.
Associate

Laurence W. Keller, P.E.
Vice President

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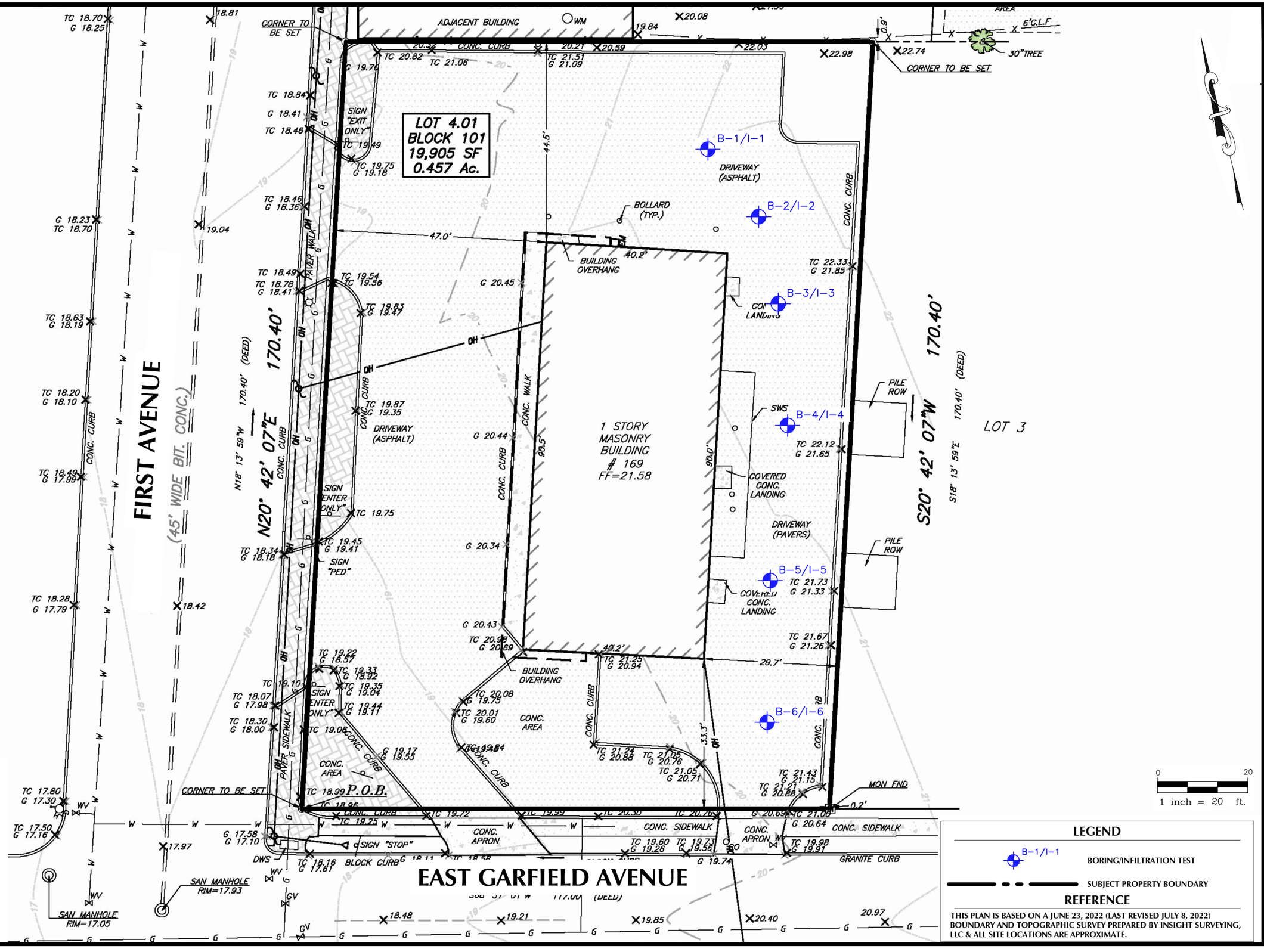
Enclosures

WHITESTONE

# FIGURE 1
# Testing Location Plan




## LEGEND

B-1/I-1 — BORING/INFILTRATION TEST

SUBJECT PROPERTY BOUNDARY

## REFERENCE

THIS PLAN IS BASED ON A JUNE 23, 2022 (LAST REVISED JULY 8, 2022) BOUNDARY AND TOPOGRAPHIC SURVEY PREPARED BY INSIGHT SURVEYING, LLC & ALL SITE LOCATIONS ARE APPROXIMATE.


