

May 19, 2025
Last revised December 30, 2025

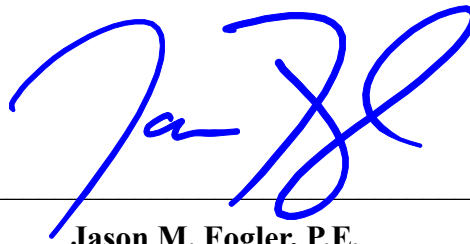
Project # BAR-2301

**STORMWATER MANAGEMENT REPORT
FOR
BEACHWAY AVENUE II REDEVELOPMENT PLAN**

**BLOCK 184, LOT 1
BOROUGH OF KEANSBURG, MONMOUTH COUNTY, NEW JERSEY**

**PREPARED FOR:
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I. INTRODUCTION

A. Project Description & Location

The proposed project outlined in this report consists of the construction of three (3) five-story condominium buildings each over parking, containing a total of 64 units and associated driveways, parking, stormwater management measures, and associated grading. Each building has garages beneath the building at ground level. The site is located at Block 184, Lot 1 in the Borough of Keansburg, Monmouth County along Beachway Avenue, containing 2.71 acres.

B. Existing Site Conditions

The proposed project site is located between Beachway Avenue and the Raritan Bay. The site is previously developed with existing bituminous pavement and utility infrastructure. A dune line exists between the current improvements and the Raritan Bay. In general, the topography of the subject project area slopes, in varying degrees, to the southeast toward an existing collection system in Beachway Avenue. Elevations onsite within the disturbed areas range approximately from a high point of 17.2 feet at the northwestern corner of the disturbed area to a low point of 5.5 feet on the north side of the existing retaining wall. Soils onsite consist of Hooksan Sand (HorBr), which is categorized as Hydrologic Soil Group 'A' and Urban Land - Klej Complex (USKLEA) which does not have a Hydrologic Soil Group according to the NRCS Web Soil Survey. Since Urban Land - Klej Complex does not have a hydrologic soil group (HSG), the default HSG provided in Table 12-1 of the NJ Stormwater Management Best Practices Manual is used. The default HSG within the Coastal Plain is HSG A for the pre-developed condition and HSG D in the post-developed condition.

II. METHODOLOGY AND SOFTWARE

The NJDEP rules regarding stormwater management, N.J.A.C. 7:8-5.2(a) states that stormwater management measures for a major development shall be developed to meet the erosion control, groundwater recharge, stormwater runoff quantity, and stormwater runoff quality standards. N.J.A.C. 7:8-1.2 defines a major development as any development that disturbs one or more acres of land since February 2, 2004, the creation of one-quarter acre or more of regulated impervious surface since February 2, 2004, or the creation of one-quarter acre or more of regulated

motor vehicle surface since March 2, 2021. The subject project area is 2.71 acres, thus meeting the definition of a major development. In accordance with the NJDEP rules regarding stormwater management, N.J.A.C. 7:8-1.6, the criteria to handle stormwater for major developments is to design acceptable systems that effectively manage the stormwater with respect to applicable regulations regarding water quality, runoff quantity and groundwater recharge. Each of these requirements was considered in a pre vs. post-development runoff analysis, conducted in conjunction with an evaluation of site conditions, local ordinance and proposed construction specifications. This was done to facilitate designing an appropriate stormwater management system for the proposed site, based on sound engineering principles to maximize water quality and to reduce peak flows offsite per the current NJDEP stormwater regulations adopted July 17, 2023.

Green infrastructure refers to methods of stormwater management that reduce stormwater volume or flow by allowing the water to infiltrate, to be treated by vegetation or by soils; or to be stored for reuse. The use of green infrastructure encourages the idea that stormwater is a resource that can be reused, instead of being treated as a nuisance that needs to be removed quickly as possible. NJDEP green infrastructure requirements are in accordance with N.J.A.C. 7:8-5.3. The criteria of which relate to the BMPs identified in Table 5-1 or Table 5-2 at N.J.A.C. 7:8-5.2(f) and/or an alternative storm water management measure approved in accordance with N.J.A.C. 7:8-5.2(g). The BMPs selected for the project are to receive a maximum contributory drainage area when specified in section 7:8-5.3 of the N.J.A.C.

Accordingly, stormwater management analysis in this report consists of: (1) calculating runoff from the 2, 10 and 100-year storm events for the current and projected pre and post-development conditions of each drainage area; (2) comparing the results of the pre-developed and post-developed conditions to ensure that an appropriate stormwater management plan has been implemented; and (3) providing a conclusion of the results of the analysis. The analysis demonstrates that the stormwater runoff will not adversely affect the area as a result of the proposed development of the property. Runoff is analyzed as a total flow at the point of analysis.

The existing pre- and proposed post-development flows were calculated using the USDA Natural Resources Conservation Service methodology, as described in Technical Release 55 - Urban Hydrology for Small Watersheds (TR-55), dated June 1986. These modeling techniques are incorporated in the HydroCAD 10.00 software package, which was used to analyze the pre- and post-development flows. All undisturbed areas of the site have been assumed to be in good

hydrologic condition, with good cover for the pre-development analysis. Any significant land features and structures that could reduce pre-construction stormwater runoff rates and volumes, including depressions and culverts have been accounted for in the pre-development analysis.

The structural stormwater management measures have been designed to take into account the existing site conditions including environmentally critical areas, slopes, depth to seasonally high water table, soil types and permeability. They have also been designed to be strong, durable and corrosion resistant so as to minimize maintenance, facilitate maintenance and repairs and ensure proper functioning within the context of their operational requirements.

III. PRE-DEVELOPMENT CONDITIONS

The proposed project site is located between Beachway Avenue and the Raritan Bay. The site area is previously developed with existing bituminous pavement and utility infrastructure. A dune line exists between the current improvements and the Raritan Bay. In general, the topography of the subject project area slopes, in varying degrees, to the southeast toward an existing collection system in Beachway Avenue. Stormwater infrastructure exists on site as part of a previously approved development consisting of catch basins and collection pipes, water quality treatment devices, and a subsurface detention system consisting of two (2) 338 LF 36" HDPE pipes with an outlet structure. To determine the peak runoff rates from the site for 2, 10 and 100-year storms before development, the site was analyzed for the previously approved development to determine the allowable flows discharging overland and from the detention system to the existing collection system in Beachway Avenue. The project area was analyzed as three (3) existing drainage areas (EA-1, EA-2 & EA-3). Drainage area EA-1 consists of 2.14 acres, of which 1.67 acres are impervious surfaces. This area is collected and conveyed to the existing subsurface detention system. Drainage area EA-2 consists of 0.32 acres, of which 0.04 acres is impervious surfaces. Runoff from EA-2 flows via overland flow to the existing collection system in Beachway Avenue. Both drainage areas EA-1 and EA-2 discharge to the existing collection system in Beachway Avenue. Drainage area EA-3 consists of 0.25 acres and discharges offsite via overland flow, ultimately toward the dunes. Time of concentration (T_c) was calculated using the McCuen-Spiess method. To determine the peak runoff for the contributory drainage area, the precipitation depths of the current and projected 2, 10 and 100-year storm events were determined by utilizing the

National Oceanographic and Atmospheric Administration (NOAA) precipitation estimates for the site and multiplying the depths by the adjustment factors provided in N.J.A.C. 7:8-5.7(c)&(d). A summary of the precipitation depths for the current and projected storm events is provided below:

**Current & Projected Precipitation Adjustment/Change Factors
(Monmouth County)**

Storm	NOAA Precipitation Depth (in.)	Precipitation Adjustment/Change Factor	Adjusted Precipitation Depth (in.)
Current			
2-Year	3.33	1.00	3.33
10-Year	5.10	1.01	5.15
100-Year	8.63	1.02	8.80
Future			
2-Year	3.33	1.19	3.96
10-Year	5.10	1.19	6.07
100-Year	8.63	1.26	10.87

Table 1: Precipitation Adjustment/Change Factors

Runoff for the pre-developed site was calculated using the HydroCAD 10.00 software package and is summarized in the tables below:

Pre-Development Input Summary

Drainage Area Name	Drainage Area (Acres)	Time of Concentration (minutes)	Curve Number (cfs)
EA-1	2.14	17.0 (Current) 15.7 (Future)	
Pervious	0.47		39
Impervious	1.67		98
EA-2	0.32	6.3 (Current) 5.8 (Future)	
Pervious	0.28		39
Impervious	0.04		98
EA-3	0.25	4.5 (Current) 4.2 (Future)	
Pervious	0.25		39

Table 2: Pre-Development Input Summary

Pre-Development Runoff Summary

	2-Year Storm (cfs)	10-Year Storm (cfs)	100-Year Storm (cfs)
Flow to Beachway Ave (EA-1 & EA-2)			
Current	2.43	3.53	5.90
Future	2.89	4.17	12.32
Flow to Offsite/Dunes (EA-3)			
Current	0.00	0.01	0.30
Future	0.00	0.03	0.61

Table 3: Pre-Development Runoff Summary

IV. POST-DEVELOPMENT STORMWATER MANAGEMENT SUMMARY

A. Water Quantity

To meet the NJDEP stormwater runoff quantity requirements at N.J.A.C. 7:8-5.6, runoff from 2.29 acres of the 2.71 acres project area is sent to the proposed stormwater management system, while 0.06 acres is directed overland towards the existing dunes, and the remaining 0.36 acres of disturbed area is directed overland toward the existing stormwater collection system along Beachway avenue. The proposed stormwater system consists of one (1) Porous pavement system with underground storage. The porous pavement with underground storage has been designed to entirely store and reduce the developed runoff to 50%, 75% and 80% of the current and projected

2, 10 and 100-year storm pre-development flows. Runoff will be collected via overland flow, building downspouts, roof leaders and a conventional piped stormwater collection system. Time of concentration (Tc) was calculated using the McCuen-Spiess method in the post-development condition.

BMP Description	Pervious Asphalt Paving Area (Ac)	Additional Flow area (Ac)	Ratio
Porous Pavement	0.78	1.51	1.94

Table 4: BMP Contributing Drainage Area Summary

Post-Development Input Summary

Drainage Area Name	Drainage Area (Acres)	Time of Concentration (minutes)	Curve Number (cfs)
DA-1	2.29	5.6 (Current) 5.2 (Future)	
Pervious	0.41		61
Impervious	1.88		98
DA-2	0.36	1.6 (Current) 1.5 (Future)	
Pervious	0.21		80
Impervious	0.15		98
DA-3	0.06	1.0 (Current) 1.0 (Future)	
Pervious	0.06		39

Table 5: Post-Development Input Summary

The allowable peak runoff rates from the post-developed site were found by applying the required reductions to the pre-developed peak flows for the onsite disturbed areas as summarized below.

Storm Event (yr)	Pre-Dev Runoff (cfs)	% Reduction	Allowable Runoff (cfs)	Post-Dev Runoff (cfs)
Current				
2	2.43	50%	1.21	1.02
10	3.53	75%	2.65	2.03
100	5.90	80%	4.72	4.71
Future				
2	2.89	50%	1.44	1.41
10	4.17	75%	3.13	2.62
100	12.32	80%	9.86	9.31

Table 6: Allowable Runoff Summary – Flow to Beachway Ave

Storm Event (yr)	Pre-Dev Runoff (cfs)	% Reduction	Allowable Runoff (cfs)	Post-Dev Runoff (cfs)
Current				
2	0.00	50%	0.00	0.00
10	0.01	75%	0.01	0.00
100	0.30	80%	0.24	0.11
Future				
2	0.00	50%	0.00	0.00
10	0.03	75%	0.02	0.01
100	0.61	80%	0.45	0.20

Table 7: Allowable Runoff Summary – Flow to Offsite/Dunes

In the six analyzed storms the post-development runoff rates are less than the required reductions, thus meeting the requirements of the NJDEP Stormwater Management rules for stormwater quantity.

B. Pervious Paving System – Discussion (Methodology)

The stormwater management system has been designed as a subsurface detention basin below the porous pavement in accordance with BMP chapter 9.6 Pervious Paving systems. As indicated in the BMP manual, the minimum design permeability rate of the subsoil shall be 0.5 inches/hour for BMPs designed to be infiltrated into the subsoil, which equates to a minimum tested permeability rate of 1.0 in/hr with a factor of safety of 2 applied. As the basin is designed with an underdrain system, a minimum rate of 0.5 inches/hour was applied to the stone above the underdrain to determine whether the basin will fully drain within 72 hours. Calculations are provided in Section E of this report showing the basin fully drains within 72 hours after the 24-hour storm rainfall event using a design infiltration rate of 0.5 inches/hour.

The underdrain network will consist of three components, the gravel layer, pipe collection network, and PVC liner. The design permeability rate of the gravel bed was assumed to be 0.5 in/hr, which is based upon the minimum design permeability for BMPs designed to infiltrated into the subsoil.

The porous pavement system is located within the 24 ft wide main drive aisle, that loops around the three proposed buildings. The storage beneath the porous pavement accepts the stormwater runoff from 2.29 acres of the proposed development, of which 1.88 acres is impervious. Due to the presence of unsuitable soils at the bottom of the proposed stone storage

area, infiltration at this location is not feasible. As a result, a 6-inch perforated PVC underdrain is proposed beneath the basin bottom to facilitate drainage and maintain system functionality. The underdrain will be encased in clean, uniformly graded stone and wrapped in geotextile fabric to prevent sediment intrusion, ensuring long-term performance. This basin provides both stormwater quality and quantity control. Stormwater will be conveyed to this basin via overland flow, and a conventional gravity storm sewer system. Stormwater flows from the basin will be attenuated by an outlet structure in the basin. Runoff discharging to the basin was analyzed with the HydroCAD 10.00 computer program utilizing the proposed basin volume characteristics. The summary of peak inflows, outflows, storage volumes, and basin elevations, are outlined below.

PERVIOUS PAVING SYSTEM SUMMARY

Storm (Yr.)	Basin Inflow (cfs)	Basin Outflow (cfs)	Maximum Pond Storage (ft³)	Basin Water Surface Elevation
Current				
WQ	4.80	0.00	7,060	9.35
2	5.30	0.38	14,545	9.90
10	8.56	1.16	21,492	10.41
25	10.73	1.65	25,760	10.72
100	15.31	4.16	33,002	11.26
Future				
WQ	4.92	0.00	7,060	9.35
2	6.56	0.49	17,428	10.11
10	10.48	1.55	24,755	10.65
25	10.99	1.65	25,764	10.72
100	19.68	8.33	36,708	11.53

Table 8: Pervious Paving System Summary

The porous pavement basin will have a 2.75 ft thick stone storage layer at elevation 8.83. Below the stone storage layer bed is a 6” perforated PVC underdrain set at a 0.15% slope. Flows from the basin are attenuated by an outlet structure with the first outlet being a 5” circular orifice set at the peak water quality design storm elevation at 9.35. This outlet controls flows generated

during the current and future 2-year storm events The second is a 3” high by 13.5” wide rectangular orifice set at 10.11, which controls flows generated by the current and future 10-year storm events. The third is a 1 ft. wide weir set at elevation 10.76. The fourth is a 4 ft wide weir set at 11.07, which controls flows generated by the current and future 100-year storm events. The outflow from the outlet structure will discharge via a 15” pipe to an existing inlet to be reconstructed along Beachway avenue.

C. Water Quality

The NJDEP Stormwater Management rules require that stormwater management measures be designed to reduce the post-construction load of total suspended solids (TSS) in stormwater runoff generated from the water quality design storm by 80 percent of the anticipated load from the developed site. This is accomplished by incorporating a green infrastructure (GI) BMP into the design in accordance with the current NJDEP stormwater regulations. The GI BMPs incorporated into the design is a Pervious Paving System. Pervious Paving Systems are approved as having an 80% total suspended solids (TSS) removal rate, with the maximum area of additional inflow less than three times the pervious paving area. The proposed porous pavement with stone storage has been sized to hold and infiltrate the entire water quality design storm volume through stone storage before being collected and conveyed via a 6-inch perforated underdrain to the outlet control structure. Since the water quality storm runoff volume is completely infiltrated through the porous pavement, a total suspended solids (TSS) removal rate of 80% is provided, meeting the water quality requirements in N.J.A.C. 7:8-5.5. The proposed basin utilized in this design incorporates the standards outlined in the NJDEP Best Management Practices.

BMP Water Quality Summary

BMP Name	Tributary Area (Acres)	WQ Volume (CF)	Available Storage (CF)	BMP Bottom Elevation	Water Quality (WSE)
Pervious Pavement	2.29	7,057	37,422	8.83	9.35

Table 9: BMP Water Quality Summary

D. Groundwater Recharge

The NJDEP Stormwater rules require recharge of the increase in the post-development 2-year runoff volume or recharge 100% of the sites average annual groundwater recharge volume in the post-developed condition. Per N.J.A.C. 7:8-5.4 (a)2.ii, the groundwater recharge requirement does not apply to projects within the urban redevelopment area. The site is located within the Metropolitan Planning Area (PA1), therefore the groundwater recharge requirement is not applicable to this site. No further analysis is necessary for ground water recharge.

E. Green Infrastructure

The green infrastructure requirements set forth in N.J.A.C. 7:8-5.3 are met by limiting the contributing drainage area to the associated green infrastructure best management practice as listed in said section. The pervious paving system has a contributing drainage area of less than three times the area of the pervious pavement. (does not include basin area per definition of Contributory Drainage Area listed in N.J.A.C. 7:8-1.2) and meets the rules of this section as described in N.J.A.C. 7:8-5.3(b). The pervious paving system is also close to the source of its respective runoff. Therefore, the project meets the intent and rules of the green infrastructure rule.

F. Nonstructural Strategies and Low Impact Development

NJDEP outlines numerous nonstructural stormwater strategies that can be incorporated into a given site design. These strategies may include one or more of the following practices:

1. *Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss;*

The project does not propose any disturbance to areas that provide water quality benefits or areas susceptible to erosion control and sediment loss. Protection measures will be in place during construction to prevent sediment discharge into downstream stormwater systems.

2. *Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces;*

Impervious area is increased by 0.32 acres in the project area due to the proposed buildings, which generates clean roof runoff and 0.78 acres of pervious pavement. Flow discharged over the pervious pavement will be treated to 80% TSS removal.

3. *Maximize the protection of natural drainage features and vegetation;*

The proposed stormwater management design has been developed to minimize disturbance to existing natural drainage features and vegetation to the greatest extent practicable. Proposed disturbance occurs within areas that were previously disturbed in the existing condition.

4. *Minimize the decrease in the "time of concentration" from pre-construction to postconstruction. "Time of concentration" is defined as the time it takes for runoff to travel from the hydraulically most distant point of the drainage area to the point of interest within a watershed;*

Decrease in the time of concentration from pre-construction to post-construction has been minimized to the maximum extent practicable.

5. *Minimize land disturbance, including clearing and grading;*

The project area is within a previously disturbed area which contains pavement areas, concrete foundations and existing storm infrastructure. The area will be cleared and regraded to accommodate the proposed building and stormwater management basin.

6. *Minimize soil compaction;*

Soil compaction will be minimized via the Soil Erosion Standards for soil de-compaction and testing.

7. *Provide low-maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides;*

The landscape design has been developed to emphasize low-maintenance plantings that support long-term sustainability and stormwater performance. The planting plan incorporates a mix of native and drought-tolerant species that are well-adapted to local climate and soil conditions, reducing the need for supplemental irrigation, fertilizers, and pesticides.

8. *Provide vegetated open-channel conveyance systems discharging into and through stable vegetated areas; and*

Vegetated open-channel conveyance systems are not feasible as the existing disturbed areas do not allow for vegetated conveyance.

9. *Provide other source controls to prevent or minimize the use or exposure of pollutants from development sites in order to prevent or minimize the release of those pollutants into stormwater runoff. These source controls include, but are not limited to:*
- i. *Development design features that help to prevent accumulation of trash and debris in drainage systems;*
Adequate trash and recycling container storage is provided within the buildings to aid in the prevention of trash and debris accumulation.
 - ii. *Development design features that help to prevent discharge of trash and debris from drainage systems;*
Trash racks are incorporated into the design of the stormwater BMP outlet structure to prevent discharge of trash and debris.
 - iii. *Development design features that help to prevent and/or contain spills or other harmful accumulations of pollutants at industrial or commercial developments; and*
The project is residential and does not anticipate the need to contain spills or other harmful accumulations of pollutants.
 - iv. *When establishing vegetation after land disturbance, applying fertilizer in accordance with the requirements established under the Soil Erosion and Sediment Control Act, N.J.S.A. 4:24-39 et seq., and implementing rules.*
Fertilizer will be applied in accordance with the requirements established under the Soil Erosion and Sediment Control Act.

G. Downstream Stability

The proposed stormwater management system has been designed to ensure downstream stability in accordance with Soil Erosion and Sediment Control Off-site stability standards. The outlet control device discharges directly into an existing stormwater inlet located along Beachway Avenue. This inlet conveys flow through a municipally maintained storm sewer system that ultimately discharges to a tidal waterway. As such, the proposed discharge point ensures that runoff is directed into an established, stable conveyance system capable of handling the post-development

flow rates, thereby meeting the downstream stability requirements and avoiding erosion or adverse impacts to adjacent properties or infrastructure.

H. Soil Erosion and Sediment Control

In an effort to minimize the effects of erosion, the proposed design and construction concepts and practices shall incorporate the standards for Soil Erosion and Sediment Control in New Jersey as provided by the New Jersey State Soil Conservation Committee. These erosion deterrents include, but are not limited to, the use of silt fence or other sediment barriers at downgrade slopes and inlet protection, as per SCS standards around drainage inlets. In addition, dust control measures, stone tracking mats and temporary and permanent vegetative cover will be utilized. General notes and guidelines are provided on the Soil Erosion and Sediment Control Plans for the contractor in order to protect against onsite soil erosion throughout the construction process.

The Soil Erosion and Sediment Control Plans will be reviewed by the Freehold Soil Conservation District, which also monitors site activities during construction. The Soil Conservation District will inspect the site and may also recommend additional erosion and sediment control measures as deemed appropriate. Before construction can occur, the Freehold Soil Conservation District must approve the soil erosion and sediment control measures proposed, in addition to any approvals that are required at the local level.

I. Storm Drainage System Discussion (Methodology):

The stormwater conduits on site were designed according to the following criteria:

1. The Rational Method was used to determine the design flows.
2. NJ Rainfall Intensity Curves, with a minimum 25-year storm frequency were utilized to size all stormwater conduits.
3. All conduits are designed to convey the design storm by open channel flow.
4. All proposed stormwater conduits are reinforced concrete pipe, Class III with an “n” value of 0.015, or high density polyethylene pipe with an “n” value of 0.011.
5. A minimum of 12” of cover is provided for all Class III Stormwater conduits.
6. The hydraulic design of all pipes assumes that the hydraulic gradient will match the inside top of the pipe when the system is under maximum design flow and no less than 12” of freeboard will be provided at all structures.

J. Drain Time Analysis

Drain time is defined as the time it takes to fully infiltrate the maximum design storm runoff volume through the most hydraulically restrictive layer. Drain time was calculated for the proposed stormwater basin using the 100-yr storm volume and the design permeability rate for the basin.

Per Chapter 9.6 of the BMP manual, the limiting factor in drain time calculation for porous pavement with underdrain, is the flow capacity of the underdrain. The design flow rate through the subsoil to the underdrain was calculated using the HydroCAD 10.00 computer program with a minimum design permeability rate of 0.5 inches/hour through the soil bed to the underdrain. A summary of the design flow rates and underdrain capacity is provided in the table below. Supporting calculations are provided in Appendix E.

BMP Description	Proposed Underdrain	Drain Time
Porous Pavement	(2) 6" Perf. PVC @ 0.15%	32 hours

V. CONCLUSION

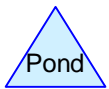
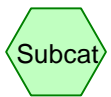
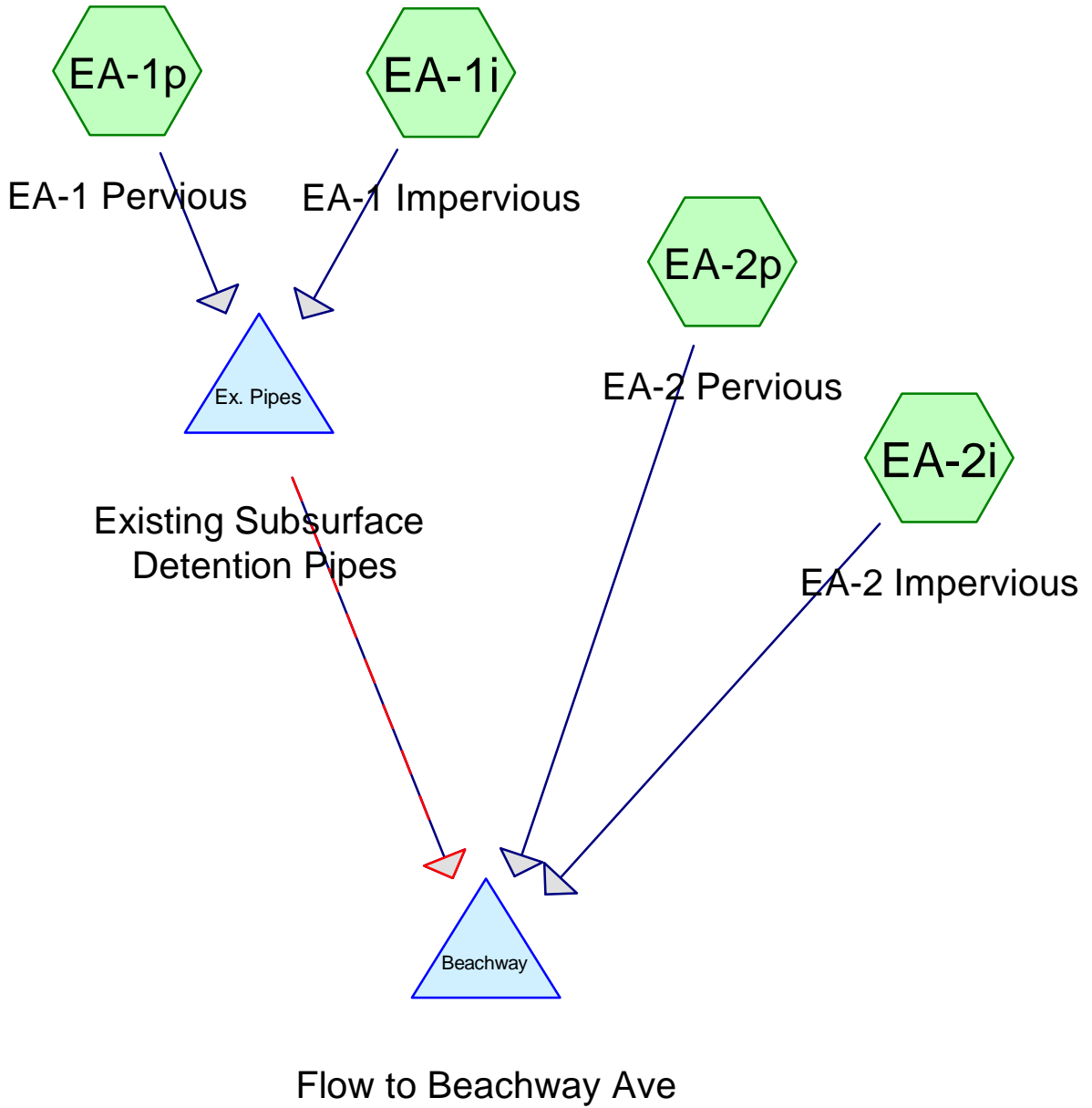
The routing summaries provided for the stormwater management system demonstrate that the design of this project will store the increases in the post-development runoff volumes and attenuate the outflows to below the pre-developed peak runoff rates in accordance with the required reductions. This design also meets all the water-quality standards through the use of porous pavement to achieve 80% TSS removal. Also, groundwater recharge does not apply to this project as the site is located in the metropolitan planning area and therefore meets the definition of an urban redevelopment area as defined in N.J.A.C. 7:8.

The stormwater management systems have been designed to meet the requirements of the "NJDEP Stormwater and Non-point Source Pollution – Best Management Practices Manual." They are designed for minimum disturbance to the natural landscape and utilizes the natural terrain for the majority of their storage. The discharge points will be in the same vicinity as the predevelopment condition, and continue to utilize the existing natural swales.

This stormwater management system meets the technical requirements as well as the overall intent of the NJDEP regulations in an aesthetically pleasing and technically compliant manner.

APPENDIX A

PRE-DEVELOPMENT DRAINAGE ANALYSIS (CURRENT)



Routing Diagram for Pre-Development (Current)
 Prepared by MidAtlantic Engineering Partners, Printed 10/10/2025
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Pre-Development (Current)

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NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Printed 10/10/2025

Summary for Subcatchment EA-1i: EA-1 Impervious

Runoff = 2.71 cfs @ 12.28 hrs, Volume= 0.431 af, Depth= 3.10"

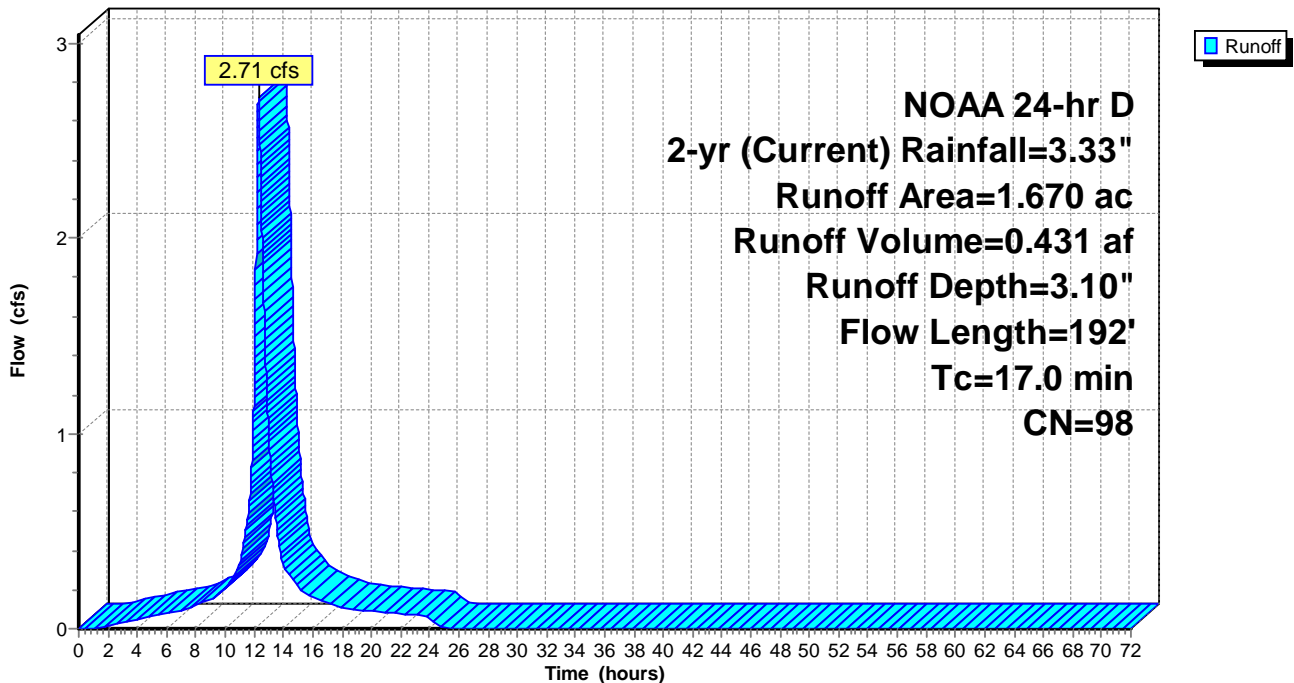
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
* 1.360	98	Paved parking, HSG URB
1.670	98	Weighted Average
1.670		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0237	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	12	0.0091	0.08		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
9.3	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.0	192	Total			

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

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Summary for Subcatchment EA-1p: EA-1 Pervious

Runoff = 0.00 cfs @ 24.03 hrs, Volume= 0.000 af, Depth= 0.00"

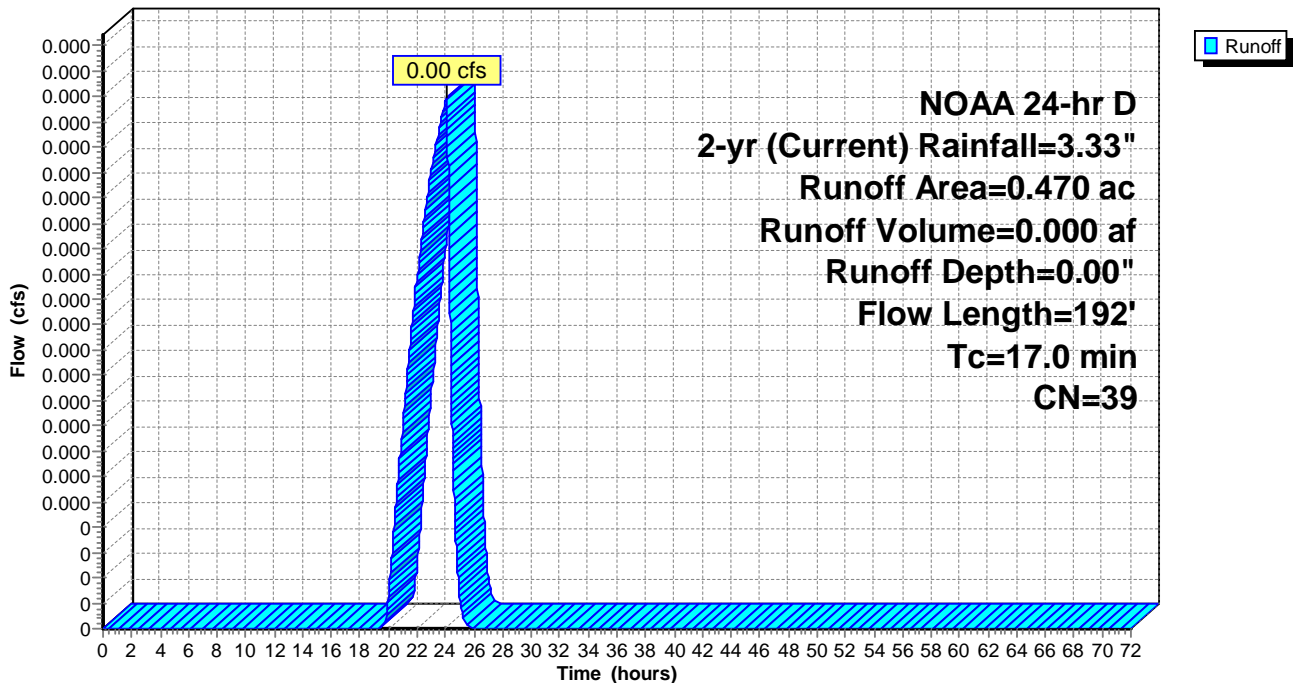
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Area (ac)	CN	Description
0.230	39	>75% Grass cover, Good, HSG A
* 0.240	39	>75% Grass cover, Good, HSG URBAN
0.470	39	Weighted Average
0.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0237	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	12	0.0091	0.08		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
9.3	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.0	192	Total			

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Printed 10/10/2025

Summary for Subcatchment EA-2i: EA-2 Impervious

Runoff = 0.10 cfs @ 12.14 hrs, Volume= 0.010 af, Depth= 3.10"

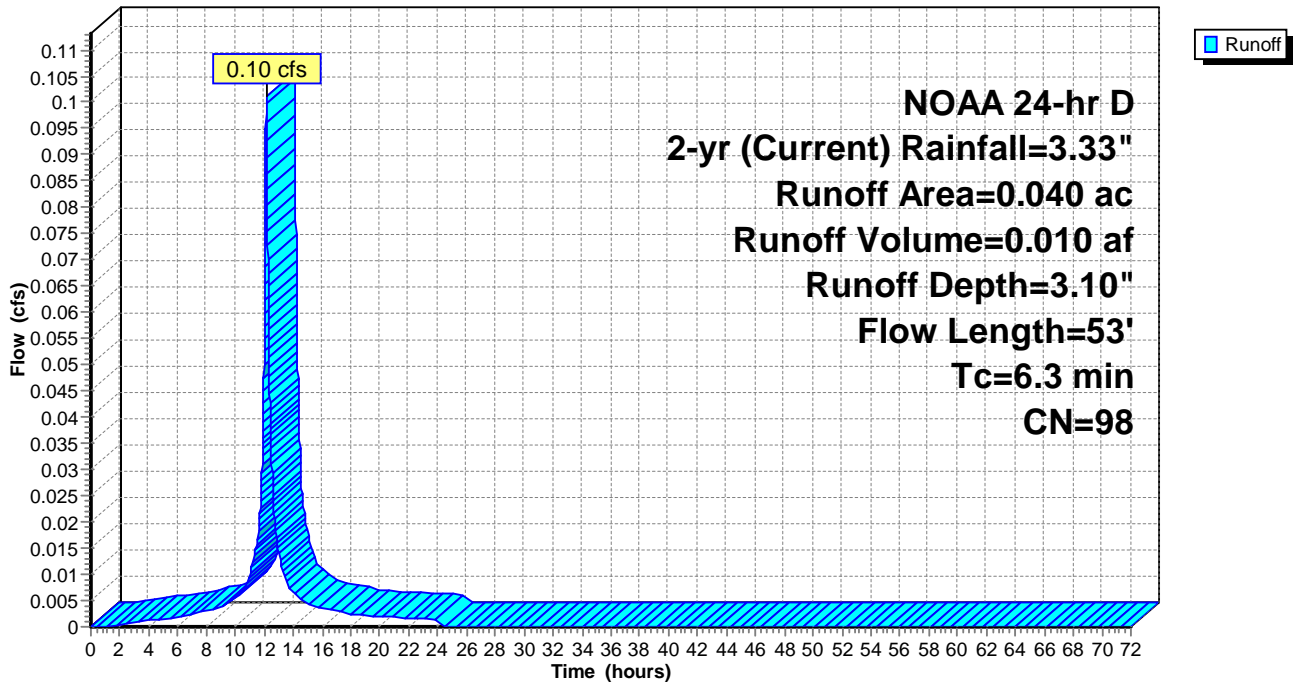
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Area (ac)	CN	Description
* 0.040	98	Paved parking, HSG URB
0.040		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	37	0.0259	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	16	0.0168	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
6.3	53	Total			

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

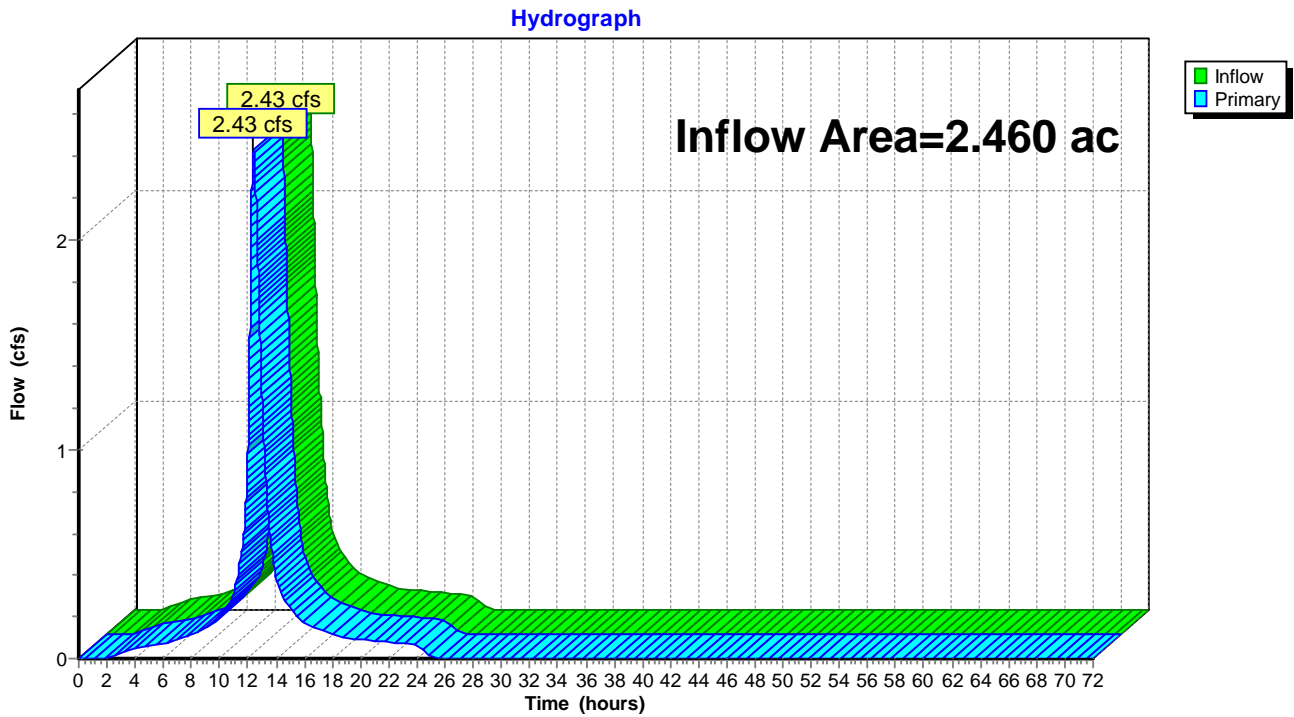
Printed 10/10/2025

Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.460 ac, 69.51% Impervious, Inflow Depth = 2.15" for 2-yr (Current) event
Inflow = 2.43 cfs @ 12.40 hrs, Volume= 0.441 af
Primary = 2.43 cfs @ 12.40 hrs, Volume= 0.441 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Pre-Development (Current)

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Inflow Area = 2.140 ac, 78.04% Impervious, Inflow Depth = 2.42" for 2-yr (Current) event
 Inflow = 2.71 cfs @ 12.28 hrs, Volume= 0.431 af
 Outflow = 2.39 cfs @ 12.41 hrs, Volume= 0.431 af, Atten= 12%, Lag= 7.9 min
 Primary = 2.39 cfs @ 12.41 hrs, Volume= 0.431 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 6
 Peak Elev= 6.02' @ 12.41 hrs Surf.Area= 0.043 ac Storage= 0.028 af

Plug-Flow detention time= 11.5 min calculated for 0.431 af (100% of inflow)
 Center-of-Mass det. time= 11.5 min (789.7 - 778.2)

Volume	Invert	Avail.Storage	Storage Description
#1	5.12'	0.110 af	36.0" Round Pipe Storage x 2 L= 338.0'
#2	5.12'	0.001 af	3.50'W x 4.00'L x 4.40'H Prismatic
		0.111 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.92'	15.0" Round Culvert L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.92' / 4.92' S= 0.0000 ' / ' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	5.12'	12.0" Vert. Orifice/Grate C= 0.600
#3	Secondary	9.31'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.39 cfs @ 12.41 hrs HW=6.02' (Free Discharge)

↑**1=Culvert** (Passes 2.39 cfs of 2.78 cfs potential flow)

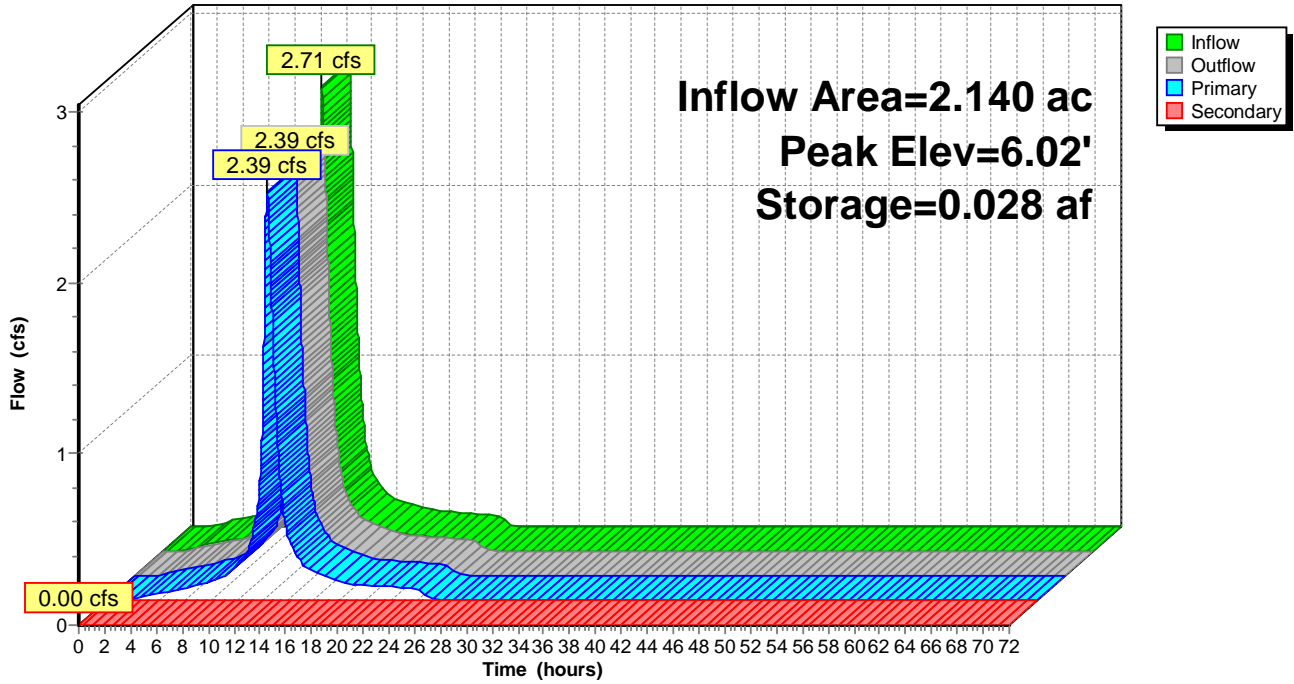
↑**2=Orifice/Grate** (Orifice Controls 2.39 cfs @ 3.22 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.12' (Free Discharge)

↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Ex. Pipes: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Hydrograph for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	5.12	0.00	0.00	0.00
2.00	0.01	0.000	5.15	0.01	0.01	0.00
4.00	0.05	0.001	5.22	0.04	0.04	0.00
6.00	0.07	0.002	5.25	0.07	0.07	0.00
8.00	0.12	0.002	5.28	0.11	0.11	0.00
10.00	0.21	0.004	5.34	0.20	0.20	0.00
12.00	1.22	0.012	5.62	0.94	0.94	0.00
14.00	0.33	0.006	5.42	0.38	0.38	0.00
16.00	0.16	0.003	5.32	0.17	0.17	0.00
18.00	0.11	0.002	5.28	0.11	0.11	0.00
20.00	0.09	0.002	5.26	0.09	0.09	0.00
22.00	0.08	0.002	5.25	0.08	0.08	0.00
24.00	0.06	0.002	5.24	0.07	0.07	0.00
26.00	0.00	0.000	5.13	0.00	0.00	0.00
28.00	0.00	0.000	5.12	0.00	0.00	0.00
30.00	0.00	0.000	5.12	0.00	0.00	0.00
32.00	0.00	0.000	5.12	0.00	0.00	0.00
34.00	0.00	0.000	5.12	0.00	0.00	0.00
36.00	0.00	0.000	5.12	0.00	0.00	0.00
38.00	0.00	0.000	5.12	0.00	0.00	0.00
40.00	0.00	0.000	5.12	0.00	0.00	0.00
42.00	0.00	0.000	5.12	0.00	0.00	0.00
44.00	0.00	0.000	5.12	0.00	0.00	0.00
46.00	0.00	0.000	5.12	0.00	0.00	0.00
48.00	0.00	0.000	5.12	0.00	0.00	0.00
50.00	0.00	0.000	5.12	0.00	0.00	0.00
52.00	0.00	0.000	5.12	0.00	0.00	0.00
54.00	0.00	0.000	5.12	0.00	0.00	0.00
56.00	0.00	0.000	5.12	0.00	0.00	0.00
58.00	0.00	0.000	5.12	0.00	0.00	0.00
60.00	0.00	0.000	5.12	0.00	0.00	0.00
62.00	0.00	0.000	5.12	0.00	0.00	0.00
64.00	0.00	0.000	5.12	0.00	0.00	0.00
66.00	0.00	0.000	5.12	0.00	0.00	0.00
68.00	0.00	0.000	5.12	0.00	0.00	0.00
70.00	0.00	0.000	5.12	0.00	0.00	0.00
72.00	0.00	0.000	5.12	0.00	0.00	0.00

Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Printed 10/10/2025

Summary for Subcatchment EA-1i: EA-1 Impervious

Runoff = 4.23 cfs @ 12.28 hrs, Volume= 0.684 af, Depth= 4.91"

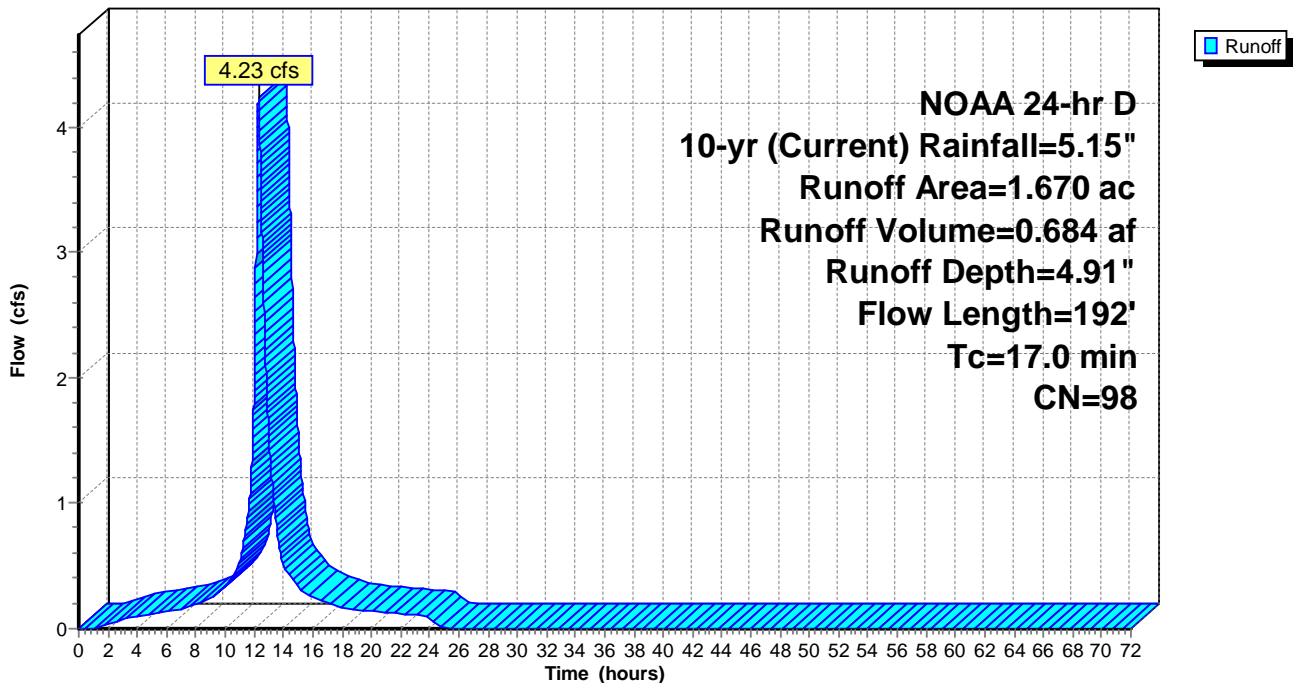
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
* 1.360	98	Paved parking, HSG URB
1.670	98	Weighted Average
1.670		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0237	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	12	0.0091	0.08		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
9.3	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.0	192	Total			

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

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Printed 10/10/2025

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Summary for Subcatchment EA-1p: EA-1 Pervious

Runoff = 0.02 cfs @ 13.34 hrs, Volume= 0.009 af, Depth= 0.23"

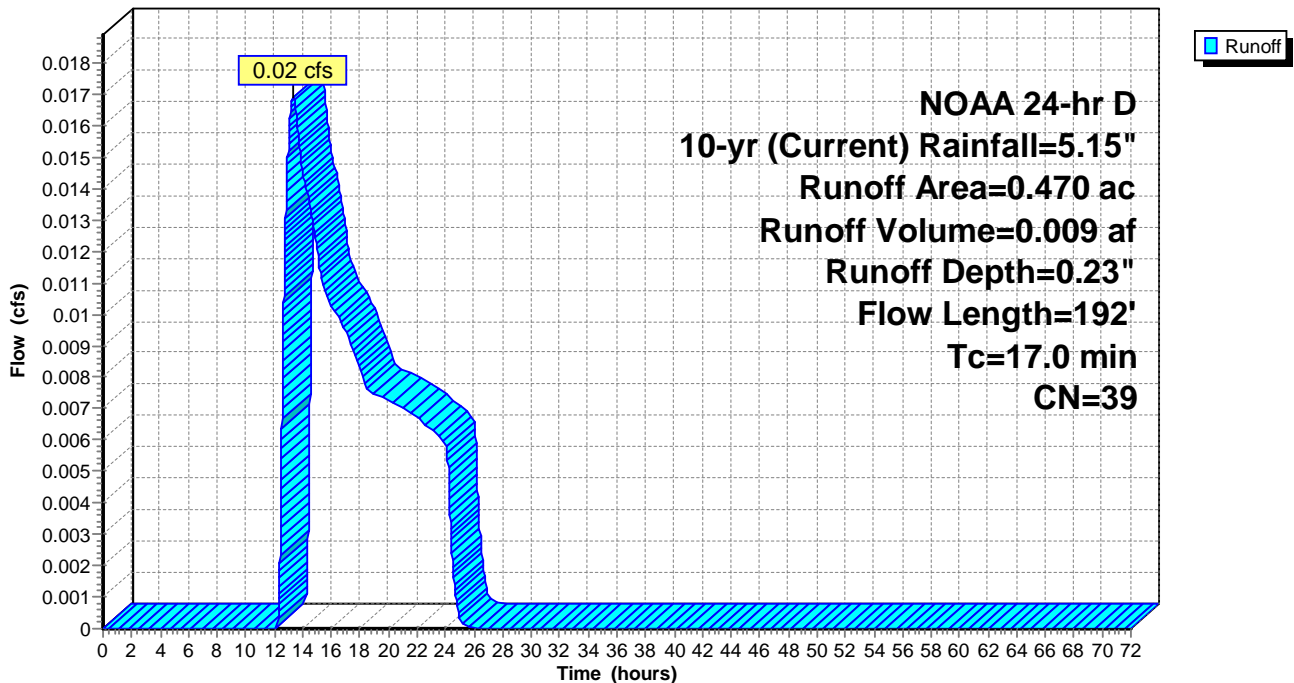
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
0.230	39	>75% Grass cover, Good, HSG A
* 0.240	39	>75% Grass cover, Good, HSG URBAN
0.470	39	Weighted Average
0.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0237	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	12	0.0091	0.08		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
9.3	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.0	192	Total			

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Printed 10/10/2025

Summary for Subcatchment EA-2i: EA-2 Impervious

Runoff = 0.16 cfs @ 12.14 hrs, Volume= 0.016 af, Depth= 4.91"

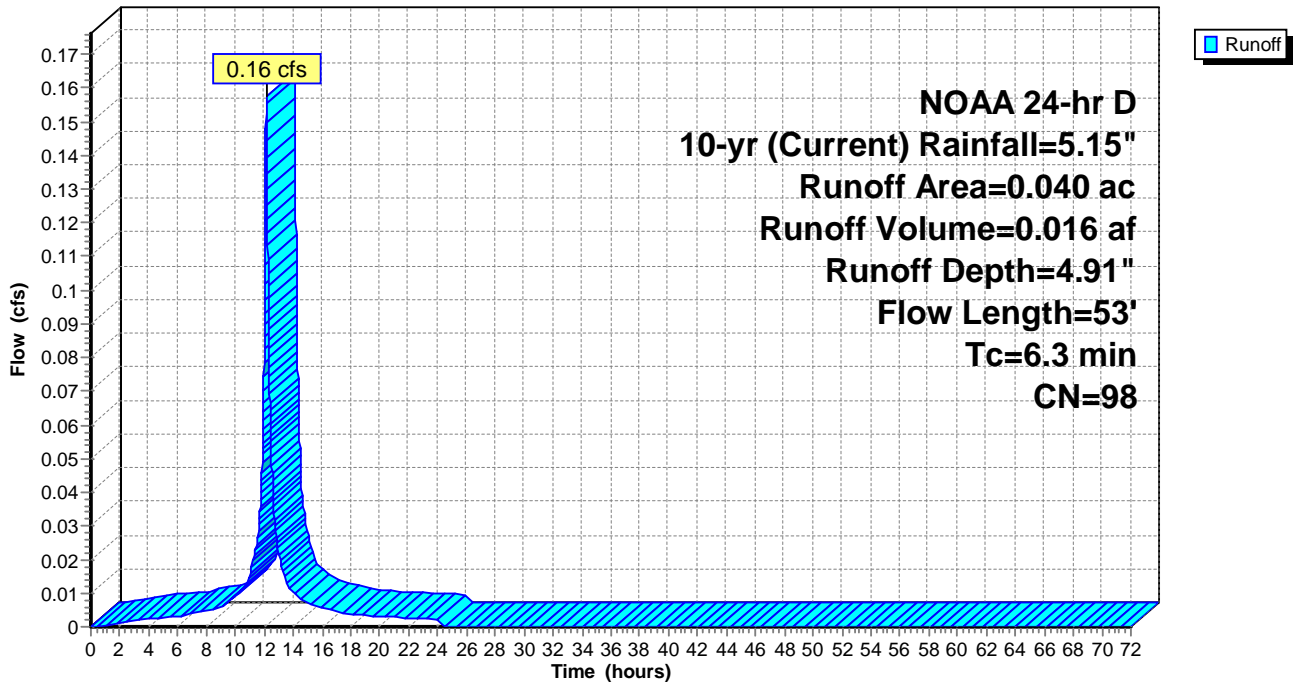
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
* 0.040	98	Paved parking, HSG URB
0.040		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	37	0.0259	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	16	0.0168	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
6.3	53	Total			

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development (Current)

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

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Summary for Subcatchment EA-2p: EA-2 Pervious

Runoff = 0.01 cfs @ 12.94 hrs, Volume= 0.005 af, Depth= 0.23"

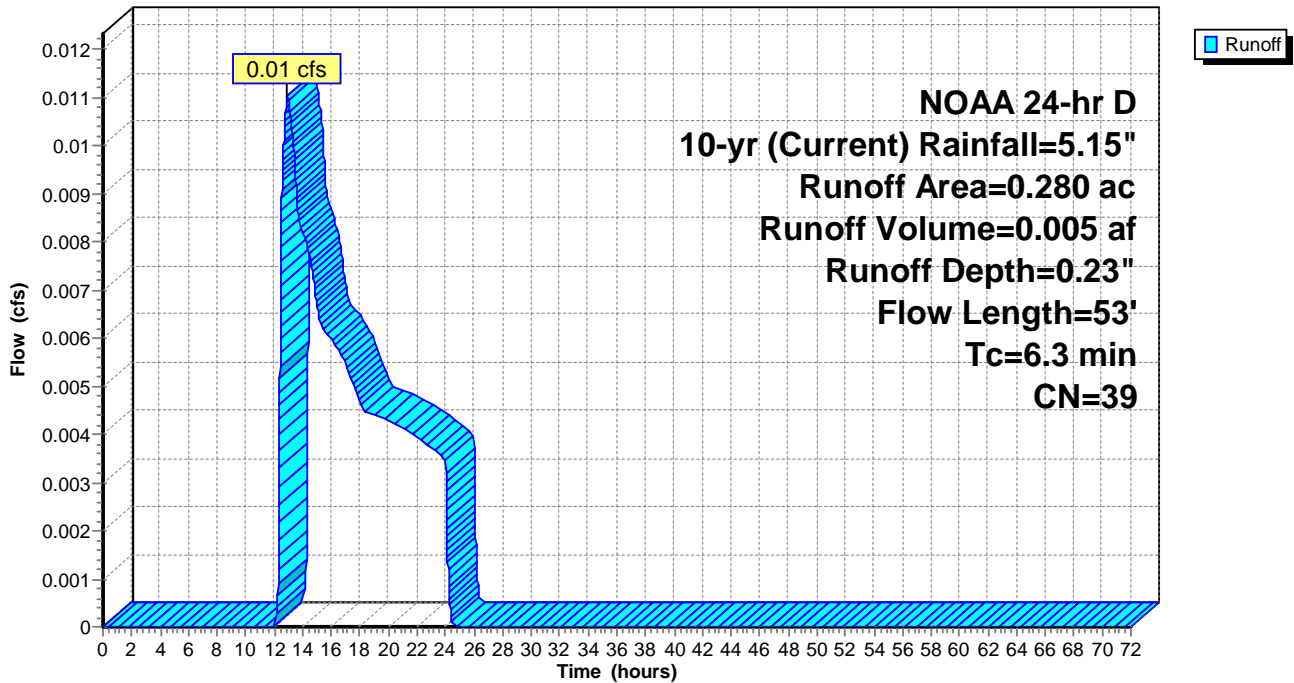
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
* 0.280	39	>75% Grass cover, Good, HSG URBAN
0.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	37	0.0259	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	16	0.0168	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
6.3	53	Total			

Subcatchment EA-2p: EA-2 Pervious

Hydrograph



Pre-Development (Current)

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

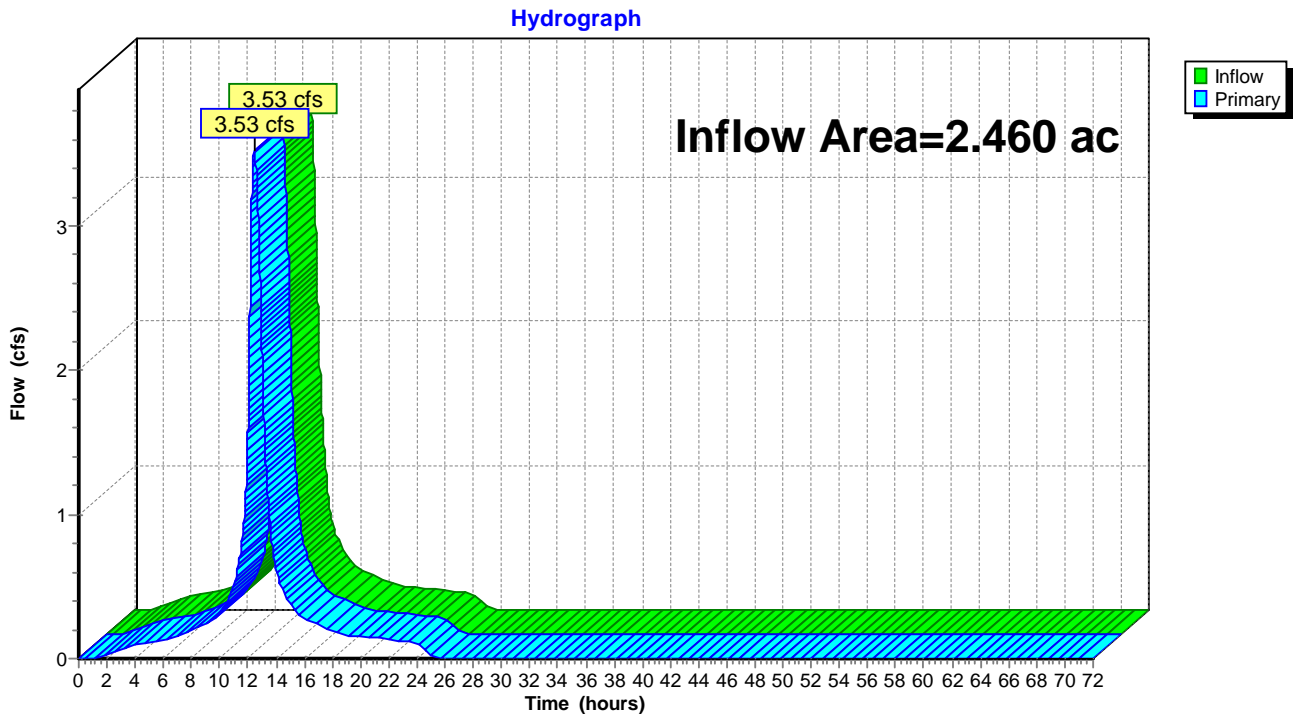
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Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.460 ac, 69.51% Impervious, Inflow Depth = 3.49" for 10-yr (Current) event
Inflow = 3.53 cfs @ 12.45 hrs, Volume= 0.715 af
Primary = 3.53 cfs @ 12.45 hrs, Volume= 0.715 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Pre-Development (Current)

NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Inflow Area = 2.140 ac, 78.04% Impervious, Inflow Depth = 3.88" for 10-yr (Current) event
 Inflow = 4.23 cfs @ 12.28 hrs, Volume= 0.693 af
 Outflow = 3.46 cfs @ 12.46 hrs, Volume= 0.693 af, Atten= 18%, Lag= 11.0 min
 Primary = 3.46 cfs @ 12.46 hrs, Volume= 0.693 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 6
 Peak Elev= 6.46' @ 12.46 hrs Surf.Area= 0.047 ac Storage= 0.048 af

Plug-Flow detention time= 11.0 min calculated for 0.693 af (100% of inflow)
 Center-of-Mass det. time= 11.0 min (783.9 - 772.9)

Volume	Invert	Avail.Storage	Storage Description
#1	5.12'	0.110 af	36.0" Round Pipe Storage x 2 L= 338.0'
#2	5.12'	0.001 af	3.50"W x 4.00"L x 4.40"H Prismatic
		0.111 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.92'	15.0" Round Culvert L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.92' / 4.92' S= 0.0000 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	5.12'	12.0" Vert. Orifice/Grate C= 0.600
#3	Secondary	9.31'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=3.46 cfs @ 12.46 hrs HW=6.46' (Free Discharge)

↑**1=Culvert** (Passes 3.46 cfs of 4.56 cfs potential flow)

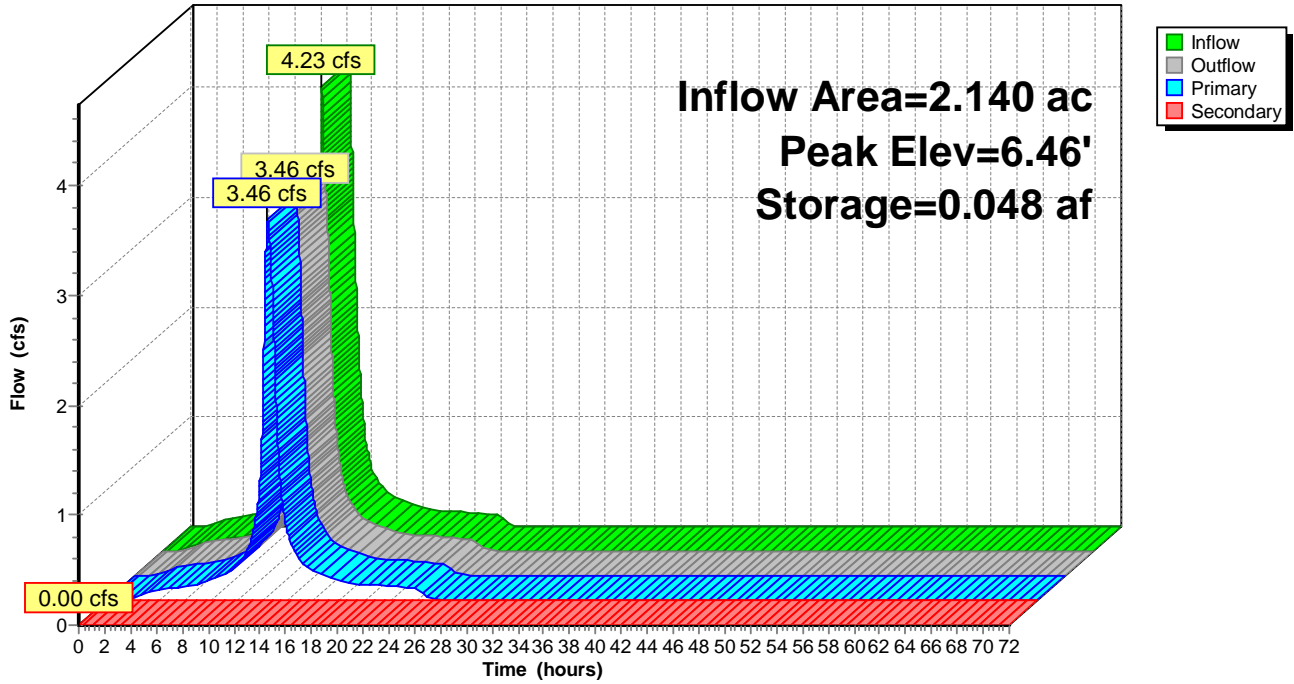
↑**2=Orifice/Grate** (Orifice Controls 3.46 cfs @ 4.41 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.12' (Free Discharge)

↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond Ex. Pipes: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Hydrograph for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	5.12	0.00	0.00	0.00
2.00	0.04	0.001	5.20	0.03	0.03	0.00
4.00	0.10	0.002	5.26	0.09	0.09	0.00
6.00	0.13	0.003	5.29	0.13	0.13	0.00
8.00	0.20	0.004	5.33	0.19	0.19	0.00
10.00	0.34	0.005	5.40	0.32	0.32	0.00
12.00	1.91	0.018	5.77	1.48	1.48	0.00
14.00	0.53	0.008	5.51	0.60	0.60	0.00
16.00	0.26	0.005	5.37	0.27	0.27	0.00
18.00	0.18	0.003	5.33	0.19	0.19	0.00
20.00	0.14	0.003	5.30	0.15	0.15	0.00
22.00	0.12	0.003	5.29	0.13	0.13	0.00
24.00	0.10	0.002	5.28	0.11	0.11	0.00
26.00	0.00	0.000	5.13	0.00	0.00	0.00
28.00	0.00	0.000	5.12	0.00	0.00	0.00
30.00	0.00	0.000	5.12	0.00	0.00	0.00
32.00	0.00	0.000	5.12	0.00	0.00	0.00
34.00	0.00	0.000	5.12	0.00	0.00	0.00
36.00	0.00	0.000	5.12	0.00	0.00	0.00
38.00	0.00	0.000	5.12	0.00	0.00	0.00
40.00	0.00	0.000	5.12	0.00	0.00	0.00
42.00	0.00	0.000	5.12	0.00	0.00	0.00
44.00	0.00	0.000	5.12	0.00	0.00	0.00
46.00	0.00	0.000	5.12	0.00	0.00	0.00
48.00	0.00	0.000	5.12	0.00	0.00	0.00
50.00	0.00	0.000	5.12	0.00	0.00	0.00
52.00	0.00	0.000	5.12	0.00	0.00	0.00
54.00	0.00	0.000	5.12	0.00	0.00	0.00
56.00	0.00	0.000	5.12	0.00	0.00	0.00
58.00	0.00	0.000	5.12	0.00	0.00	0.00
60.00	0.00	0.000	5.12	0.00	0.00	0.00
62.00	0.00	0.000	5.12	0.00	0.00	0.00
64.00	0.00	0.000	5.12	0.00	0.00	0.00
66.00	0.00	0.000	5.12	0.00	0.00	0.00
68.00	0.00	0.000	5.12	0.00	0.00	0.00
70.00	0.00	0.000	5.12	0.00	0.00	0.00
72.00	0.00	0.000	5.12	0.00	0.00	0.00

Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment EA-1i: EA-1 Impervious

Runoff = 5.22 cfs @ 12.28 hrs, Volume= 0.849 af, Depth= 6.10"

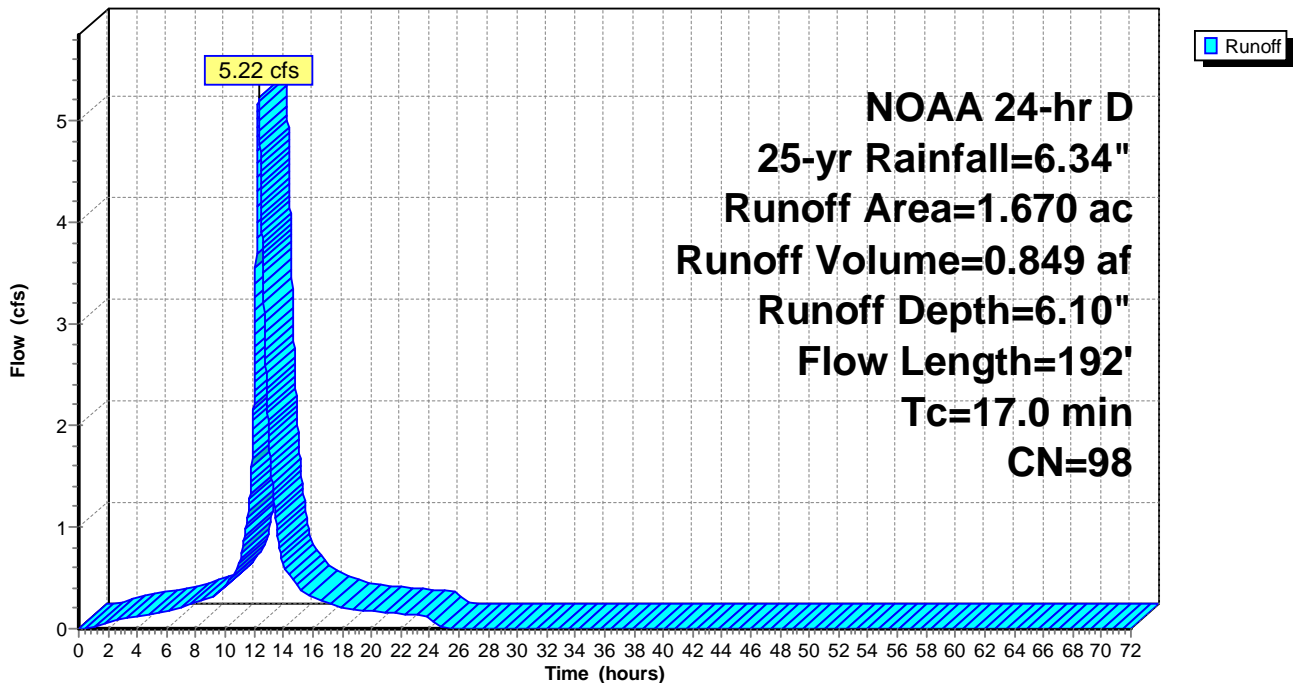
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
* 1.360	98	Paved parking, HSG URB
1.670	98	Weighted Average
1.670		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0237	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	12	0.0091	0.08		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
9.3	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.0	192	Total			

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment EA-1p: EA-1 Pervious

Runoff = 0.06 cfs @ 12.66 hrs, Volume= 0.021 af, Depth= 0.55"

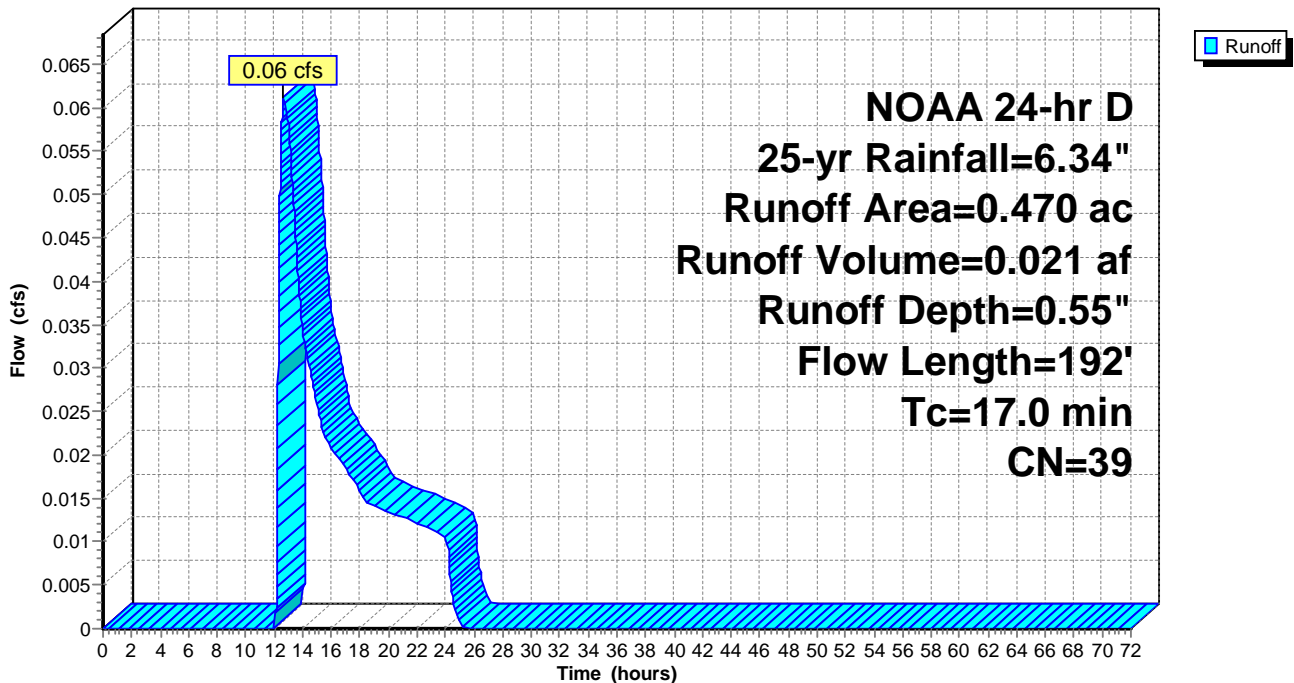
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.230	39	>75% Grass cover, Good, HSG A
* 0.240	39	>75% Grass cover, Good, HSG URBAN
0.470	39	Weighted Average
0.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0237	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	12	0.0091	0.08		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
9.3	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.0	192	Total			

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development (Current)

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NOAA 24-hr D 25-yr Rainfall=6.34"

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Summary for Subcatchment EA-2i: EA-2 Impervious

Runoff = 0.19 cfs @ 12.14 hrs, Volume= 0.020 af, Depth= 6.10"

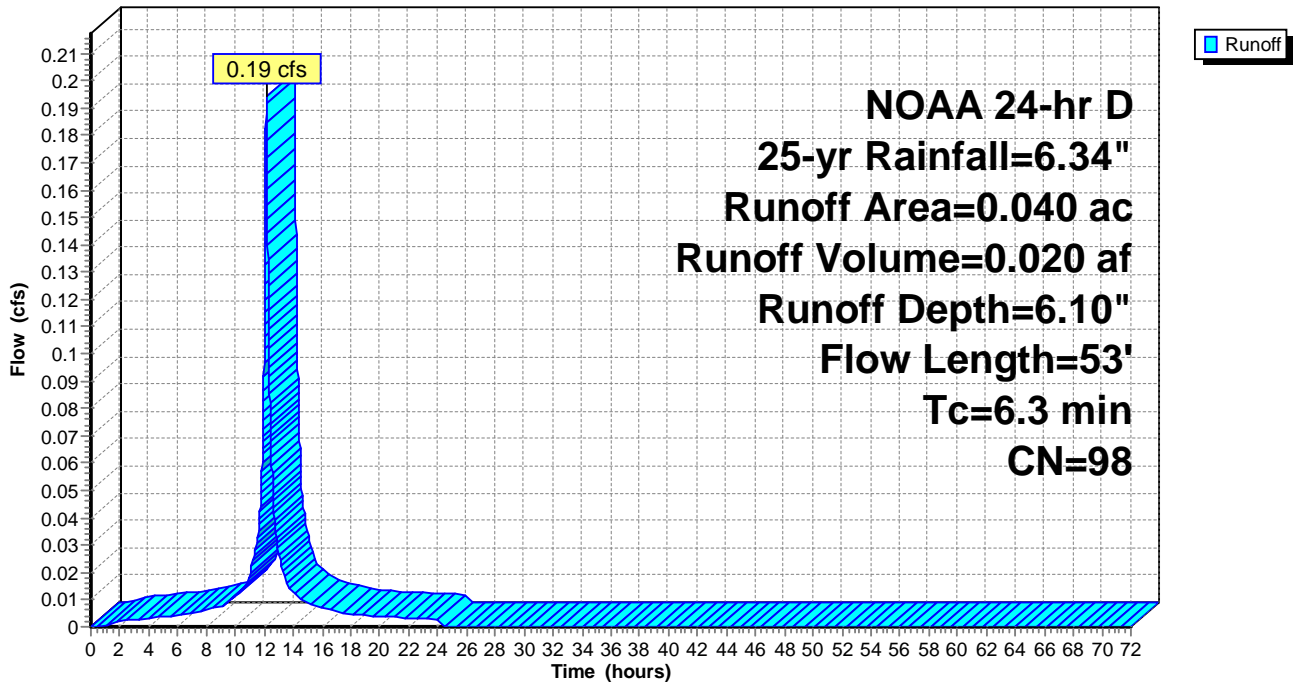
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
* 0.040	98	Paved parking, HSG URB
0.040		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	37	0.0259	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	16	0.0168	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
6.3	53	Total			

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development (Current)

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment EA-2p: EA-2 Pervious

Runoff = 0.05 cfs @ 12.34 hrs, Volume= 0.013 af, Depth= 0.55"

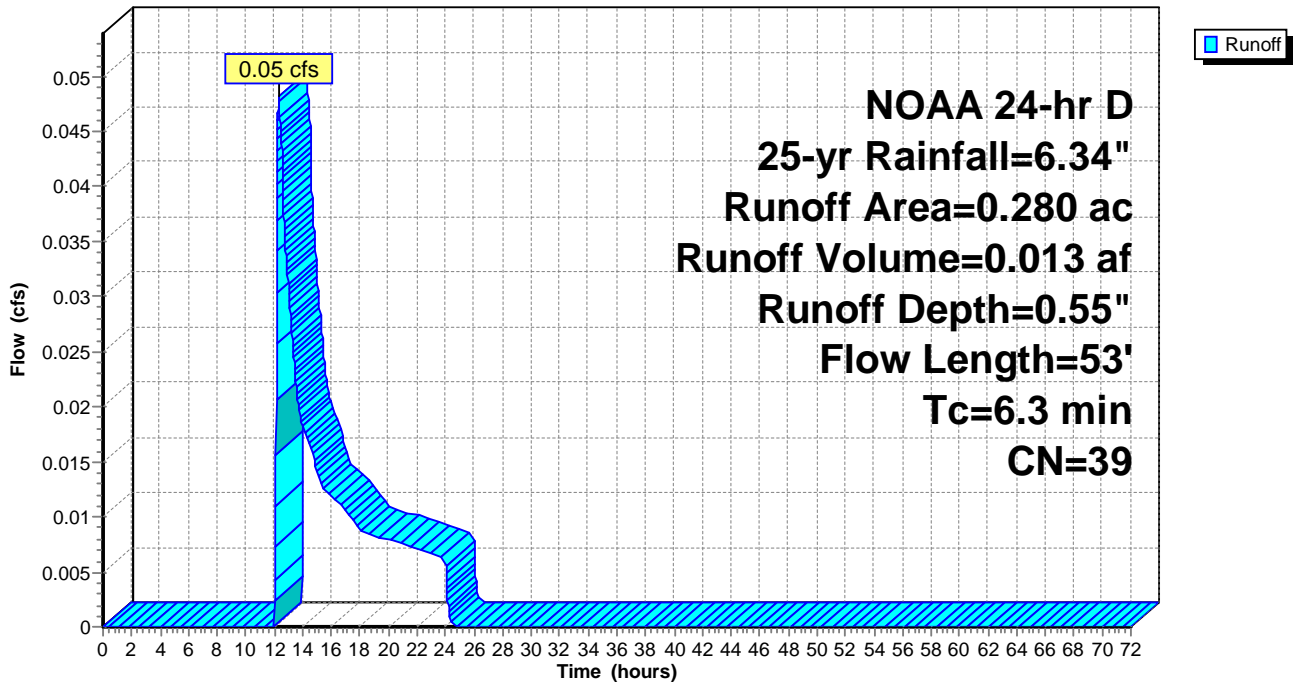
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
* 0.280	39	>75% Grass cover, Good, HSG URBAN
0.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	37	0.0259	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	16	0.0168	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
6.3	53	Total			

Subcatchment EA-2p: EA-2 Pervious

Hydrograph



Pre-Development (Current)

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NOAA 24-hr D 25-yr Rainfall=6.34"

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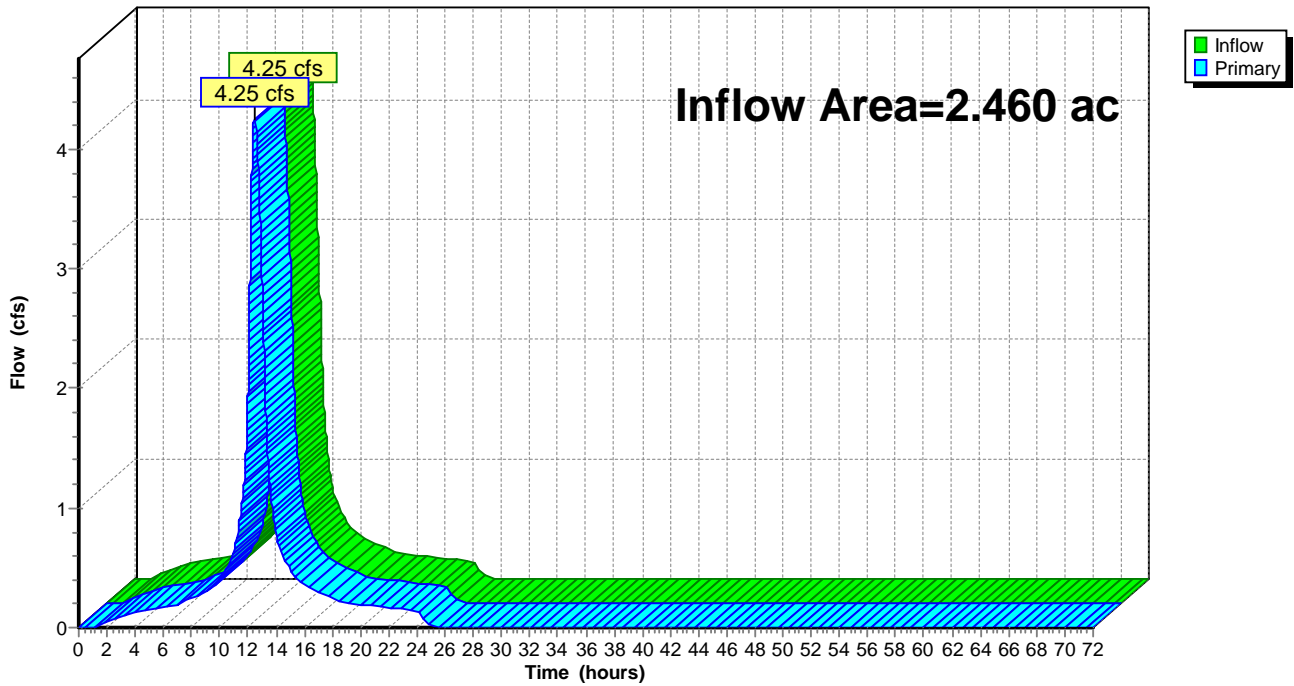
Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.460 ac, 69.51% Impervious, Inflow Depth = 4.41" for 25-yr event
Inflow = 4.25 cfs @ 12.48 hrs, Volume= 0.904 af
Primary = 4.25 cfs @ 12.48 hrs, Volume= 0.904 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 25-yr Rainfall=6.34"

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Summary for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Inflow Area = 2.140 ac, 78.04% Impervious, Inflow Depth = 4.88" for 25-yr event
 Inflow = 5.26 cfs @ 12.28 hrs, Volume= 0.871 af
 Outflow = 4.14 cfs @ 12.49 hrs, Volume= 0.871 af, Atten= 21%, Lag= 12.8 min
 Primary = 4.14 cfs @ 12.49 hrs, Volume= 0.871 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 6
 Peak Elev= 6.82' @ 12.49 hrs Surf.Area= 0.046 ac Storage= 0.065 af

Plug-Flow detention time= 11.0 min calculated for 0.871 af (100% of inflow)
 Center-of-Mass det. time= 10.9 min (782.3 - 771.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5.12'	0.110 af	36.0" Round Pipe Storage x 2 L= 338.0'
#2	5.12'	0.001 af	3.50"W x 4.00"L x 4.40"H Prismatic
		0.111 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.92'	15.0" Round Culvert L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.92' / 4.92' S= 0.0000 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	5.12'	12.0" Vert. Orifice/Grate C= 0.600
#3	Secondary	9.31'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.14 cfs @ 12.49 hrs HW=6.82' (Free Discharge)
 ↑1=Culvert (Passes 4.14 cfs of 6.07 cfs potential flow)
 ↑2=Orifice/Grate (Orifice Controls 4.14 cfs @ 5.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.12' (Free Discharge)
 ↑3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pre-Development (Current)

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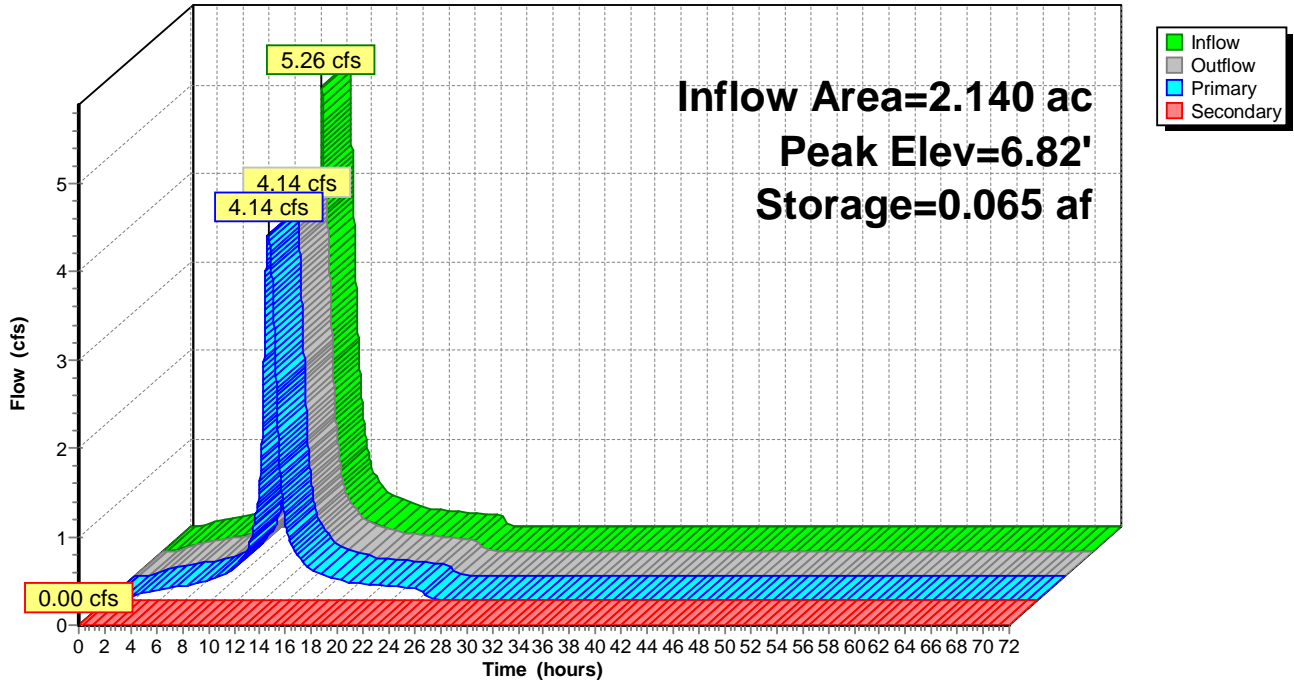
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NOAA 24-hr D 25-yr Rainfall=6.34"

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Pond Ex. Pipes: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development (Current)

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NOAA 24-hr D 25-yr Rainfall=6.34"

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Hydrograph for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	5.12	0.00	0.00	0.00
2.00	0.06	0.001	5.22	0.05	0.05	0.00
4.00	0.13	0.002	5.29	0.12	0.12	0.00
6.00	0.16	0.003	5.31	0.16	0.16	0.00
8.00	0.25	0.004	5.36	0.24	0.24	0.00
10.00	0.42	0.006	5.43	0.40	0.40	0.00
12.00	2.35	0.021	5.86	1.83	1.83	0.00
14.00	0.67	0.010	5.56	0.75	0.75	0.00
16.00	0.33	0.005	5.41	0.34	0.34	0.00
18.00	0.23	0.004	5.35	0.23	0.23	0.00
20.00	0.18	0.003	5.33	0.18	0.18	0.00
22.00	0.16	0.003	5.31	0.16	0.16	0.00
24.00	0.13	0.003	5.30	0.13	0.13	0.00
26.00	0.00	0.000	5.13	0.00	0.00	0.00
28.00	0.00	0.000	5.12	0.00	0.00	0.00
30.00	0.00	0.000	5.12	0.00	0.00	0.00
32.00	0.00	0.000	5.12	0.00	0.00	0.00
34.00	0.00	0.000	5.12	0.00	0.00	0.00
36.00	0.00	0.000	5.12	0.00	0.00	0.00
38.00	0.00	0.000	5.12	0.00	0.00	0.00
40.00	0.00	0.000	5.12	0.00	0.00	0.00
42.00	0.00	0.000	5.12	0.00	0.00	0.00
44.00	0.00	0.000	5.12	0.00	0.00	0.00
46.00	0.00	0.000	5.12	0.00	0.00	0.00
48.00	0.00	0.000	5.12	0.00	0.00	0.00
50.00	0.00	0.000	5.12	0.00	0.00	0.00
52.00	0.00	0.000	5.12	0.00	0.00	0.00
54.00	0.00	0.000	5.12	0.00	0.00	0.00
56.00	0.00	0.000	5.12	0.00	0.00	0.00
58.00	0.00	0.000	5.12	0.00	0.00	0.00
60.00	0.00	0.000	5.12	0.00	0.00	0.00
62.00	0.00	0.000	5.12	0.00	0.00	0.00
64.00	0.00	0.000	5.12	0.00	0.00	0.00
66.00	0.00	0.000	5.12	0.00	0.00	0.00
68.00	0.00	0.000	5.12	0.00	0.00	0.00
70.00	0.00	0.000	5.12	0.00	0.00	0.00
72.00	0.00	0.000	5.12	0.00	0.00	0.00

Pre-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment EA-1i: EA-1 Impervious

Runoff = 7.26 cfs @ 12.28 hrs, Volume= 1.191 af, Depth= 8.56"

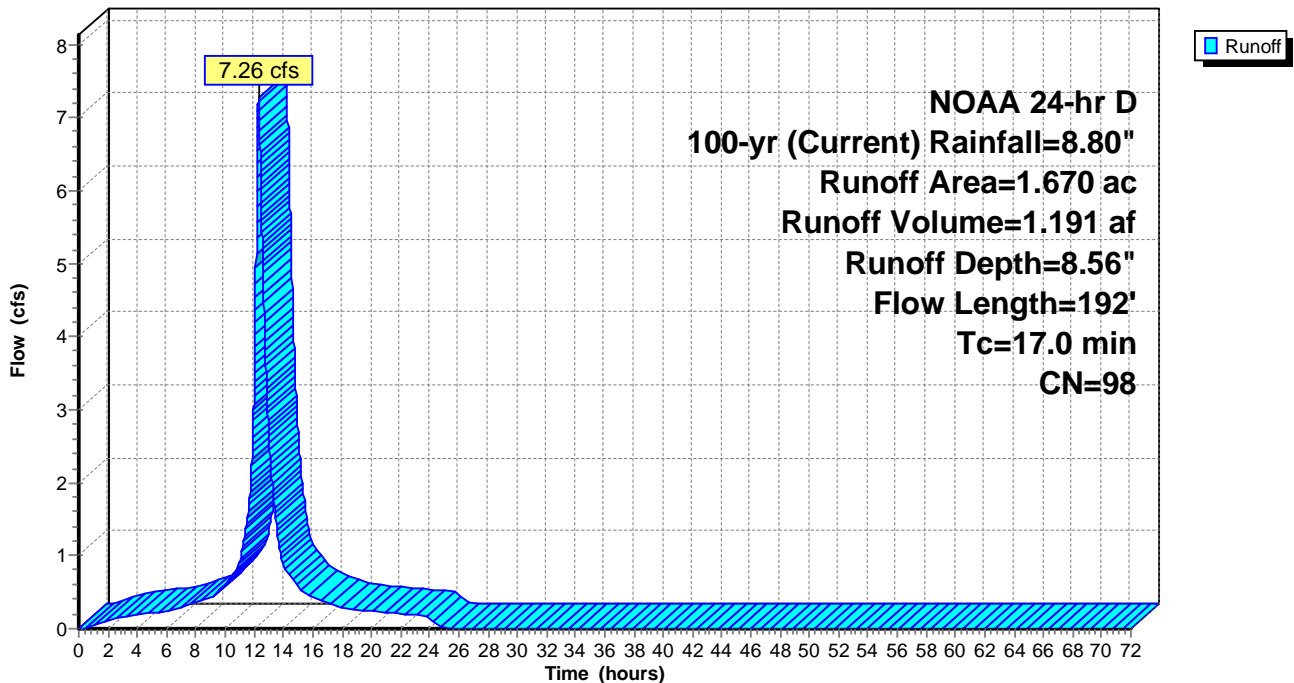
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
* 1.360	98	Paved parking, HSG URB
1.670	98	Weighted Average
1.670		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0237	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	12	0.0091	0.08		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
9.3	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.0	192	Total			

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment EA-1p: EA-1 Pervious

Runoff = 0.28 cfs @ 12.36 hrs, Volume= 0.059 af, Depth= 1.51"