WHITESTONE
*An Employee-Owned Company*
1959 HIGHWAY 34 BUILDING A, UNIT 102 WALL, NJ 07719
732-592-2101 WHITESTONEASSOC.COM


DRAWING TITLE: **TEST LOCATION PLAN**

CLIENT: **KALIAN COMPANIES**

PROJECT: PROPOSED MIXED-USE BUILDING
160 FIRST AVENUE
ATLANTIC HIGHLANDS, MONMOUTH COUNTY, NJ

| | |
|---|---|
| PROJECT #: | GS2219785.000 |
| DESIGNED BY: GR | PROJ. MGR.: KK |
| DATE: 12/9/22 | FIGURE: 1 |
| SCALE: 1" = 20' | |

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# APPENDIX A
# Records of Subsurface Exploration

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# RECORD OF SUBSURFACE EXPLORATION

**Boring No.:** B-1

Page 1 of 1

| | | | |
|---|---|---|---|
| **Project:** | Proposed Mixed-Use Building | **WAI Project No.:** | GS2219785.000 |
| **Location:** | 160 First Avenue (Block 101, Lot 4.01); Atlantic Highlands, Monmouth County, NJ | **Client:** | Kalian Companies |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | ± 22.0 feet | **Date Started:** | 12/1/2022 | | **Water Depth (feet bgs)** | **Elevation (feet)** | **Cave-In Depth (feet bgs)** / **Elevation (feet)** |
| **Termination Depth:** | 12.0 feet bgs | **Date Completed:** | 12/1/2022 | | | | |
| **Proposed Location:** | SWM | **Logged By:** | TJ | **During:** | 11.0 | 11.0 | **At Completion:** 5.0 / 17.0 |
| **Drill / Test Method:** | HSA / SPT | **Contractor:** | BW | **At Completion:** | 12.0 | 10.0 | |
| | | **Equipment:** | CME-55 | **24 Hours:** | --- | --- | **ESHGW:** 11.0 / 11.0 |

| SAMPLE INFORMATION | | | | | | DEPTH | STRATA | DESCRIPTION OF MATERIALS (Classification) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|
| Depth (feet) | No | Type | Blows Per 6" | Rec. (in.) | N | (feet) | | | |
| | | | | | | 0.0 | PAVEMENT | 4" Asphalt with 6" Gravel Subbase | |
| | | | | | | 0.8 | COASTAL PLAIN DEPOSITS | | |
| 2 - 4 | S-1 | | 6 - 9 - 8 - 8 | 16 | 17 | | | Brownish-Yellow (10YR 6/6) LOAMY SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SM) | |
| | | | | | | 4.0 | | | |
| 4 - 6 | S-2 | | 6 - 6 - 8 - 8 | 19 | 14 | 5.0 | | Brownish-Yellow (10YR 6/6) SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SP) | |
| 6 - 8 | S-3 | | 6 - 8 - 11 - 11 | 13 | 19 | | | As Above (SP) | |
| 8 - 10 | S-4 | | 11 - 17 - 20 - 20 | 15 | 37 | | | As Above (SP) | |
| | | | | | | 10.0 | | | |
| 10 - 12 | S-5 | | 20 - 24 - 25 - 29 | 10 | 49 | | | As Above, <5% Gravel, Wet (SP) | |
| | | | | | | 12.0 | | | |
| | | | | | | | | Boring Log B-1 Terminated at a Depth of 12.0 Feet Below Ground Surface | |
| | | | | | | 15.0 | | | |
| | | | | | | 20.0 | | | |
| | | | | | | 25.0 | | | |

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched, ESHGW = Estimated Seasonal High Groundwater

WHITESTONE

# RECORD OF SUBSURFACE EXPLORATION

**Boring No.:** B-2

Page 1 of 1

| | | | |
|---|---|---|---|
| **Project:** | Proposed Mixed-Use Building | **WAI Project No.:** | GS2219785.000 |
| **Location:** | 160 First Avenue (Block 101, Lot 4.01); Atlantic Highlands, Monmouth County, NJ | **Client:** | Kalian Companies |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | ± 22.0 feet | **Date Started:** | 12/1/2022 | | **Water Depth (feet bgs)** | **Elevation (feet)** | **Cave-In Depth (feet bgs)** / **Elevation (feet)** |
| **Termination Depth:** | 12.0 feet bgs | **Date Completed:** | 12/1/2022 | | | | |
| **Proposed Location:** | SWM | **Logged By:** | TJ | **During:** | 11.5 | 10.5 | **At Completion:** 5.0 / 17.0 |
| **Drill / Test Method:** | HSA / SPT | **Contractor:** | BW | **At Completion:** | 12.0 | 10.0 | |
| | | **Equipment:** | CME-55 | **24 Hours:** | --- | --- | **ESHGW:** 11.5 / 10.5 |