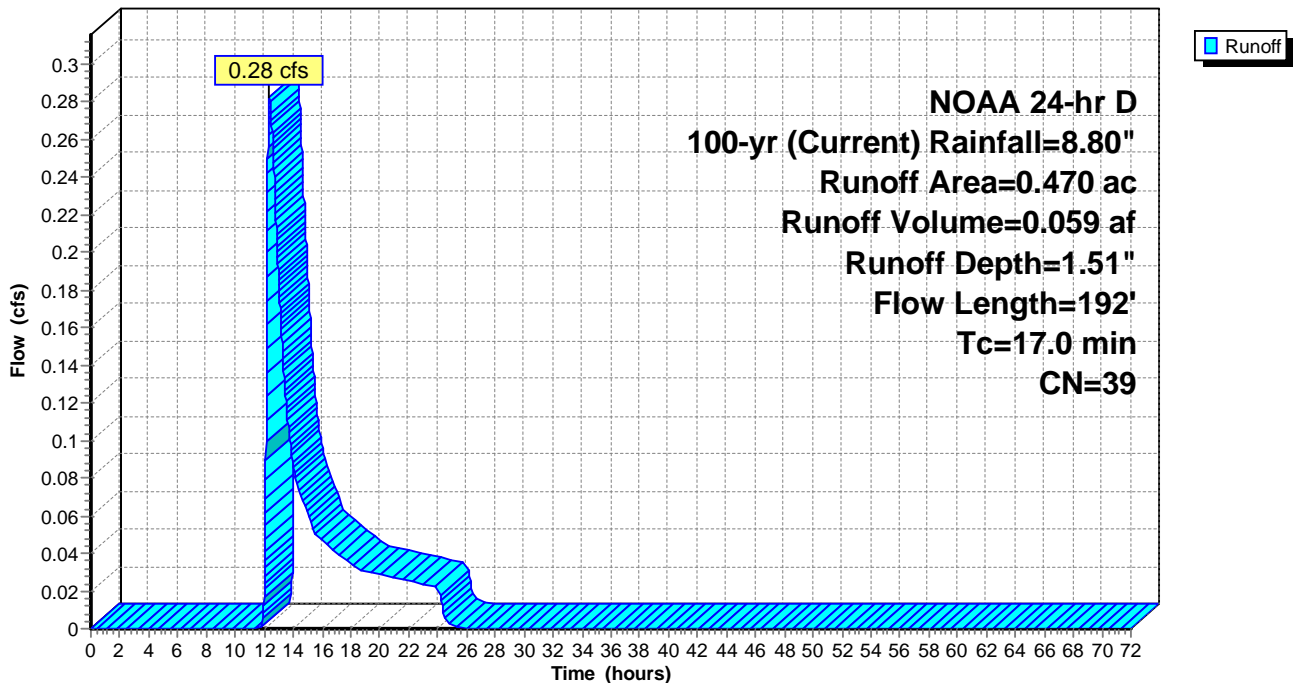
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
0.230	39	>75% Grass cover, Good, HSG A
* 0.240	39	>75% Grass cover, Good, HSG URBAN
0.470	39	Weighted Average
0.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	25	0.0237	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	12	0.0091	0.08		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
9.3	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
17.0	192	Total			

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Printed 10/10/2025

Summary for Subcatchment EA-2i: EA-2 Impervious

Runoff = 0.27 cfs @ 12.14 hrs, Volume= 0.029 af, Depth= 8.56"

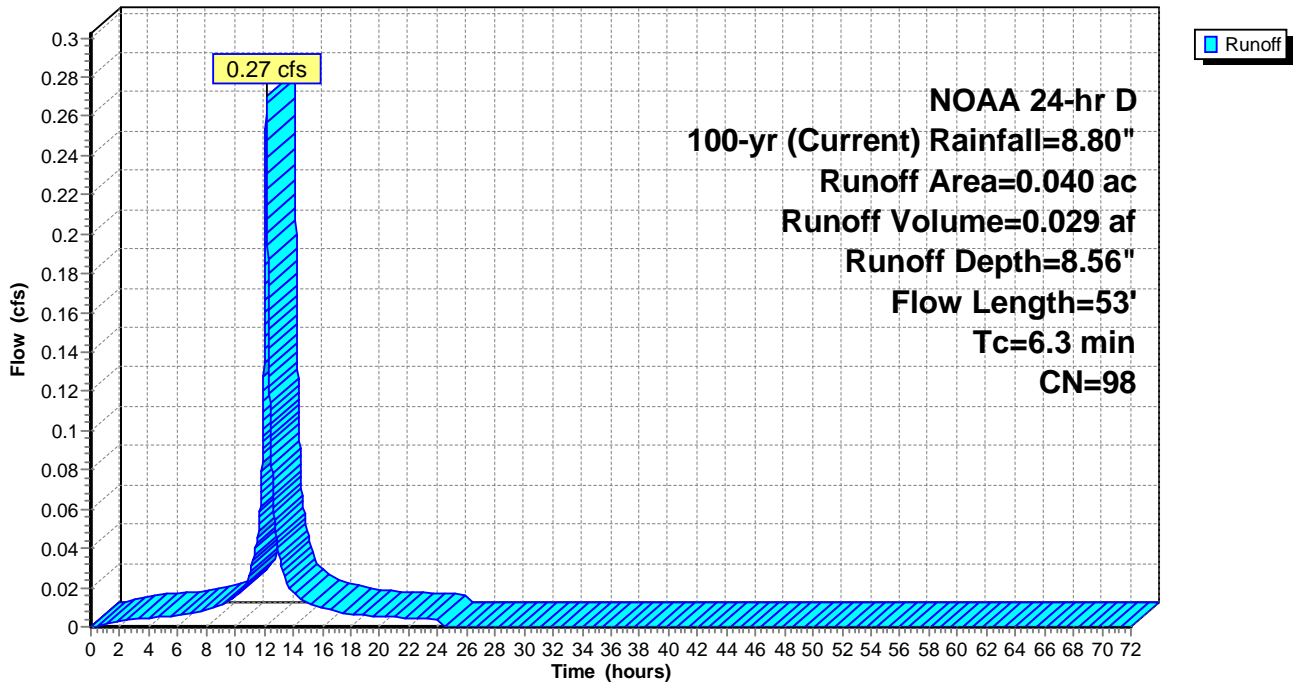
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
* 0.040	98	Paved parking, HSG URB
0.040		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	37	0.0259	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	16	0.0168	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
6.3	53	Total			

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

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Summary for Subcatchment EA-2p: EA-2 Pervious

Runoff = 0.29 cfs @ 12.16 hrs, Volume= 0.035 af, Depth= 1.51"

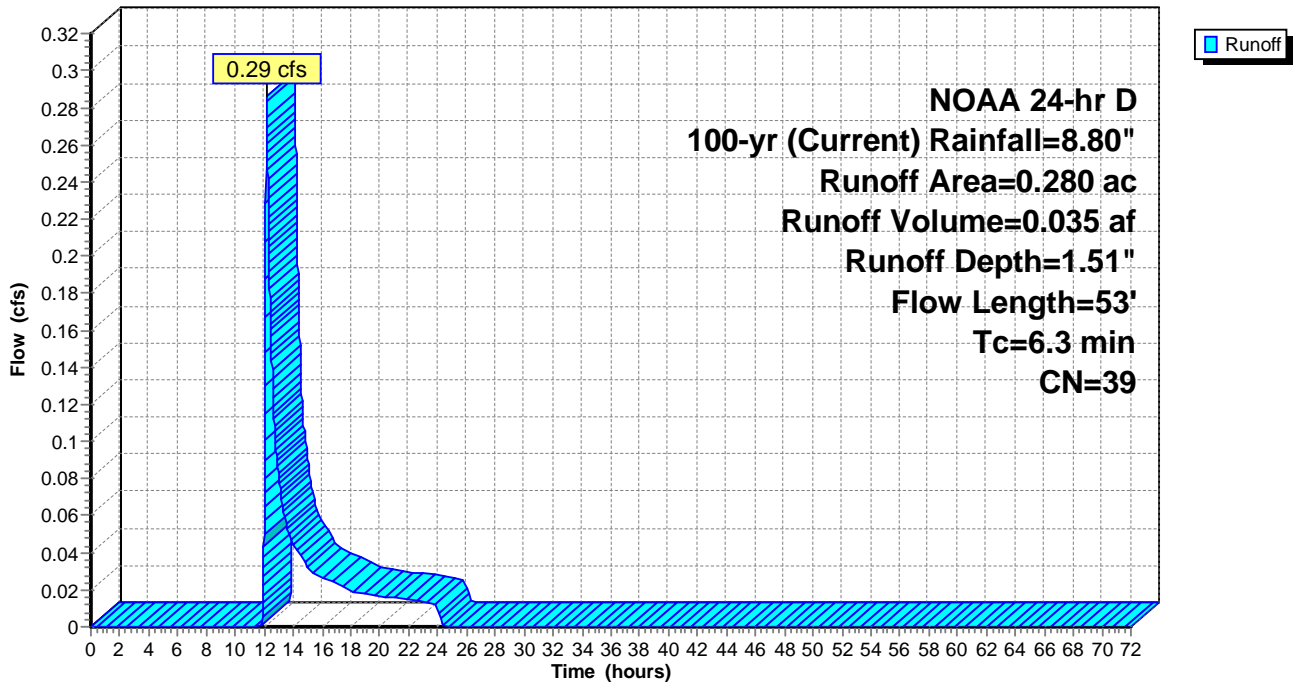
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
* 0.280	39	>75% Grass cover, Good, HSG URBAN
0.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	37	0.0259	0.16		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
2.4	16	0.0168	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
6.3	53	Total			

Subcatchment EA-2p: EA-2 Pervious

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

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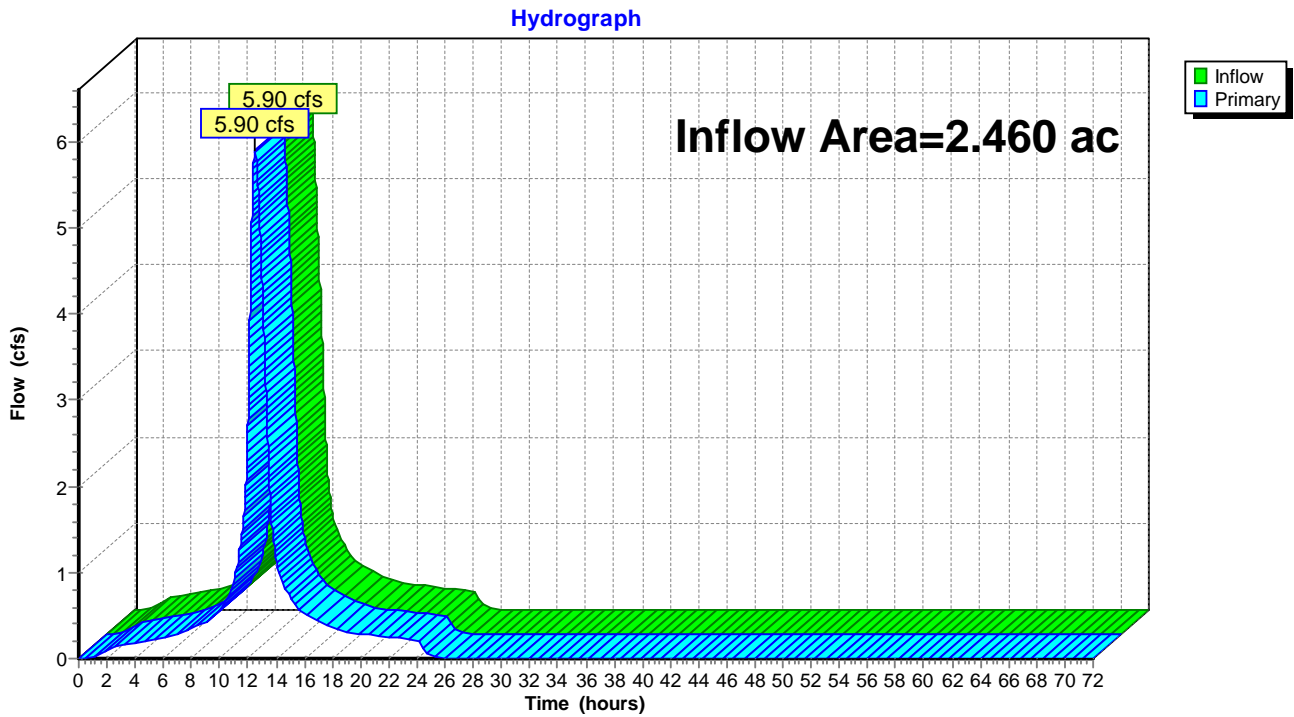
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Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.460 ac, 69.51% Impervious, Inflow Depth = 6.41" for 100-yr (Current) event
Inflow = 5.90 cfs @ 12.51 hrs, Volume= 1.314 af
Primary = 5.90 cfs @ 12.51 hrs, Volume= 1.314 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Pre-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Prepared by MidAtlantic Engineering Partners

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Summary for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Inflow Area = 2.140 ac, 78.04% Impervious, Inflow Depth = 7.01" for 100-yr (Current) event
 Inflow = 7.53 cfs @ 12.28 hrs, Volume= 1.250 af
 Outflow = 5.67 cfs @ 12.52 hrs, Volume= 1.250 af, Atten= 25%, Lag= 14.7 min
 Primary = 5.67 cfs @ 12.52 hrs, Volume= 1.250 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 6
 Peak Elev= 7.87' @ 12.52 hrs Surf.Area= 0.026 ac Storage= 0.106 af

Plug-Flow detention time= 11.3 min calculated for 1.250 af (100% of inflow)
 Center-of-Mass det. time= 11.2 min (781.0 - 769.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5.12'	0.110 af	36.0" Round Pipe Storage x 2 L= 338.0'
#2	5.12'	0.001 af	3.50"W x 4.00"L x 4.40"H Prismatic
		0.111 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.92'	15.0" Round Culvert L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.92' / 4.92' S= 0.0000 ' /' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	5.12'	12.0" Vert. Orifice/Grate C= 0.600
#3	Secondary	9.31'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=5.67 cfs @ 12.52 hrs HW=7.87' (Free Discharge)

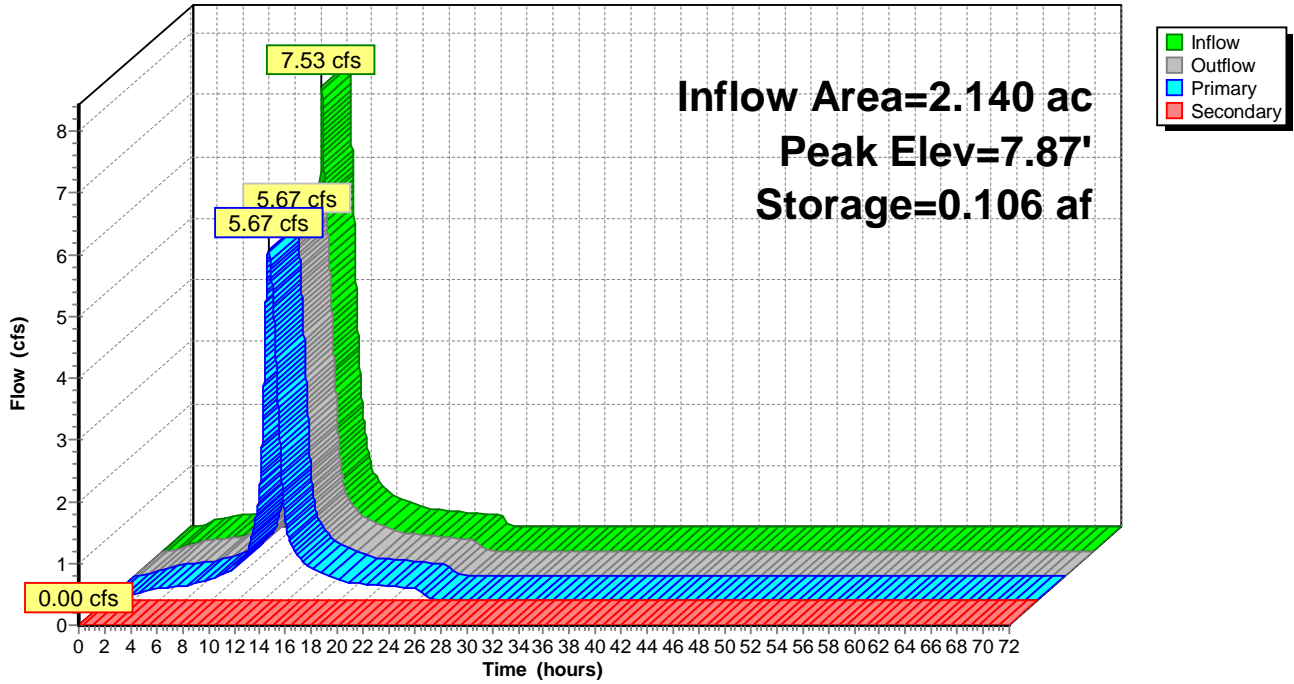
- ↑1=Culvert (Passes 5.67 cfs of 9.01 cfs potential flow)
- ↑2=Orifice/Grate (Orifice Controls 5.67 cfs @ 7.23 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.12' (Free Discharge)

- ↑3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond Ex. Pipes: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

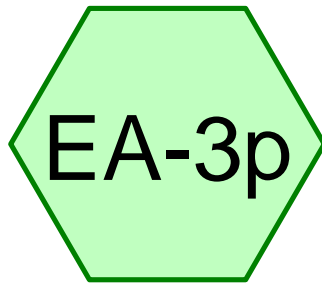
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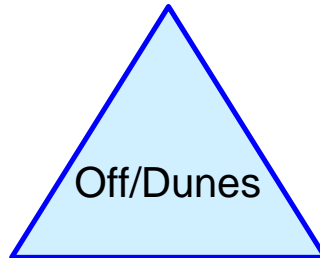
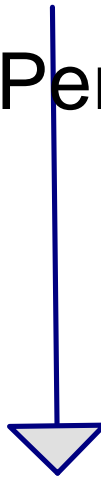
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Hydrograph for Pond Ex. Pipes: Existing Subsurface Detention Pipes

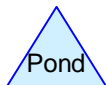
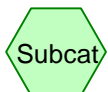
Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	5.12	0.00	0.00	0.00
2.00	0.11	0.002	5.27	0.10	0.10	0.00
4.00	0.19	0.003	5.33	0.19	0.19	0.00
6.00	0.24	0.004	5.36	0.24	0.24	0.00
8.00	0.36	0.006	5.41	0.35	0.35	0.00
10.00	0.60	0.008	5.50	0.57	0.57	0.00
12.00	3.30	0.029	6.05	2.49	2.49	0.00
14.00	0.97	0.014	5.66	1.09	1.09	0.00
16.00	0.47	0.007	5.47	0.49	0.49	0.00
18.00	0.33	0.005	5.40	0.34	0.34	0.00
20.00	0.26	0.004	5.37	0.27	0.27	0.00
22.00	0.23	0.004	5.35	0.23	0.23	0.00
24.00	0.19	0.004	5.33	0.19	0.19	0.00
26.00	0.00	0.000	5.14	0.00	0.00	0.00
28.00	0.00	0.000	5.12	0.00	0.00	0.00
30.00	0.00	0.000	5.12	0.00	0.00	0.00
32.00	0.00	0.000	5.12	0.00	0.00	0.00
34.00	0.00	0.000	5.12	0.00	0.00	0.00
36.00	0.00	0.000	5.12	0.00	0.00	0.00
38.00	0.00	0.000	5.12	0.00	0.00	0.00
40.00	0.00	0.000	5.12	0.00	0.00	0.00
42.00	0.00	0.000	5.12	0.00	0.00	0.00
44.00	0.00	0.000	5.12	0.00	0.00	0.00
46.00	0.00	0.000	5.12	0.00	0.00	0.00
48.00	0.00	0.000	5.12	0.00	0.00	0.00
50.00	0.00	0.000	5.12	0.00	0.00	0.00
52.00	0.00	0.000	5.12	0.00	0.00	0.00
54.00	0.00	0.000	5.12	0.00	0.00	0.00
56.00	0.00	0.000	5.12	0.00	0.00	0.00
58.00	0.00	0.000	5.12	0.00	0.00	0.00
60.00	0.00	0.000	5.12	0.00	0.00	0.00
62.00	0.00	0.000	5.12	0.00	0.00	0.00
64.00	0.00	0.000	5.12	0.00	0.00	0.00
66.00	0.00	0.000	5.12	0.00	0.00	0.00
68.00	0.00	0.000	5.12	0.00	0.00	0.00
70.00	0.00	0.000	5.12	0.00	0.00	0.00
72.00	0.00	0.000	5.12	0.00	0.00	0.00



EA-3 Pervious



Flow to Offsite/Dunes



Pre-Development (Current)

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

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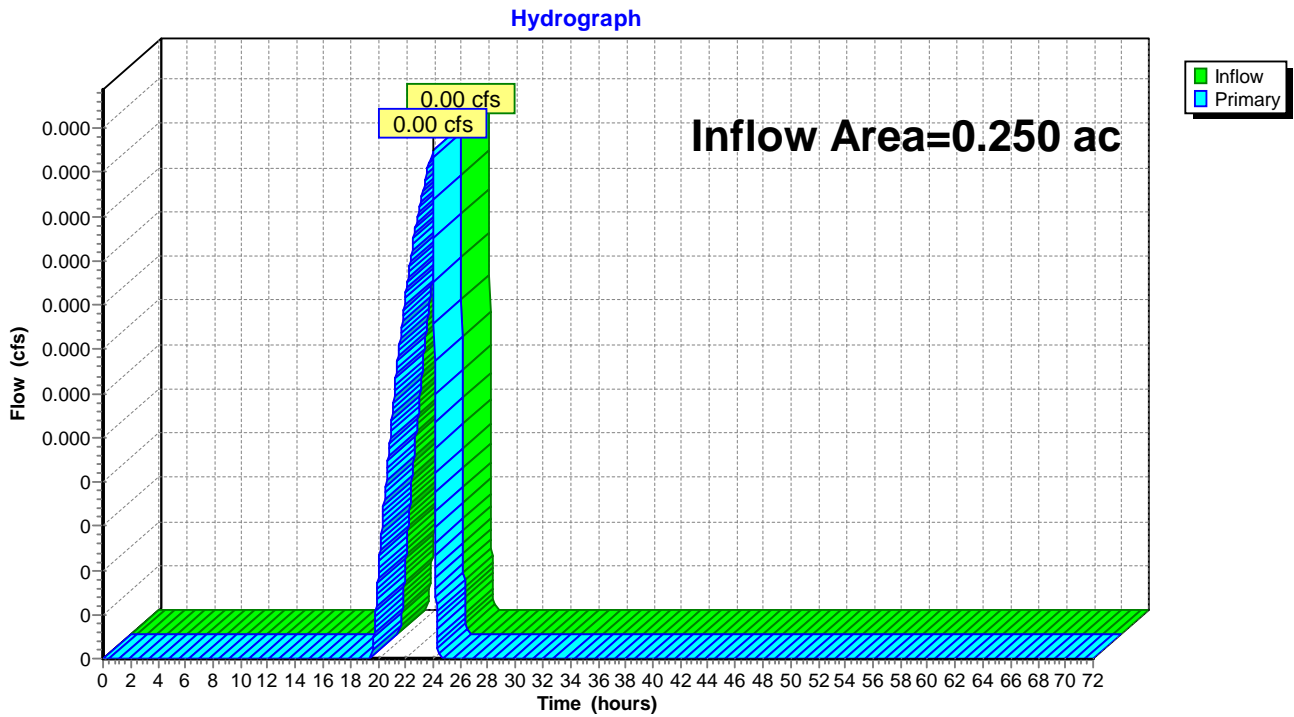
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.250 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-yr (Current) event
Inflow = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 24.01 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

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Summary for Subcatchment EA-3p: EA-3 Pervious

Runoff = 0.01 cfs @ 12.93 hrs, Volume= 0.005 af, Depth= 0.23"

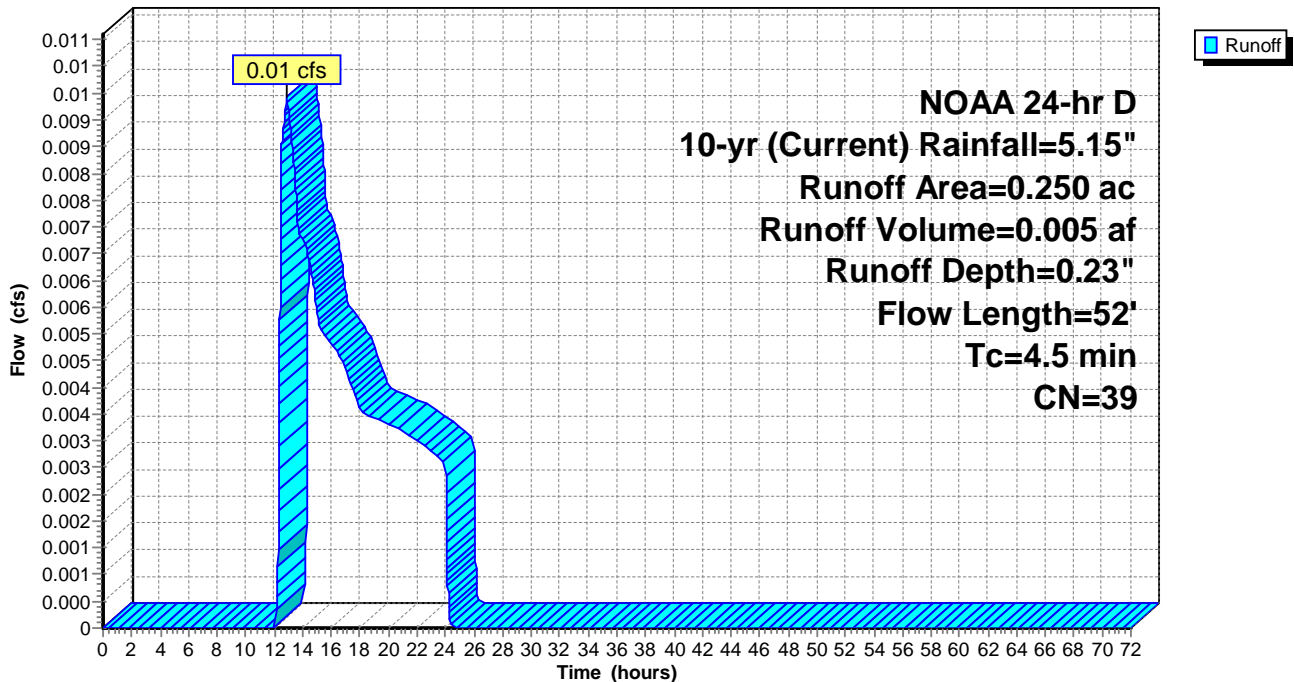
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
* 0.180	39	>75% Grass cover, Good, HSG URBAN
0.250	39	Weighted Average
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	39	0.0328	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.8	13	0.1565	0.26		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
4.5	52	Total			

Subcatchment EA-3p: EA-3 Pervious

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

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Printed 10/10/2025

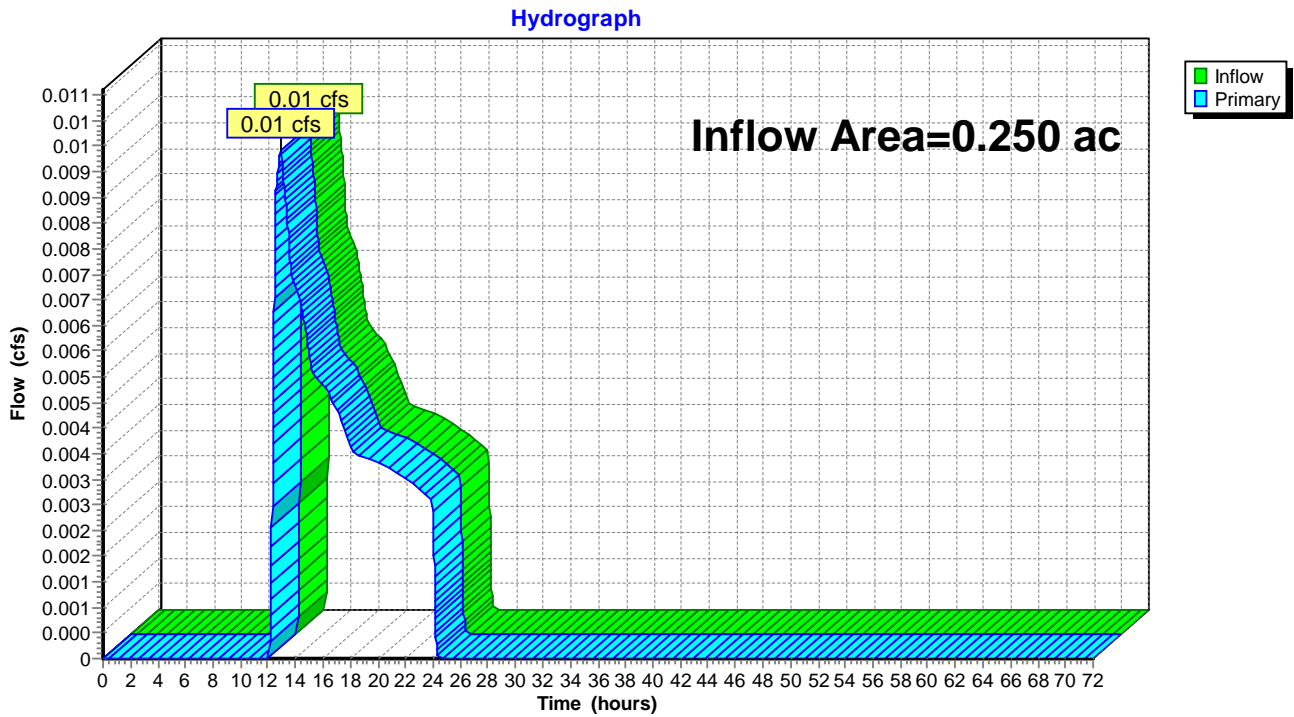
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.250 ac, 0.00% Impervious, Inflow Depth = 0.23" for 10-yr (Current) event
Inflow = 0.01 cfs @ 12.93 hrs, Volume= 0.005 af
Primary = 0.01 cfs @ 12.93 hrs, Volume= 0.005 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment EA-3p: EA-3 Pervious

Runoff = 0.05 cfs @ 12.24 hrs, Volume= 0.011 af, Depth= 0.55"

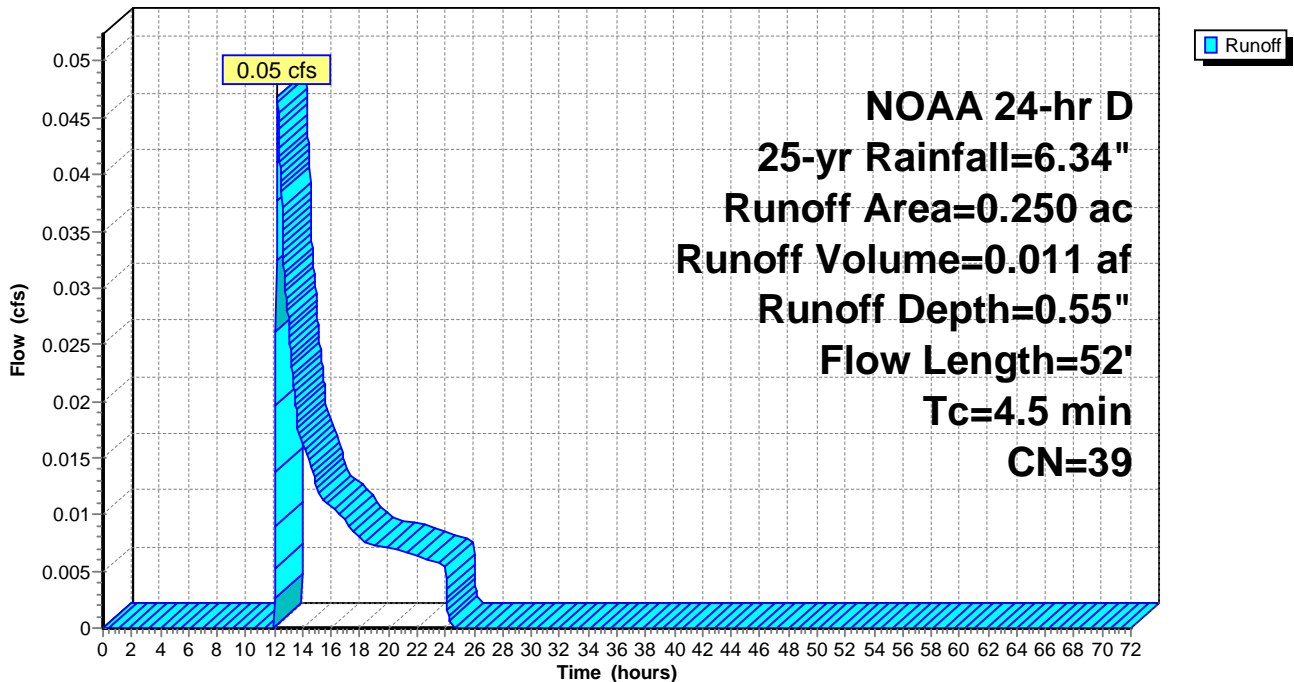
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
* 0.180	39	>75% Grass cover, Good, HSG URBAN
0.250	39	Weighted Average
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	39	0.0328	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.8	13	0.1565	0.26		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
4.5	52	Total			

Subcatchment EA-3p: EA-3 Pervious

Hydrograph



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

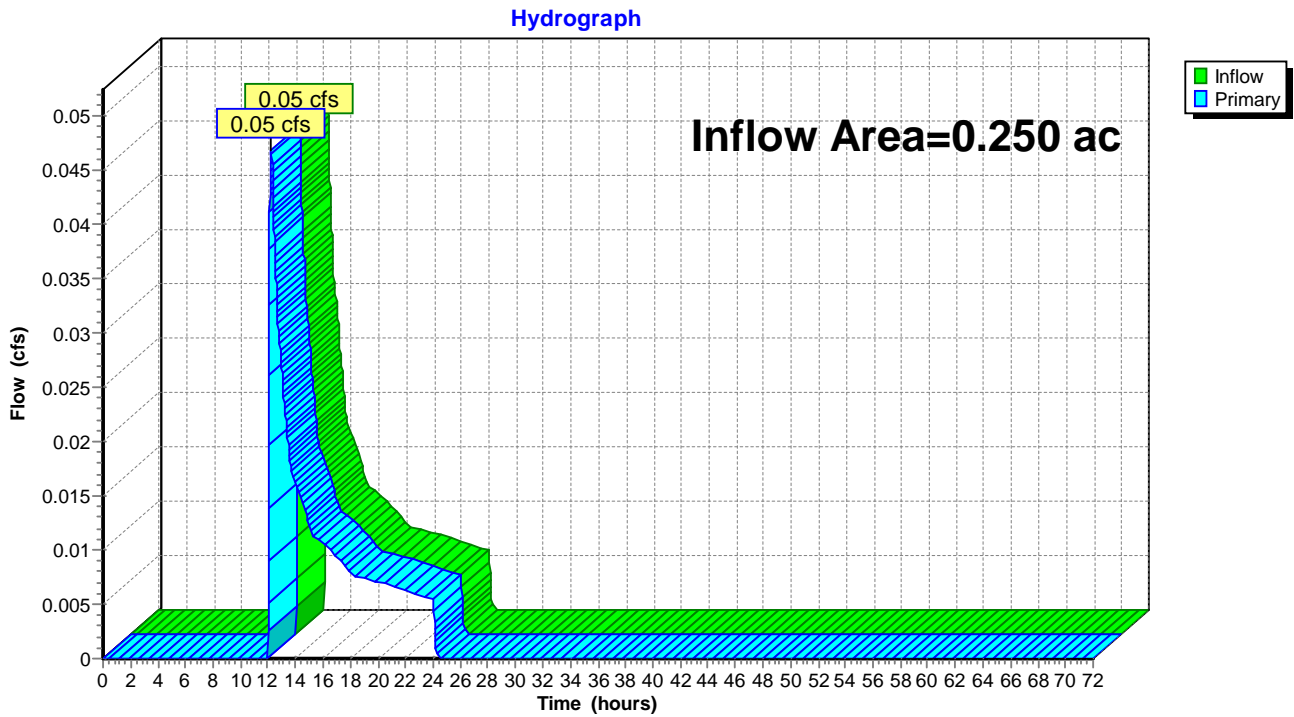
Printed 10/10/2025

Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.250 ac, 0.00% Impervious, Inflow Depth = 0.55" for 25-yr event
Inflow = 0.05 cfs @ 12.24 hrs, Volume= 0.011 af
Primary = 0.05 cfs @ 12.24 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Pre-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Printed 10/10/2025

Summary for Subcatchment EA-3p: EA-3 Pervious

Runoff = 0.30 cfs @ 12.14 hrs, Volume= 0.031 af, Depth= 1.51"

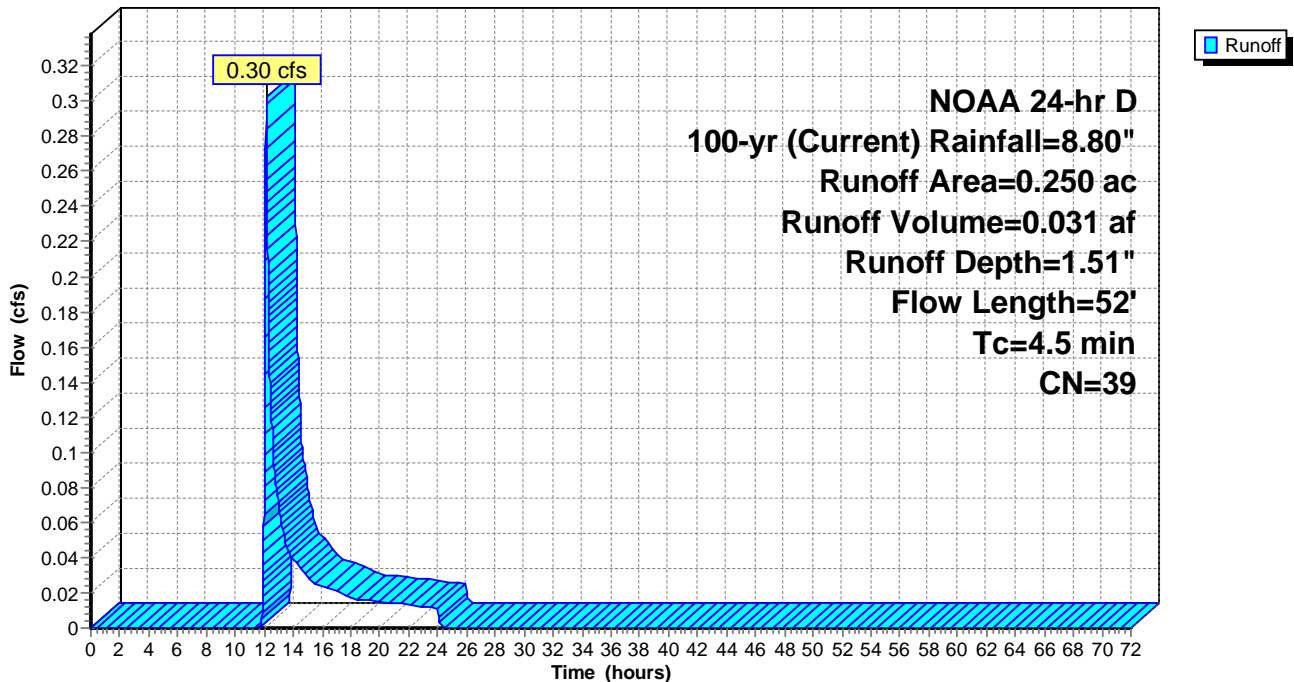
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
* 0.180	39	>75% Grass cover, Good, HSG URBAN
0.250	39	Weighted Average
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.7	39	0.0328	0.18		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.8	13	0.1565	0.26		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
4.5	52	Total			

Subcatchment EA-3p: EA-3 Pervious

Hydrograph



Pre-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

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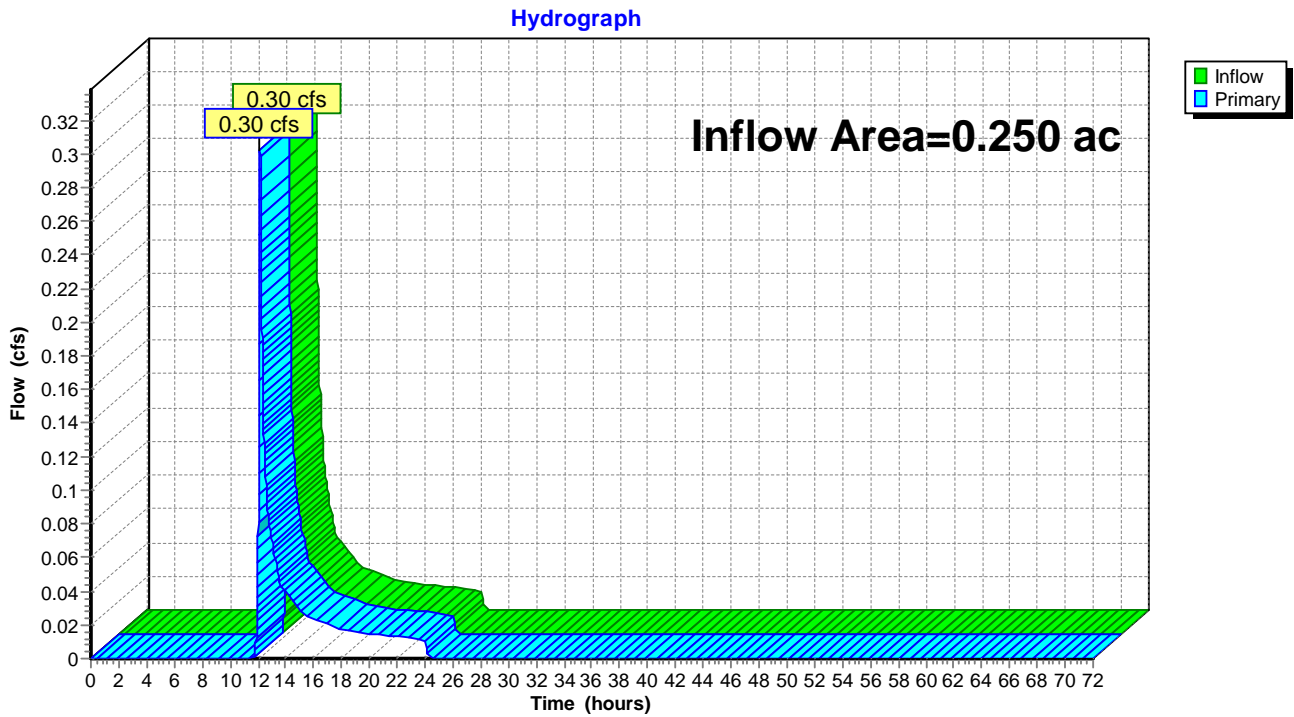
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.250 ac, 0.00% Impervious, Inflow Depth = 1.51" for 100-yr (Current) event
Inflow = 0.30 cfs @ 12.14 hrs, Volume= 0.031 af
Primary = 0.30 cfs @ 12.14 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

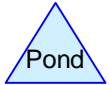
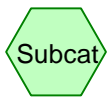
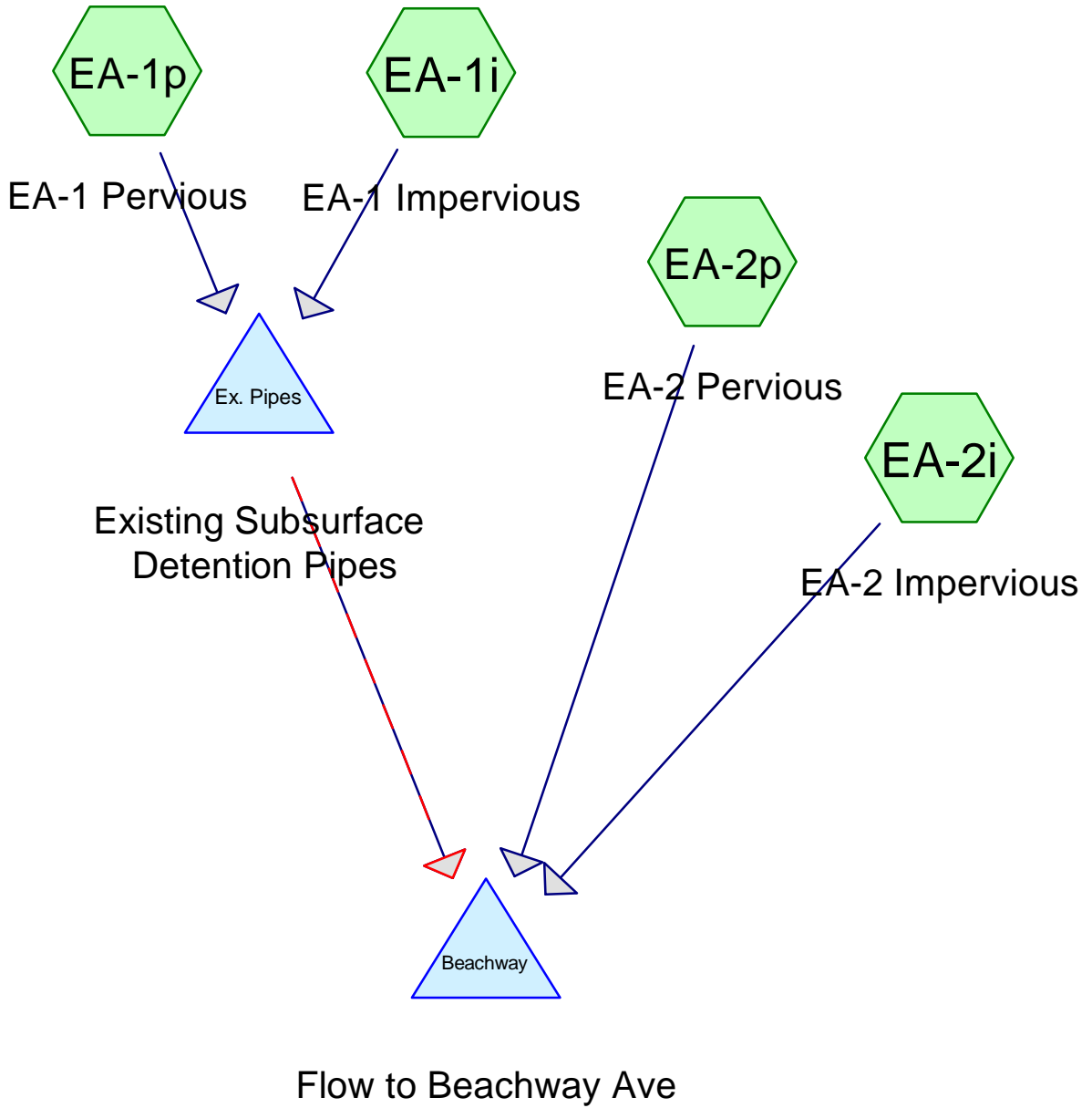
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



APPENDIX B

PRE-DEVELOPMENT DRAINAGE ANALYSIS (FUTURE)



Routing Diagram for Pre-Development (Future)
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Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

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Summary for Subcatchment EA-1i: EA-1 Impervious

Runoff = 3.38 cfs @ 12.25 hrs, Volume= 0.518 af, Depth= 3.73"

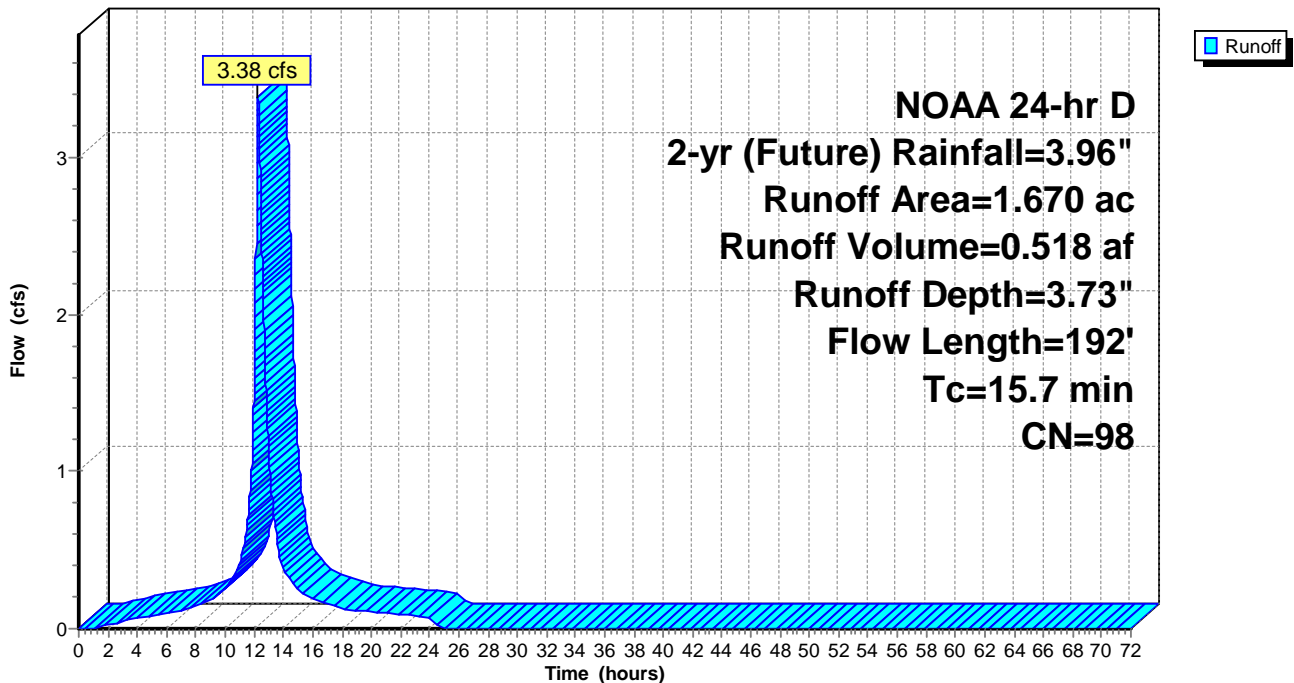
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
* 1.360	98	Paved parking, HSG URB
1.670	98	Weighted Average
1.670		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0237	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	12	0.0091	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
8.5	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.7	192	Total			

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Printed 10/10/2025

Summary for Subcatchment EA-2i: EA-2 Impervious

Runoff = 0.12 cfs @ 12.14 hrs, Volume= 0.012 af, Depth= 3.73"

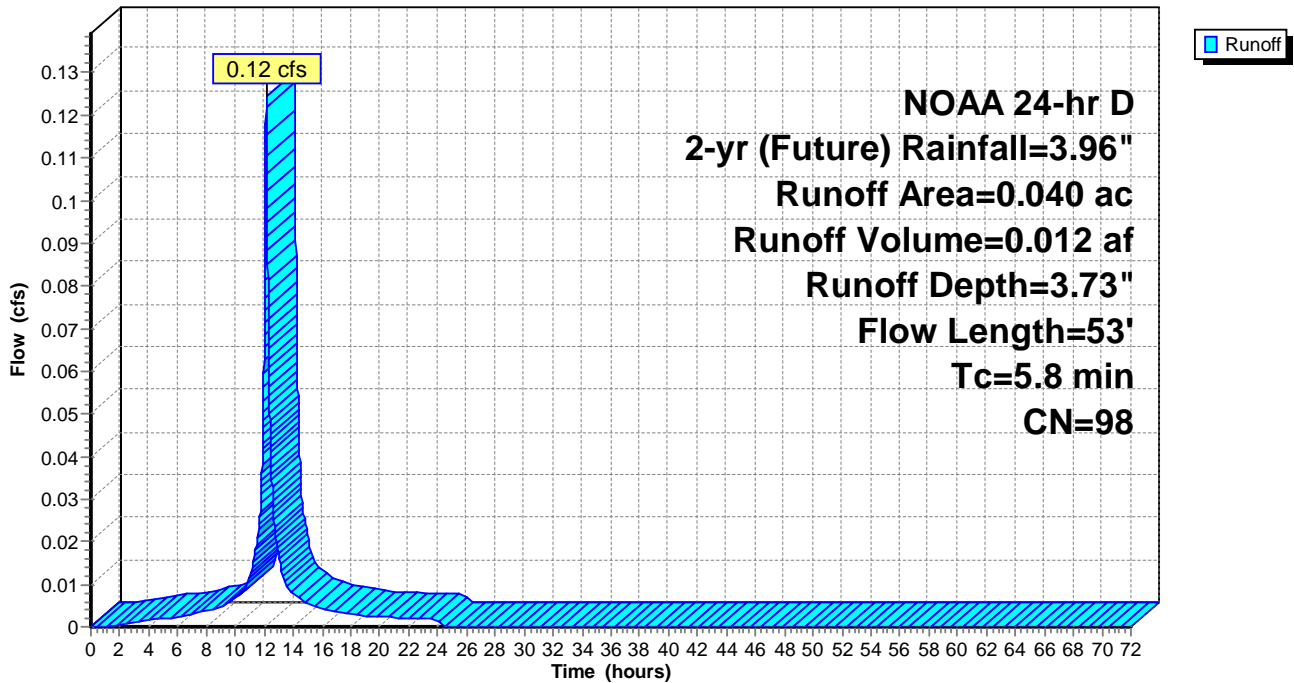
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Area (ac)	CN	Description
* 0.040	98	Paved parking, HSG URB
0.040		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	37	0.0259	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	16	0.0168	0.12		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
5.8	53	Total			

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development (Future)

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NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

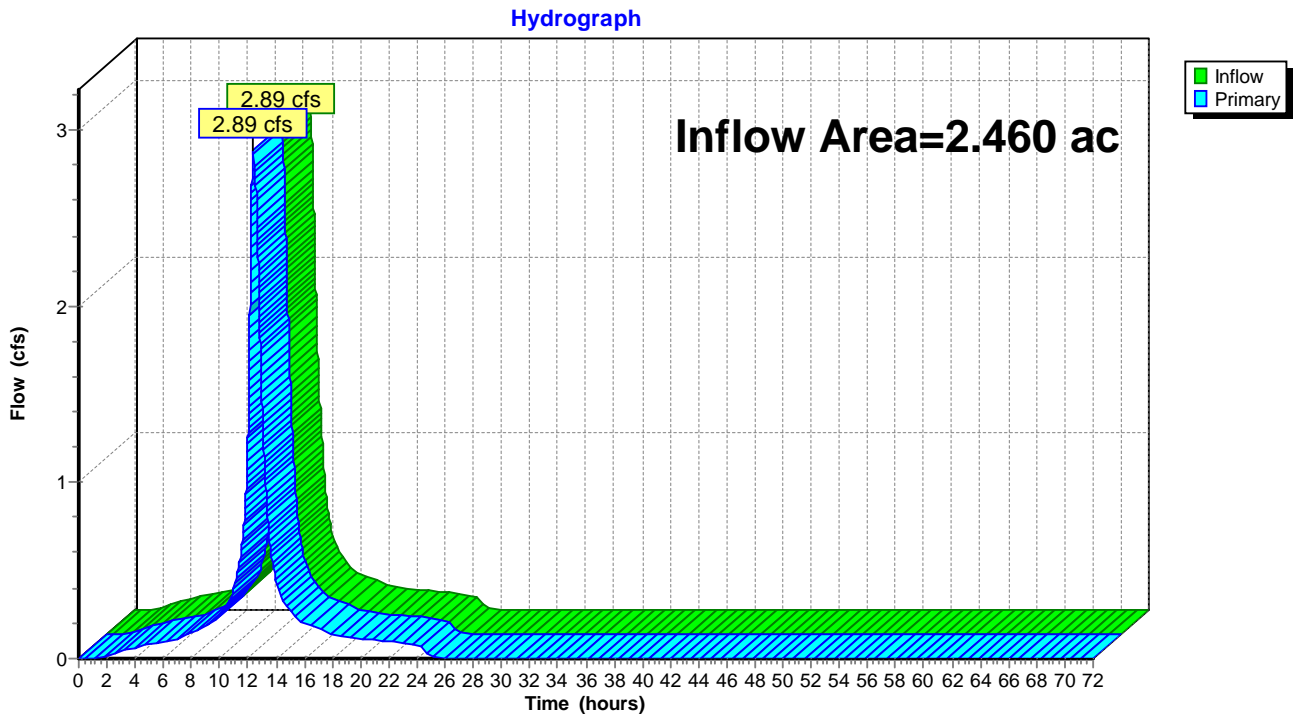
Printed 10/10/2025

Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.460 ac, 69.51% Impervious, Inflow Depth = 2.60" for 2-yr (Future) event
Inflow = 2.89 cfs @ 12.40 hrs, Volume= 0.533 af
Primary = 2.89 cfs @ 12.40 hrs, Volume= 0.533 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Pre-Development (Future)

NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Inflow Area = 2.140 ac, 78.04% Impervious, Inflow Depth = 2.92" for 2-yr (Future) event
 Inflow = 3.38 cfs @ 12.25 hrs, Volume= 0.520 af
 Outflow = 2.84 cfs @ 12.41 hrs, Volume= 0.520 af, Atten= 16%, Lag= 9.6 min
 Primary = 2.84 cfs @ 12.41 hrs, Volume= 0.520 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 6
 Peak Elev= 6.18' @ 12.41 hrs Surf.Area= 0.045 ac Storage= 0.035 af

Plug-Flow detention time= 11.2 min calculated for 0.520 af (100% of inflow)
 Center-of-Mass det. time= 11.2 min (784.8 - 773.6)

Volume	Invert	Avail.Storage	Storage Description
#1	5.12'	0.110 af	36.0" Round Pipe Storage x 2 L= 338.0'
#2	5.12'	0.001 af	3.50"W x 4.00"L x 4.40"H Prismatic
		0.111 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.92'	15.0" Round Culvert L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.92' / 4.92' S= 0.0000 ' /' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	5.12'	12.0" Vert. Orifice/Grate C= 0.600
#3	Secondary	9.31'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=2.84 cfs @ 12.41 hrs HW=6.18' (Free Discharge)

↑**1=Culvert** (Passes 2.84 cfs of 3.49 cfs potential flow)

↑**2=Orifice/Grate** (Orifice Controls 2.84 cfs @ 3.62 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.12' (Free Discharge)

↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pre-Development (Future)

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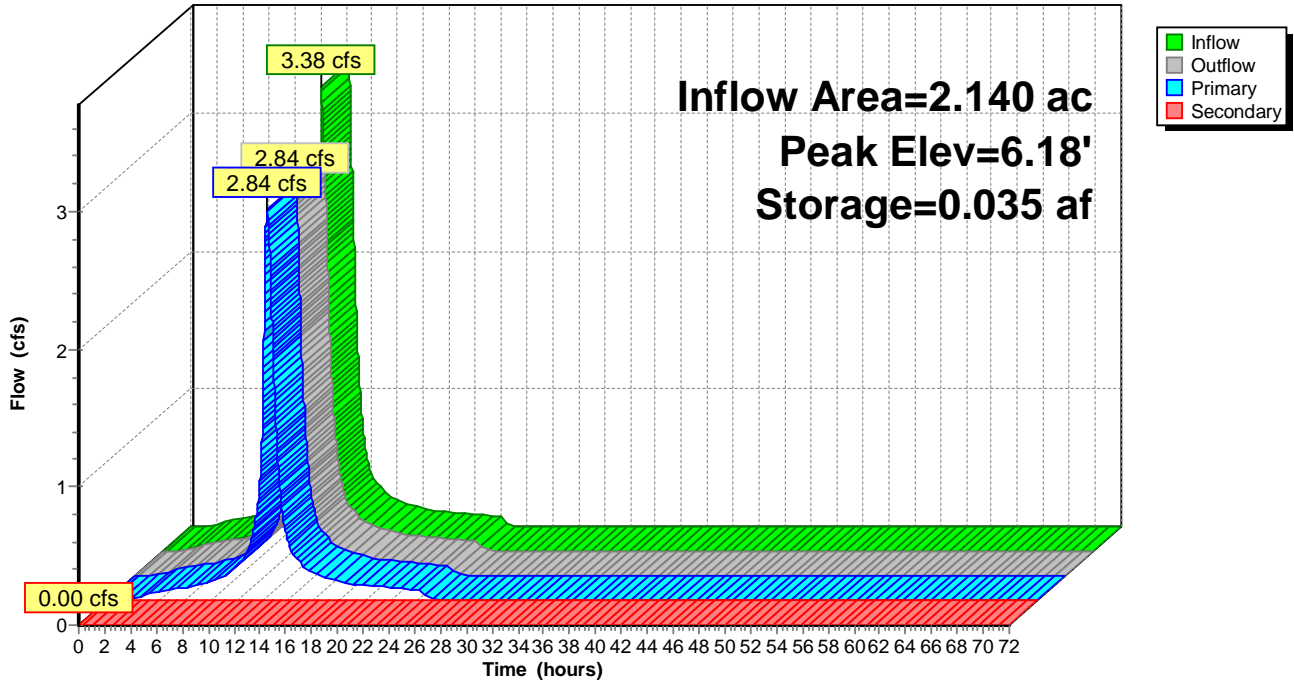
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NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Printed 10/10/2025

Pond Ex. Pipes: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

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Printed 10/10/2025

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Hydrograph for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	5.12	0.00	0.00	0.00
2.00	0.02	0.000	5.17	0.01	0.01	0.00
4.00	0.06	0.001	5.24	0.06	0.06	0.00
6.00	0.09	0.002	5.26	0.09	0.09	0.00
8.00	0.15	0.003	5.30	0.14	0.14	0.00
10.00	0.26	0.004	5.36	0.24	0.24	0.00
12.00	1.54	0.015	5.69	1.18	1.18	0.00
14.00	0.39	0.007	5.44	0.43	0.43	0.00
16.00	0.19	0.004	5.34	0.20	0.20	0.00
18.00	0.13	0.003	5.30	0.14	0.14	0.00
20.00	0.11	0.002	5.28	0.11	0.11	0.00
22.00	0.09	0.002	5.27	0.09	0.09	0.00
24.00	0.08	0.002	5.25	0.08	0.08	0.00
26.00	0.00	0.000	5.13	0.00	0.00	0.00
28.00	0.00	0.000	5.12	0.00	0.00	0.00
30.00	0.00	0.000	5.12	0.00	0.00	0.00
32.00	0.00	0.000	5.12	0.00	0.00	0.00
34.00	0.00	0.000	5.12	0.00	0.00	0.00
36.00	0.00	0.000	5.12	0.00	0.00	0.00
38.00	0.00	0.000	5.12	0.00	0.00	0.00
40.00	0.00	0.000	5.12	0.00	0.00	0.00
42.00	0.00	0.000	5.12	0.00	0.00	0.00
44.00	0.00	0.000	5.12	0.00	0.00	0.00
46.00	0.00	0.000	5.12	0.00	0.00	0.00
48.00	0.00	0.000	5.12	0.00	0.00	0.00
50.00	0.00	0.000	5.12	0.00	0.00	0.00
52.00	0.00	0.000	5.12	0.00	0.00	0.00
54.00	0.00	0.000	5.12	0.00	0.00	0.00
56.00	0.00	0.000	5.12	0.00	0.00	0.00
58.00	0.00	0.000	5.12	0.00	0.00	0.00
60.00	0.00	0.000	5.12	0.00	0.00	0.00
62.00	0.00	0.000	5.12	0.00	0.00	0.00
64.00	0.00	0.000	5.12	0.00	0.00	0.00
66.00	0.00	0.000	5.12	0.00	0.00	0.00
68.00	0.00	0.000	5.12	0.00	0.00	0.00
70.00	0.00	0.000	5.12	0.00	0.00	0.00
72.00	0.00	0.000	5.12	0.00	0.00	0.00

Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Printed 10/10/2025

Summary for Subcatchment EA-1i: EA-1 Impervious

Runoff = 5.21 cfs @ 12.25 hrs, Volume= 0.812 af, Depth= 5.83"

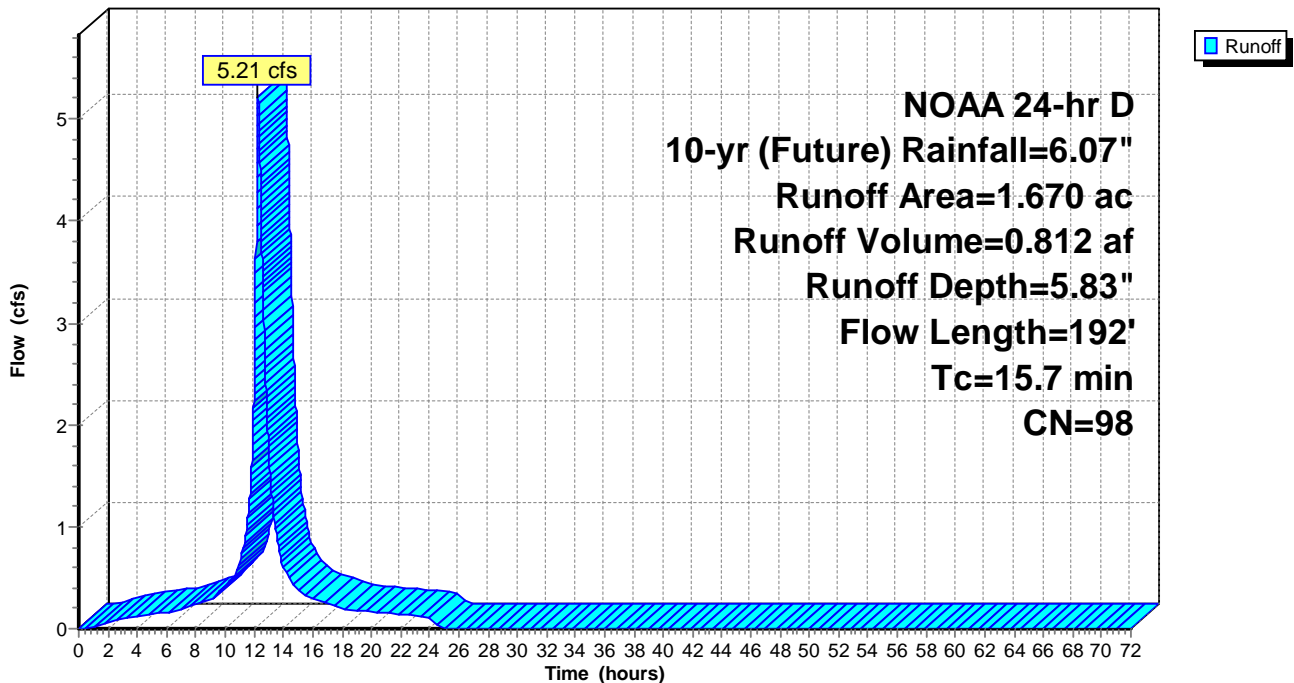
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
* 1.360	98	Paved parking, HSG URB
1.670	98	Weighted Average
1.670		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0237	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	12	0.0091	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
8.5	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.7	192	Total			

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment EA-1p: EA-1 Pervious

Runoff = 0.05 cfs @ 12.70 hrs, Volume= 0.018 af, Depth= 0.47"

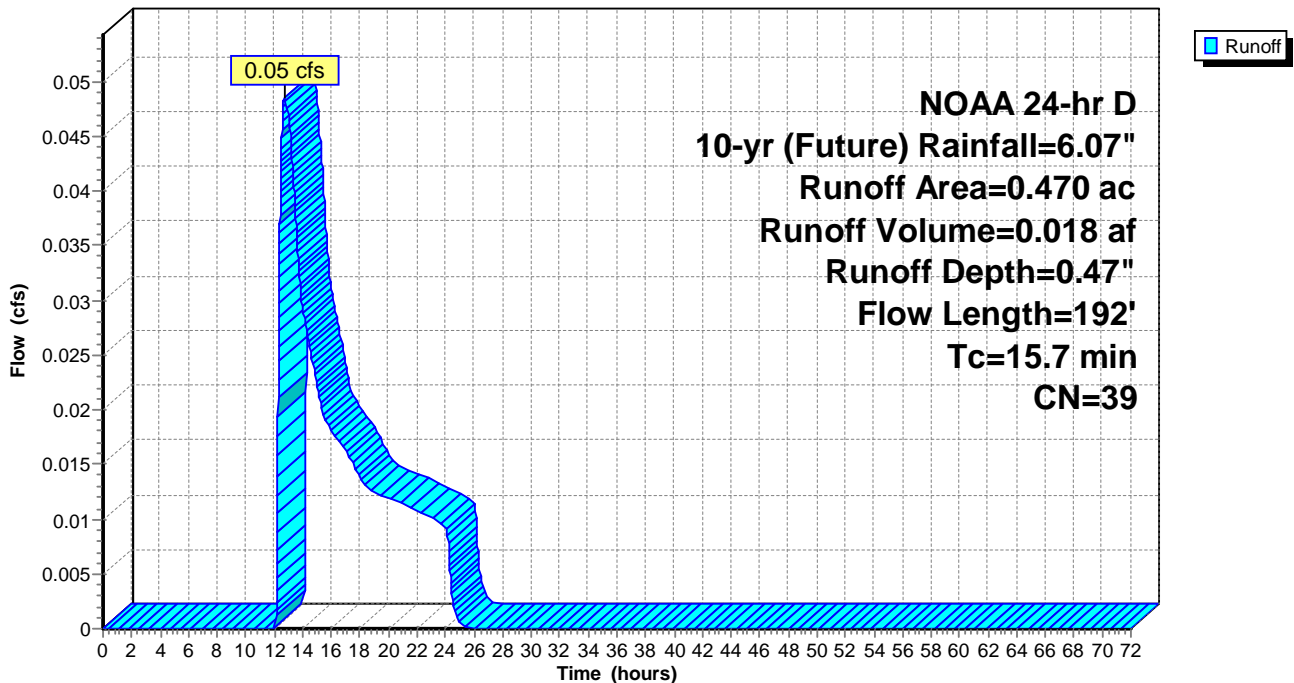
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
0.230	39	>75% Grass cover, Good, HSG A
* 0.240	39	>75% Grass cover, Good, HSG URBAN
0.470	39	Weighted Average
0.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0237	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	12	0.0091	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
8.5	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.7	192	Total			

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development (Future)

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NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Printed 10/10/2025

Summary for Subcatchment EA-2i: EA-2 Impervious

Runoff = 0.19 cfs @ 12.14 hrs, Volume= 0.019 af, Depth= 5.83"

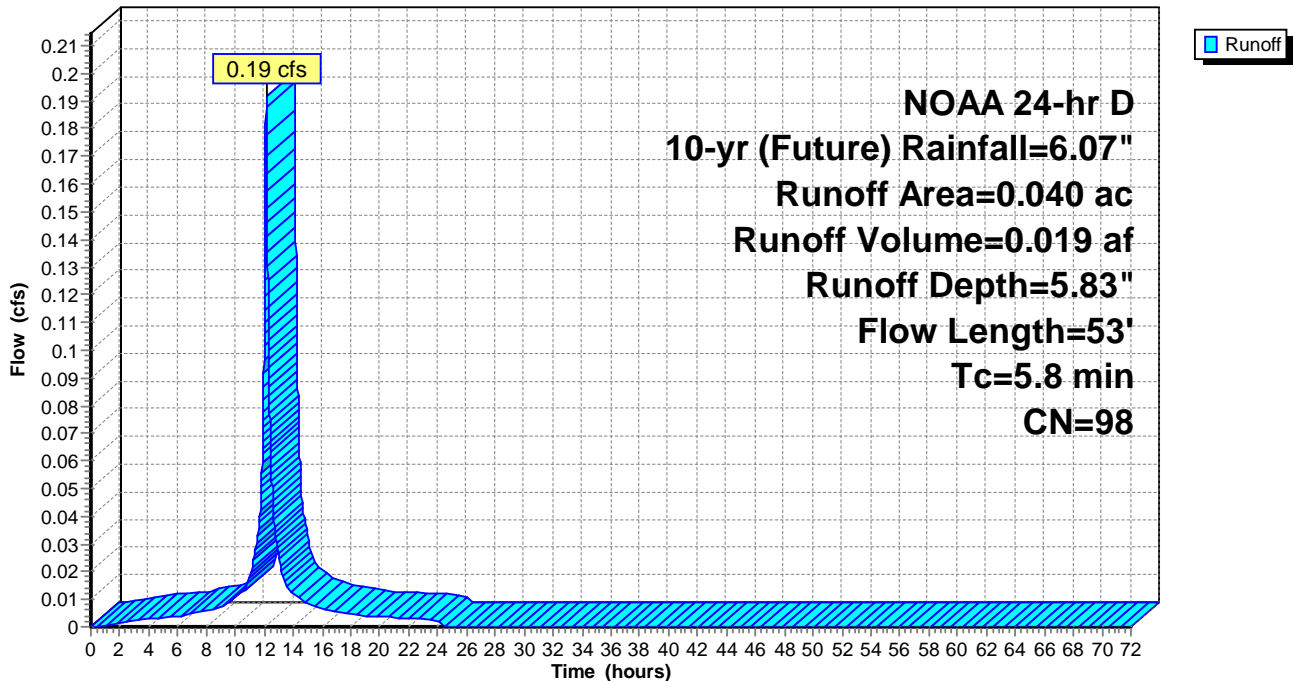
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
* 0.040	98	Paved parking, HSG URB
0.040		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	37	0.0259	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	16	0.0168	0.12		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
5.8	53	Total			

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

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Summary for Subcatchment EA-2p: EA-2 Pervious

Runoff = 0.04 cfs @ 12.35 hrs, Volume= 0.011 af, Depth= 0.47"

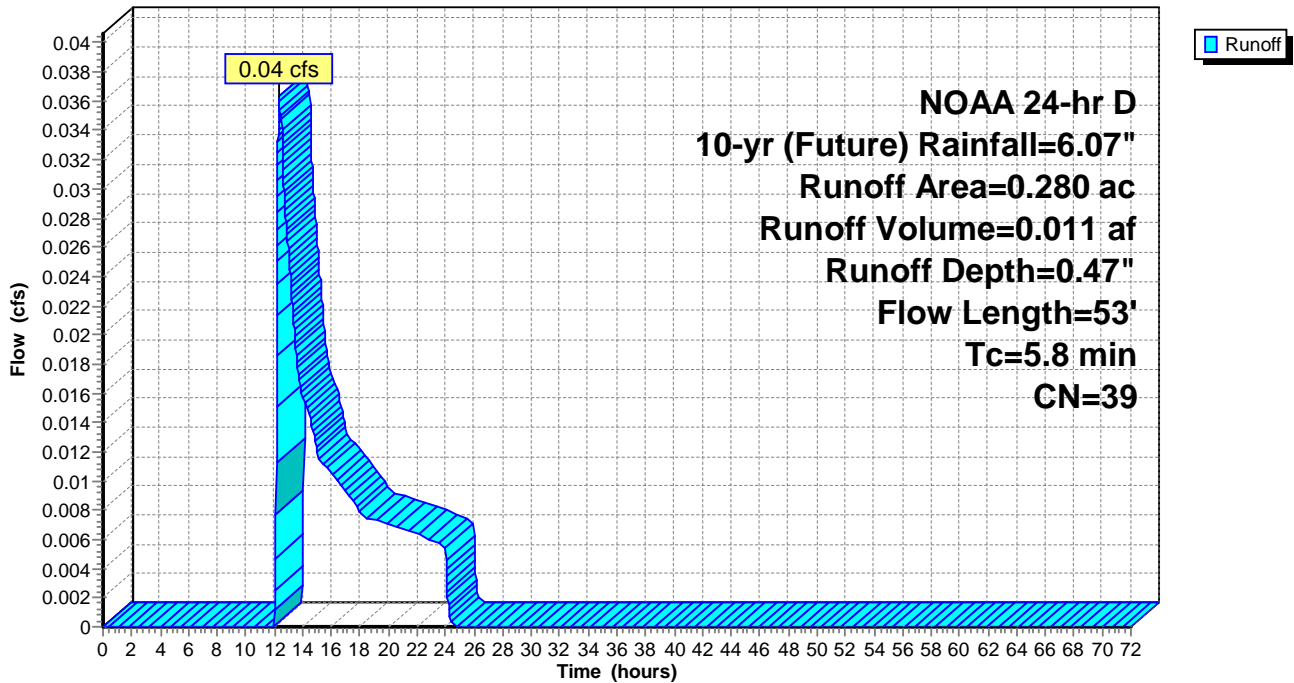
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
* 0.280	39	>75% Grass cover, Good, HSG URBAN
0.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	37	0.0259	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	16	0.0168	0.12		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
5.8	53	Total			

Subcatchment EA-2p: EA-2 Pervious

Hydrograph



Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

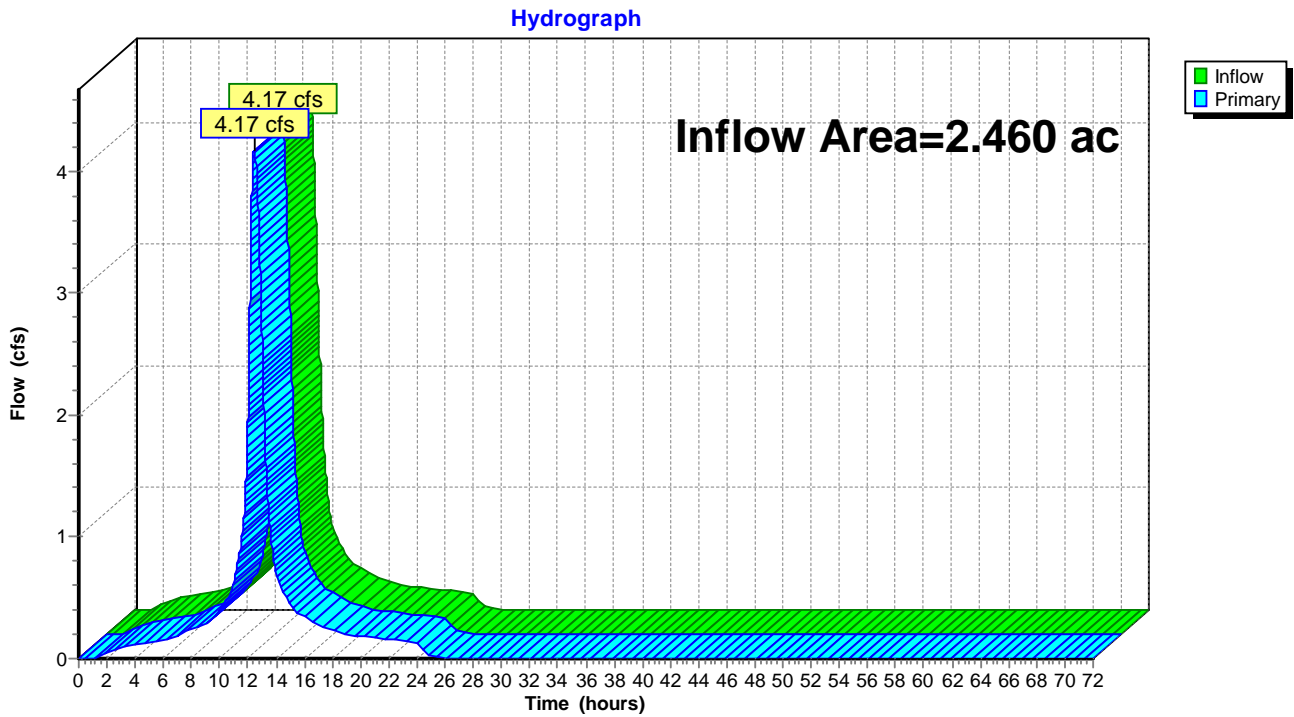
Printed 10/10/2025

Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.460 ac, 69.51% Impervious, Inflow Depth = 4.20" for 10-yr (Future) event
Inflow = 4.17 cfs @ 12.45 hrs, Volume= 0.860 af
Primary = 4.17 cfs @ 12.45 hrs, Volume= 0.860 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Pre-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Inflow Area = 2.140 ac, 78.04% Impervious, Inflow Depth = 4.65" for 10-yr (Future) event
 Inflow = 5.23 cfs @ 12.25 hrs, Volume= 0.830 af
 Outflow = 4.07 cfs @ 12.46 hrs, Volume= 0.830 af, Atten= 22%, Lag= 12.7 min
 Primary = 4.07 cfs @ 12.46 hrs, Volume= 0.830 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 6
 Peak Elev= 6.78' @ 12.46 hrs Surf.Area= 0.047 ac Storage= 0.063 af

Plug-Flow detention time= 11.0 min calculated for 0.830 af (100% of inflow)
 Center-of-Mass det. time= 11.0 min (780.7 - 769.7)

Volume	Invert	Avail.Storage	Storage Description
#1	5.12'	0.110 af	36.0" Round Pipe Storage x 2 L= 338.0'
#2	5.12'	0.001 af	3.50"W x 4.00"L x 4.40"H Prismatic
		0.111 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.92'	15.0" Round Culvert L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.92' / 4.92' S= 0.0000 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	5.12'	12.0" Vert. Orifice/Grate C= 0.600
#3	Secondary	9.31'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.07 cfs @ 12.46 hrs HW=6.78' (Free Discharge)

- ↑1=Culvert (Passes 4.07 cfs of 5.88 cfs potential flow)
- ↑2=Orifice/Grate (Orifice Controls 4.07 cfs @ 5.19 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.12' (Free Discharge)

- ↑3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pre-Development (Future)

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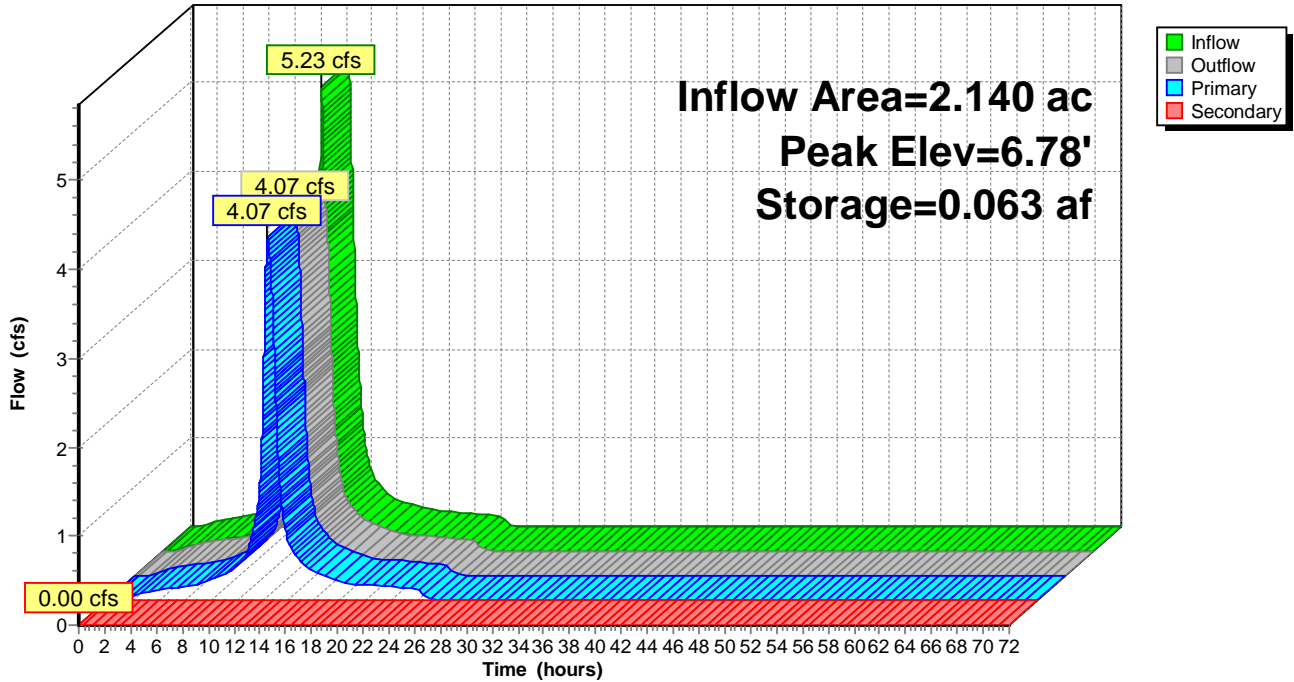
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NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Printed 10/10/2025

Pond Ex. Pipes: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

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Hydrograph for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	5.12	0.00	0.00	0.00
2.00	0.06	0.001	5.22	0.05	0.05	0.00
4.00	0.12	0.002	5.28	0.12	0.12	0.00
6.00	0.16	0.003	5.31	0.15	0.15	0.00
8.00	0.24	0.004	5.35	0.23	0.23	0.00
10.00	0.41	0.006	5.43	0.39	0.39	0.00
12.00	2.38	0.021	5.86	1.83	1.83	0.00
14.00	0.62	0.009	5.54	0.69	0.69	0.00
16.00	0.31	0.005	5.40	0.32	0.32	0.00
18.00	0.21	0.004	5.35	0.22	0.22	0.00
20.00	0.17	0.003	5.32	0.18	0.18	0.00
22.00	0.15	0.003	5.31	0.15	0.15	0.00
24.00	0.13	0.003	5.29	0.13	0.13	0.00
26.00	0.00	0.000	5.13	0.00	0.00	0.00
28.00	0.00	0.000	5.12	0.00	0.00	0.00
30.00	0.00	0.000	5.12	0.00	0.00	0.00
32.00	0.00	0.000	5.12	0.00	0.00	0.00
34.00	0.00	0.000	5.12	0.00	0.00	0.00
36.00	0.00	0.000	5.12	0.00	0.00	0.00
38.00	0.00	0.000	5.12	0.00	0.00	0.00
40.00	0.00	0.000	5.12	0.00	0.00	0.00
42.00	0.00	0.000	5.12	0.00	0.00	0.00
44.00	0.00	0.000	5.12	0.00	0.00	0.00
46.00	0.00	0.000	5.12	0.00	0.00	0.00
48.00	0.00	0.000	5.12	0.00	0.00	0.00
50.00	0.00	0.000	5.12	0.00	0.00	0.00
52.00	0.00	0.000	5.12	0.00	0.00	0.00
54.00	0.00	0.000	5.12	0.00	0.00	0.00
56.00	0.00	0.000	5.12	0.00	0.00	0.00
58.00	0.00	0.000	5.12	0.00	0.00	0.00
60.00	0.00	0.000	5.12	0.00	0.00	0.00
62.00	0.00	0.000	5.12	0.00	0.00	0.00
64.00	0.00	0.000	5.12	0.00	0.00	0.00
66.00	0.00	0.000	5.12	0.00	0.00	0.00
68.00	0.00	0.000	5.12	0.00	0.00	0.00
70.00	0.00	0.000	5.12	0.00	0.00	0.00
72.00	0.00	0.000	5.12	0.00	0.00	0.00

Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners
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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment EA-1i: EA-1 Impervious

Runoff = 5.44 cfs @ 12.25 hrs, Volume= 0.849 af, Depth= 6.10"

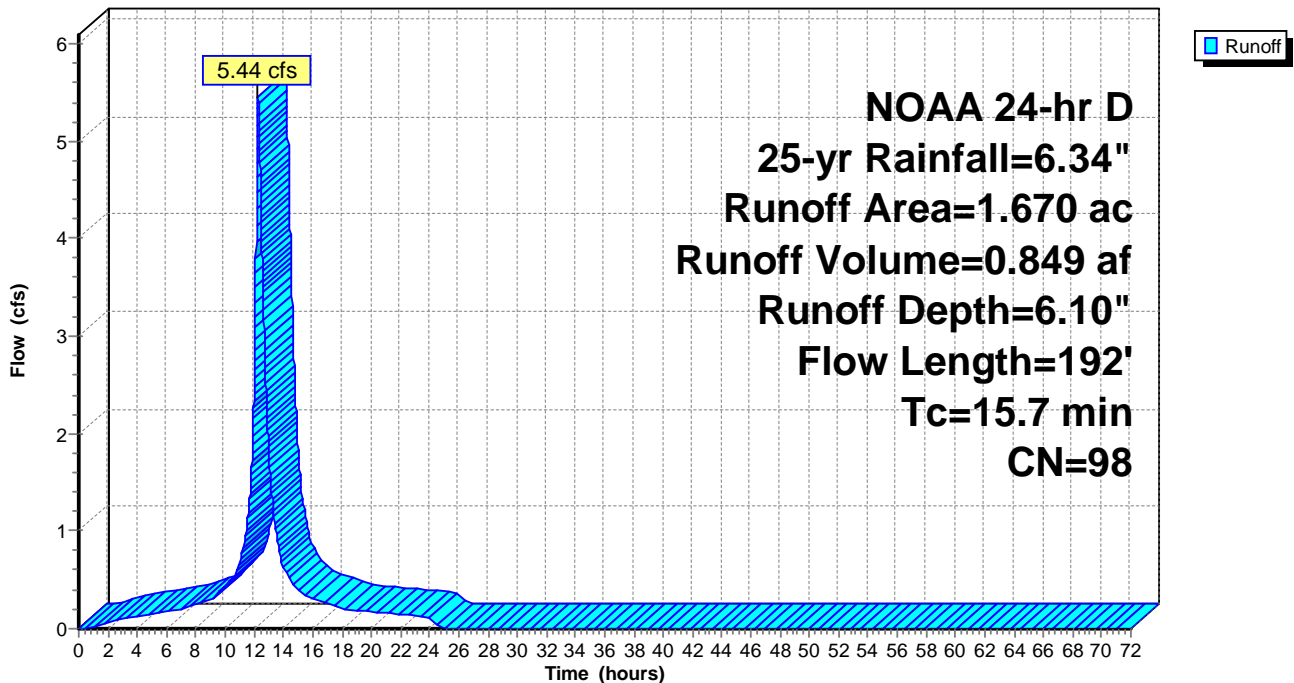
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
* 1.360	98	Paved parking, HSG URB
1.670	98	Weighted Average
1.670		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0237	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	12	0.0091	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
8.5	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.7	192	Total			

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment EA-1p: EA-1 Pervious

Runoff = 0.06 cfs @ 12.63 hrs, Volume= 0.021 af, Depth= 0.55"

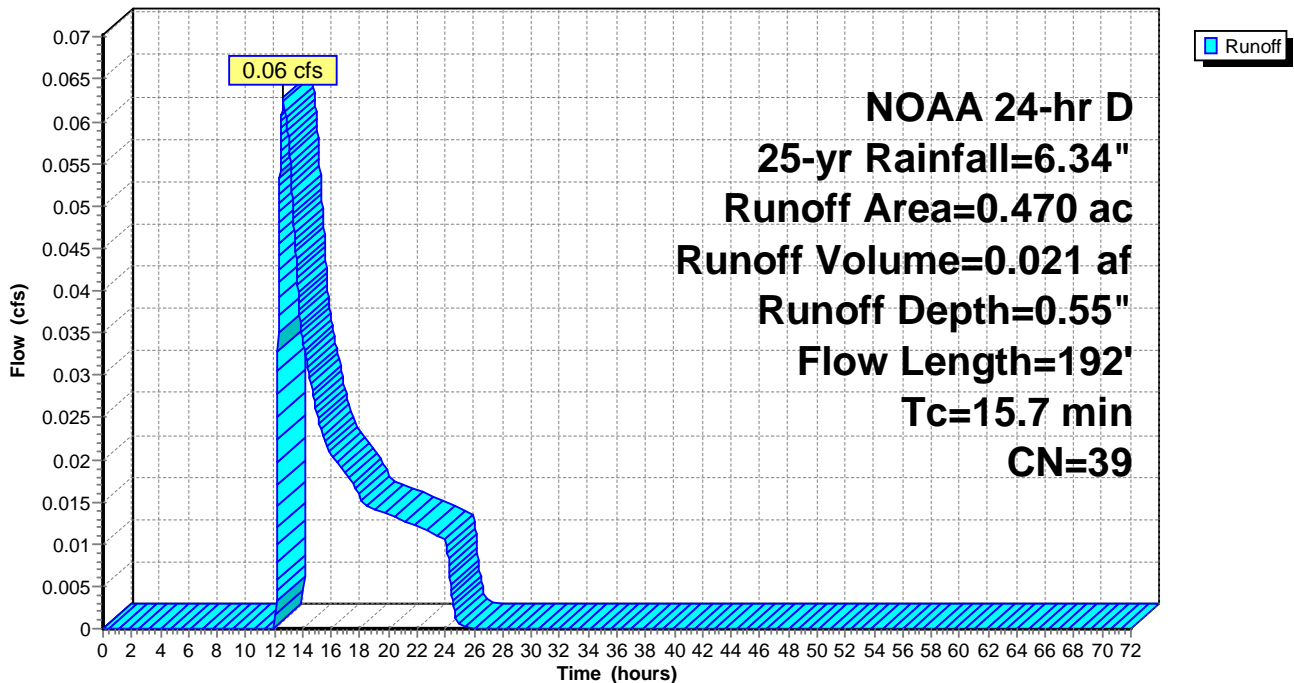
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.230	39	>75% Grass cover, Good, HSG A
* 0.240	39	>75% Grass cover, Good, HSG URBAN
0.470	39	Weighted Average
0.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0237	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	12	0.0091	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
8.5	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.7	192	Total			

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development (Future)

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment EA-2i: EA-2 Impervious

Runoff = 0.20 cfs @ 12.14 hrs, Volume= 0.020 af, Depth= 6.10"

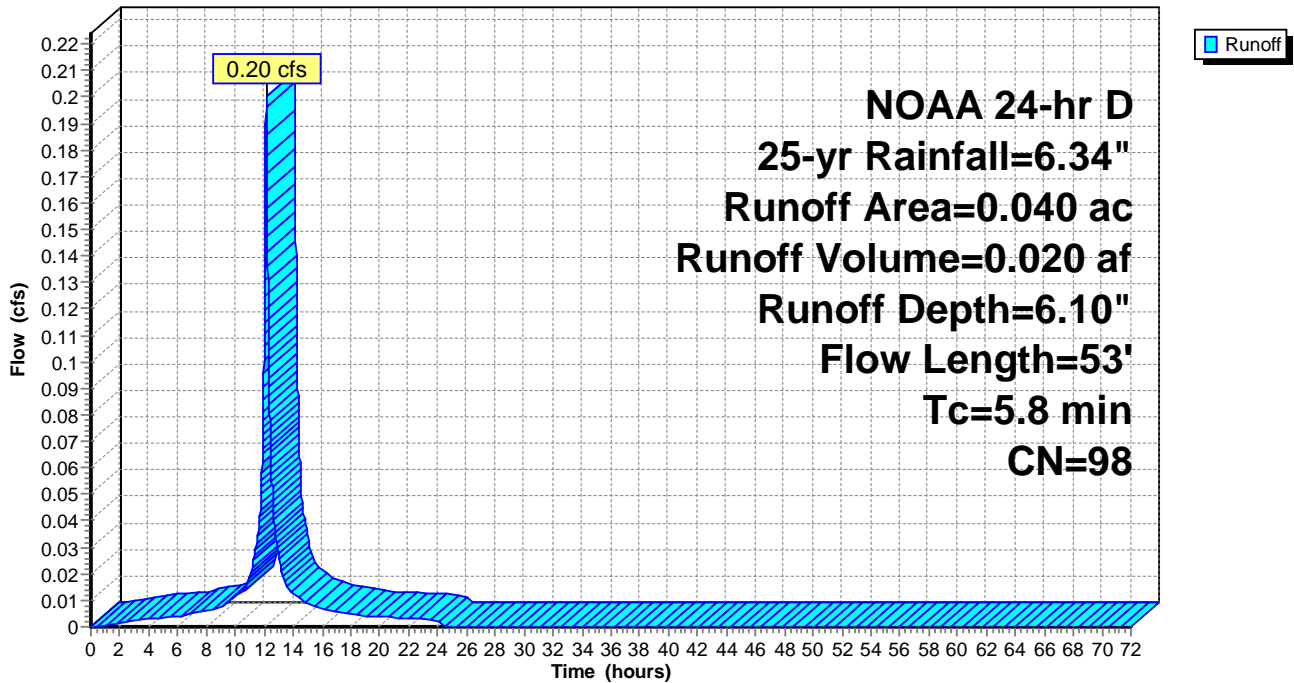
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
* 0.040	98	Paved parking, HSG URB
0.040		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	37	0.0259	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	16	0.0168	0.12		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
5.8	53	Total			

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

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Summary for Subcatchment EA-2p: EA-2 Pervious

Runoff = 0.05 cfs @ 12.33 hrs, Volume= 0.013 af, Depth= 0.55"

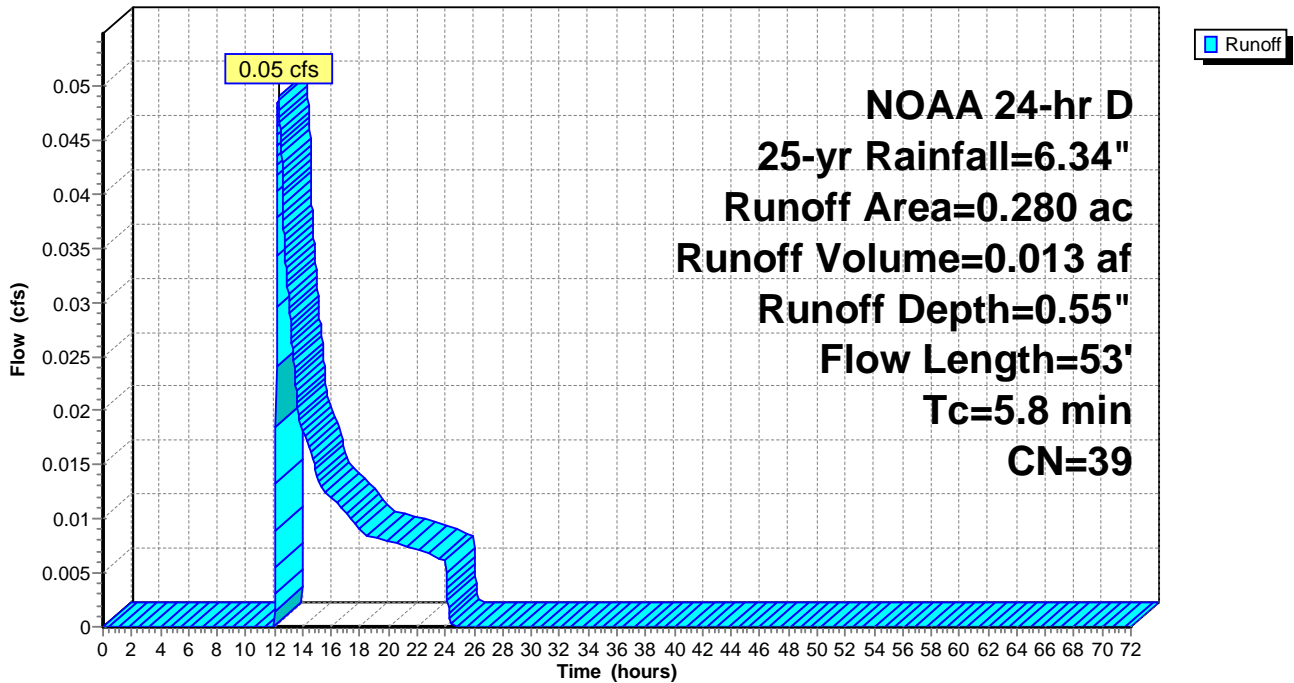
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
* 0.280	39	>75% Grass cover, Good, HSG URBAN
0.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	37	0.0259	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	16	0.0168	0.12		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
5.8	53	Total			