| SAMPLE INFORMATION | | | | | | DEPTH | STRATA | | DESCRIPTION OF MATERIALS (Classification) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (feet) | No | Type | Blows Per 6" | Rec. (in.) | N | (feet) | | | | |
| | | | | | | 0.0 | | | | |
| | | | | | | | PAVEMENT | | 4" Asphalt with 6" Gravel Subbase | |
| | | | | | | 0.8 | COASTAL PLAIN DEPOSITS | | | |
| 2 - 4 | S-1 | | 4 - 5 - 5 - 7 | 18 | 10 | | | | Brownish-Yellow (10YR 6/6) LOAMY SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SM) | |
| | | | | | | 4.0 | | | | |
| 4 - 6 | S-2 | | 6 - 8 - 8 - 11 | 20 | 16 | 5.0 | | | Brownish-Yellow (10YR 6/6) SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SP) | |
| 6 - 8 | S-3 | | 9 - 10 - 15 - 16 | 18 | 25 | | | | As Above (SP) | |
| 8 - 10 | S-4 | | 11 - 16 - 20 - 23 | 15 | 36 | | | | As Above (SP) | |
| | | | | | | 10.0 | | | | |
| 10 - 12 | S-5 | | 15 - 16 - 11 - 15 | 12 | 27 | 12.0 | | | As Above, Brownish-Yellow (10-YR 6/6), Wet (SP) | |
| | | | | | | | | | Boring Log B-2 Terminated at a Depth of 12.0 Feet Below Ground Surface | |
| | | | | | | 15.0 | | | | |
| | | | | | | 20.0 | | | | |
| | | | | | | 25.0 | | | | |

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched, ESHGW = Estimated Seasonal High Groundwater

WHITESTONE

# RECORD OF SUBSURFACE EXPLORATION

**Boring No.:** B-3



| | | | |
|---|---|---|---|
| **Project:** | Proposed Mixed-Use Building | **WAI Project No.:** | GS2219785.000 |
| **Location:** | 160 First Avenue (Block 101, Lot 4.01); Atlantic Highlands, Monmouth County, NJ | **Client:** | Kalian Companies |

| | | | | Water Depth (feet bgs) \| Elevation (feet) | Cave-In Depth (feet bgs) \| Elevation (feet) |
|---|---|---|---|---|---|
| **Surface Elevation:** | ± 22.0 feet | **Date Started:** | 12/1/2022 | | |
| **Termination Depth:** | 12.0 feet bgs | **Date Completed:** | 12/1/2022 | | |
| **Proposed Location:** | SWM | **Logged By:** | TJ | **During:** 11.0 \| 11.0 | **At Completion:** 6.0 \| 16.0 |
| **Drill / Test Method:** | HSA / SPT | **Contractor:** | BW | **At Completion:** 11.0 \| 11.0 | |
| | | **Equipment:** | CME-55 | **24 Hours:** --- \| --- | **ESHGW:** 11.0 \| 11.0 |

| SAMPLE INFORMATION | | | | | | DEPTH | STRATA | | DESCRIPTION OF MATERIALS (Classification) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (feet) | No | Type | Blows Per 6" | Rec. (in.) | N | (feet) | | | | |
| | | | | | | 0.0 | PAVEMENT | | 4" Asphalt with 6" Gravel Subbase | |
| | | | | | | 0.8 | COASTAL PLAIN DEPOSITS | | | |
| 2 - 4 | S-1 | X | 9 - 12 - 9 - 7 | 18 | 21 | | | | Brownish-Yellow (10YR 6/6) LOAMY SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SM) | |
| | | | | | | 4.0 | | | | |
| 4 - 6 | S-2 | X | 7 - 6 - 6 - 7 | 19 | 12 | 5.0 | | | Brownish-Yellow (10YR 6/6) SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SP) | |
| 6 - 8 | S-3 | X | 7 - 8 - 8 - 10 | 13 | 16 | | | | As Above (SP) | |
| 8 - 10 | S-4 | X | 9 - 12 - 12 - 15 | 16 | 24 | | | | As Above (SP) | |
| | | | | | | 10.0 | | | | |
| 10 - 12 | S-5 | X | 15 - 16 - 15 - 11 | 17 | 31 | | | | As Above (SP) | |
| | | | | | | 12.0 | | | | |
| | | | | | | | | | Boring Log B-3 Terminated at a Depth of 12.0 Feet Below Ground Surface | |
| | | | | | | 15.0 | | | | |
| | | | | | | 20.0 | | | | |
| | | | | | | 25.0 | | | | |

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched, ESHGW = Estimated Seasonal High Groundwater

WHITESTONE

# RECORD OF SUBSURFACE EXPLORATION

**Boring No.:** B-4



| | | | |
|---|---|---|---|
| **Project:** | Proposed Mixed-Use Building | **WAI Project No.:** | GS2219785.000 |
| **Location:** | 160 First Avenue (Block 101, Lot 4.01); Atlantic Highlands, Monmouth County, NJ | **Client:** | Kalian Companies |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | ± 22.0 feet | **Date Started:** | 12/1/2022 | | **Water Depth (feet bgs)** | **Elevation (feet)** | **Cave-In Depth (feet bgs)** / **Elevation (feet)** |
| **Termination Depth:** | 12.0 feet bgs | **Date Completed:** | 12/1/2022 | | | | |
| **Proposed Location:** | SWM | **Logged By:** | TJ | **During:** | 11.5 | 10.5 | **At Completion:** 8.0 / 14.0 |
| **Drill / Test Method:** | HSA / SPT | **Contractor:** | BW | **At Completion:** | 11.5 | 10.5 | |
| | | **Equipment:** | CME-55 | **24 Hours:** | --- | --- | **ESHGW:** 11.5 / 10.5 |

| SAMPLE INFORMATION | | | | | | DEPTH | STRATA | | DESCRIPTION OF MATERIALS (Classification) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (feet) | No | Type | Blows Per 6" | Rec. (in.) | N | (feet) | | | | |
| | | | | | | 0.0 | PAVEMENT | | 4" Asphalt with 6" Gravel Subbase | |
| | | | | | | 0.8 | COASTAL PLAIN DEPOSITS | | | |
| 2 - 4 | S-1 | | 8 - 9 - 12 - 10 | 16 | 21 | | | | Brownish-Yellow (10YR 6/6) SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SP) | |
| 4 - 6 | S-2 | | 10 - 11 - 12 - 12 | 15 | 23 | 5.0 | | | As Above (SP) | |
| 6 - 8 | S-3 | | 10 - 9 - 11 - 14 | 20 | 20 | | | | As Above (SP) | |
| 8 - 10 | S-4 | | 13 - 17 - 20 - 20 | 20 | 37 | 10.0 | | | As Above, Dense (SP) | |
| 10 - 12 | S-5 | | 15 - 19 - 17 - 16 | 20 | 36 | 12.0 | | | As Above, <5% Gravel, Wet (SP) | |
| | | | | | | 15.0 | | | Boring Log B-4 Terminated at a Depth of 12.0 Feet Below Ground Surface | |
| | | | | | | 20.0 | | | | |
| | | | | | | 25.0 | | | | |

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched, ESHGW = Estimated Seasonal High Groundwater

# RECORD OF SUBSURFACE EXPLORATION

WHITESTONE

**Boring No.:** B-5



| | | | |
|---|---|---|---|
| **Project:** | Proposed Mixed-Use Building | **WAI Project No.:** | GS2219785.000 |
| **Location:** | 160 First Avenue (Block 101, Lot 4.01); Atlantic Highlands, Monmouth County, NJ | **Client:** | Kalian Companies |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | ± 21.0 feet | **Date Started:** | 12/1/2022 | | **Water Depth (feet bgs) \| Elevation (feet)** | | **Cave-In Depth (feet bgs) \| Elevation (feet)** |
| **Termination Depth:** | 12.0 feet bgs | **Date Completed:** | 12/1/2022 | | | | |
| **Proposed Location:** | SWM | **Logged By:** | TJ | **During:** | 11.0 \| 10.0 | **At Completion:** | 7.0 \| 14.0 |
| **Drill / Test Method:** | HSA / SPT | **Contractor:** | BW | **At Completion:** | 11.0 \| 10.0 | | |
| | | **Equipment:** | CME-55 | **24 Hours:** | --- \| --- | **ESHGW:** | 11.0 \| 10.0 |

| SAMPLE INFORMATION | | | | | | DEPTH | STRATA | | DESCRIPTION OF MATERIALS (Classification) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (feet) | No | Type | Blows Per 6" | Rec. (in.) | N | (feet) | | | | |
| | | | | | | 0.0 | | | | |
| | | | | | | | PAVEMENT | | 5" Asphalt with 6" Gravel Subbase | |
| | | | | | | 0.9 | COASTAL PLAIN DEPOSITS | | | |
| 2 - 4 | S-1 | | 6 - 9 - 6 - 7 | 18 | 15 | | | | Brownish-Yellow (10YR 6/6) LOAMY SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SM) | |
| | | | | | | 4.0 | | | | |
| 4 - 6 | S-2 | | 6 - 5 - 6 - 6 | 14 | 11 | 5.0 | | | Brownish-Yellow (10YR 6/6) SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SP) | |
| 6 - 8 | S-3 | | 5 - 5 - 6 - 6 | 16 | 11 | | | | As Above (SP) | |
| 8 - 10 | S-4 | | 8 - 13 - 16 - 25 | 15 | 29 | | | | As Above (SP) | |
| | | | | | | 10.0 | | | | |
| 10 - 12 | S-5 | | 25 - 21 - 19 - 19 | 16 | 40 | | | | As Above, 20% Gravel, Wet (SP) | |
| | | | | | | 12.0 | | | | |
| | | | | | | | | | Boring Log B-5 Terminated at a Depth of 12.0 Feet Below Ground Surface | |
| | | | | | | 15.0 | | | | |
| | | | | | | 20.0 | | | | |
| | | | | | | 25.0 | | | | |

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched, ESHGW = Estimated Seasonal High Groundwater