Subcatchment EA-2p: EA-2 Pervious

Hydrograph



Pre-Development (Future)

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NOAA 24-hr D 25-yr Rainfall=6.34"

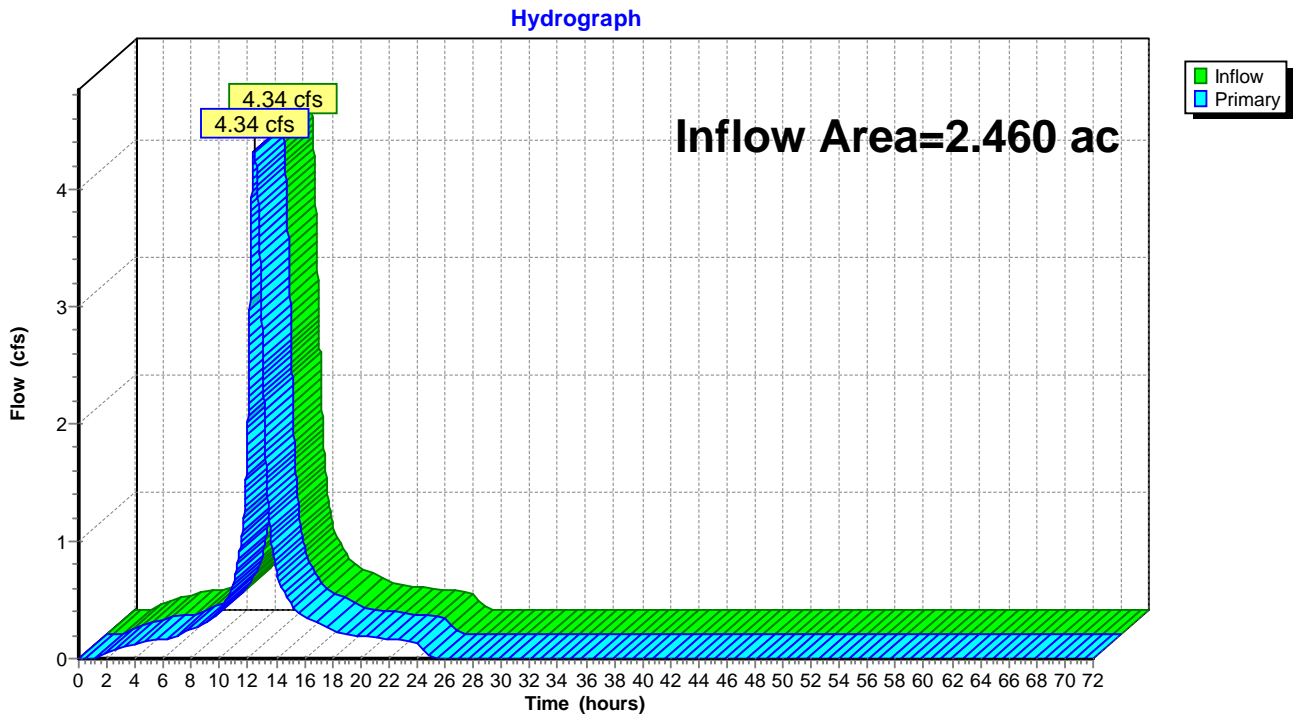
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Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.460 ac, 69.51% Impervious, Inflow Depth = 4.41" for 25-yr event
Inflow = 4.34 cfs @ 12.46 hrs, Volume= 0.904 af
Primary = 4.34 cfs @ 12.46 hrs, Volume= 0.904 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Pre-Development (Future)

NOAA 24-hr D 25-yr Rainfall=6.34"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Inflow Area = 2.140 ac, 78.04% Impervious, Inflow Depth = 4.88" for 25-yr event
 Inflow = 5.47 cfs @ 12.25 hrs, Volume= 0.871 af
 Outflow = 4.23 cfs @ 12.47 hrs, Volume= 0.871 af, Atten= 23%, Lag= 13.1 min
 Primary = 4.23 cfs @ 12.47 hrs, Volume= 0.871 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 6
 Peak Elev= 6.87' @ 12.47 hrs Surf.Area= 0.046 ac Storage= 0.067 af

Plug-Flow detention time= 11.0 min calculated for 0.870 af (100% of inflow)
 Center-of-Mass det. time= 11.0 min (780.4 - 769.4)

Volume	Invert	Avail.Storage	Storage Description
#1	5.12'	0.110 af	36.0" Round Pipe Storage x 2 L= 338.0'
#2	5.12'	0.001 af	3.50"W x 4.00"L x 4.40"H Prismatic
		0.111 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.92'	15.0" Round Culvert L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.92' / 4.92' S= 0.0000 ' / ' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	5.12'	12.0" Vert. Orifice/Grate C= 0.600
#3	Secondary	9.31'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.23 cfs @ 12.47 hrs HW=6.87' (Free Discharge)

↑**1=Culvert** (Passes 4.23 cfs of 6.30 cfs potential flow)

↑**2=Orifice/Grate** (Orifice Controls 4.23 cfs @ 5.38 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=5.12' (Free Discharge)

↑**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

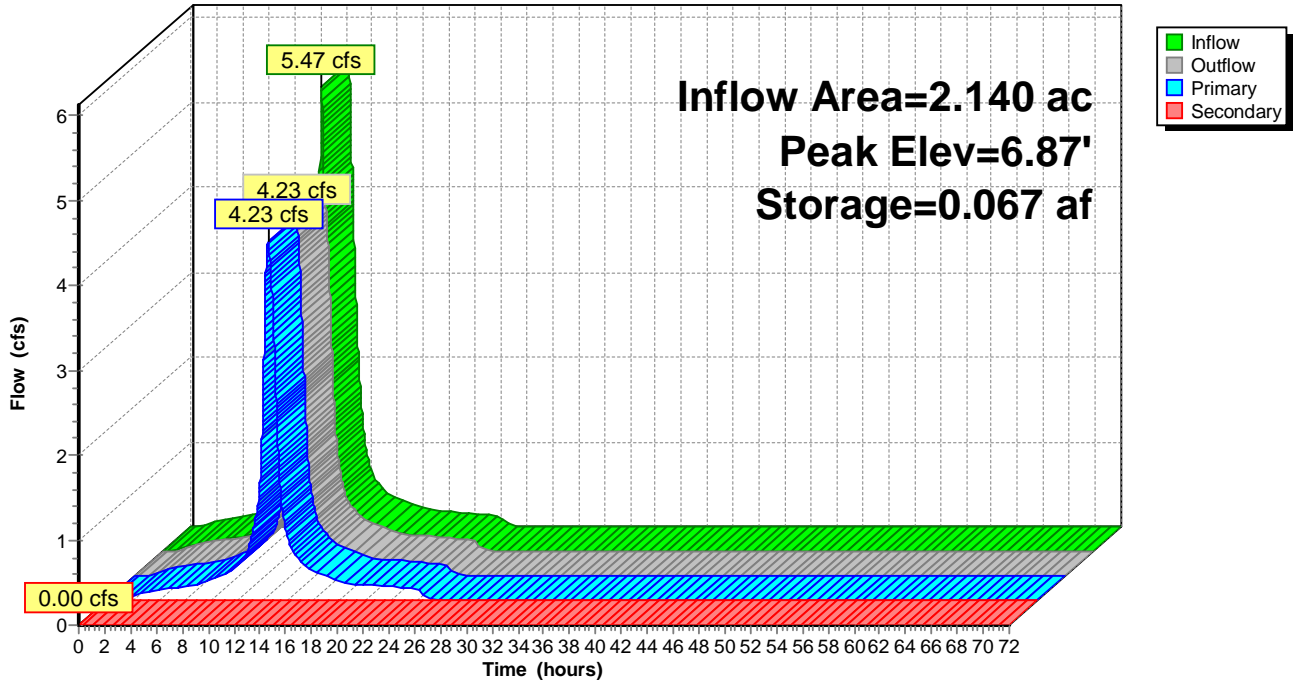
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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Pond Ex. Pipes: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Hydrograph for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	5.12	0.00	0.00	0.00
2.00	0.06	0.001	5.23	0.05	0.05	0.00
4.00	0.13	0.002	5.29	0.12	0.12	0.00
6.00	0.17	0.003	5.31	0.16	0.16	0.00
8.00	0.25	0.004	5.36	0.24	0.24	0.00
10.00	0.43	0.006	5.44	0.41	0.41	0.00
12.00	2.49	0.022	5.88	1.91	1.91	0.00
14.00	0.65	0.010	5.55	0.72	0.72	0.00
16.00	0.33	0.005	5.40	0.33	0.33	0.00
18.00	0.22	0.004	5.35	0.23	0.23	0.00
20.00	0.18	0.003	5.33	0.18	0.18	0.00
22.00	0.16	0.003	5.31	0.16	0.16	0.00
24.00	0.13	0.003	5.30	0.13	0.13	0.00
26.00	0.00	0.000	5.13	0.00	0.00	0.00
28.00	0.00	0.000	5.12	0.00	0.00	0.00
30.00	0.00	0.000	5.12	0.00	0.00	0.00
32.00	0.00	0.000	5.12	0.00	0.00	0.00
34.00	0.00	0.000	5.12	0.00	0.00	0.00
36.00	0.00	0.000	5.12	0.00	0.00	0.00
38.00	0.00	0.000	5.12	0.00	0.00	0.00
40.00	0.00	0.000	5.12	0.00	0.00	0.00
42.00	0.00	0.000	5.12	0.00	0.00	0.00
44.00	0.00	0.000	5.12	0.00	0.00	0.00
46.00	0.00	0.000	5.12	0.00	0.00	0.00
48.00	0.00	0.000	5.12	0.00	0.00	0.00
50.00	0.00	0.000	5.12	0.00	0.00	0.00
52.00	0.00	0.000	5.12	0.00	0.00	0.00
54.00	0.00	0.000	5.12	0.00	0.00	0.00
56.00	0.00	0.000	5.12	0.00	0.00	0.00
58.00	0.00	0.000	5.12	0.00	0.00	0.00
60.00	0.00	0.000	5.12	0.00	0.00	0.00
62.00	0.00	0.000	5.12	0.00	0.00	0.00
64.00	0.00	0.000	5.12	0.00	0.00	0.00
66.00	0.00	0.000	5.12	0.00	0.00	0.00
68.00	0.00	0.000	5.12	0.00	0.00	0.00
70.00	0.00	0.000	5.12	0.00	0.00	0.00
72.00	0.00	0.000	5.12	0.00	0.00	0.00

Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Printed 10/10/2025

Summary for Subcatchment EA-1i: EA-1 Impervious

Runoff = 9.35 cfs @ 12.25 hrs, Volume= 1.479 af, Depth=10.63"

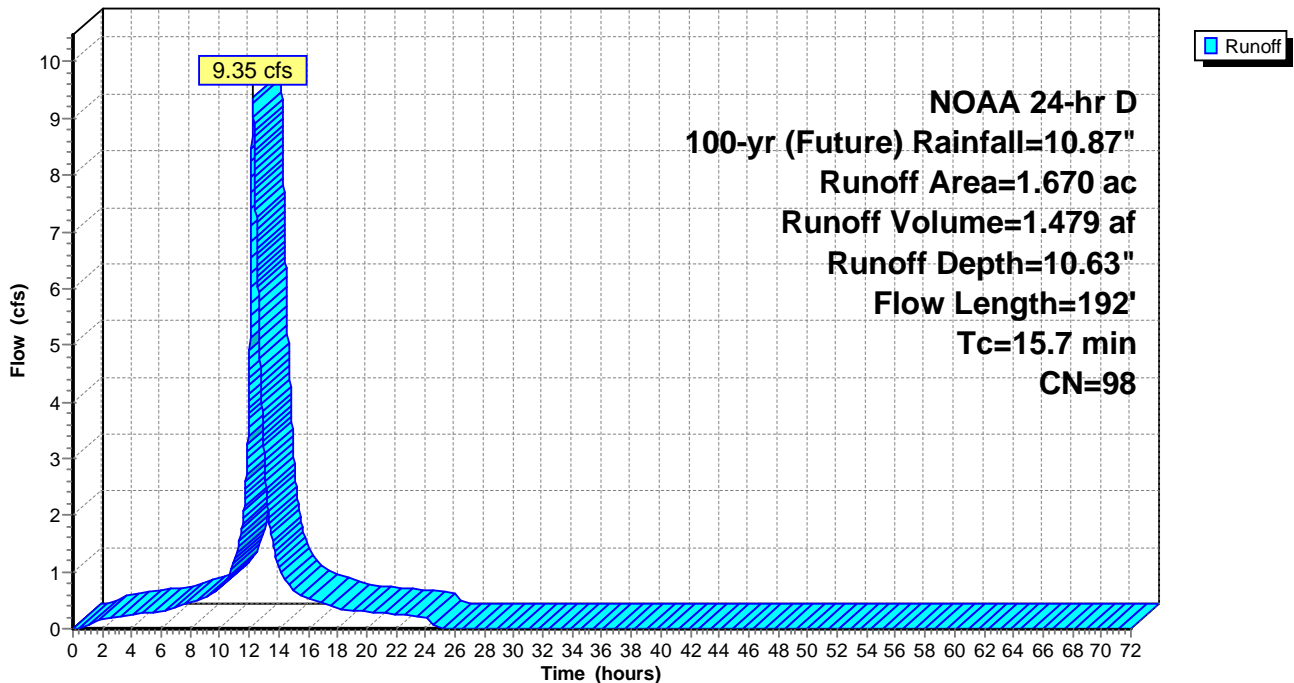
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
0.310	98	Paved parking, HSG A
* 1.360	98	Paved parking, HSG URB
1.670	98	Weighted Average
1.670		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0237	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	12	0.0091	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
8.5	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.7	192	Total			

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment EA-1p: EA-1 Pervious

Runoff = 0.60 cfs @ 12.29 hrs, Volume= 0.100 af, Depth= 2.56"

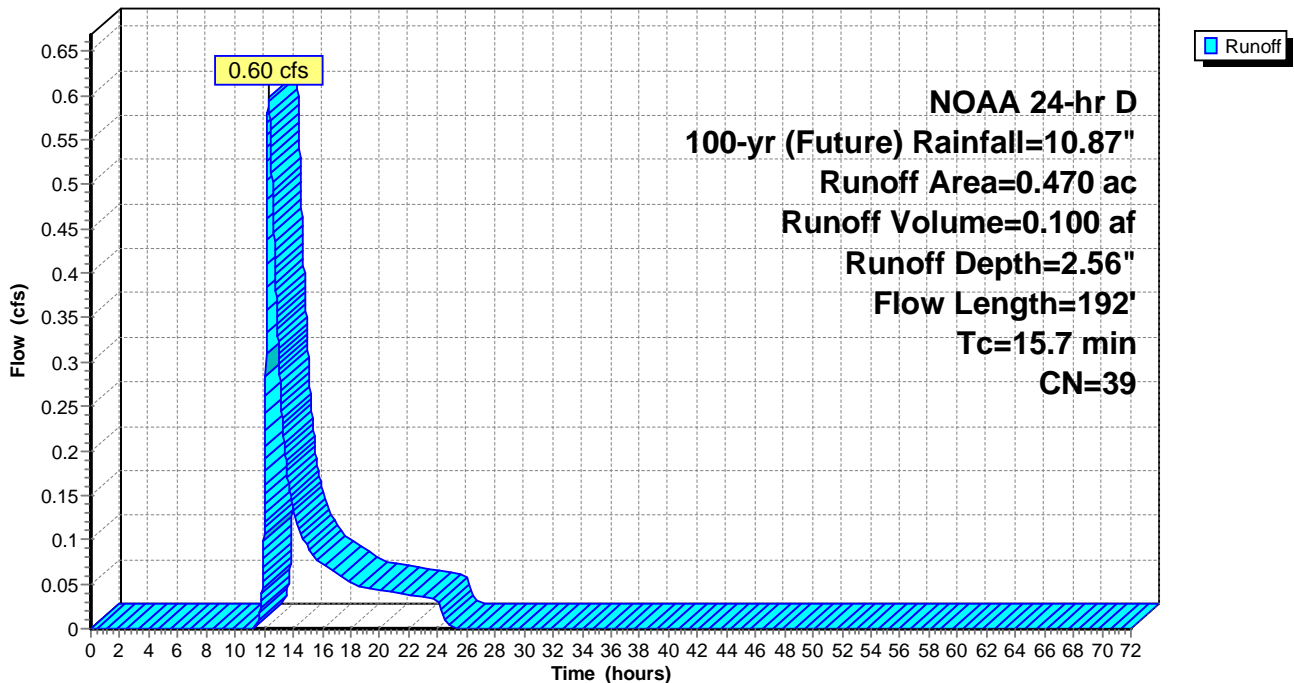
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
0.230	39	>75% Grass cover, Good, HSG A
* 0.240	39	>75% Grass cover, Good, HSG URBAN
0.470	39	Weighted Average
0.470		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	25	0.0237	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	12	0.0091	0.09		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
8.5	27	0.0016	0.05		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
1.9	72	0.0016	0.64		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
0.4	56	0.0208	2.32		Shallow Concentrated Flow, Unpaved Kv= 16.1 fps
15.7	192	Total			

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

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Summary for Subcatchment EA-2i: EA-2 Impervious

Runoff = 0.34 cfs @ 12.14 hrs, Volume= 0.035 af, Depth=10.63"

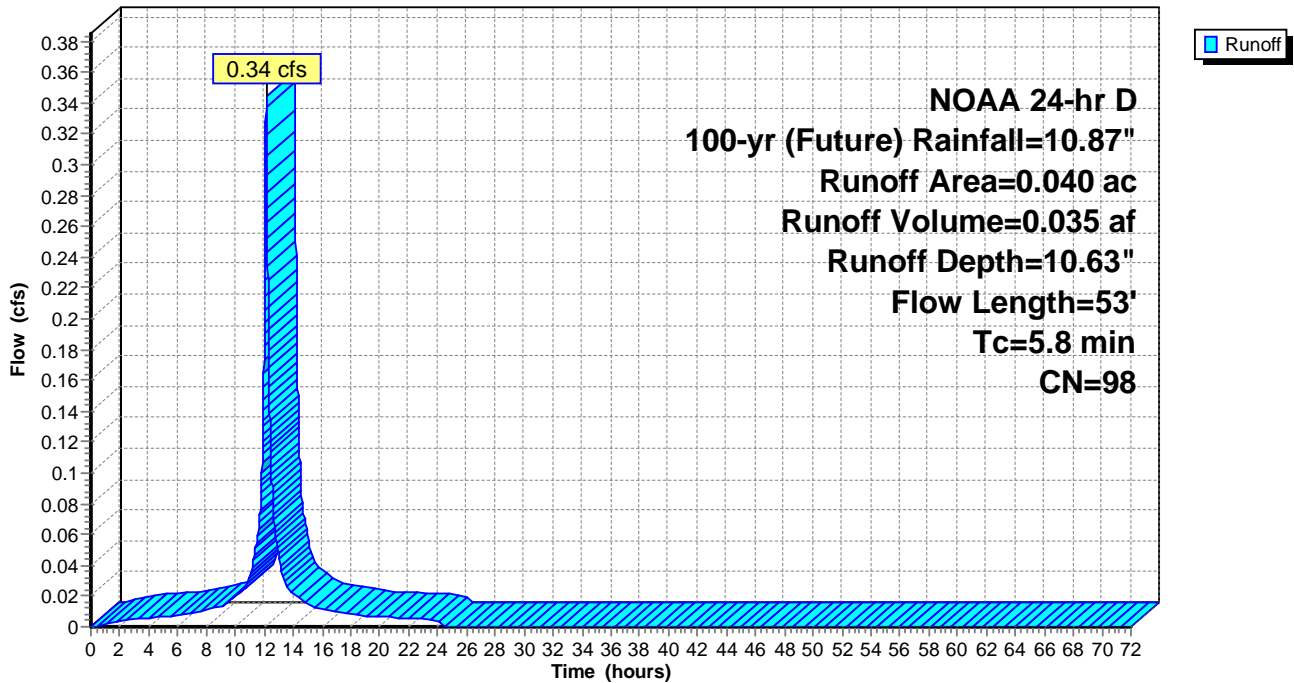
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
* 0.040	98	Paved parking, HSG URB
0.040		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	37	0.0259	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	16	0.0168	0.12		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
5.8	53	Total			

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development (Future)

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NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Printed 10/10/2025

Summary for Subcatchment EA-2p: EA-2 Pervious

Runoff = 0.60 cfs @ 12.15 hrs, Volume= 0.060 af, Depth= 2.56"

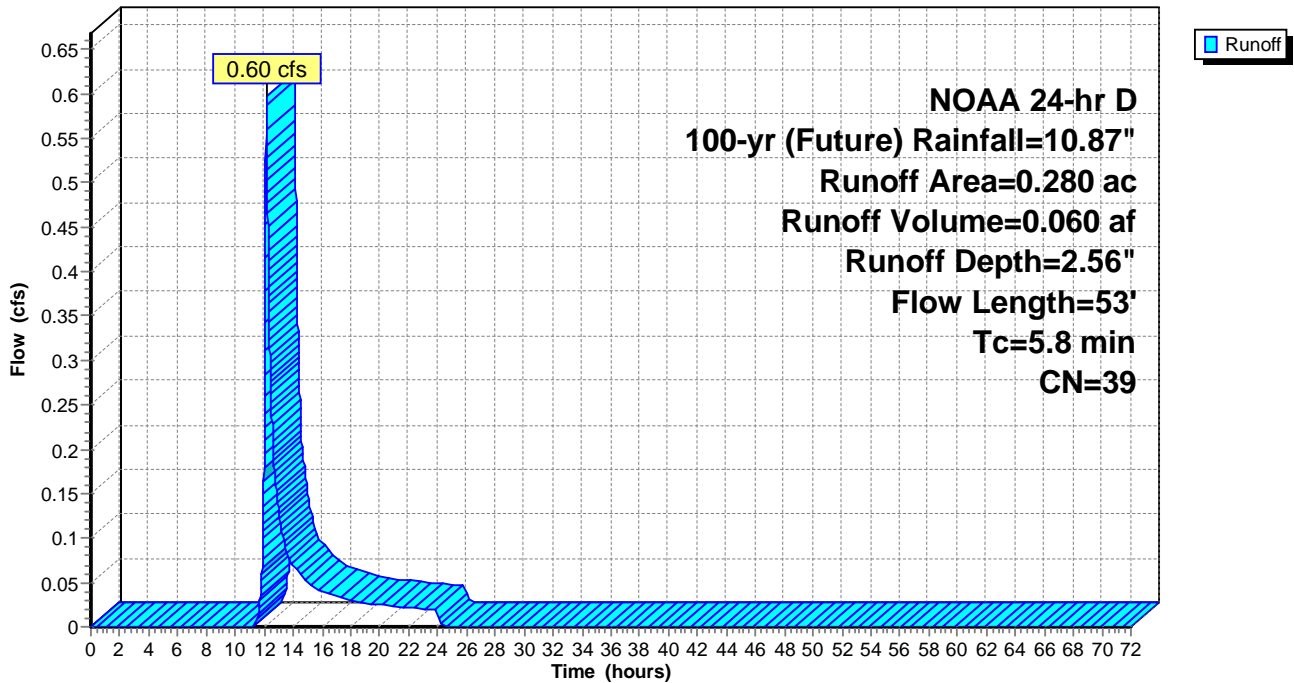
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
* 0.280	39	>75% Grass cover, Good, HSG URBAN
0.280		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.6	37	0.0259	0.17		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
2.2	16	0.0168	0.12		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
5.8	53	Total			

Subcatchment EA-2p: EA-2 Pervious

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

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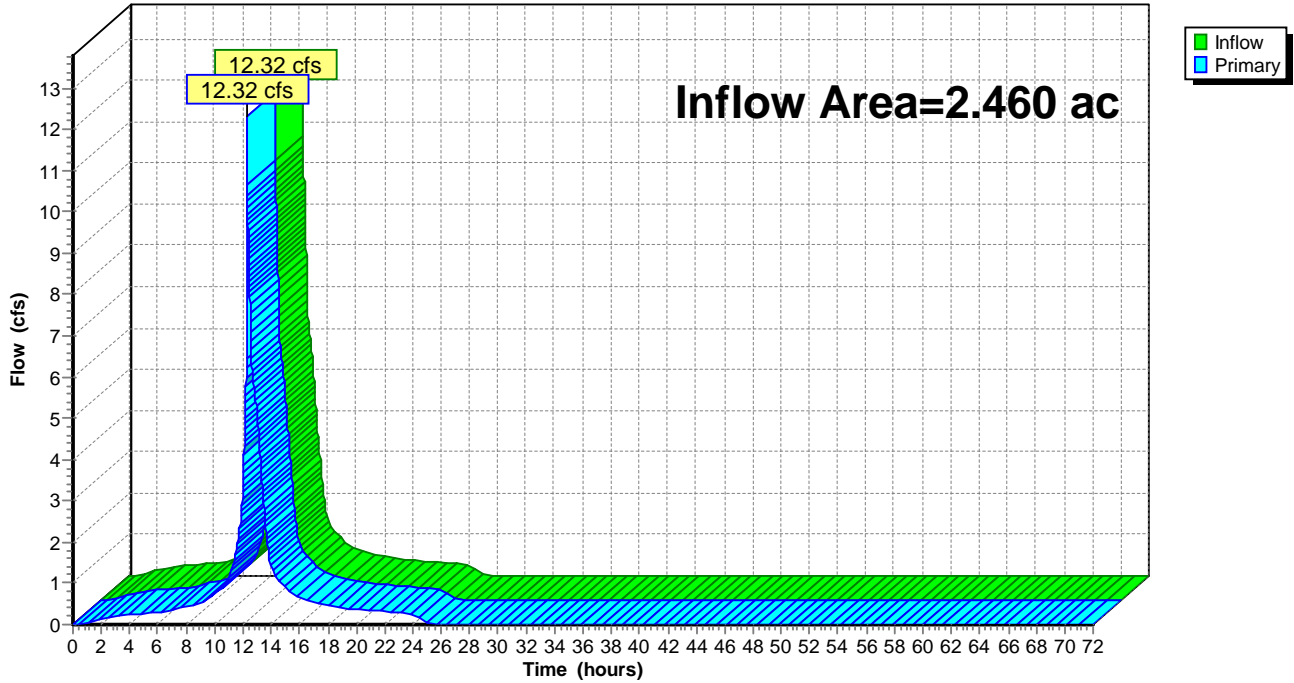
Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.460 ac, 69.51% Impervious, Inflow Depth = 8.18" for 100-yr (Future) event
Inflow = 12.32 cfs @ 12.27 hrs, Volume= 1.677 af
Primary = 12.32 cfs @ 12.27 hrs, Volume= 1.677 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond Ex. Pipes: Existing Subsurface Detention Pipes

Inflow Area = 2.140 ac, 78.04% Impervious, Inflow Depth = 8.86" for 100-yr (Future) event
 Inflow = 9.94 cfs @ 12.25 hrs, Volume= 1.580 af
 Outflow = 11.67 cfs @ 12.27 hrs, Volume= 1.582 af, Atten= 0%, Lag= 1.3 min
 Primary = 7.46 cfs @ 12.27 hrs, Volume= 1.554 af
 Secondary = 4.04 cfs @ 12.27 hrs, Volume= 0.028 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 6
 Peak Elev= 9.51' @ 12.27 hrs Surf.Area= 0.000 ac Storage= 0.111 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
 Center-of-Mass det. time= 10.7 min (777.7 - 767.0)

Volume	Invert	Avail.Storage	Storage Description
#1	5.12'	0.110 af	36.0" Round Pipe Storage x 2 L= 338.0'
#2	5.12'	0.001 af	3.50"W x 4.00"L x 4.40"H Prismatic
		0.111 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	4.92'	15.0" Round Culvert L= 9.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.92' / 4.92' S= 0.0000 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	5.12'	12.0" Vert. Orifice/Grate C= 0.600
#3	Secondary	9.31'	15.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=7.46 cfs @ 12.27 hrs HW=9.51' (Free Discharge)

↑**1=Culvert** (Passes 7.46 cfs of 11.77 cfs potential flow)

↑**2=Orifice/Grate** (Orifice Controls 7.46 cfs @ 9.50 fps)

Secondary OutFlow Max=3.53 cfs @ 12.27 hrs HW=9.50' (Free Discharge)

↑**3=Broad-Crested Rectangular Weir** (Weir Controls 3.53 cfs @ 1.23 fps)

Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

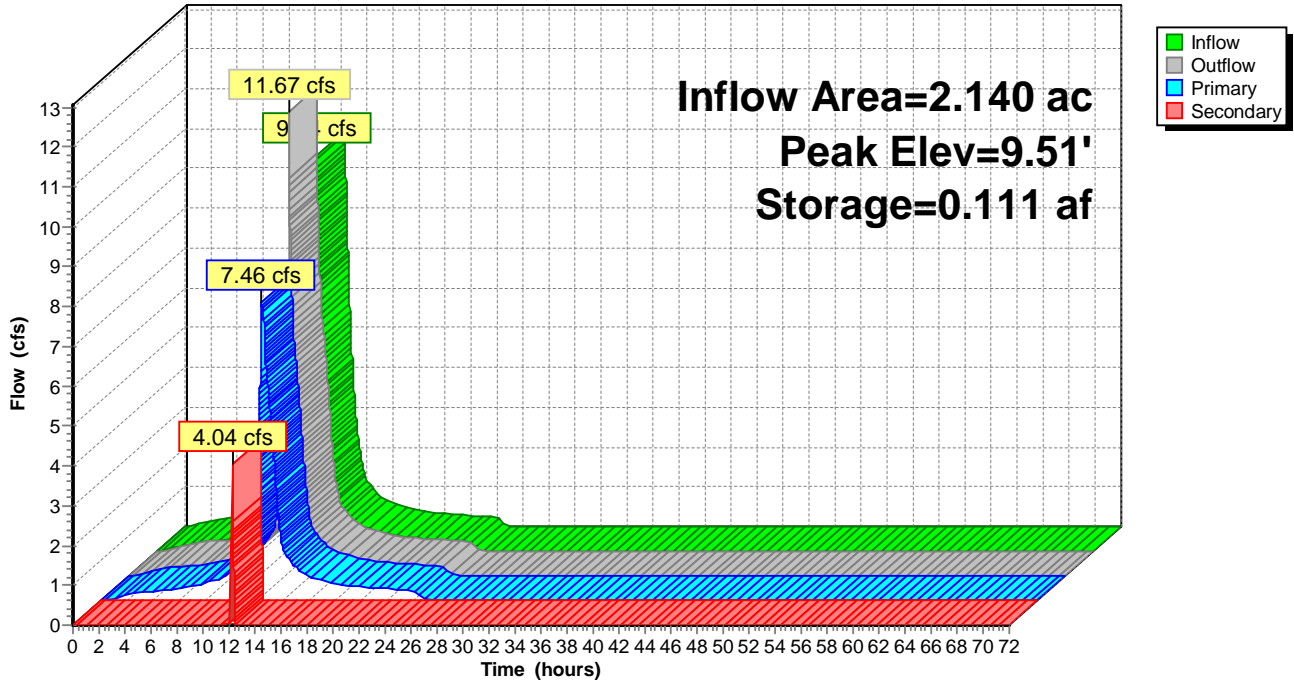
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NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Printed 10/10/2025

Pond Ex. Pipes: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

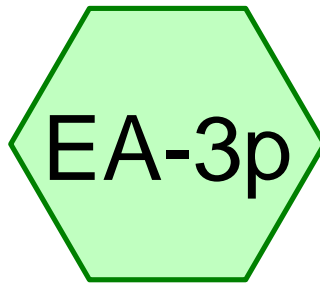
Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

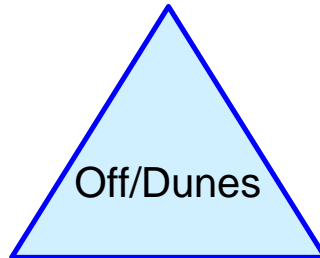
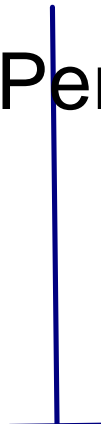
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Hydrograph for Pond Ex. Pipes: Existing Subsurface Detention Pipes

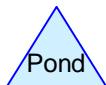
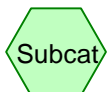
Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)
0.00	0.00	0.000	5.12	0.00	0.00	0.00
2.00	0.16	0.003	5.30	0.14	0.14	0.00
4.00	0.25	0.004	5.36	0.24	0.24	0.00
6.00	0.30	0.005	5.39	0.30	0.30	0.00
8.00	0.45	0.007	5.45	0.43	0.43	0.00
10.00	0.75	0.010	5.55	0.71	0.71	0.00
12.00	4.40	0.040	6.28	3.07	3.07	0.00
14.00	1.19	0.016	5.73	1.33	1.33	0.00
16.00	0.59	0.009	5.51	0.61	0.61	0.00
18.00	0.41	0.006	5.44	0.42	0.42	0.00
20.00	0.33	0.005	5.40	0.34	0.34	0.00
22.00	0.29	0.005	5.38	0.29	0.29	0.00
24.00	0.24	0.004	5.36	0.24	0.24	0.00
26.00	0.00	0.000	5.13	0.00	0.00	0.00
28.00	0.00	0.000	5.12	0.00	0.00	0.00
30.00	0.00	0.000	5.12	0.00	0.00	0.00
32.00	0.00	0.000	5.12	0.00	0.00	0.00
34.00	0.00	0.000	5.12	0.00	0.00	0.00
36.00	0.00	0.000	5.12	0.00	0.00	0.00
38.00	0.00	0.000	5.12	0.00	0.00	0.00
40.00	0.00	0.000	5.12	0.00	0.00	0.00
42.00	0.00	0.000	5.12	0.00	0.00	0.00
44.00	0.00	0.000	5.12	0.00	0.00	0.00
46.00	0.00	0.000	5.12	0.00	0.00	0.00
48.00	0.00	0.000	5.12	0.00	0.00	0.00
50.00	0.00	0.000	5.12	0.00	0.00	0.00
52.00	0.00	0.000	5.12	0.00	0.00	0.00
54.00	0.00	0.000	5.12	0.00	0.00	0.00
56.00	0.00	0.000	5.12	0.00	0.00	0.00
58.00	0.00	0.000	5.12	0.00	0.00	0.00
60.00	0.00	0.000	5.12	0.00	0.00	0.00
62.00	0.00	0.000	5.12	0.00	0.00	0.00
64.00	0.00	0.000	5.12	0.00	0.00	0.00
66.00	0.00	0.000	5.12	0.00	0.00	0.00
68.00	0.00	0.000	5.12	0.00	0.00	0.00
70.00	0.00	0.000	5.12	0.00	0.00	0.00
72.00	0.00	0.000	5.12	0.00	0.00	0.00



EA-3 Pervious



Flow to Offsite/Dunes



Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Printed 10/10/2025

Summary for Subcatchment EA-3p: EA-3 Pervious

Runoff = 0.00 cfs @ 21.42 hrs, Volume= 0.001 af, Depth= 0.04"

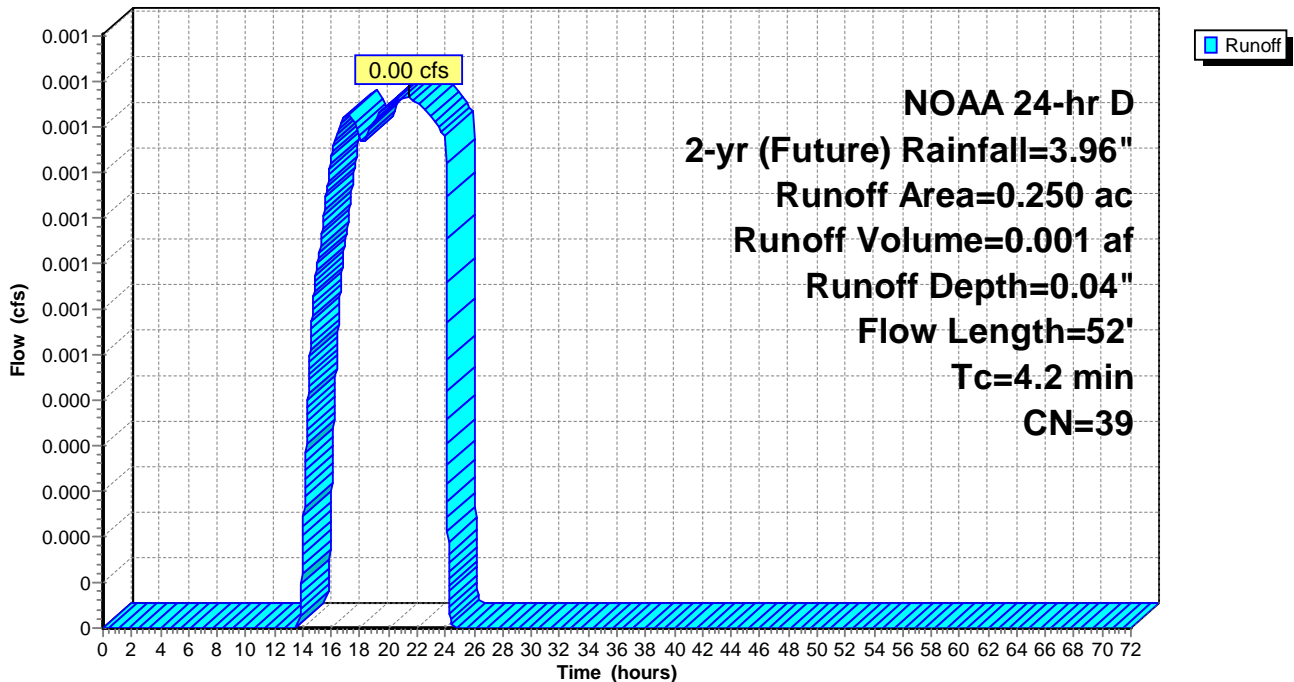
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
* 0.180	39	>75% Grass cover, Good, HSG URBAN
0.250	39	Weighted Average
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	39	0.0328	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.8	13	0.1565	0.29		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
4.2	52	Total			

Subcatchment EA-3p: EA-3 Pervious

Hydrograph



Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

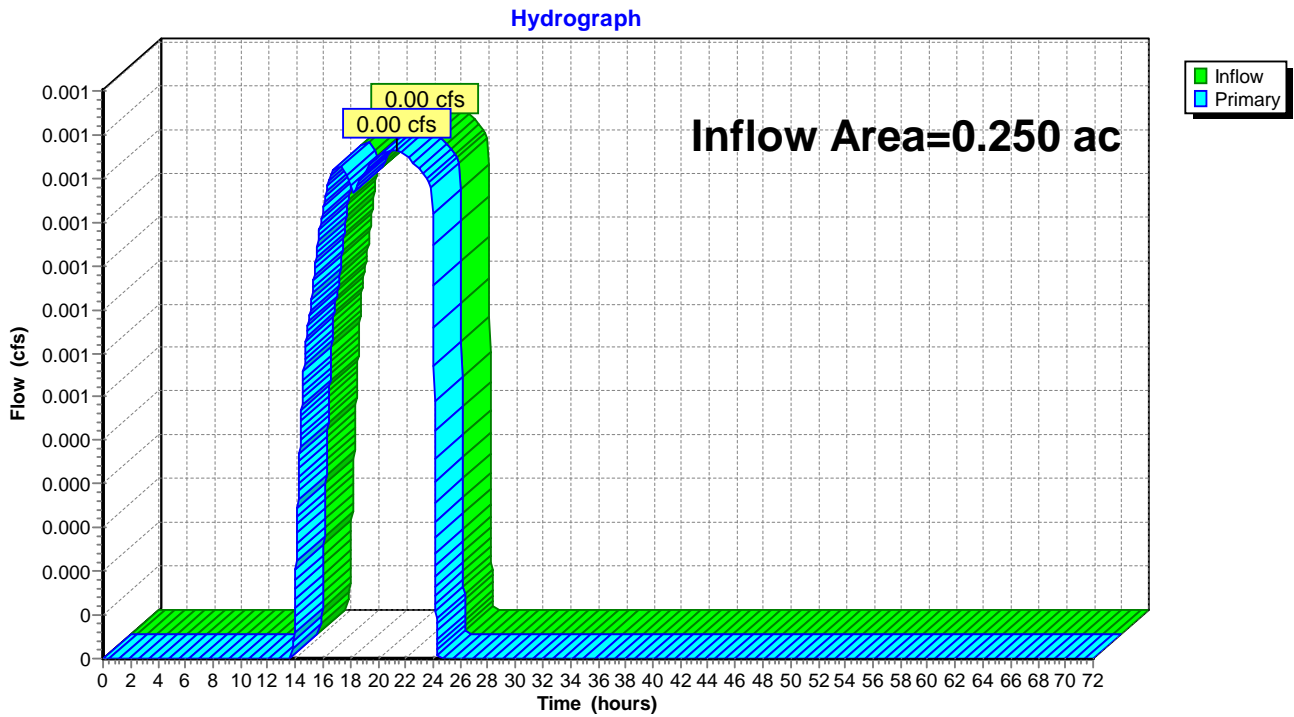
Printed 10/10/2025

Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.250 ac, 0.00% Impervious, Inflow Depth = 0.04" for 2-yr (Future) event
Inflow = 0.00 cfs @ 21.42 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 21.42 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Pre-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment EA-3p: EA-3 Pervious

Runoff = 0.03 cfs @ 12.32 hrs, Volume= 0.010 af, Depth= 0.47"

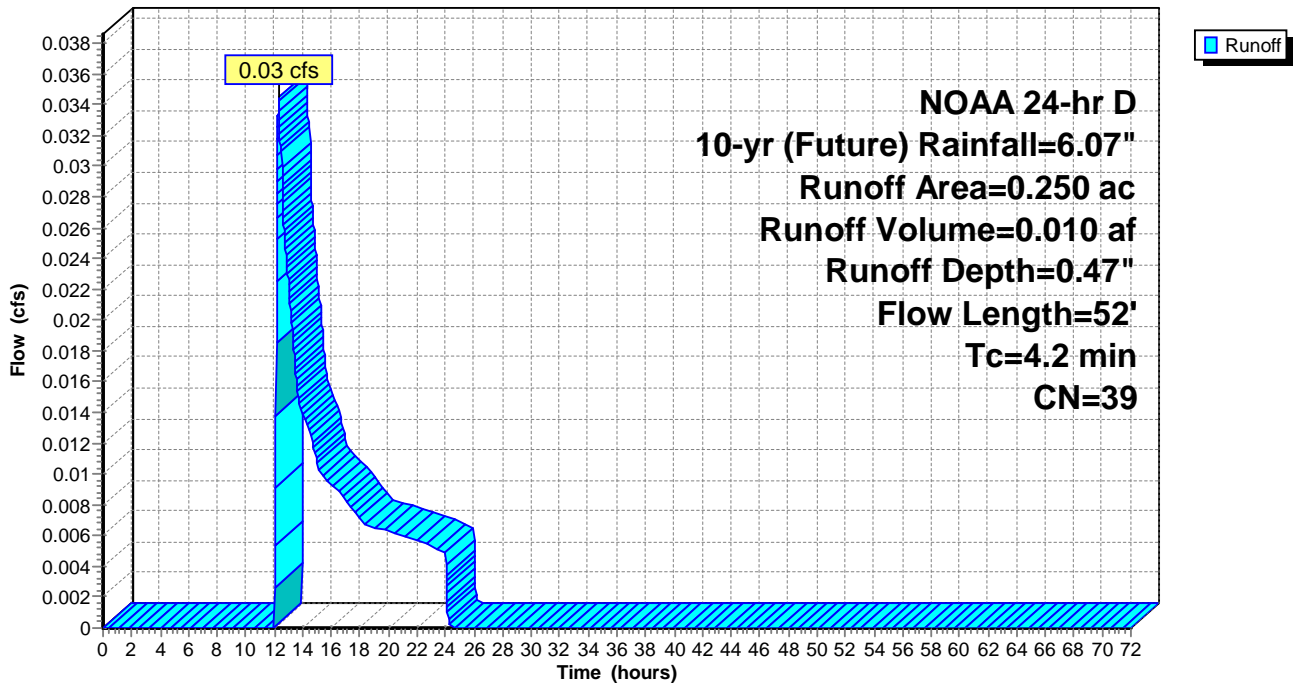
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
* 0.180	39	>75% Grass cover, Good, HSG URBAN
0.250	39	Weighted Average
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	39	0.0328	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.8	13	0.1565	0.29		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
4.2	52	Total			

Subcatchment EA-3p: EA-3 Pervious

Hydrograph



Pre-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Prepared by MidAtlantic Engineering Partners

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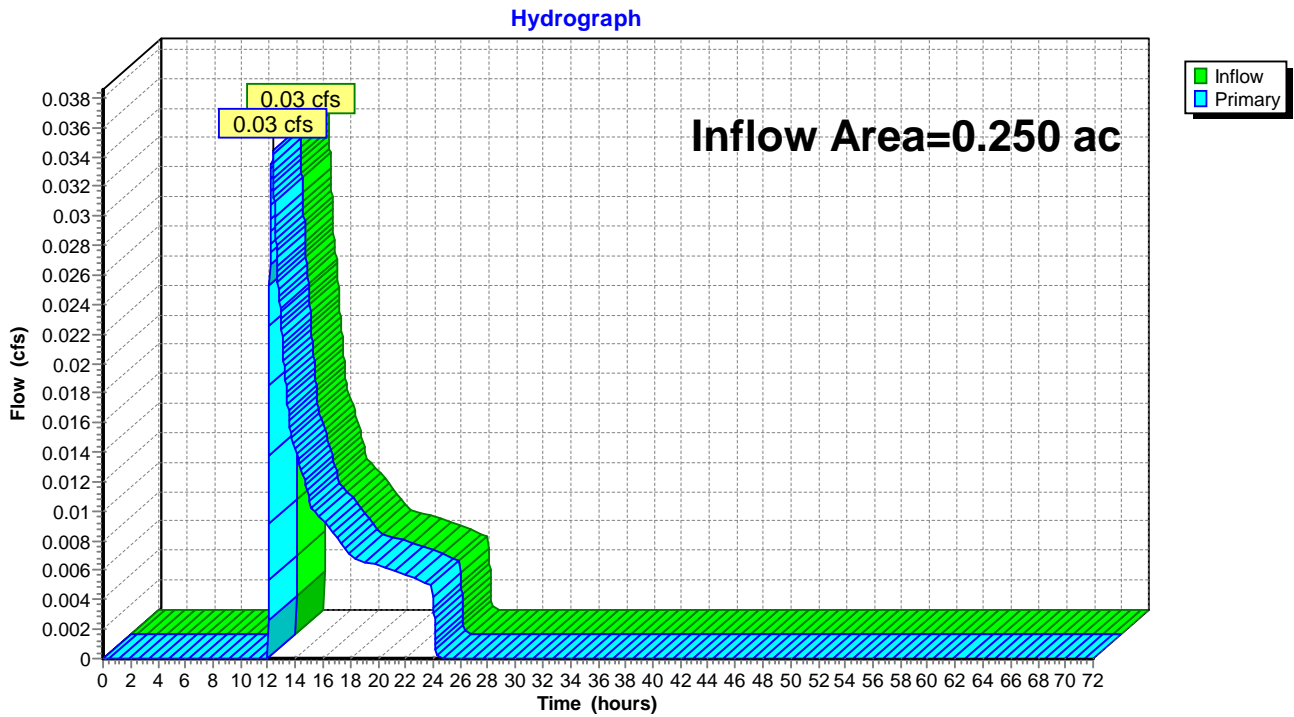
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.250 ac, 0.00% Impervious, Inflow Depth = 0.47" for 10-yr (Future) event
Inflow = 0.03 cfs @ 12.32 hrs, Volume= 0.010 af
Primary = 0.03 cfs @ 12.32 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners
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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment EA-3p: EA-3 Pervious

Runoff = 0.05 cfs @ 12.23 hrs, Volume= 0.011 af, Depth= 0.55"