WHITESTONE

# RECORD OF SUBSURFACE EXPLORATION

**Boring No.:** B-6

Page 1 of 1

| | | | |
|---|---|---|---|
| **Project:** | Proposed Mixed-Use Building | **WAI Project No.:** | GS2219785.000 |
| **Location:** | 160 First Avenue (Block 101, Lot 4.01); Atlantic Highlands, Monmouth County, NJ | **Client:** | Kalian Companies |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Surface Elevation:** | ± 21.0 feet | **Date Started:** | 12/1/2022 | | **Water Depth (feet bgs) \| Elevation (feet)** | | **Cave-In Depth (feet bgs) \| Elevation (feet)** |
| **Termination Depth:** | 12.0 feet bgs | **Date Completed:** | 12/1/2022 | | | | |
| **Proposed Location:** | SWM | **Logged By:** | TJ | **During:** | 11.0 \| 10.0 | **At Completion:** | 5.0 \| 16.0 |
| **Drill / Test Method:** | HSA / SPT | **Contractor:** | BW | **At Completion:** | 11.0 \| 10.0 | | |
| | | **Equipment:** | CME-55 | **24 Hours:** | --- \| --- | **ESHGW:** | 11.0 \| 10.0 |

| SAMPLE INFORMATION | | | | | | DEPTH | STRATA | | DESCRIPTION OF MATERIALS (Classification) | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|
| Depth (feet) | No | Type | Blows Per 6" | Rec. (in.) | N | (feet) | | | | |
| | | | | | | 0.0 | PAVEMENT | | 4" Asphalt with 6" Gravel Subbase | |
| | | | | | | 0.8 | COASTAL PLAIN DEPOSITS | | | |
| 2 - 4 | S-1 | | 6 - 8 - 6 - 6 | 18 | 14 | | | | Brownish-Yellow (10YR 6/6) LOAMY SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SM) | |
| | | | | | | 4.0 | | | | |
| 4 - 6 | S-2 | | 6 - 5 - 6 - 6 | 16 | 11 | 5.0 | | | Brownish-Yellow (10YR 6/6) SAND; No Coarse Fragments; Moist; Weak Granular Structure; Friable; No Roots (SP) | |
| 6 - 8 | S-3 | | 6 - 8 - 8 - 12 | 11 | 16 | | | | As Above (SP) | |
| 8 - 10 | S-4 | | 12 - 10 - 10 - 9 | 12 | 20 | | | | As Above (SP) | |
| | | | | | | 10.0 | | | | |
| 10 - 12 | S-5 | | 9 - 10 - 12 - 11 | 15 | 22 | | | | As Above, Wet (SP) | |
| | | | | | | 12.0 | | | | |
| | | | | | | | | | Boring Log B-6 Terminated at a Depth of 12.0 Feet Below Ground Surface | |
| | | | | | | 15.0 | | | | |
| | | | | | | 20.0 | | | | |
| | | | | | | 25.0 | | | | |

NOTES: bgs = below ground surface, NA = Not Applicable, NE = Not Encountered, NS = Not Surveyed, P = Perched, ESHGW = Estimated Seasonal High Groundwater

WHITESTONE

# APPENDIX B
# Infiltration Test Results

WHITESTONE

# INFILTRATION TEST

**Client:** Kalian Companies

**Test Hole No.:** I-1@B-1

**Project:** Proposed Mixed-Use Building

**Date:** 12/1/2022

**Location:** 160 First Avenue
(Block 101, Lot 4.01)
Atlantic Highlands, Monmouth Co., NJ

**Weather:** Clear

**Surface Elevation:** 22.00

**File No.** GS2219785.000

**Test Depth (Feet):** 4.00

**Field Engineer:** TJ

**Test Depth (Elevation):** 18.00

| Reading No. | Time | | Water Level Reading (inches) | | Water Level Fall (Inches) | Time Interval (Hours) | Rate of Flow (Inches/Hour) |
|---|---|---|---|---|---|---|---|
| | Start | Finish | Start | Finish | | | |
| PS | 8:55 | 9:07 | 6.0 | 0.0 | 6.0 | 0.2 | >20.0 |
| 1 | 9:09 | 9:15 | 6.0 | 3.0 | 3.0 | 0.1 | >20.0 |
| 2 | 9:15 | 9:21 | 6.0 | 3.0 | 3.0 | 0.1 | >20.0 |
| 3 | 9:21 | 9:27 | 6.0 | 3.0 | 3.0 | 0.1 | >20.0 |
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**Remarks:** Field $i$ = >20.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

# INFILTRATION TEST

**Client:** Kalian Companies

**Test Hole No.:** I-2@B-2

**Project:** Proposed Mixed-Use Building

**Date:** 12/1/2022

**Location:** 160 First Avenue
(Block 101, Lot 4.01)
Atlantic Highlands, Monmouth Co., NJ

**Weather:** Clear

**Surface Elevation:** 22.00

**File No.** GS2219785.000

**Test Depth (Feet):** 4.00

**Field Engineer:** TJ

**Test Depth (Elevation):** 18.00

| Reading No. | Time | | Water Level Reading (inches) | | Water Level Fall (Inches) | Time Interval (Hours) | Rate of Flow (Inches/Hour) |
|---|---|---|---|---|---|---|---|
| | Start | Finish | Start | Finish | | | |
| PS | 8:31 | 8:39 | 6.0 | 0.0 | 6.0 | 0.133 | >20.0 |
| 1 | 8:40 | 8:49 | 6.0 | 0.0 | 6.0 | 0.15 | >20.0 |
| 2 | 8:49 | 8:58 | 6.0 | 0.0 | 6.0 | 0.15 | >20.0 |
| 3 | 8:58 | 9:07 | 6.0 | 0.0 | 6.0 | 0.15 | >20.0 |
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**Remarks:** Field *i* = >20.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