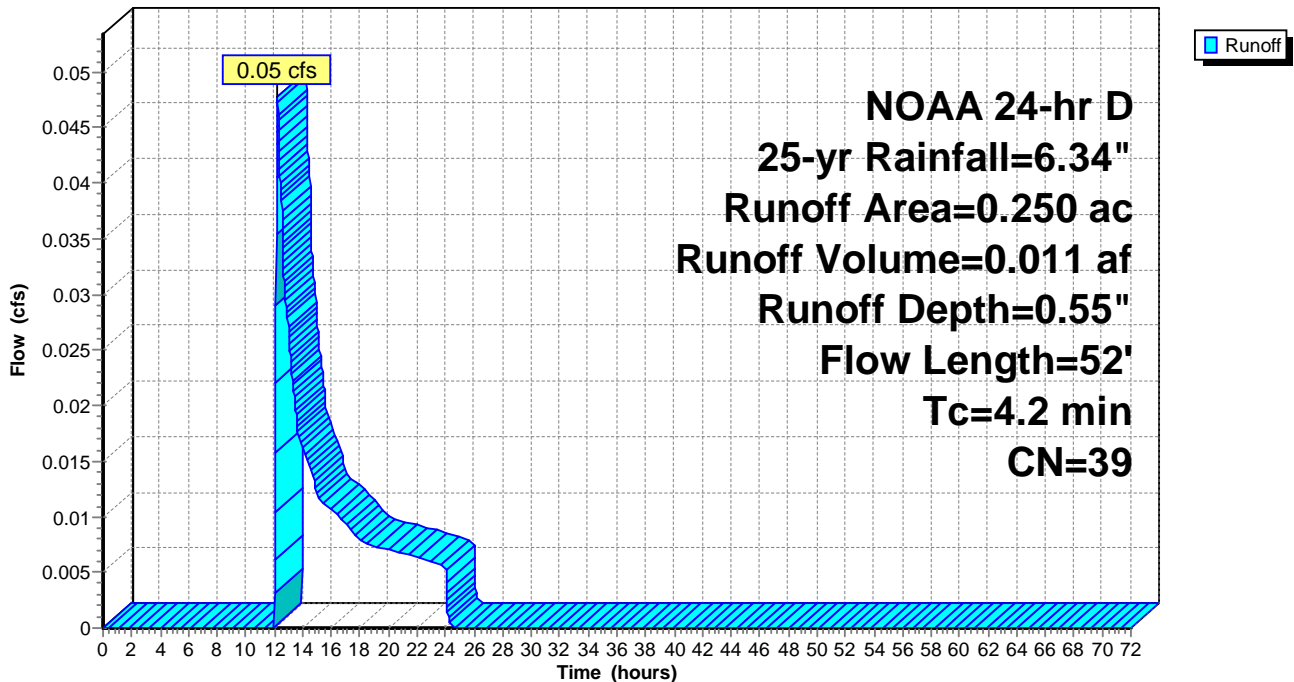
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
* 0.180	39	>75% Grass cover, Good, HSG URBAN
0.250	39	Weighted Average
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	39	0.0328	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.8	13	0.1565	0.29		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
4.2	52	Total			

Subcatchment EA-3p: EA-3 Pervious

Hydrograph



Pre-Development (Future)

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NOAA 24-hr D 25-yr Rainfall=6.34"

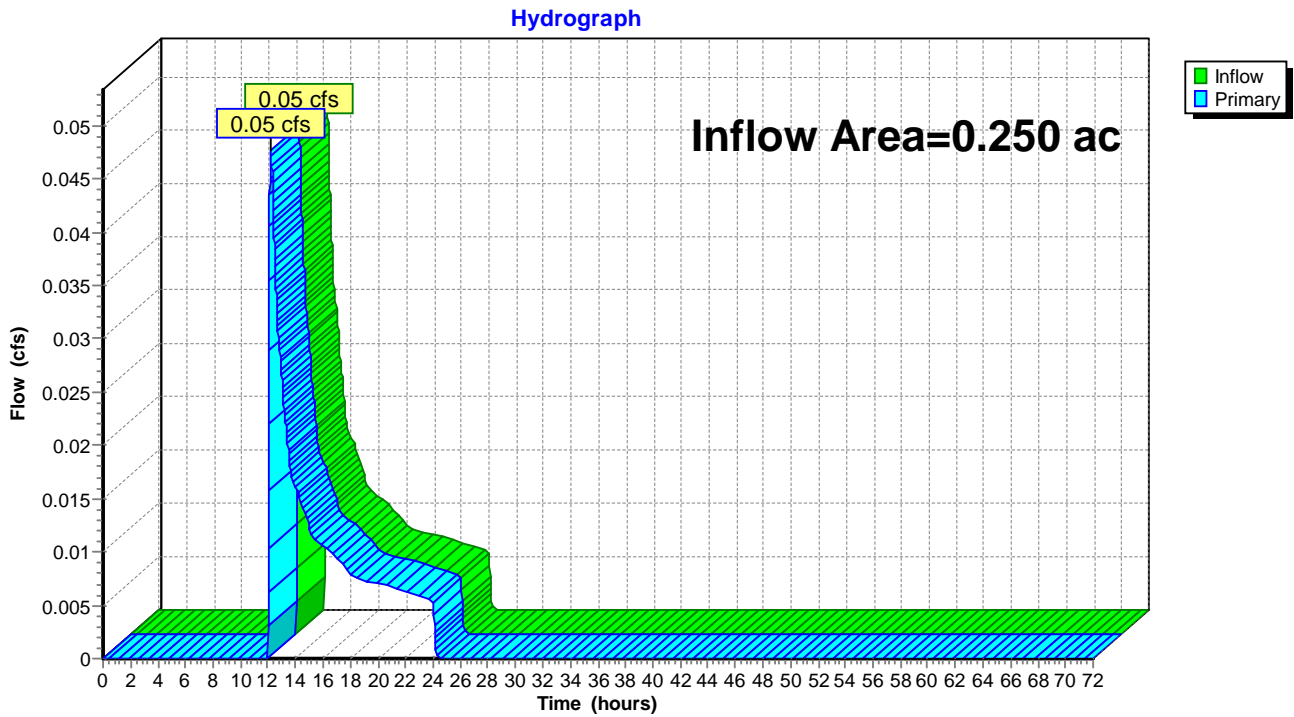
Printed 10/10/2025

Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.250 ac, 0.00% Impervious, Inflow Depth = 0.55" for 25-yr event
Inflow = 0.05 cfs @ 12.23 hrs, Volume= 0.011 af
Primary = 0.05 cfs @ 12.23 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Pre-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment EA-3p: EA-3 Pervious

Runoff = 0.61 cfs @ 12.13 hrs, Volume= 0.053 af, Depth= 2.56"

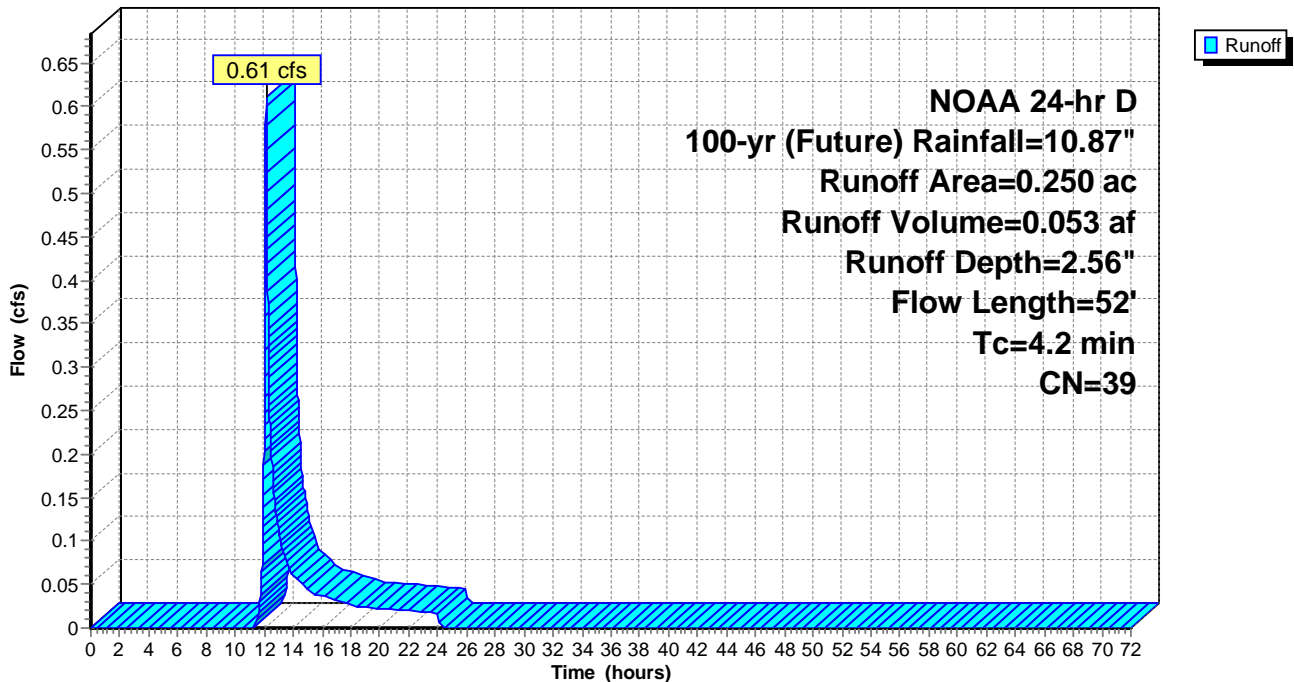
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
0.070	39	>75% Grass cover, Good, HSG A
* 0.180	39	>75% Grass cover, Good, HSG URBAN
0.250	39	Weighted Average
0.250		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.4	39	0.0328	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.8	13	0.1565	0.29		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
4.2	52	Total			

Subcatchment EA-3p: EA-3 Pervious

Hydrograph



Pre-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

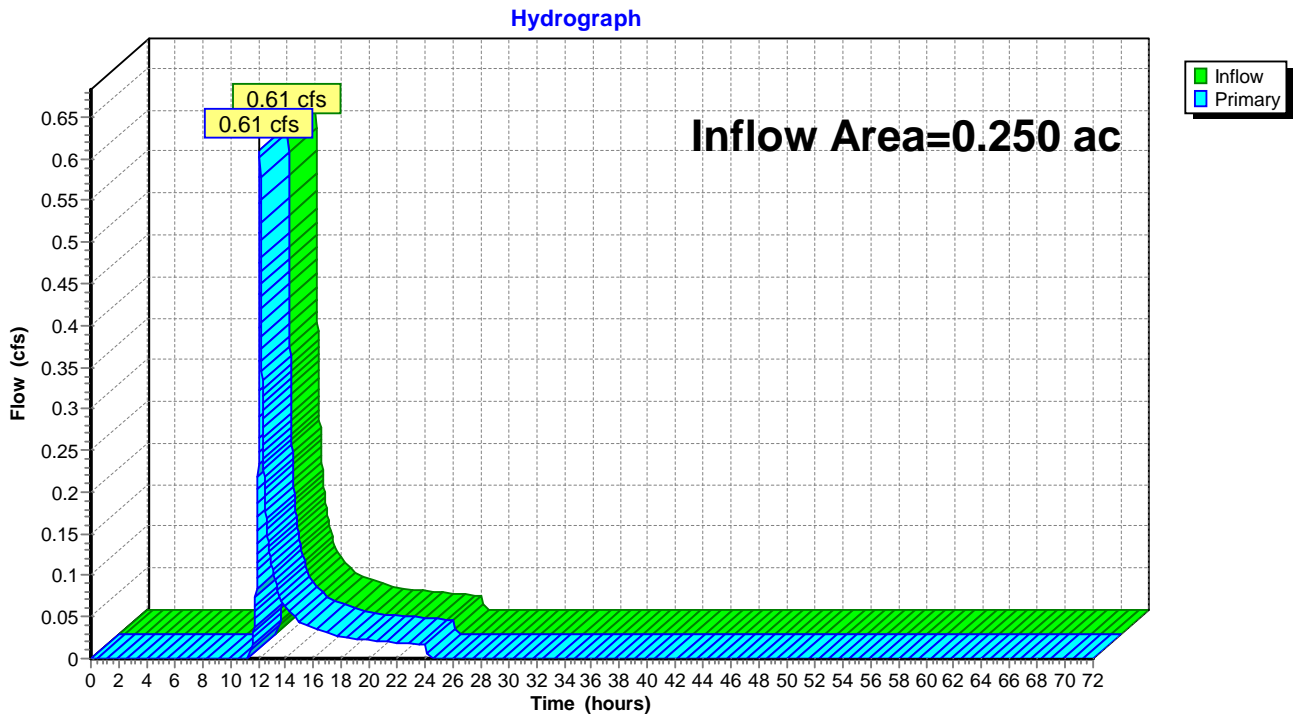
Printed 10/10/2025

Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.250 ac, 0.00% Impervious, Inflow Depth = 2.56" for 100-yr (Future) event
Inflow = 0.61 cfs @ 12.13 hrs, Volume= 0.053 af
Primary = 0.61 cfs @ 12.13 hrs, Volume= 0.053 af, Atten= 0%, Lag= 0.0 min

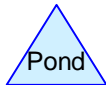
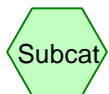
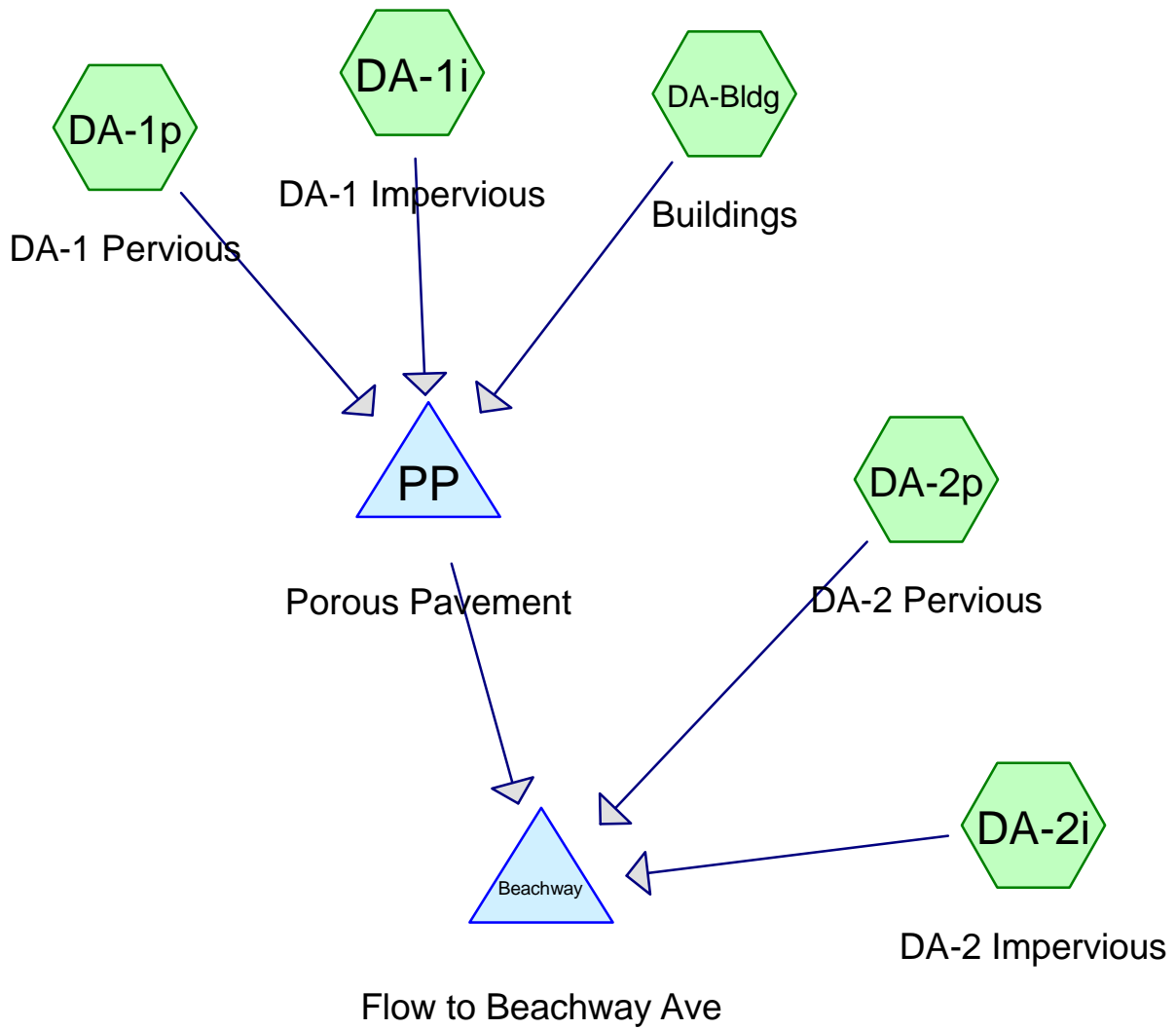
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



APPENDIX C

POST-DEVELOPMENT DRAINAGE ANALYSIS (CURRENT)



Routing Diagram for Post-Development (Current)
 Prepared by MidAtlantic Engineering Partners, Printed 10/10/2025
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Post-Development (Current)

Prepared by MidAtlantic Engineering Partners
 HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 3.08 cfs @ 1.12 hrs, Volume= 0.109 af, Depth= 1.03"

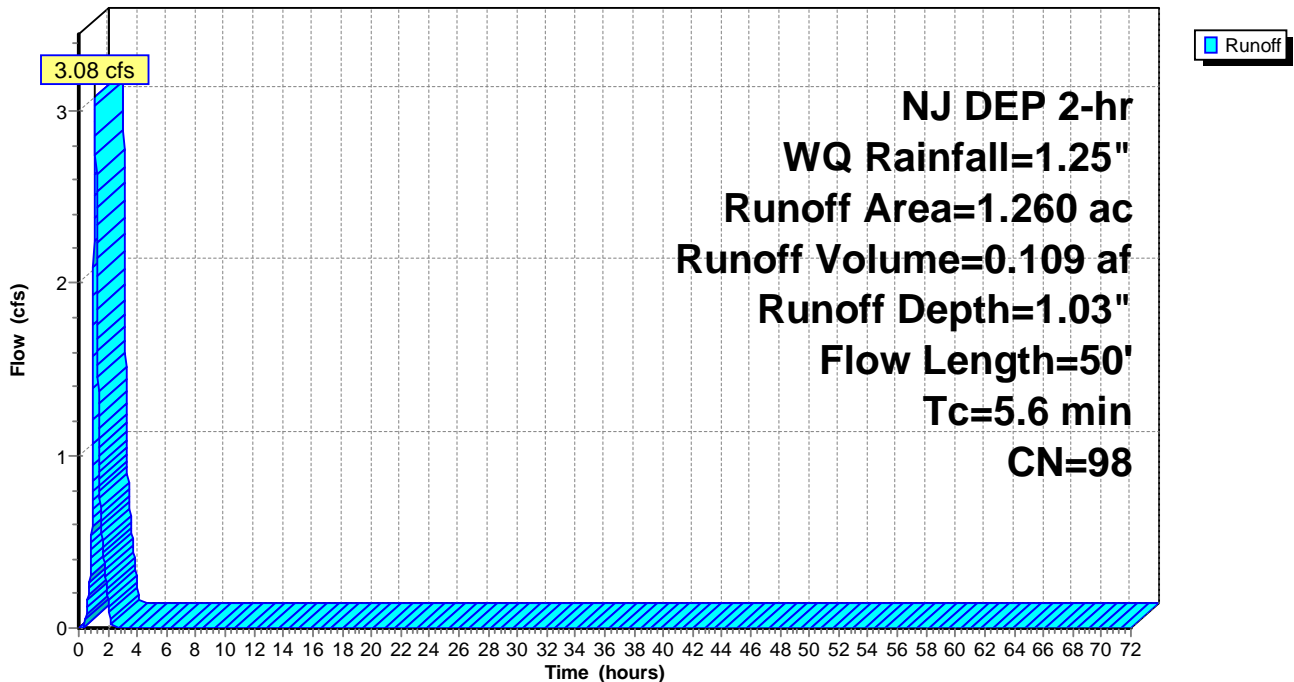
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-1p: DA-1 Pervious

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

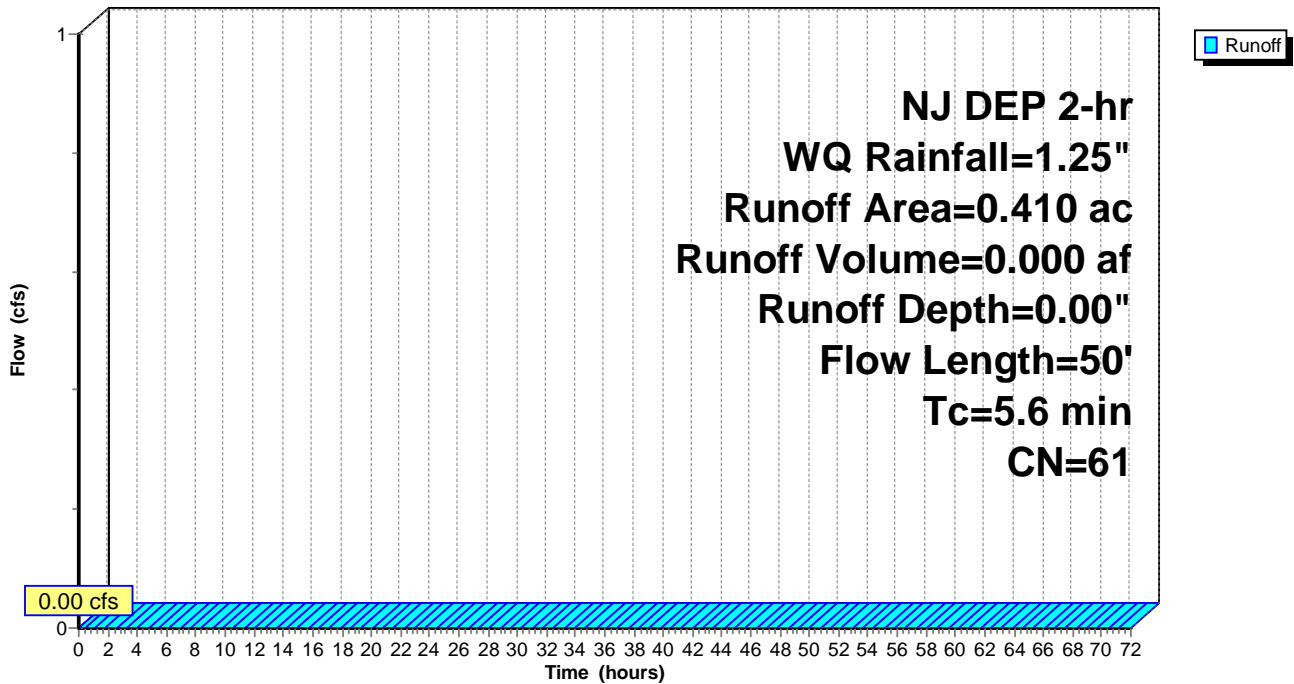
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 0.46 cfs @ 1.08 hrs, Volume= 0.013 af, Depth= 1.03"

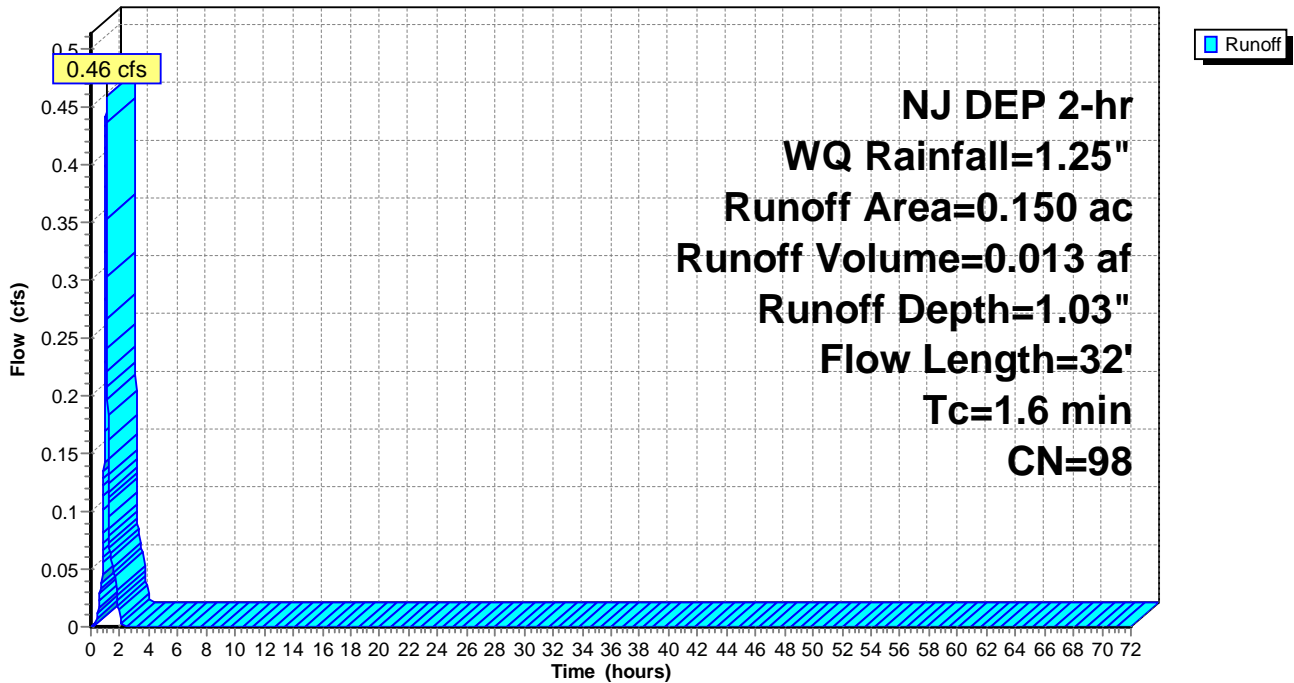
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners
 HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 0.13 cfs @ 1.09 hrs, Volume= 0.003 af, Depth= 0.17"

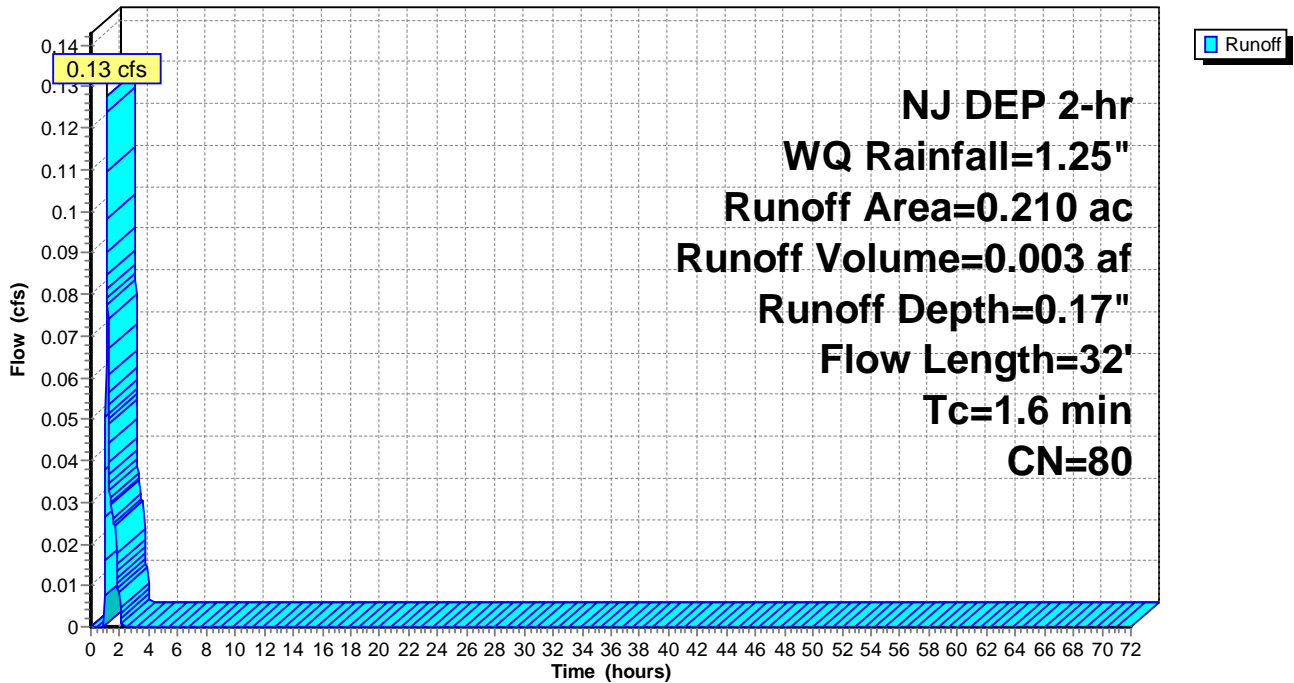
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 1.91 cfs @ 1.08 hrs, Volume= 0.053 af, Depth= 1.03"

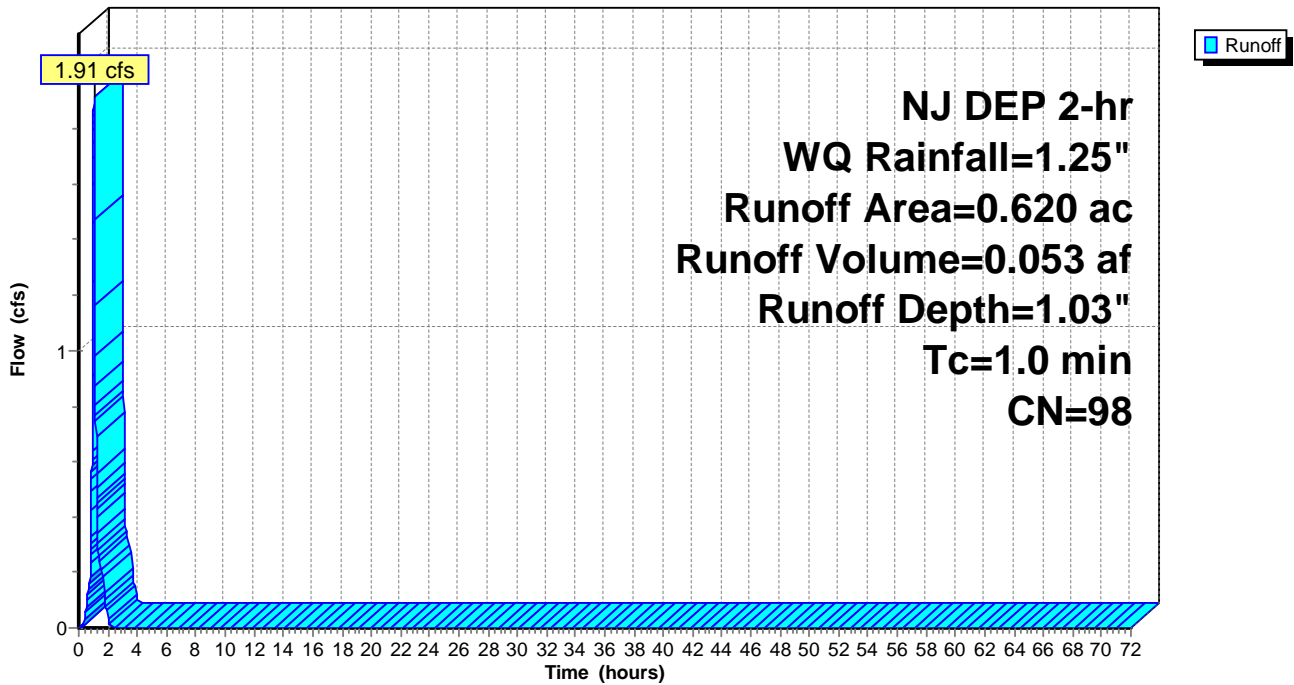
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NJ DEP 2-hr WQ Rainfall=1.25"

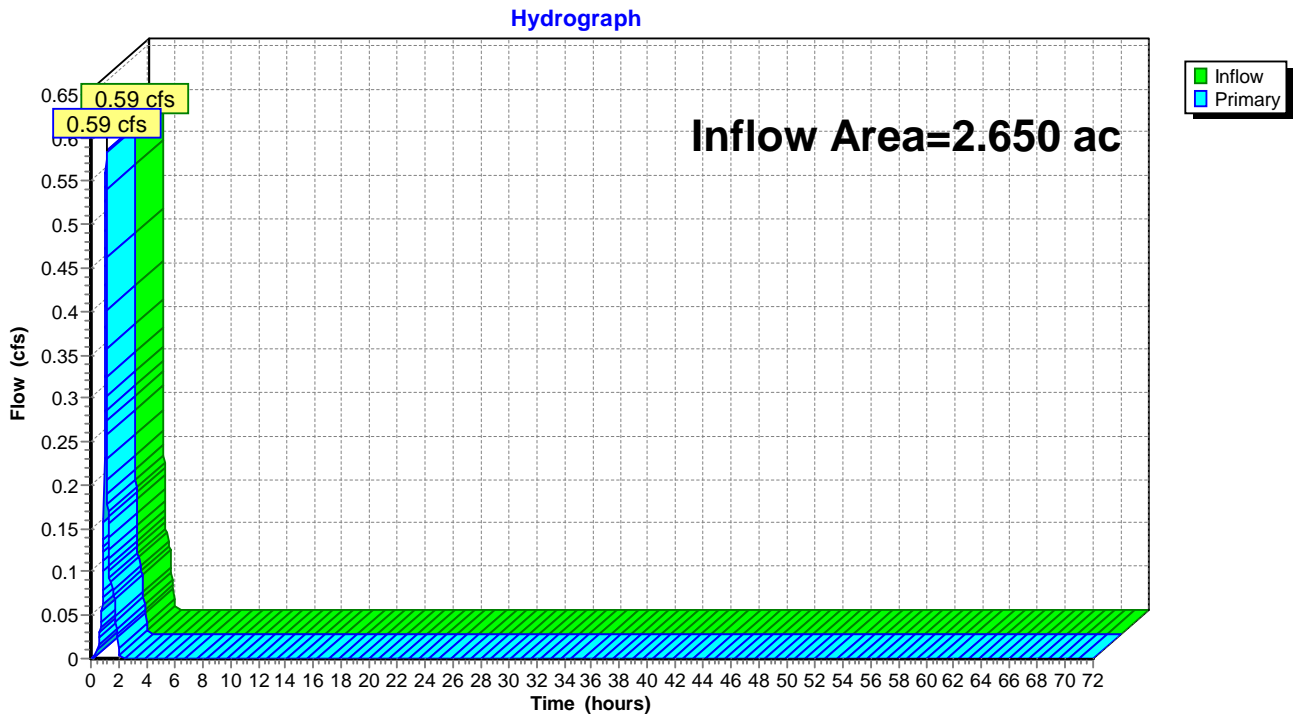
Printed 10/10/2025

Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth = 0.07" for WQ event
Inflow = 0.59 cfs @ 1.09 hrs, Volume= 0.016 af
Primary = 0.59 cfs @ 1.09 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 0.85" for WQ event
 Inflow = 4.80 cfs @ 1.09 hrs, Volume= 0.162 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 9.35' @ 2.62 hrs Surf.Area= 34,020 sf Storage= 7,060 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=8.83' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.00 cfs of 8.61 cfs potential flow)
- ↑ **2=Orifice/Grate** (Controls 0.00 cfs)
- ↑ **3=Orifice/Grate** (Controls 0.00 cfs)
- ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- ↑ **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

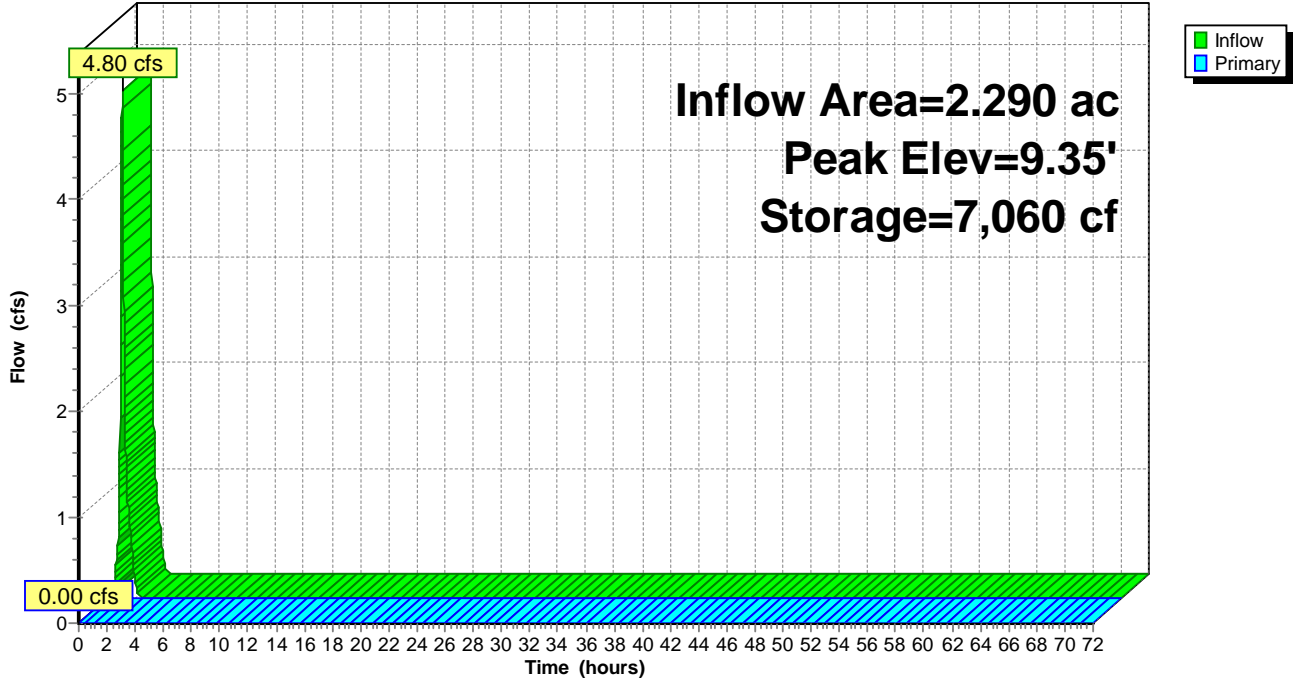
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NJ DEP 2-hr WQ Rainfall=1.25"

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Pond PP: Porous Pavement

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.22	6,980	9.34	0.00
4.00	0.00	7,060	9.35	0.00
6.00	0.00	7,060	9.35	0.00
8.00	0.00	7,060	9.35	0.00
10.00	0.00	7,060	9.35	0.00
12.00	0.00	7,060	9.35	0.00
14.00	0.00	7,060	9.35	0.00
16.00	0.00	7,060	9.35	0.00
18.00	0.00	7,060	9.35	0.00
20.00	0.00	7,060	9.35	0.00
22.00	0.00	7,060	9.35	0.00
24.00	0.00	7,060	9.35	0.00
26.00	0.00	7,060	9.35	0.00
28.00	0.00	7,060	9.35	0.00
30.00	0.00	7,060	9.35	0.00
32.00	0.00	7,060	9.35	0.00
34.00	0.00	7,060	9.35	0.00
36.00	0.00	7,060	9.35	0.00
38.00	0.00	7,060	9.35	0.00
40.00	0.00	7,060	9.35	0.00
42.00	0.00	7,060	9.35	0.00
44.00	0.00	7,060	9.35	0.00
46.00	0.00	7,060	9.35	0.00
48.00	0.00	7,060	9.35	0.00
50.00	0.00	7,060	9.35	0.00
52.00	0.00	7,060	9.35	0.00
54.00	0.00	7,060	9.35	0.00
56.00	0.00	7,060	9.35	0.00
58.00	0.00	7,060	9.35	0.00
60.00	0.00	7,060	9.35	0.00
62.00	0.00	7,060	9.35	0.00
64.00	0.00	7,060	9.35	0.00
66.00	0.00	7,060	9.35	0.00
68.00	0.00	7,060	9.35	0.00
70.00	0.00	7,060	9.35	0.00
72.00	0.00	7,060	9.35	0.00

Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Printed 10/10/2025

Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 3.32 cfs @ 12.13 hrs, Volume= 0.325 af, Depth= 3.10"

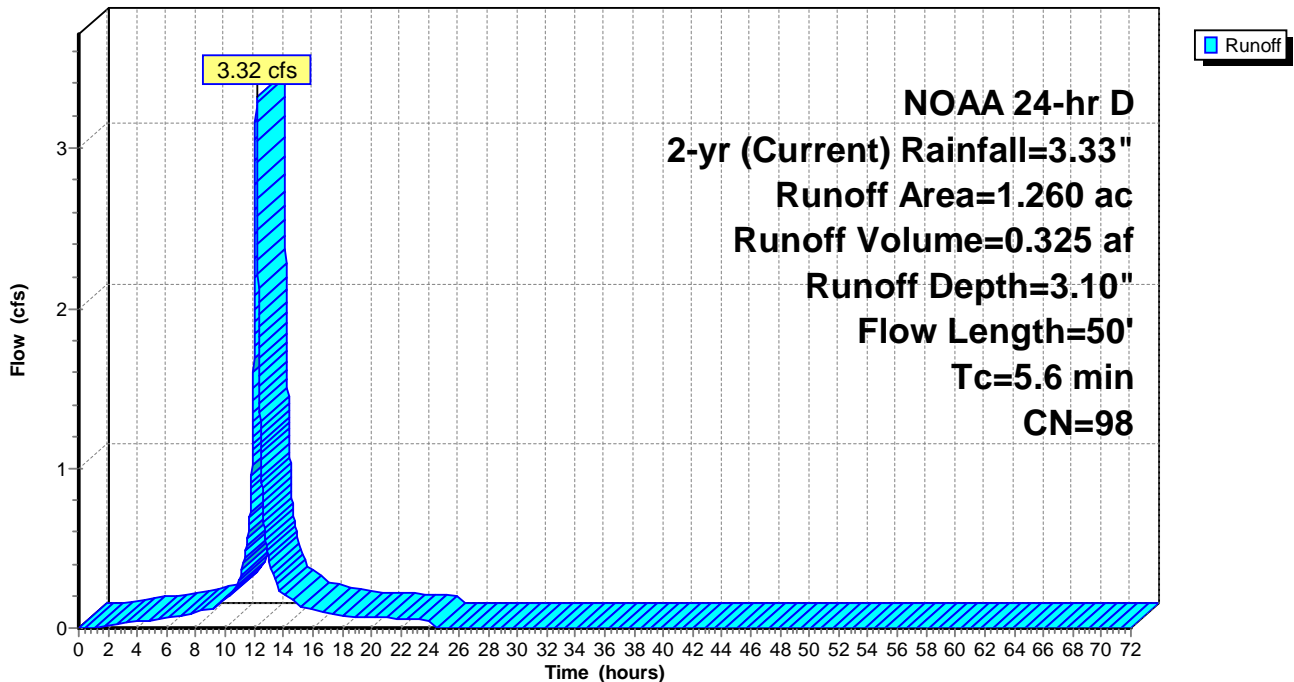
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

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Summary for Subcatchment DA-1p: DA-1 Pervious

Runoff = 0.13 cfs @ 12.15 hrs, Volume= 0.017 af, Depth= 0.50"

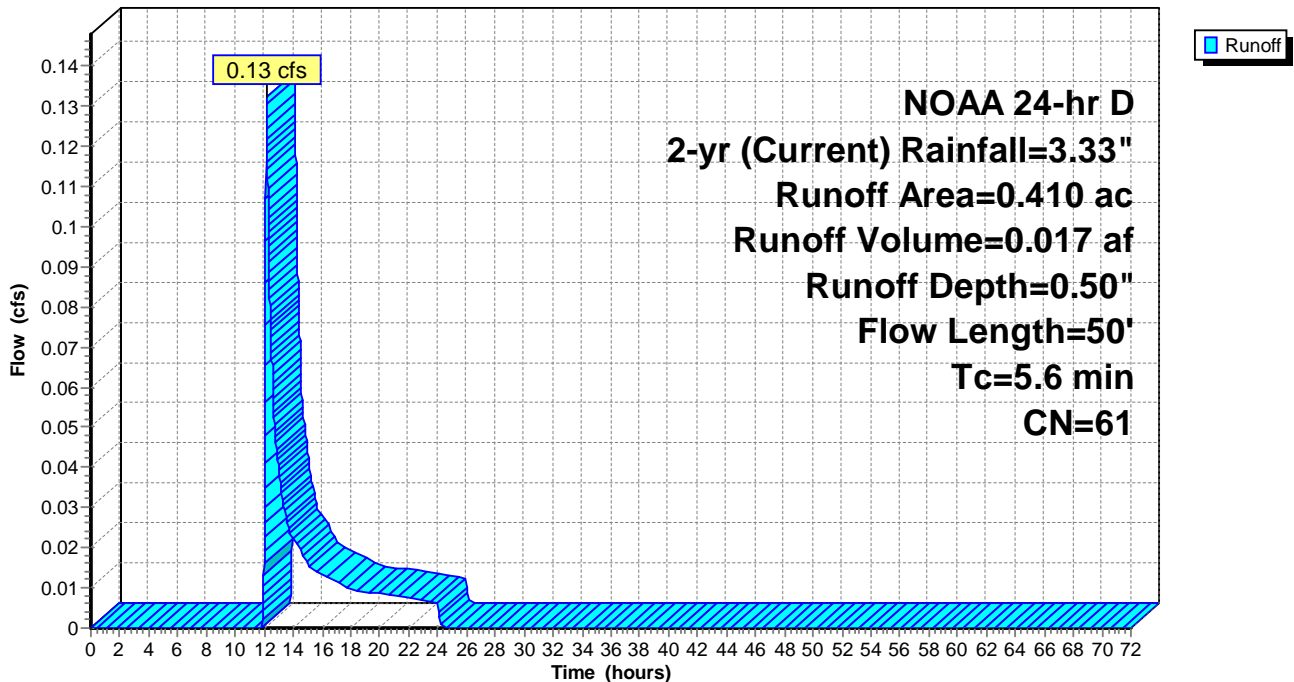
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Printed 10/10/2025

Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 0.51 cfs @ 12.10 hrs, Volume= 0.039 af, Depth= 3.10"

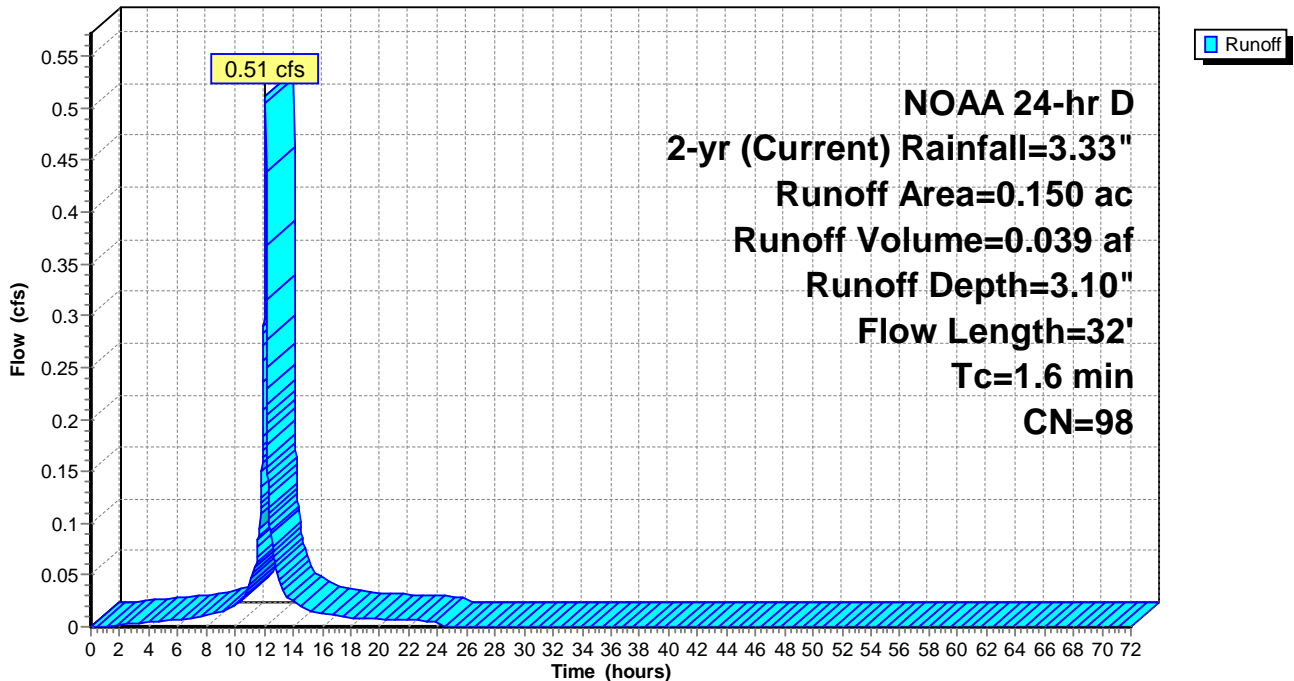
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 0.41 cfs @ 12.10 hrs, Volume= 0.026 af, Depth= 1.50"