# INFILTRATION TEST

**Client:** Kalian Companies

**Test Hole No.:** I-3@B-3

**Project:** Proposed Mixed-Use Building

**Date:** 12/1/2022

**Location:** 160 First Avenue
(Block 101, Lot 4.01)
Atlantic Highlands, Monmouth Co., NJ

**Weather:** Clear

**Surface Elevation:** 22.00

**File No.** GS2219785.000

**Test Depth (Feet):** 4.00

**Field Engineer:** TJ

**Test Depth (Elevation):** 18.00

| Reading No. | Time | | Water Level Reading (inches) | | Water Level Fall (Inches) | Time Interval (Hours) | Rate of Flow (Inches/Hour) |
|---|---|---|---|---|---|---|---|
| | Start | Finish | Start | Finish | | | |
| PS | 9:35 | 9:50 | 6.0 | 0.0 | 6.0 | 0.2 | >20.0 |
| 1 | 9:50 | 9:59 | 6.0 | 3.0 | 3.0 | 0.15 | 20.0 |
| 2 | 10:00 | 10:09 | 6.0 | 3.0 | 3.0 | 0.15 | 20.0 |
| 3 | 10:09 | 10:18 | 6.0 | 3.0 | 3.0 | 0.15 | 20.0 |
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**Remarks:** Field *i* = 20.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

# INFILTRATION TEST

**Client:** Kalian Companies

**Test Hole No.:** I-4@B-4

**Project:** Proposed Mixed-Use Building

**Date:** 12/1/2022

**Location:** 160 First Avenue
(Block 101, Lot 4.01)
Atlantic Highlands, Monmouth Co., NJ

**Weather:** Clear

**Surface Elevation:** 22.00

**File No.** GS2219785.000

**Test Depth (Feet):** 4.00

**Field Engineer:** TJ

**Test Depth (Elevation):** 18.00

| Reading No. | Time | | Water Level Reading (inches) | | Water Level Fall (Inches) | Time Interval (Hours) | Rate of Flow (Inches/Hour) |
|---|---|---|---|---|---|---|---|
| | Start | Finish | Start | Finish | | | |
| PS | 11:55 | 12:02 | 6.0 | 0.0 | 6.0 | 0.117 | >20.0 |
| 1 | 12:02 | 12:12 | 6.0 | 0.0 | 6.0 | 0.167 | >20.0 |
| 2 | 12:12 | 12:22 | 6.0 | 0.0 | 6.0 | 0.167 | >20.0 |
| 3 | 12:22 | 12:32 | 6.0 | 0.0 | 6.0 | 0.167 | >20.0 |
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**Remarks:** Field $i$ = >20.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

# INFILTRATION TEST

**Client:** Kalian Companies

**Test Hole No.:** I-5@B-5

**Project:** Proposed Mixed-Use Building

**Date:** 12/1/2022

**Location:** 160 First Avenue
(Block 101, Lot 4.01)
Atlantic Highlands, Monmouth Co., NJ

**Weather:** Clear

**Surface Elevation:** 21.00

**File No.** GS2219785.000

**Test Depth (Feet):** 4.00

**Field Engineer:** TJ

**Test Depth (Elevation):** 17.00

| Reading No. | Time | | Water Level Reading (inches) | | Water Level Fall (Inches) | Time Interval (Hours) | Rate of Flow (Inches/Hour) |
|---|---|---|---|---|---|---|---|
| | Start | Finish | Start | Finish | | | |
| PS | 12:20 | 12:34 | 6.0 | 0.0 | 6.0 | 0.23 | >20.0 |
| 1 | 12:34 | 12:42 | 6.0 | 3.0 | 3.0 | 0.13 | >20.0 |
| 2 | 12:42 | 12:50 | 6.0 | 3.0 | 3.0 | 0.13 | >20.0 |
| 3 | 12:50 | 12:58 | 6.0 | 3.0 | 3.0 | 0.13 | >20.0 |
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**Remarks:** Field *i* = >20.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

# INFILTRATION TEST

**Client:** Kalian Companies

**Test Hole No.:** I-6@B-6

**Project:** Proposed Mixed-Use Building

**Date:** 12/1/2022

**Location:** 160 First Avenue
(Block 101, Lot 4.01)
Atlantic Highlands, Monmouth Co., NJ

**Weather:** Clear

**Surface Elevation:** 21.00

**File No.** GS2219785.000

**Test Depth (Feet):** 4.00

**Field Engineer:** TJ

**Test Depth (Elevation):** 17.00

| Reading No. | Time | | Water Level Reading (inches) | | Water Level Fall (Inches) | Time Interval (Hours) | Rate of Flow (Inches/Hour) |
|---|---|---|---|---|---|---|---|
| | Start | Finish | Start | Finish | | | |
| PS | 1:00 | 1:15 | 6.0 | 0.0 | 6.0 | 0.25 | >20.0 |
| 1 | 1:15 | 1:24 | 6.0 | 3.0 | 3.0 | 0.15 | 20.00 |
| 2 | 1:24 | 1:33 | 6.0 | 3.0 | 3.0 | 0.15 | 20.00 |
| 3 | 1:33 | 1:42 | 6.0 | 3.0 | 3.0 | 0.15 | 20.00 |
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**Remarks:** Field *i* = 20.0 in/hr

NOTES: PS = Pre Soak; NS = Not Surveyed

WHITESTONE

# APPENDIX C
# Supplemental Information (USCS, Terms & Symbols)

WHITESTONE
An Employee-Owned Company

1959 HIGHWAY 34
BUILDING A, SUITE 102
WALL, NJ 07719
732.592.2101
whitestoneassoc.com

# UNIFIED SOIL CLASSIFICATION SYSTEM

**SOIL CLASSIFICATION CHART**

| MAJOR DIVISIONS | | | LETTER SYMBOL | TYPICAL DESCRIPTIONS |
|---|---|---|---|---|
| COARSE GRAINED SOILS | GRAVEL AND GRAVELLY SOILS | CLEAN GRAVELS (LITTLE OR NO FINES) | GW | WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES |
| | | | GP | POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES |
| | MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE | GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES) | GM | SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES |
| | | | GC | CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES |
| | SAND AND SANDY SOILS | CLEAN SAND (LITTLE OR NO FINES) | SW | WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES |
| | | | SP | POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES |
| MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE | MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE | SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES) | SM | SILTY SANDS, SAND-SILT MIXTURES |
| | | | SC | CLAYEY SANDS, SAND-CLAY MIXTURES |
| FINE GRAINED SOILS | SILTS AND CLAYS | LIQUID LIMITS LESS THAN 50 | ML | INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY |
| | | | CL | INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS |
| | | | OL | ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY |
| MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE | SILTS AND CLAYS | LIQUID LIMITS GREATER THAN 50 | MH | INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS |
| | | | CH | INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS |
| | | | OH | ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS |
| HIGHLY ORGANIC SOILS | | | PT | PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS |

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS FOR SAMPLES WITH 5% TO 12% FINES

**GRADATION***

| % FINER BY WEIGHT | |
|---|---|
| TRACE | 1% TO 10% |
| LITTLE | 10% TO 20% |
| SOME | 20% TO 35% |
| AND | 35% TO 50% |

**COMPACTNESS***
**Sand and/or Gravel**

| RELATIVE DENSITY | |
|---|---|
| LOOSE | 0% TO 40% |
| MEDIUM DENSE | 40% TO 70% |
| DENSE | 70% TO 90% |
| VERY DENSE | 90% TO 100% |

**CONSISTENCY***
**Clay and/or Silt**

| RANGE OF SHEARING STRENGTH IN POUNDS PER SQUARE FOOT | |
|---|---|
| VERY SOFT | LESS THAN 250 |
| SOFT | 250 TO 500 |
| MEDIUM | 500 TO 1000 |
| STIFF | 1000 TO 2000 |
| VERY STIFF | 2000 TO 4000 |
| HARD | GREATER THAN 4000 |

** VALUES ARE FROM LABORATORY OR FIELD TEST DATA, WHERE APPLICABLE. WHEN NO TESTING WAS PERFORMED, VALUES ARE ESTIMATED.*



*Other Office Locations:*

WARREN, NJ 908.668.7777 | CHALFONT, PA 215.712.2700 | SOUTHBOROUGH, MA 508.485.0755 | ROCKY HILL, CT 860.726.7889 | PHILADELPHIA, PA 215.848.2323 | BEDFORD, NH 603.514.2230 | TAMPA, FL 813.851.0690 | MIAMI, FL 786.783.6966

*Environmental & Geotechnical Engineers & Consultants*

WHITESTONE
An Employee-Owned Company

1959 HIGHWAY 34
BUILDING A, SUITE 102
WALL, NJ 07719
732.592.2101
whitestoneassoc.com

# GEOTECHNICAL TERMS AND SYMBOLS

## SAMPLE IDENTIFICATION

The Unified Soil Classification System is used to identify the soil unless otherwise noted.

## SOIL PROPERTY SYMBOLS

N: Standard Penetration Value: Blows per ft. of a 140 lb. hammer falling 30" on a 2" O.D. split-spoon.
Qu: Unconfined compressive strength, TSF.
Qp: Penetrometer value, unconfined compressive strength, TSF.
Mc: Moisture content, %.
LL: Liquid limit, %.
PI: Plasticity index, %.
δd: Natural dry density, PCF.
▼: Apparent groundwater level at time noted after completion of boring.