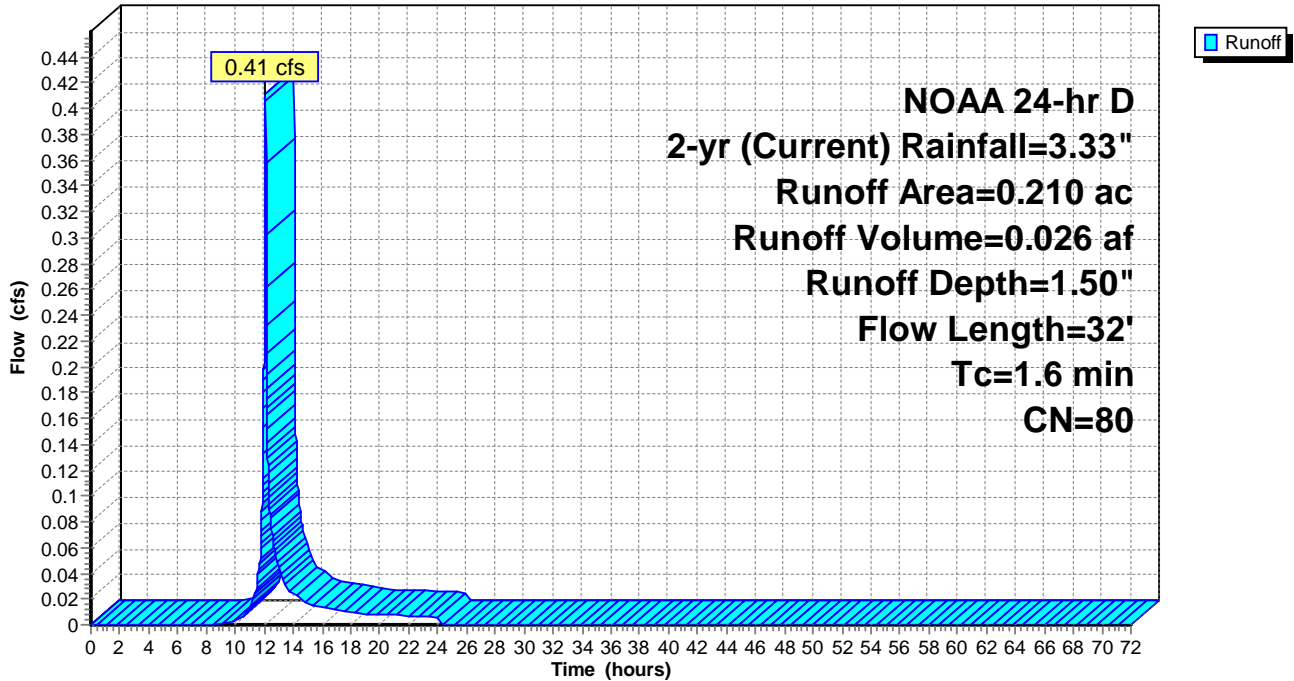
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment DA-Bldg: Buildings

Runoff = 2.15 cfs @ 12.10 hrs, Volume= 0.160 af, Depth= 3.10"

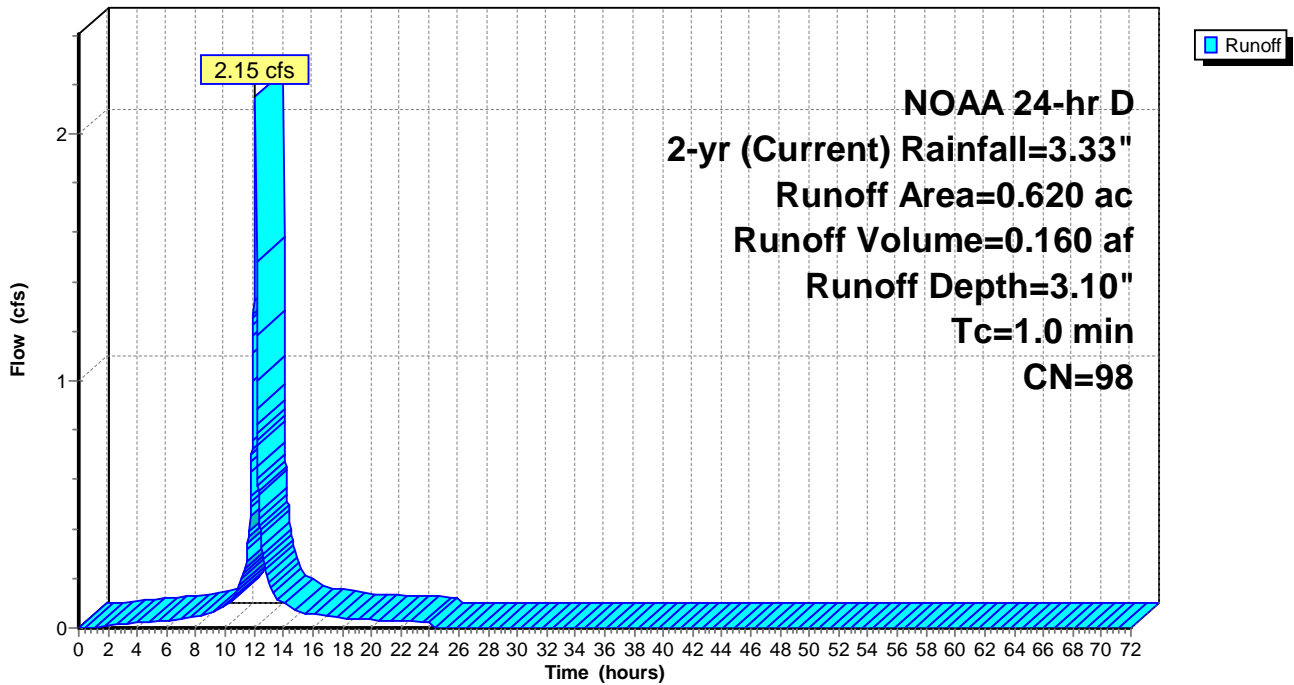
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

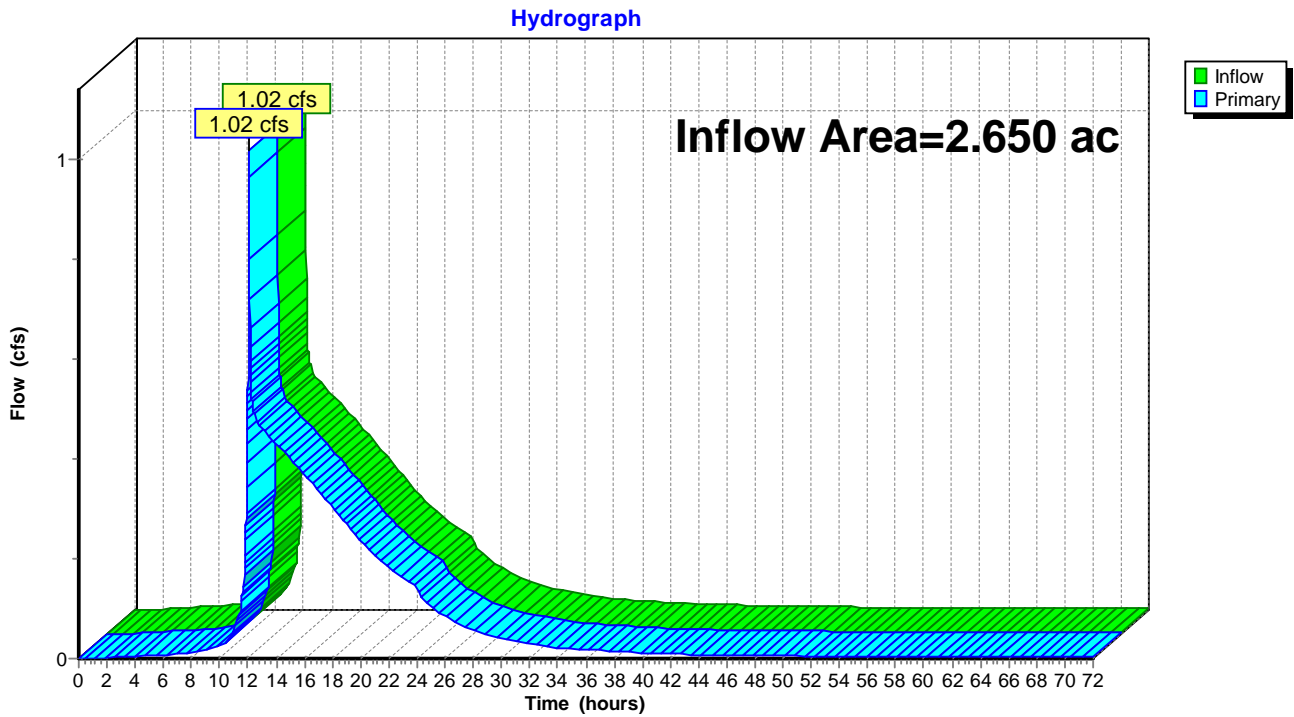
Printed 10/10/2025

Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth > 1.80" for 2-yr (Current) event
Inflow = 1.02 cfs @ 12.10 hrs, Volume= 0.397 af
Primary = 1.02 cfs @ 12.10 hrs, Volume= 0.397 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Current)

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 2.63" for 2-yr (Current) event
 Inflow = 5.30 cfs @ 12.10 hrs, Volume= 0.502 af
 Outflow = 0.38 cfs @ 13.63 hrs, Volume= 0.332 af, Atten= 93%, Lag= 91.4 min
 Primary = 0.38 cfs @ 13.63 hrs, Volume= 0.332 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 9.90' @ 13.63 hrs Surf.Area= 34,020 sf Storage= 14,545 cf

Plug-Flow detention time= 566.2 min calculated for 0.332 af (66% of inflow)
 Center-of-Mass det. time= 454.2 min (1,218.2 - 764.0)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.38 cfs @ 13.63 hrs HW=9.90' (Free Discharge)

- 1=Culvert (Passes 0.38 cfs of 10.56 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.38 cfs @ 2.81 fps)
- 3=Orifice/Grate (Controls 0.00 cfs)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

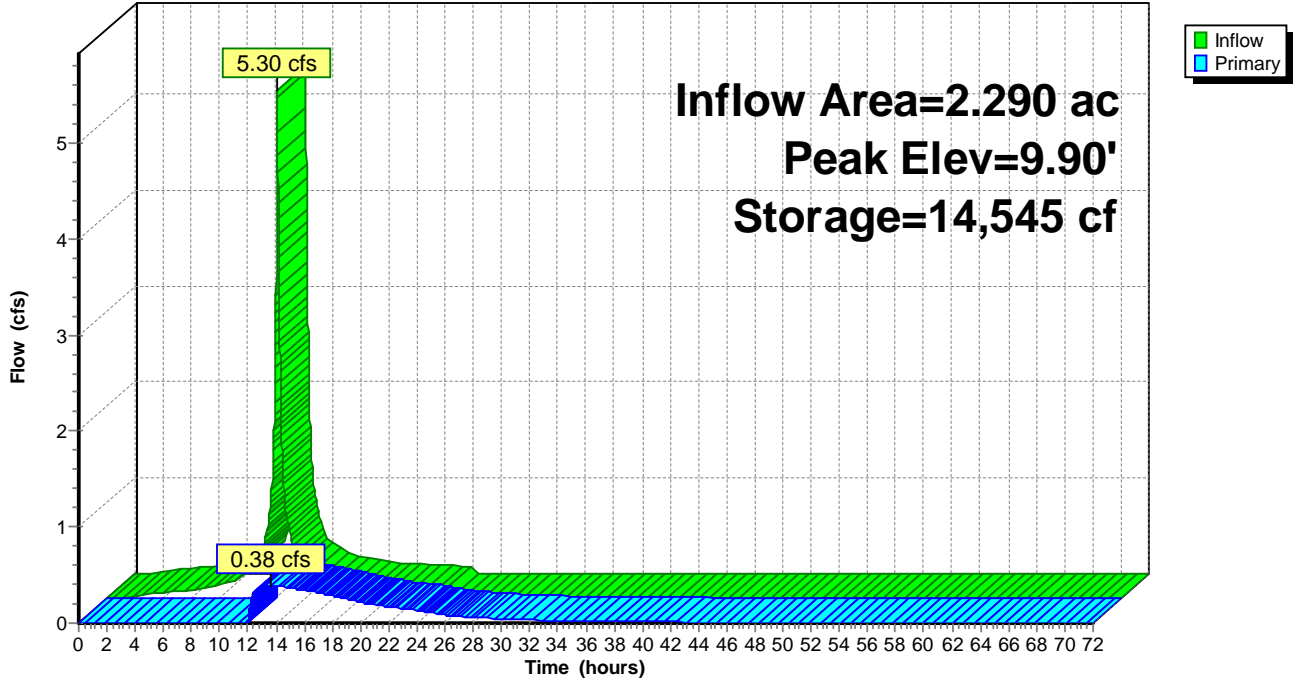
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NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Post-Development (Current)

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.02	35	8.83	0.00
4.00	0.06	339	8.85	0.00
6.00	0.09	871	8.89	0.00
8.00	0.15	1,700	8.95	0.00
10.00	0.27	3,077	9.06	0.00
12.00	3.15	8,182	9.43	0.02
14.00	0.33	14,506	9.90	0.38
16.00	0.18	13,601	9.83	0.34
18.00	0.12	12,451	9.74	0.29
20.00	0.11	11,458	9.67	0.22
22.00	0.09	10,786	9.62	0.17
24.00	0.08	10,307	9.59	0.13
26.00	0.00	9,566	9.53	0.08
28.00	0.00	9,071	9.50	0.06
30.00	0.00	8,731	9.47	0.04
32.00	0.00	8,486	9.45	0.03
34.00	0.00	8,301	9.44	0.02
36.00	0.00	8,159	9.43	0.02
38.00	0.00	8,043	9.42	0.01
40.00	0.00	7,949	9.41	0.01
42.00	0.00	7,872	9.41	0.01
44.00	0.00	7,807	9.40	0.01
46.00	0.00	7,751	9.40	0.01
48.00	0.00	7,701	9.40	0.01
50.00	0.00	7,658	9.39	0.01
52.00	0.00	7,619	9.39	0.00
54.00	0.00	7,586	9.39	0.00
56.00	0.00	7,556	9.39	0.00
58.00	0.00	7,530	9.38	0.00
60.00	0.00	7,507	9.38	0.00
62.00	0.00	7,487	9.38	0.00
64.00	0.00	7,469	9.38	0.00
66.00	0.00	7,451	9.38	0.00
68.00	0.00	7,435	9.38	0.00
70.00	0.00	7,419	9.38	0.00
72.00	0.00	7,404	9.37	0.00

Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Printed 10/10/2025

Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 5.17 cfs @ 12.13 hrs, Volume= 0.516 af, Depth= 4.91"

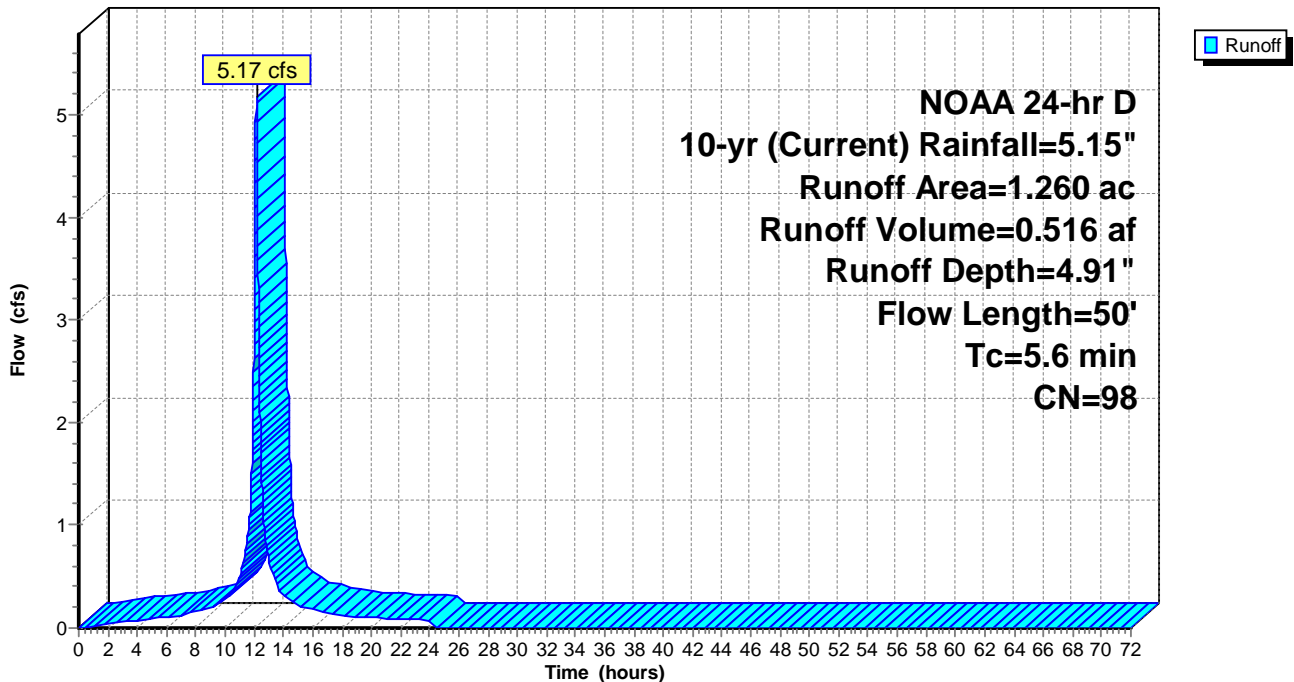
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Printed 10/10/2025

Summary for Subcatchment DA-1p: DA-1 Pervious

Runoff = 0.53 cfs @ 12.14 hrs, Volume= 0.050 af, Depth= 1.46"

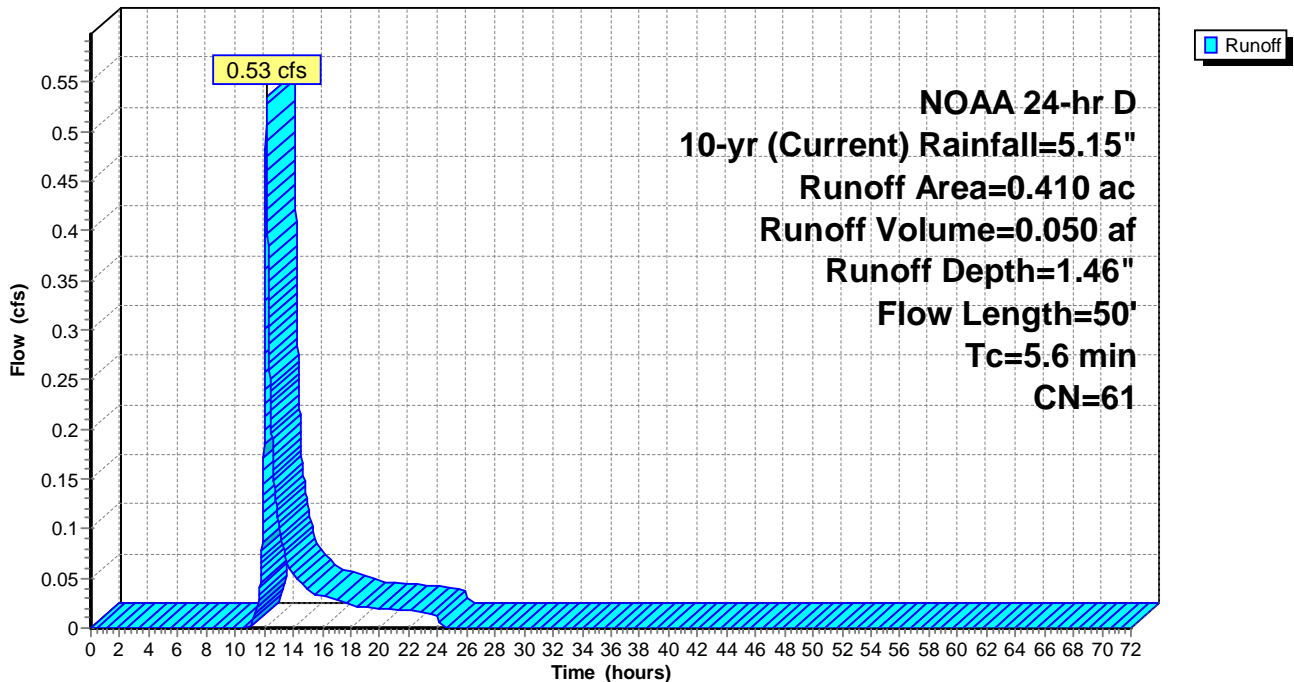
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 0.80 cfs @ 12.10 hrs, Volume= 0.061 af, Depth= 4.91"

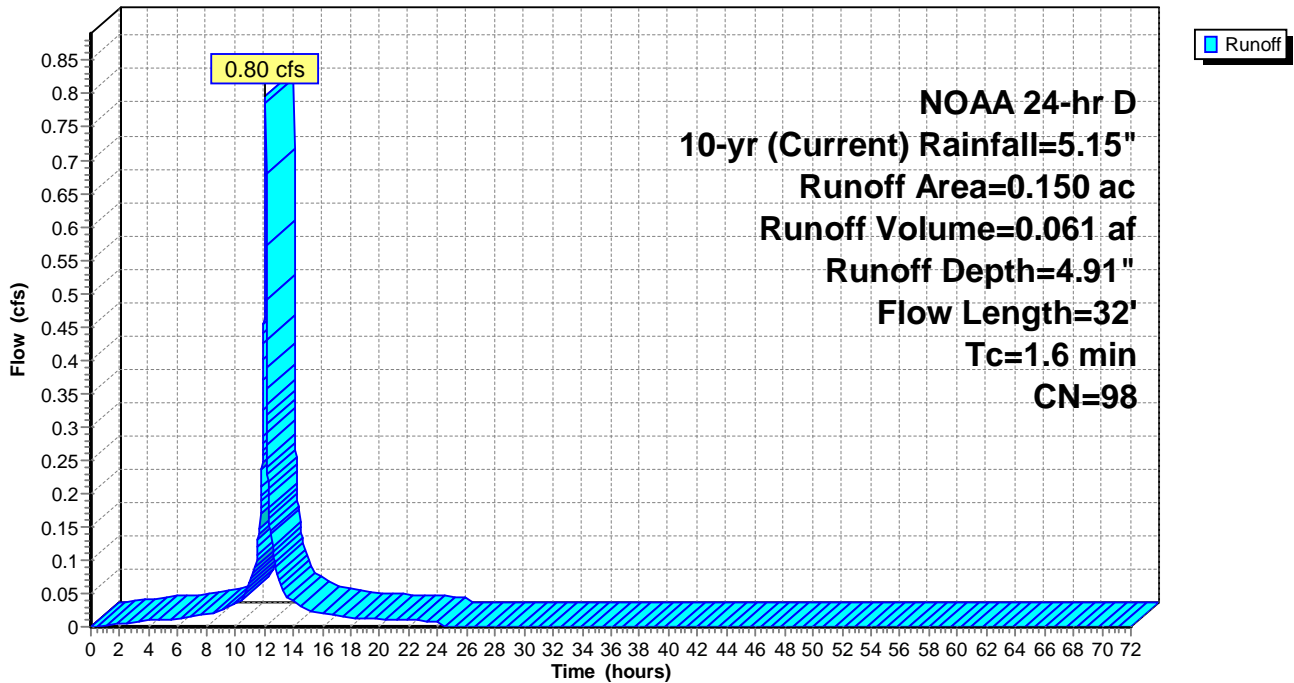
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Prepared by MidAtlantic Engineering Partners

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Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 0.81 cfs @ 12.10 hrs, Volume= 0.053 af, Depth= 3.02"

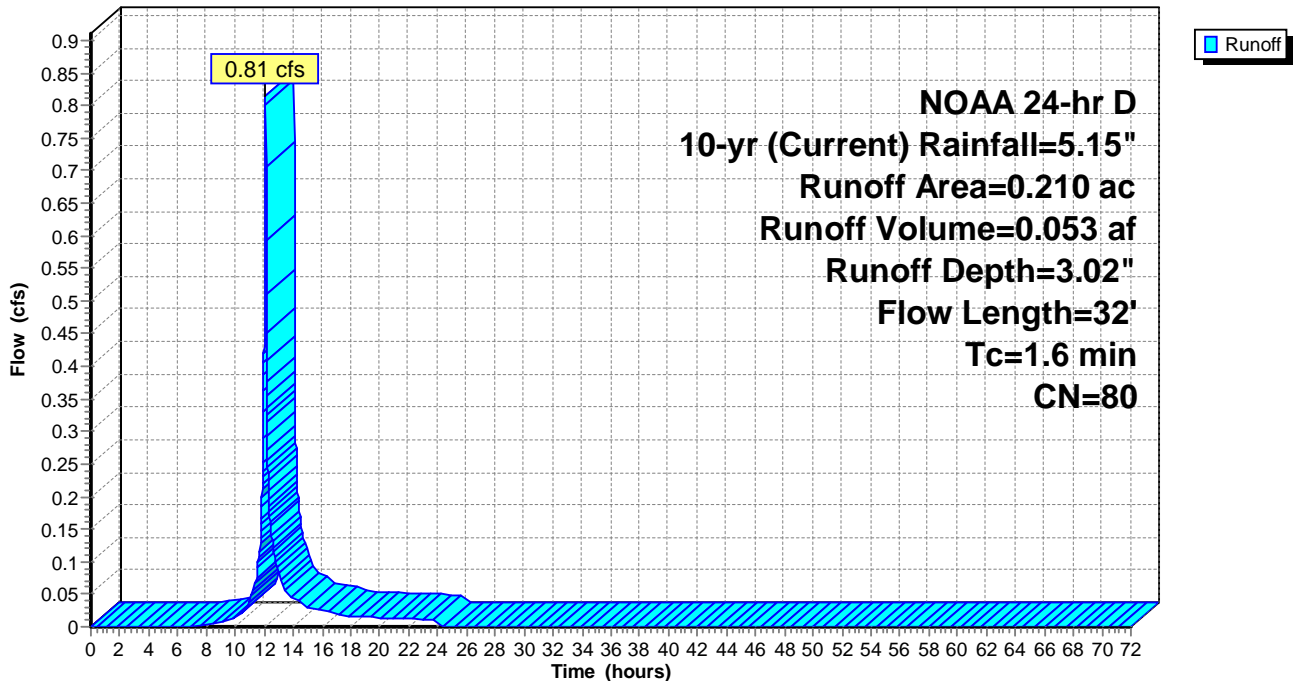
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Printed 10/10/2025

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 3.34 cfs @ 12.10 hrs, Volume= 0.254 af, Depth= 4.91"

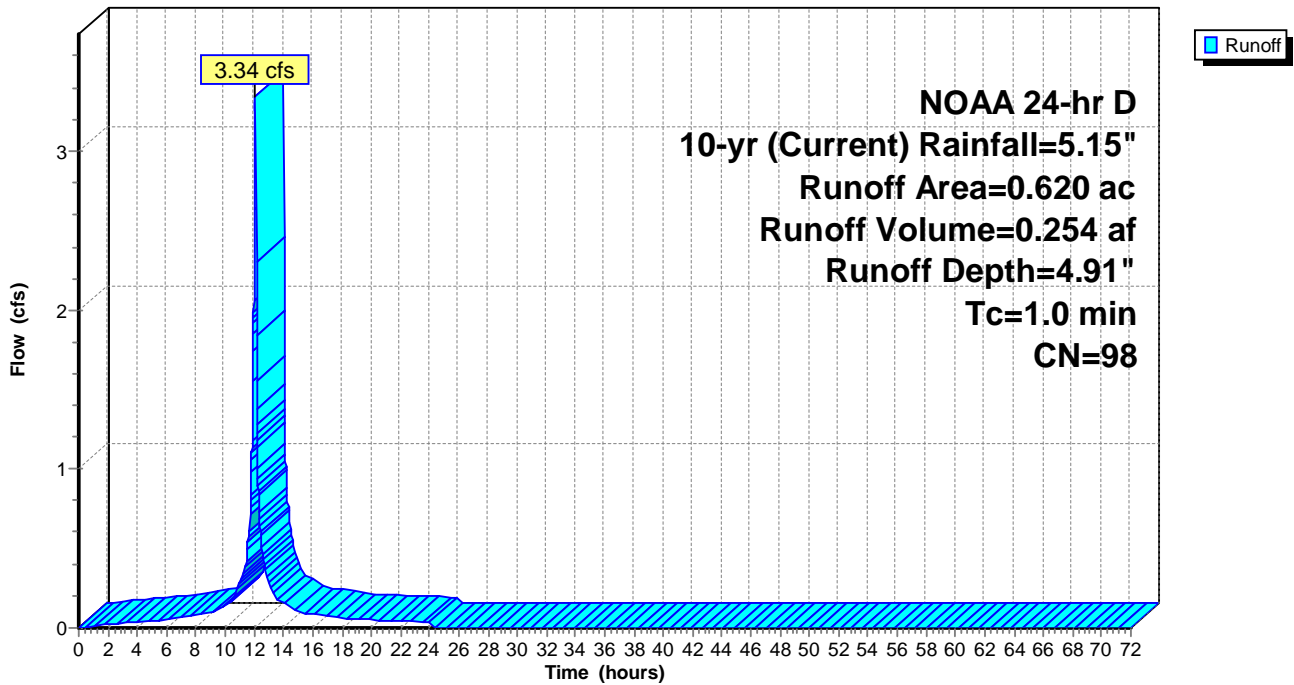
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

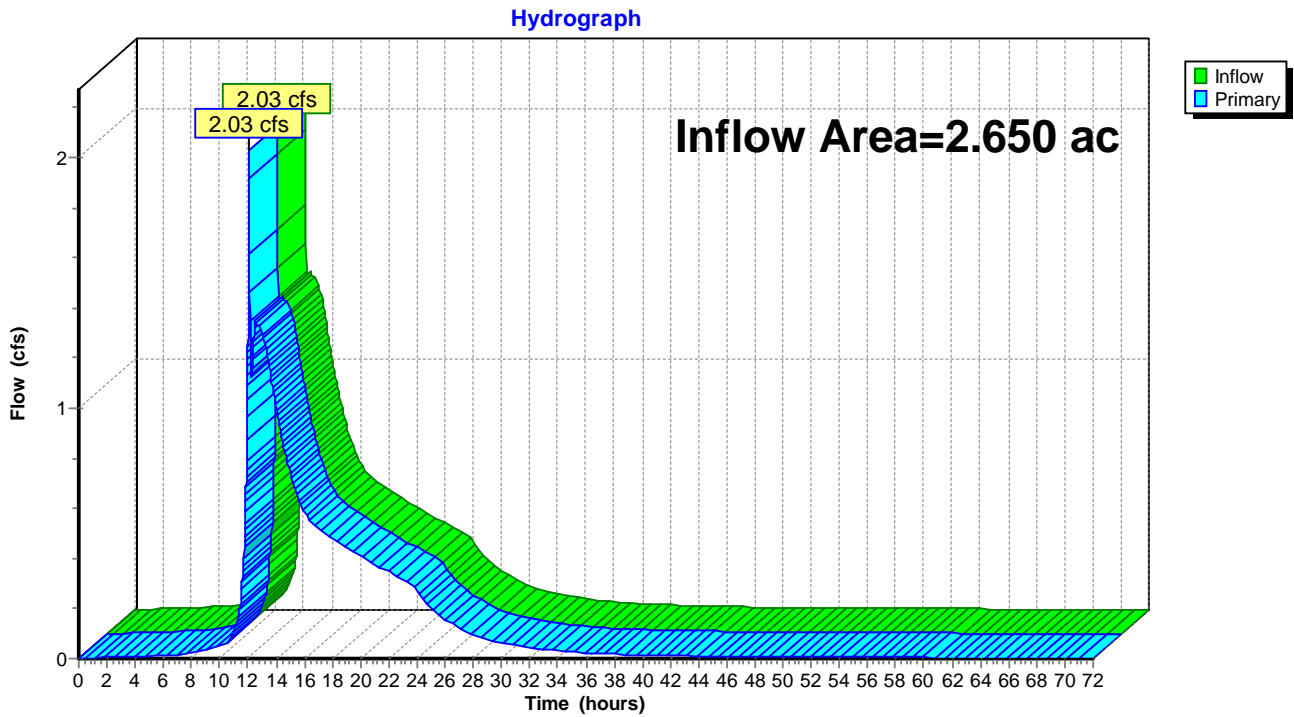
Printed 10/10/2025

Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth > 3.46" for 10-yr (Current) event
Inflow = 2.03 cfs @ 12.10 hrs, Volume= 0.764 af
Primary = 2.03 cfs @ 12.10 hrs, Volume= 0.764 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Current)

NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 4.29" for 10-yr (Current) event
 Inflow = 8.56 cfs @ 12.10 hrs, Volume= 0.820 af
 Outflow = 1.16 cfs @ 12.92 hrs, Volume= 0.649 af, Atten= 86%, Lag= 49.3 min
 Primary = 1.16 cfs @ 12.92 hrs, Volume= 0.649 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.41' @ 12.92 hrs Surf.Area= 34,020 sf Storage= 21,492 cf

Plug-Flow detention time= 469.4 min calculated for 0.649 af (79% of inflow)
 Center-of-Mass det. time= 381.6 min (1,139.5 - 757.9)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.16 cfs @ 12.92 hrs HW=10.41' (Free Discharge)

- 1=Culvert (Passes 1.16 cfs of 11.37 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.61 cfs @ 4.44 fps)
- 3=Orifice/Grate (Orifice Controls 0.55 cfs @ 1.96 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

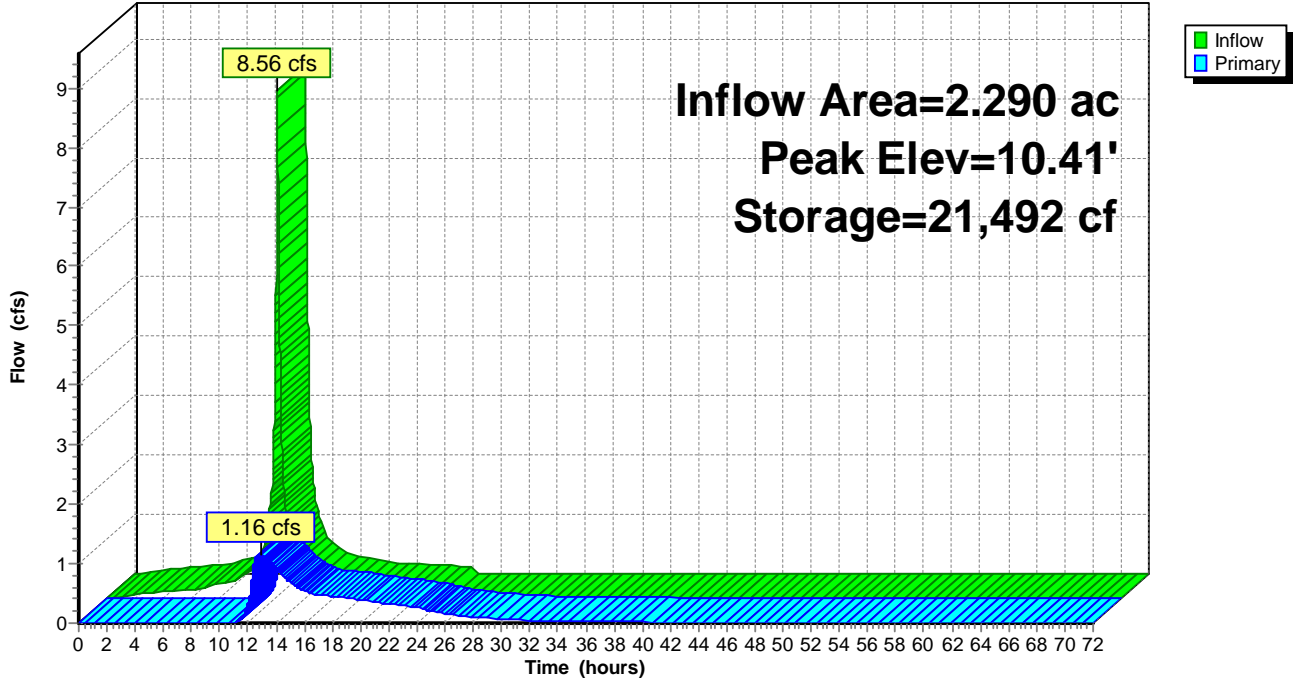
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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Post-Development (Current)

NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.06	141	8.84	0.00
4.00	0.11	785	8.89	0.00
6.00	0.15	1,744	8.96	0.00
8.00	0.24	3,141	9.06	0.00
10.00	0.43	5,373	9.22	0.00
12.00	5.09	13,216	9.80	0.32
14.00	0.53	20,273	10.32	0.92
16.00	0.30	18,013	10.15	0.54
18.00	0.20	16,314	10.03	0.45
20.00	0.17	14,617	9.90	0.39
22.00	0.15	13,204	9.80	0.32
24.00	0.12	12,060	9.72	0.26
26.00	0.00	10,624	9.61	0.16
28.00	0.00	9,742	9.55	0.09
30.00	0.00	9,187	9.51	0.06
32.00	0.00	8,813	9.48	0.04
34.00	0.00	8,546	9.46	0.03
36.00	0.00	8,347	9.44	0.02
38.00	0.00	8,194	9.43	0.02
40.00	0.00	8,072	9.42	0.02
42.00	0.00	7,973	9.42	0.01
44.00	0.00	7,891	9.41	0.01
46.00	0.00	7,824	9.40	0.01
48.00	0.00	7,766	9.40	0.01
50.00	0.00	7,714	9.40	0.01
52.00	0.00	7,669	9.39	0.01
54.00	0.00	7,629	9.39	0.01
56.00	0.00	7,594	9.39	0.00
58.00	0.00	7,564	9.39	0.00
60.00	0.00	7,537	9.38	0.00
62.00	0.00	7,513	9.38	0.00
64.00	0.00	7,492	9.38	0.00
66.00	0.00	7,473	9.38	0.00
68.00	0.00	7,456	9.38	0.00
70.00	0.00	7,439	9.38	0.00
72.00	0.00	7,423	9.38	0.00

Post-Development (Current)

Prepared by MidAtlantic Engineering Partners
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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 6.37 cfs @ 12.13 hrs, Volume= 0.641 af, Depth= 6.10"

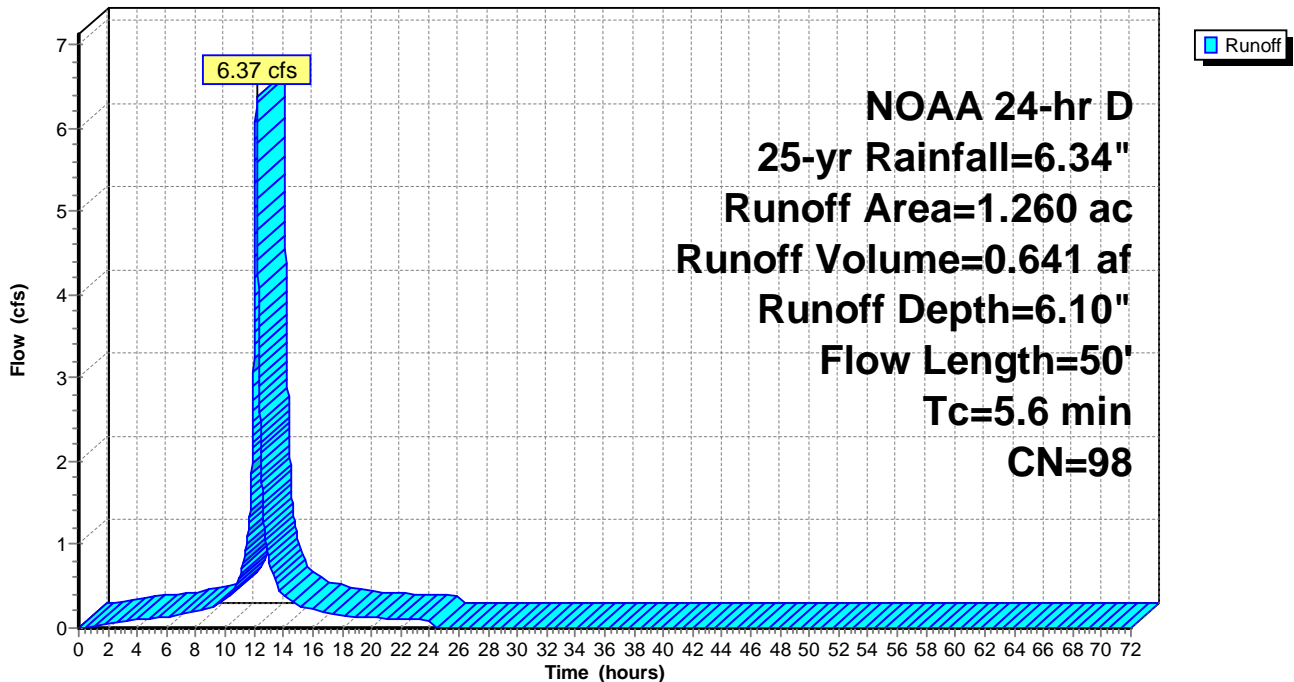
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-1p: DA-1 Pervious

Runoff = 0.85 cfs @ 12.14 hrs, Volume= 0.076 af, Depth= 2.24"

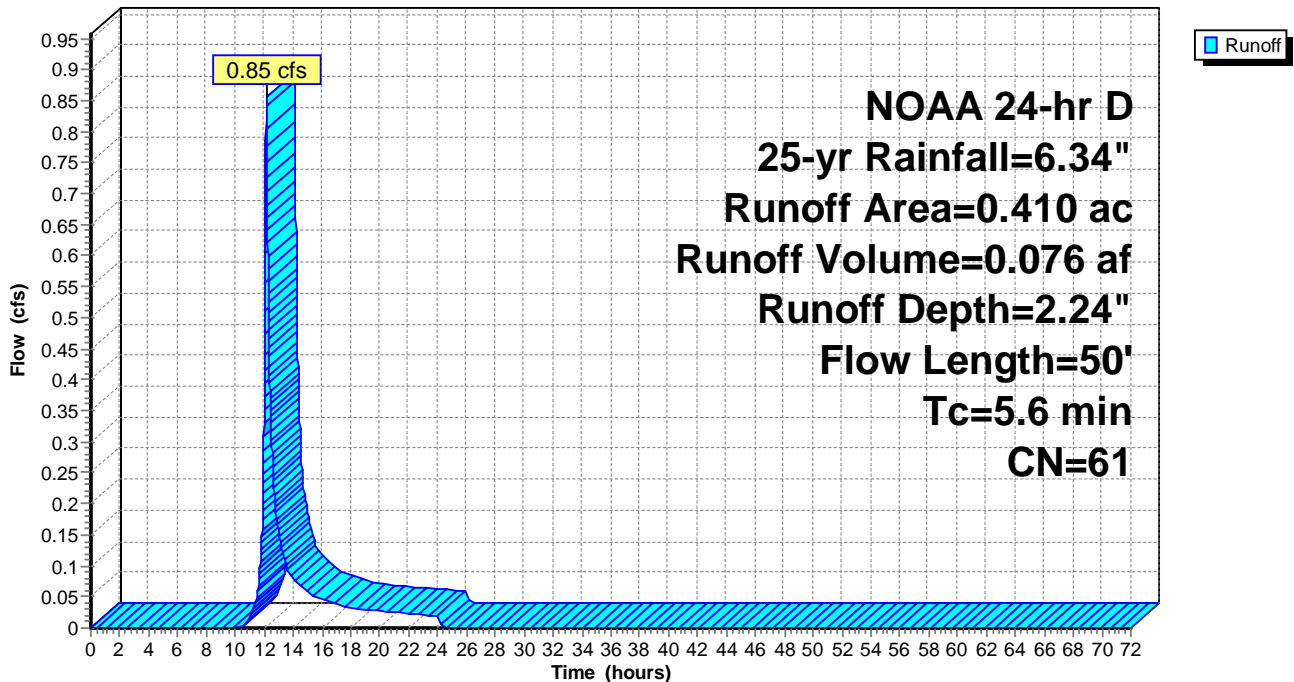
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 0.98 cfs @ 12.10 hrs, Volume= 0.076 af, Depth= 6.10"

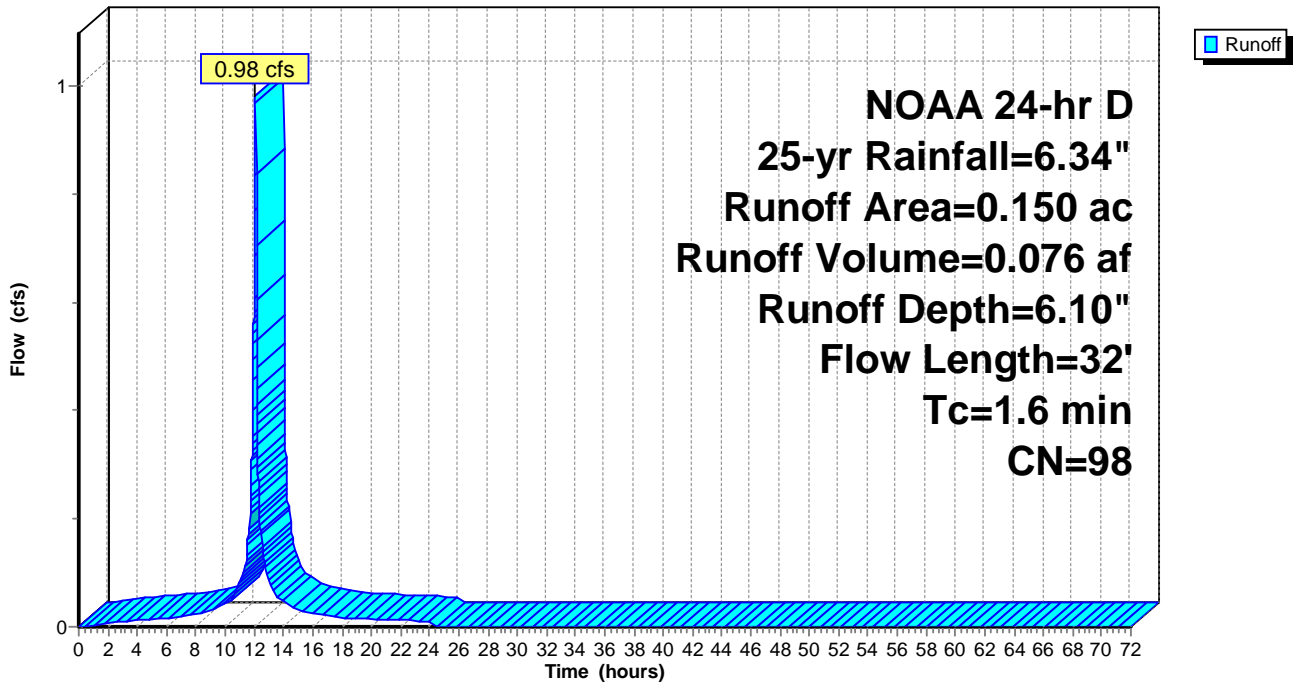
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 1.08 cfs @ 12.10 hrs, Volume= 0.072 af, Depth= 4.09"

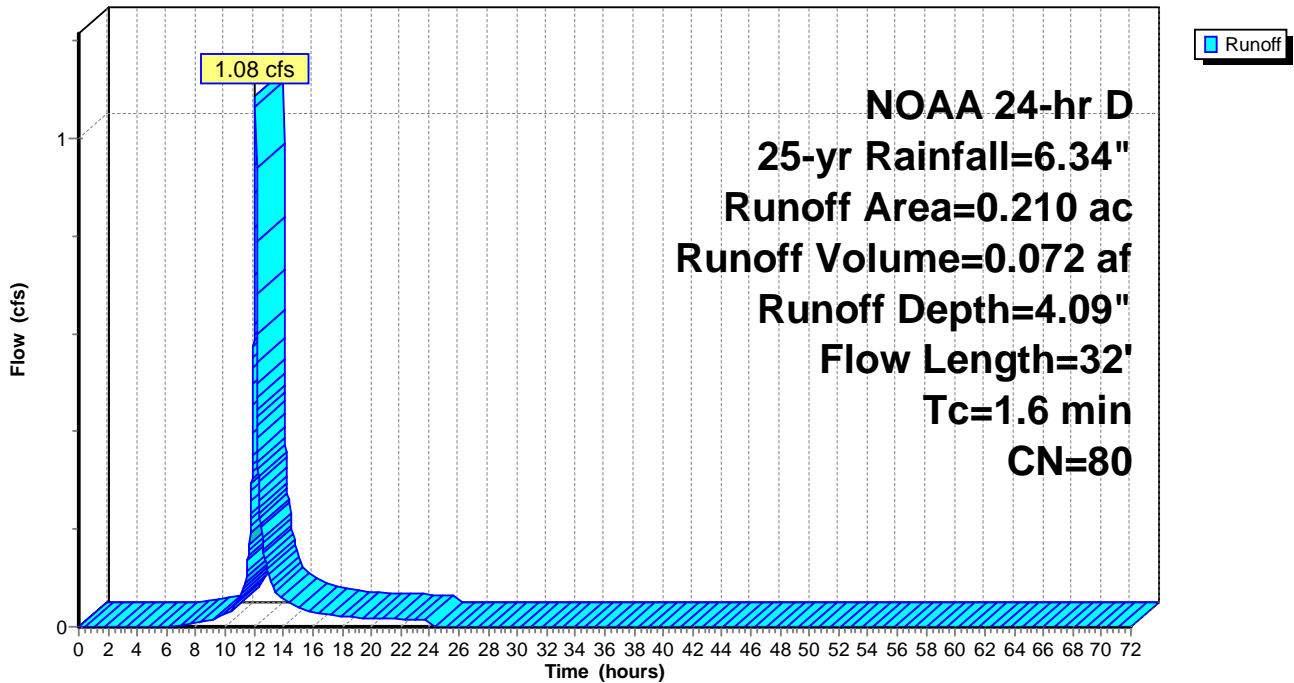
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 4.12 cfs @ 12.10 hrs, Volume= 0.315 af, Depth= 6.10"