## DRILLING AND SAMPLING SYMBOLS

NE: Not Encountered (Groundwater was not encountered).
SS: Split-Spoon - 1 ⅜" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
AU: Auger Sample.
OB: Diamond Bit.
CB: Carbide Bit
WS: Washed Sample.

## RELATIVE DENSITY AND CONSISTENCY CLASSIFICATION

| Term (Non-Cohesive Soils) | Standard Penetration Resistance |
|---|---|
| Very Loose | 0-4 |
| Loose | 4-10 |
| Medium Dense | 10-30 |
| Dense | 30-50 |
| Very Dense | Over 50 |

| Term (Cohesive Soils) | Qu (TSF) |
|---|---|
| Very Soft | 0 - 0.25 |
| Soft | 0.25 - 0.50 |
| Firm (Medium) | 0.50 - 1.00 |
| Stiff | 1.00 - 2.00 |
| Very Stiff | 2.00 - 4.00 |
| Hard | 4.00+ |

## PARTICLE SIZE

| | | | | | |
|---|---|---|---|---|---|
| Boulders | 8 in.+ | Coarse Sand | 5mm-0.6mm | Silt | 0.074mm-0.005mm |
| Cobbles | 8 in.-3 in. | Medium Sand | 0.6mm-0.2mm | Clay | -0.005mm |
| Gravel | 3 in.-5mm | Fine Sand | 0.2mm-0.074mm | | |



*Other Office Locations:*

WARREN, NJ 908.668.7777 | CHALFONT, PA 215.712.2700 | SOUTHBOROUGH, MA 508.485.0755 | ROCKY HILL, CT 860.726.7889 | PHILADELPHIA, PA 215.848.2323 | BEDFORD, NH 603.514.2230 | TAMPA, FL 813.851.0690 | MIAMI, FL 786.783.6966

# D. 72 HOUR DRAIN DOWN

## Hydrograph for Pond 7P: Permeable Pavement

| Time (hours) | Inflow (cfs) | Storage (cubic-feet) | Elevation (feet) | Discarded (cfs) |
|---|---|---|---|---|
| 0.00 | 0.00 | 0 | 18.51 | 0.00 |
| 2.00 | 0.04 | 1 | 18.51 | 0.04 |
| 4.00 | 0.05 | 1 | 18.51 | 0.05 |
| 6.00 | 0.07 | 1 | 18.51 | 0.07 |
| 8.00 | 0.10 | 2 | 18.51 | 0.10 |
| 10.00 | 0.18 | 3 | 18.51 | **0.18** |
| 12.00 | **2.22** | **110** | **18.55** | **1.61** |
| 14.00 | **0.20** | **3** | **18.51** | 0.20 |
| 16.00 | 0.11 | 2 | 18.51 | 0.11 |
| 18.00 | 0.07 | 1 | 18.51 | 0.07 |
| 20.00 | 0.06 | 1 | 18.51 | 0.06 |
| 22.00 | 0.05 | 1 | 18.51 | 0.05 |
| 24.00 | 0.04 | 1 | 18.51 | 0.04 |
| 26.00 | 0.00 | 0 | 18.51 | 0.00 |
| 28.00 | 0.00 | 0 | 18.51 | 0.00 |
| 30.00 | 0.00 | 0 | 18.51 | 0.00 |
| 32.00 | 0.00 | 0 | 18.51 | 0.00 |
| 34.00 | 0.00 | 0 | 18.51 | 0.00 |
| 36.00 | 0.00 | 0 | 18.51 | 0.00 |
| 38.00 | 0.00 | 0 | 18.51 | 0.00 |
| 40.00 | 0.00 | 0 | 18.51 | 0.00 |
| 42.00 | 0.00 | 0 | 18.51 | 0.00 |
| 44.00 | 0.00 | 0 | 18.51 | 0.00 |
| 46.00 | 0.00 | 0 | 18.51 | 0.00 |
| 48.00 | 0.00 | 0 | 18.51 | 0.00 |
| 50.00 | 0.00 | 0 | 18.51 | 0.00 |
| 52.00 | 0.00 | 0 | 18.51 | 0.00 |
| 54.00 | 0.00 | 0 | 18.51 | 0.00 |
| 56.00 | 0.00 | 0 | 18.51 | 0.00 |
| 58.00 | 0.00 | 0 | 18.51 | 0.00 |
| 60.00 | 0.00 | 0 | 18.51 | 0.00 |
| 62.00 | 0.00 | 0 | 18.51 | 0.00 |
| 64.00 | 0.00 | 0 | 18.51 | 0.00 |
| 66.00 | 0.00 | 0 | 18.51 | 0.00 |
| 68.00 | 0.00 | 0 | 18.51 | 0.00 |
| 70.00 | 0.00 | 0 | 18.51 | 0.00 |
| 72.00 | 0.00 | 0 | 18.51 | 0.00 |

# E. DRAINAGE AREA MAPS