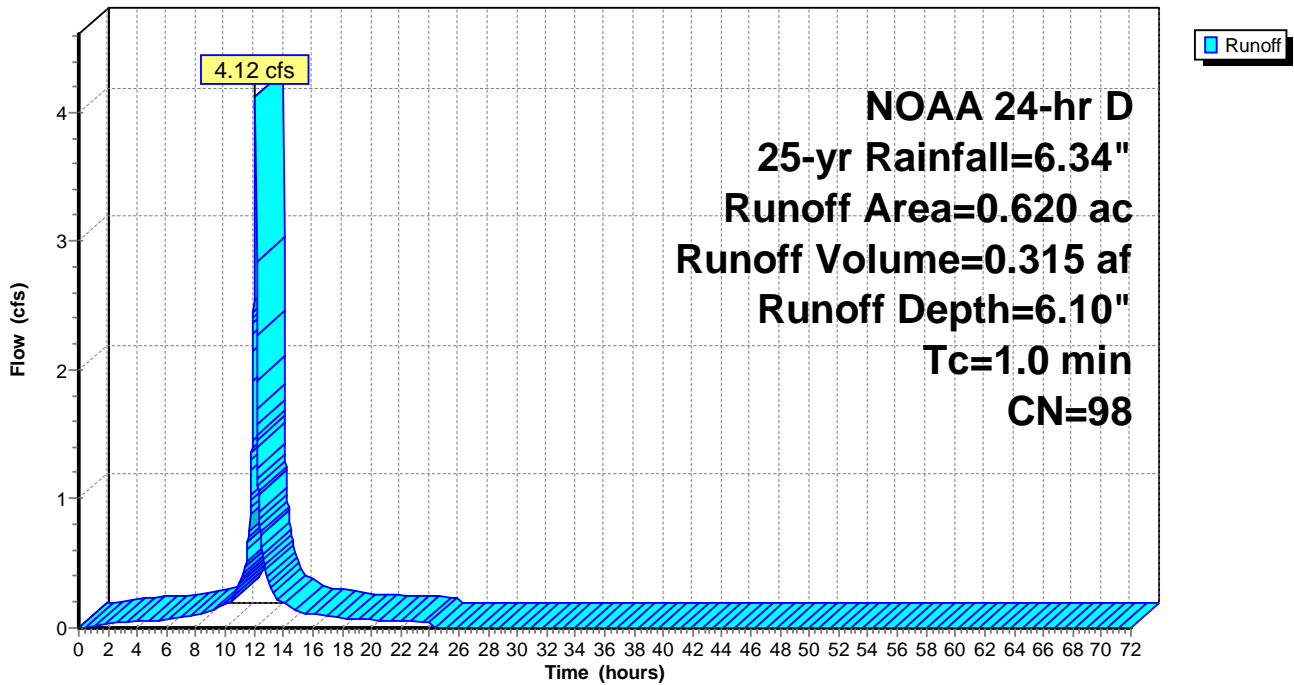
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NOAA 24-hr D 25-yr Rainfall=6.34"

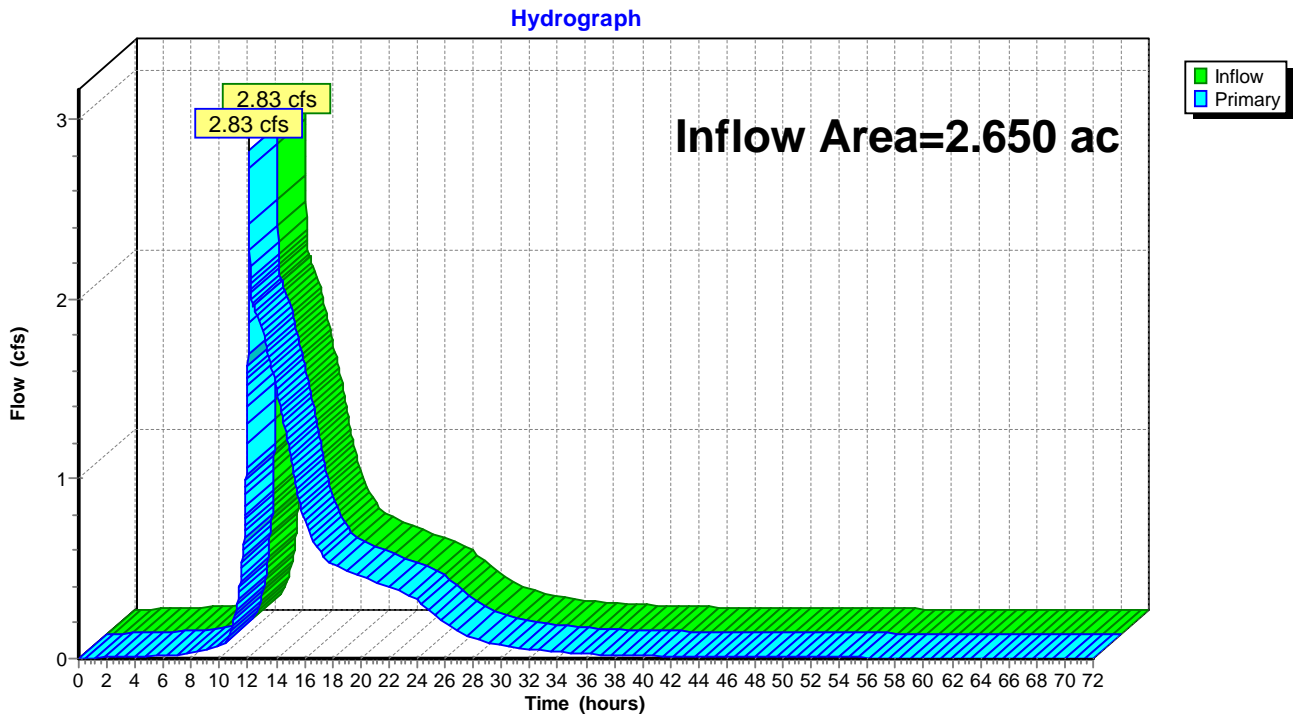
Printed 10/10/2025

Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth > 4.57" for 25-yr event
Inflow = 2.83 cfs @ 12.11 hrs, Volume= 1.010 af
Primary = 2.83 cfs @ 12.11 hrs, Volume= 1.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Current)

NOAA 24-hr D 25-yr Rainfall=6.34"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 5.41" for 25-yr event
 Inflow = 10.73 cfs @ 12.10 hrs, Volume= 1.032 af
 Outflow = 1.65 cfs @ 12.80 hrs, Volume= 0.862 af, Atten= 85%, Lag= 41.9 min
 Primary = 1.65 cfs @ 12.80 hrs, Volume= 0.862 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.72' @ 12.80 hrs Surf.Area= 34,020 sf Storage= 25,760 cf

Plug-Flow detention time= 417.9 min calculated for 0.862 af (83% of inflow)
 Center-of-Mass det. time= 341.2 min (1,096.6 - 755.4)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.65 cfs @ 12.80 hrs HW=10.72' (Free Discharge)

- ↑ **1=Culvert** (Passes 1.65 cfs of 11.84 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.71 cfs @ 5.20 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.94 cfs @ 3.35 fps)
- ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- ↑ **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

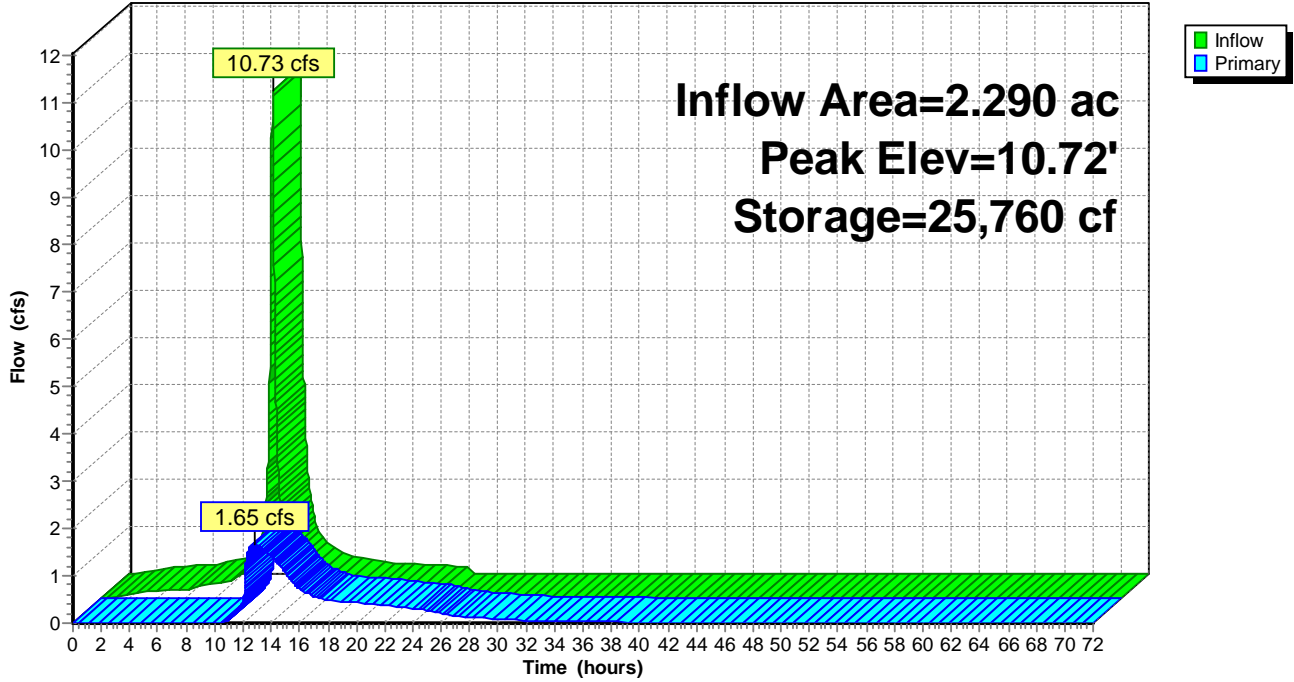
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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Post-Development (Current)

NOAA 24-hr D 25-yr Rainfall=6.34"

Prepared by MidAtlantic Engineering Partners

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Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.09	235	8.85	0.00
4.00	0.15	1,115	8.91	0.00
6.00	0.19	2,354	9.00	0.00
8.00	0.30	4,118	9.13	0.00
10.00	0.54	6,903	9.34	0.00
12.00	6.40	16,295	10.03	0.45
14.00	0.67	23,376	10.55	1.41
16.00	0.37	19,252	10.24	0.72
18.00	0.25	17,345	10.10	0.49
20.00	0.21	15,699	9.98	0.43
22.00	0.18	14,247	9.88	0.37
24.00	0.15	12,992	9.78	0.31
26.00	0.00	11,197	9.65	0.20
28.00	0.00	10,087	9.57	0.12
30.00	0.00	9,409	9.52	0.07
32.00	0.00	8,965	9.49	0.05
34.00	0.00	8,656	9.47	0.04
36.00	0.00	8,430	9.45	0.03
38.00	0.00	8,258	9.44	0.02
40.00	0.00	8,124	9.43	0.02
42.00	0.00	8,015	9.42	0.01
44.00	0.00	7,926	9.41	0.01
46.00	0.00	7,853	9.41	0.01
48.00	0.00	7,791	9.40	0.01
50.00	0.00	7,737	9.40	0.01
52.00	0.00	7,689	9.40	0.01
54.00	0.00	7,647	9.39	0.01
56.00	0.00	7,610	9.39	0.00
58.00	0.00	7,577	9.39	0.00
60.00	0.00	7,548	9.38	0.00
62.00	0.00	7,523	9.38	0.00
64.00	0.00	7,501	9.38	0.00
66.00	0.00	7,482	9.38	0.00
68.00	0.00	7,464	9.38	0.00
70.00	0.00	7,447	9.38	0.00
72.00	0.00	7,430	9.38	0.00

Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 8.86 cfs @ 12.13 hrs, Volume= 0.899 af, Depth= 8.56"

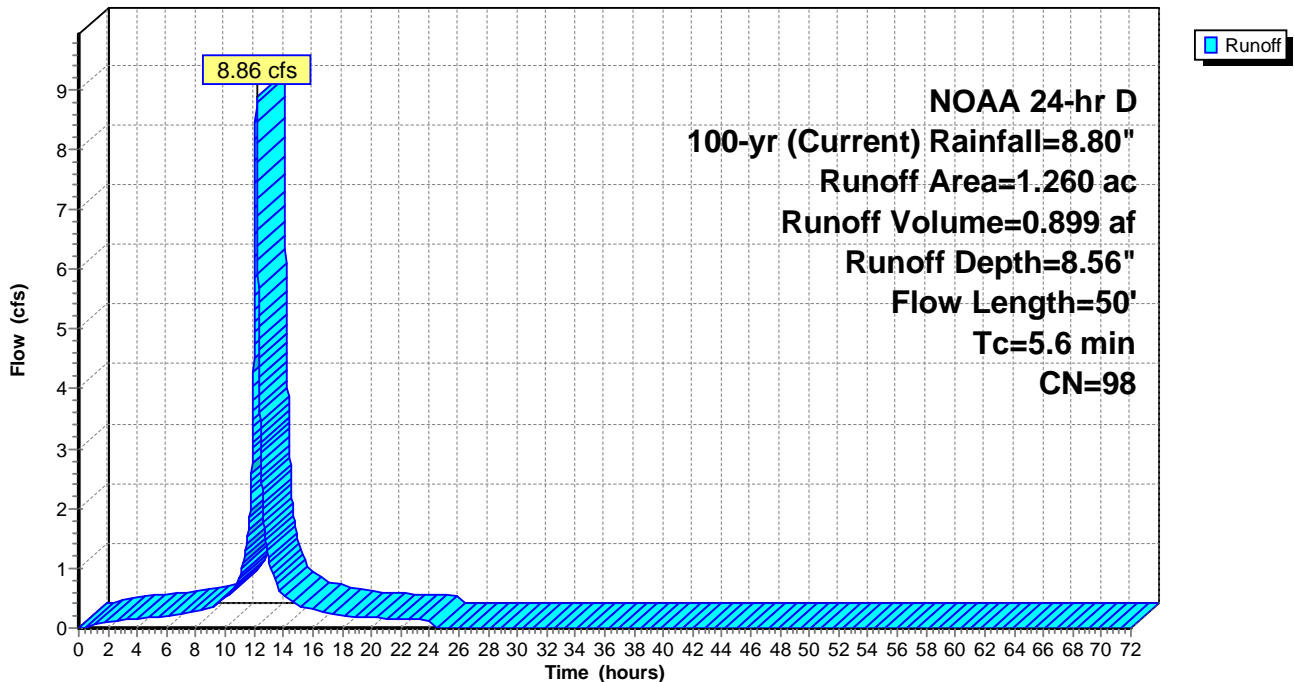
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

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Summary for Subcatchment DA-1p: DA-1 Pervious

Runoff = 1.60 cfs @ 12.14 hrs, Volume= 0.139 af, Depth= 4.07"

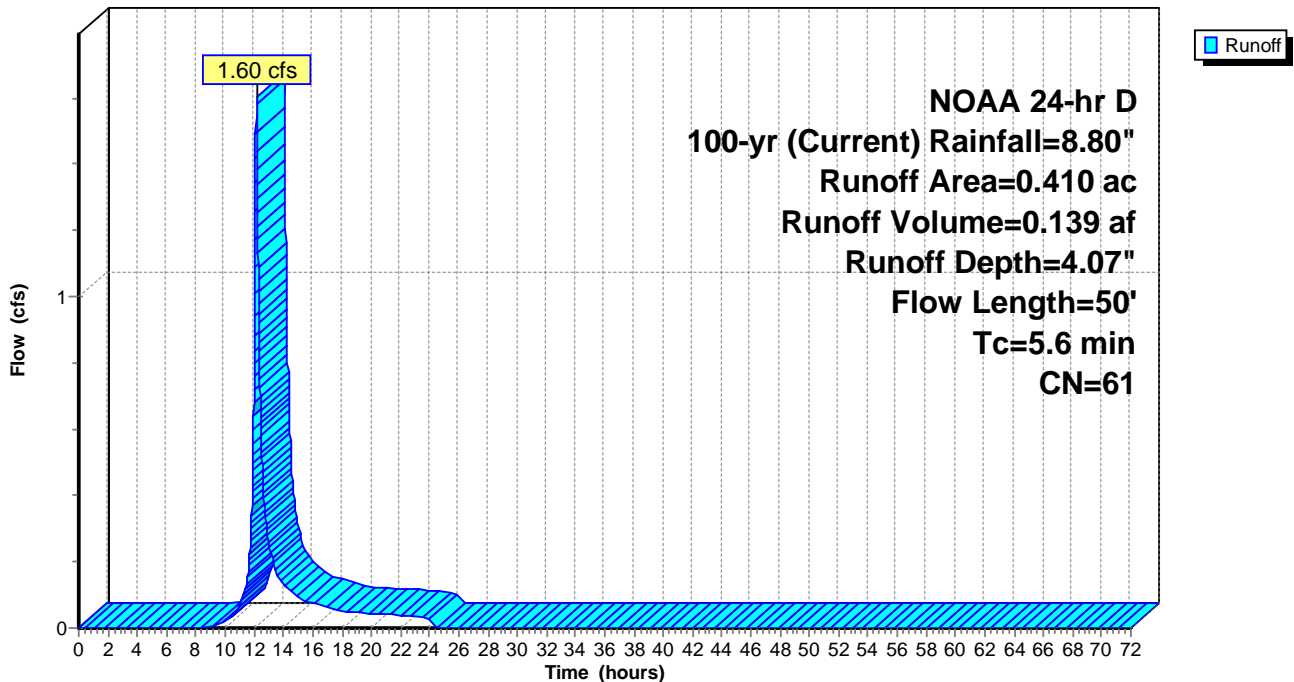
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.5	47	0.0175	0.14		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	3	0.0181	0.67		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
5.6	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Prepared by MidAtlantic Engineering Partners

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Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 1.36 cfs @ 12.10 hrs, Volume= 0.107 af, Depth= 8.56"

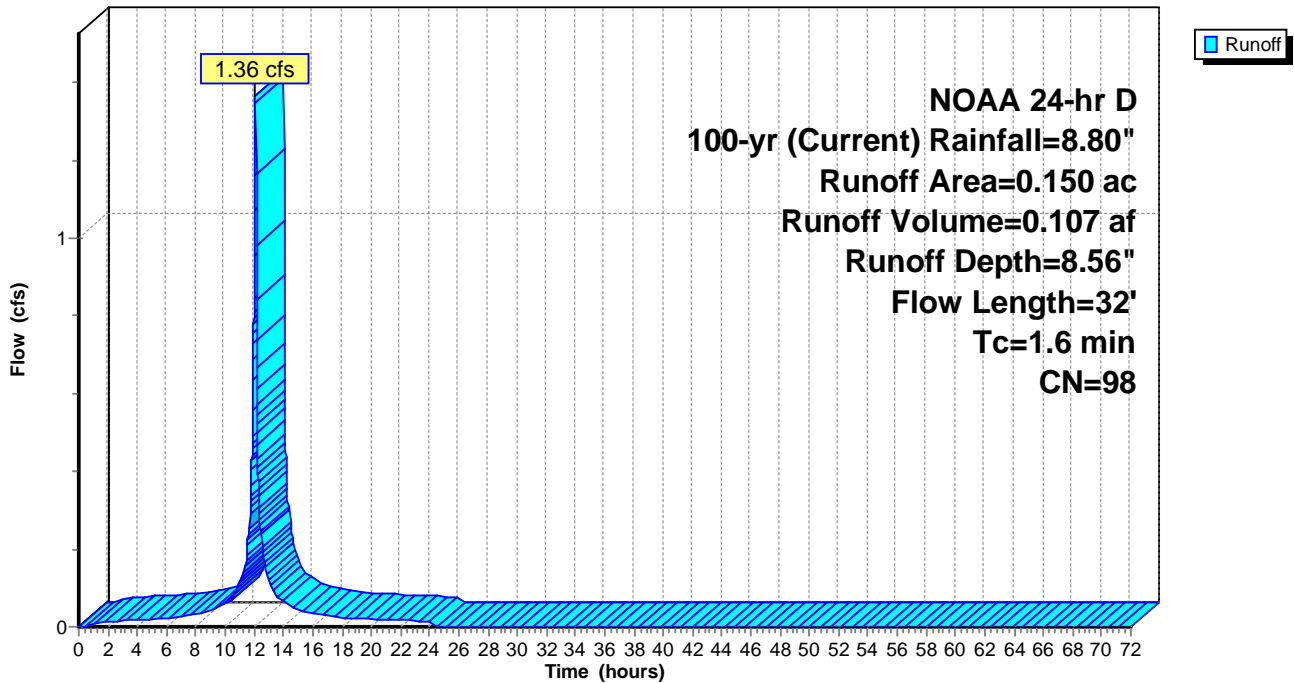
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

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Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 1.65 cfs @ 12.10 hrs, Volume= 0.112 af, Depth= 6.38"

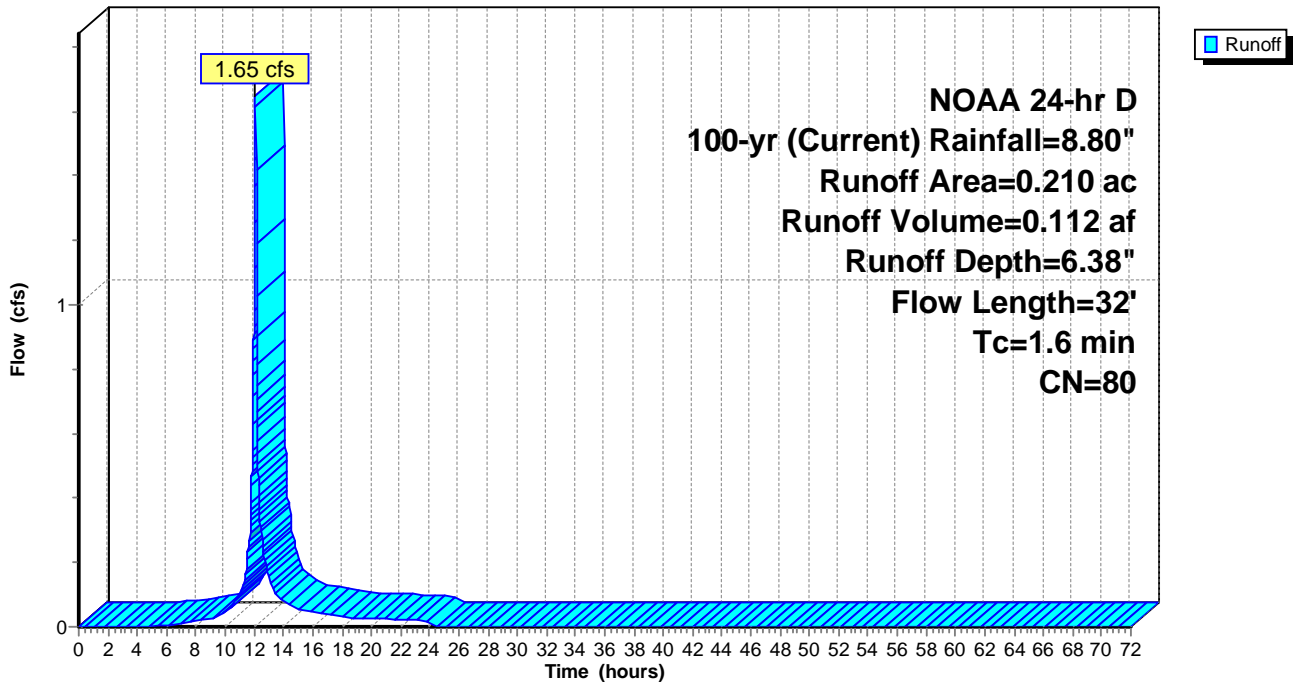
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.5	27	0.1552	0.30		Sheet Flow, Grass: Short n= 0.150 P2= 3.33"
0.1	5	0.0150	0.69		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.33"
1.6	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

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Summary for Subcatchment DA-Bldg: Buildings

Runoff = 5.72 cfs @ 12.10 hrs, Volume= 0.442 af, Depth= 8.56"

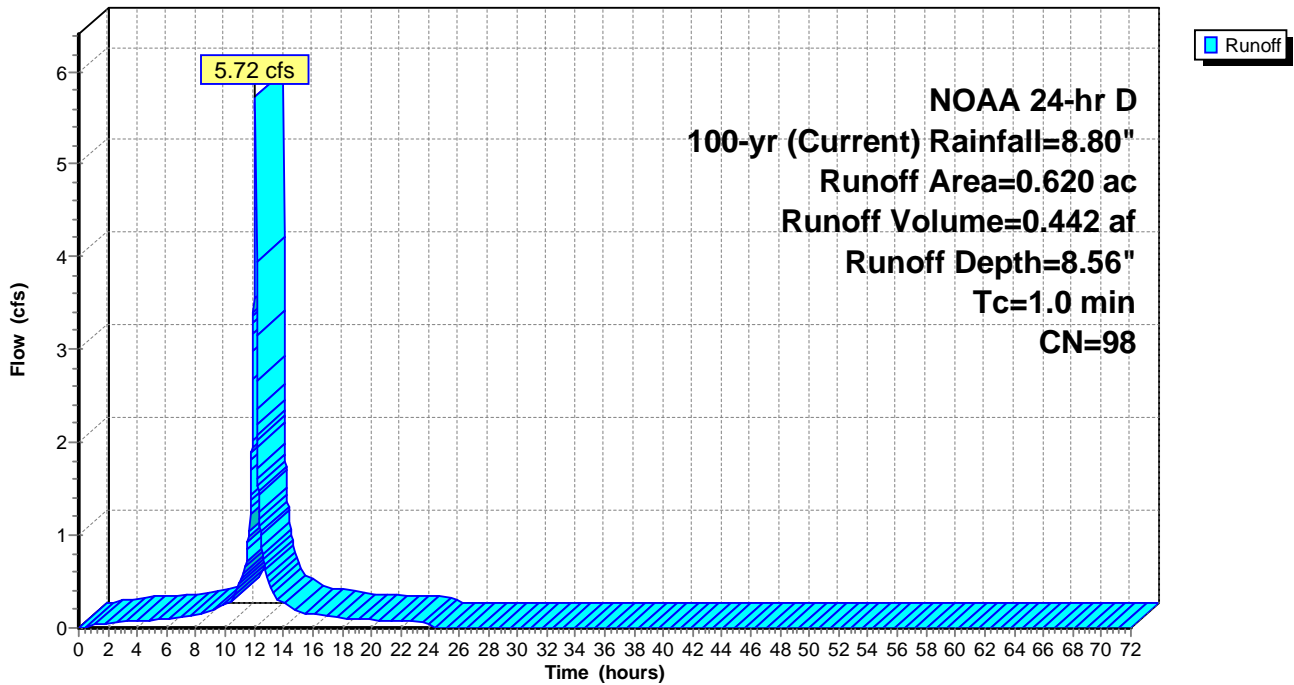
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

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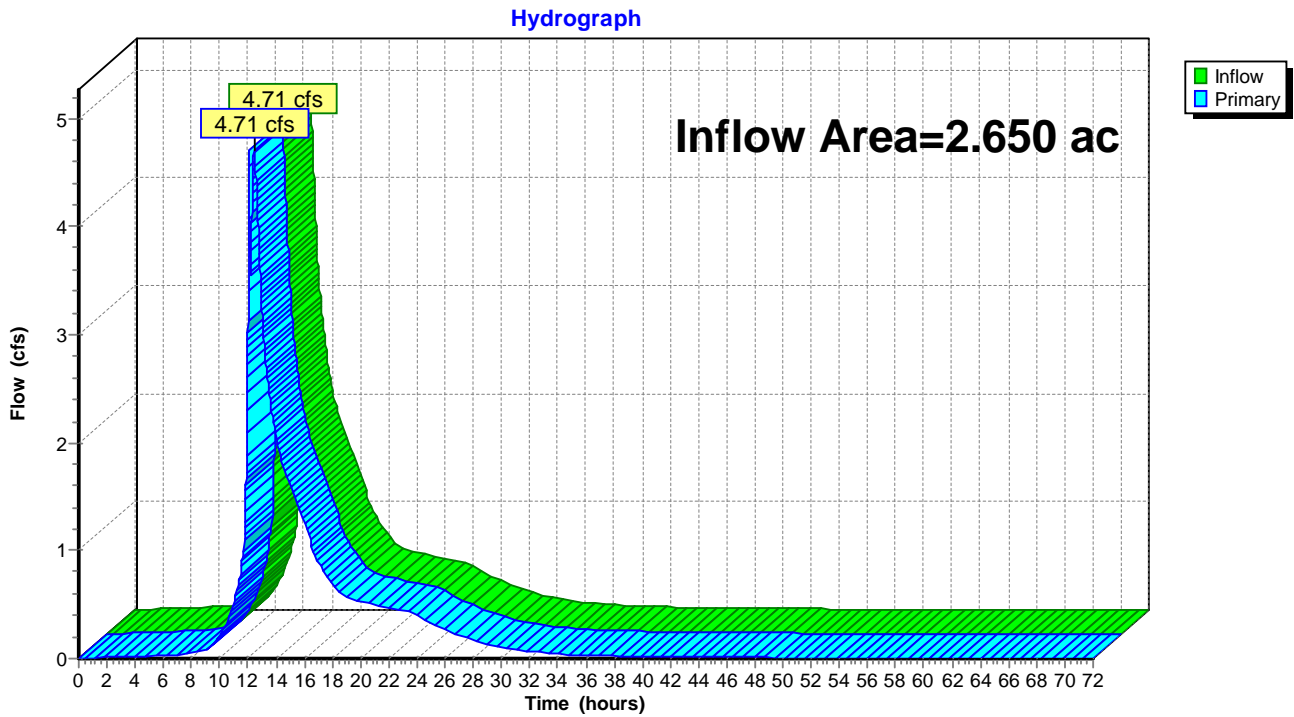
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Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth > 6.92" for 100-yr (Current) event
Inflow = 4.71 cfs @ 12.47 hrs, Volume= 1.528 af
Primary = 4.71 cfs @ 12.47 hrs, Volume= 1.528 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

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Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 7.76" for 100-yr (Current) event
Inflow = 15.31 cfs @ 12.10 hrs, Volume= 1.480 af
Outflow = 4.16 cfs @ 12.48 hrs, Volume= 1.309 af, Atten= 73%, Lag= 22.6 min
Primary = 4.16 cfs @ 12.48 hrs, Volume= 1.309 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.26' @ 12.48 hrs Surf.Area= 34,020 sf Storage= 33,002 cf

Plug-Flow detention time= 345.5 min calculated for 1.309 af (88% of inflow)
Center-of-Mass det. time= 285.2 min (1,037.2 - 752.0)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=4.16 cfs @ 12.48 hrs HW=11.26' (Free Discharge)

- 1=Culvert (Passes 4.16 cfs of 12.60 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.86 cfs @ 6.27 fps)
- 3=Orifice/Grate (Orifice Controls 1.37 cfs @ 4.86 fps)
- 4=Broad-Crested Rectangular Weir (Weir Controls 1.04 cfs @ 2.11 fps)
- 5=Broad-Crested Rectangular Weir (Weir Controls 0.89 cfs @ 1.20 fps)

Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

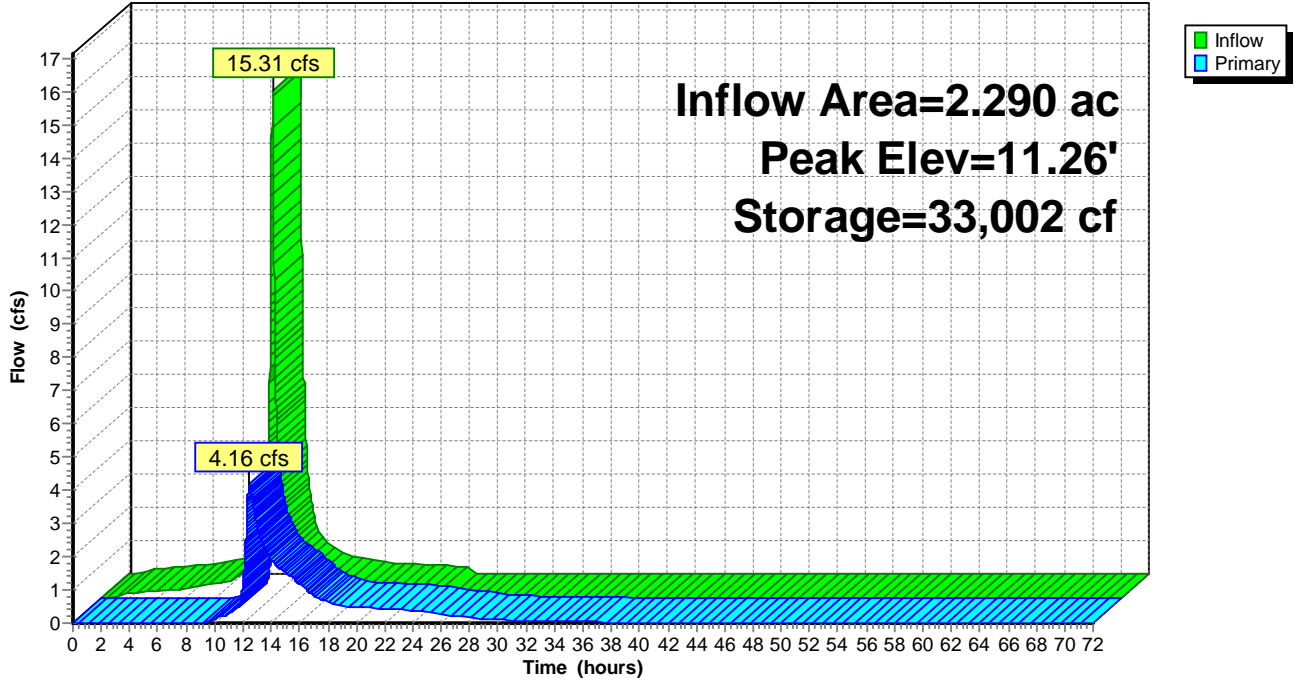
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NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

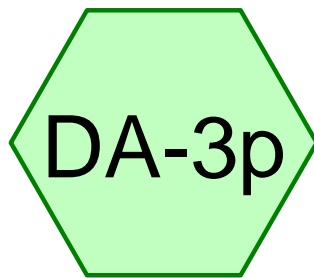
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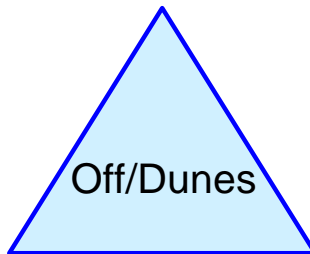
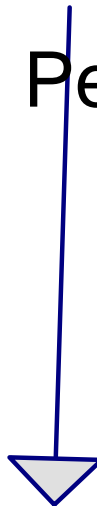
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Hydrograph for Pond PP: Porous Pavement

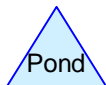
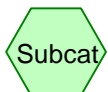
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.15	473	8.86	0.00
4.00	0.23	1,849	8.97	0.00
6.00	0.28	3,662	9.10	0.00
8.00	0.43	6,179	9.28	0.00
10.00	0.77	9,954	9.56	0.11
12.00	9.14	22,188	10.46	1.26
14.00	0.95	27,613	10.86	1.90
16.00	0.53	21,621	10.42	1.18
18.00	0.36	18,653	10.20	0.63
20.00	0.30	17,162	10.09	0.48
22.00	0.26	15,884	10.00	0.43
24.00	0.22	14,629	9.91	0.39
26.00	0.00	12,316	9.74	0.28
28.00	0.00	10,746	9.62	0.17
30.00	0.00	9,816	9.55	0.10
32.00	0.00	9,236	9.51	0.06
34.00	0.00	8,847	9.48	0.05
36.00	0.00	8,571	9.46	0.03
38.00	0.00	8,366	9.44	0.02
40.00	0.00	8,209	9.43	0.02
42.00	0.00	8,084	9.42	0.02
44.00	0.00	7,982	9.42	0.01
46.00	0.00	7,899	9.41	0.01
48.00	0.00	7,831	9.41	0.01
50.00	0.00	7,771	9.40	0.01
52.00	0.00	7,719	9.40	0.01
54.00	0.00	7,674	9.39	0.01
56.00	0.00	7,633	9.39	0.01
58.00	0.00	7,598	9.39	0.00
60.00	0.00	7,567	9.39	0.00
62.00	0.00	7,539	9.38	0.00
64.00	0.00	7,515	9.38	0.00
66.00	0.00	7,494	9.38	0.00
68.00	0.00	7,475	9.38	0.00
70.00	0.00	7,458	9.38	0.00
72.00	0.00	7,441	9.38	0.00



DA-3 Pervious



Flow to Offsite/Dunes



Post-Development (Current)

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NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment DA-3p: DA-3 Pervious

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

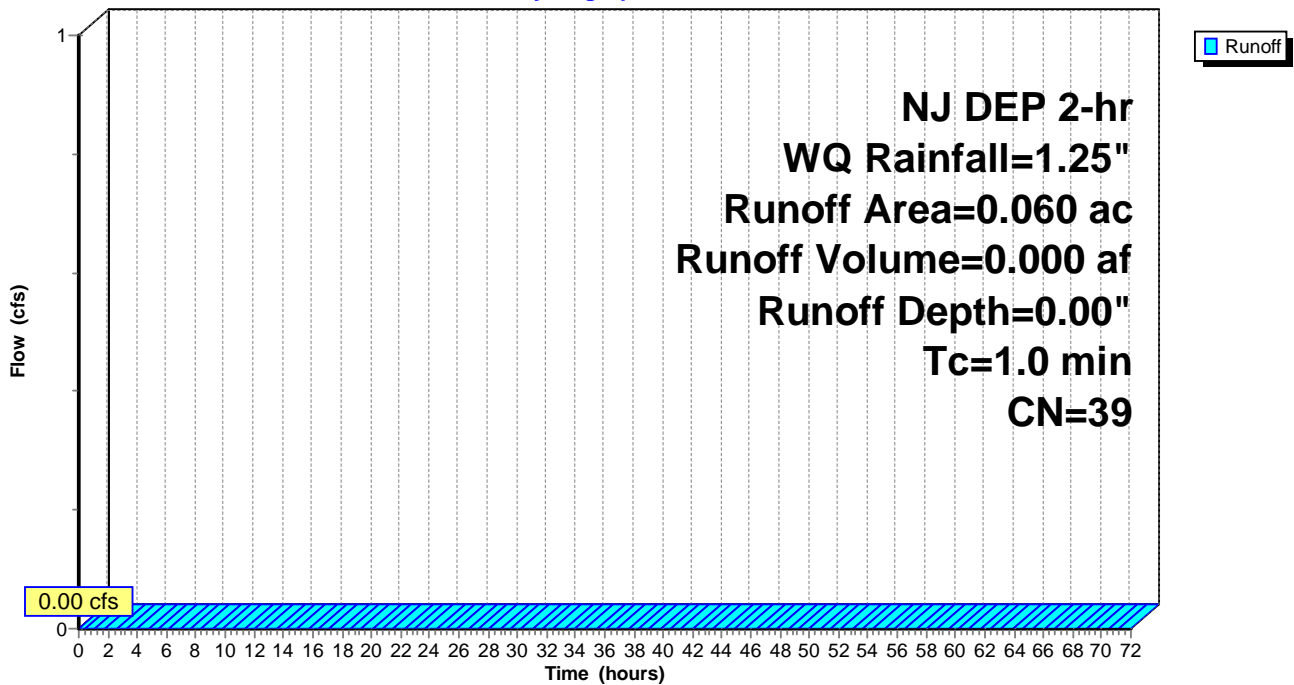
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.060		100.00% Pervious Area

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

Subcatchment DA-3p: DA-3 Pervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NJ DEP 2-hr WQ Rainfall=1.25"

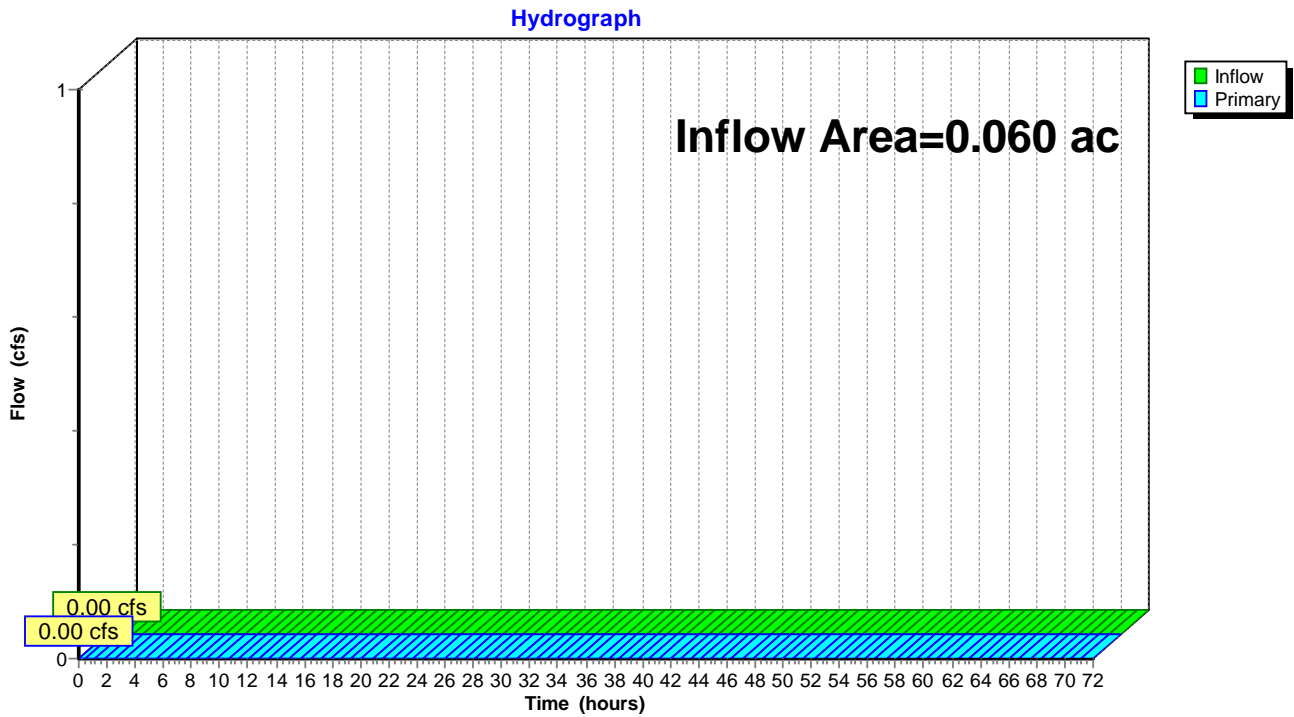
Printed 10/10/2025

Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 0.00" for WQ event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Printed 10/10/2025

Summary for Subcatchment DA-3p: DA-3 Pervious

Runoff = 0.00 cfs @ 23.99 hrs, Volume= 0.000 af, Depth= 0.00"

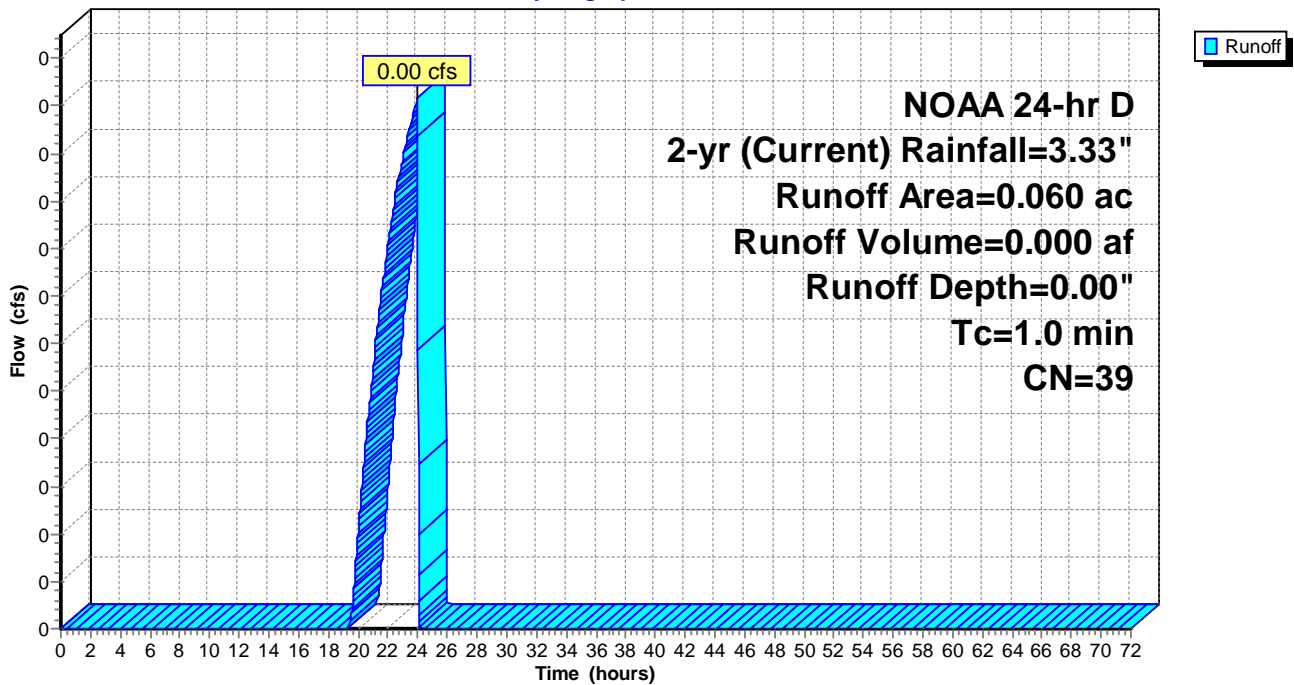
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.060		100.00% Pervious Area

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

Subcatchment DA-3p: DA-3 Pervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 2-yr (Current) Rainfall=3.33"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

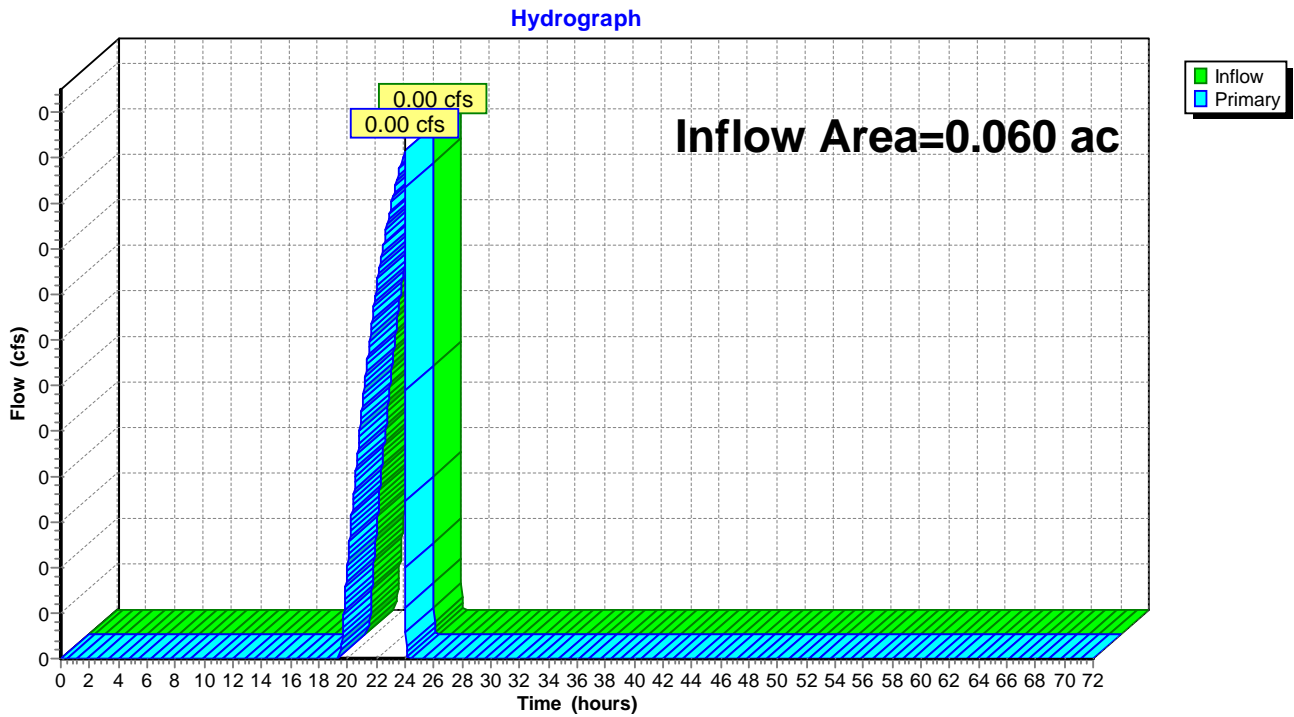
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 0.00" for 2-yr (Current) event
Inflow = 0.00 cfs @ 23.99 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 23.99 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Printed 10/10/2025

Summary for Subcatchment DA-3p: DA-3 Pervious

Runoff = 0.00 cfs @ 12.50 hrs, Volume= 0.001 af, Depth= 0.23"

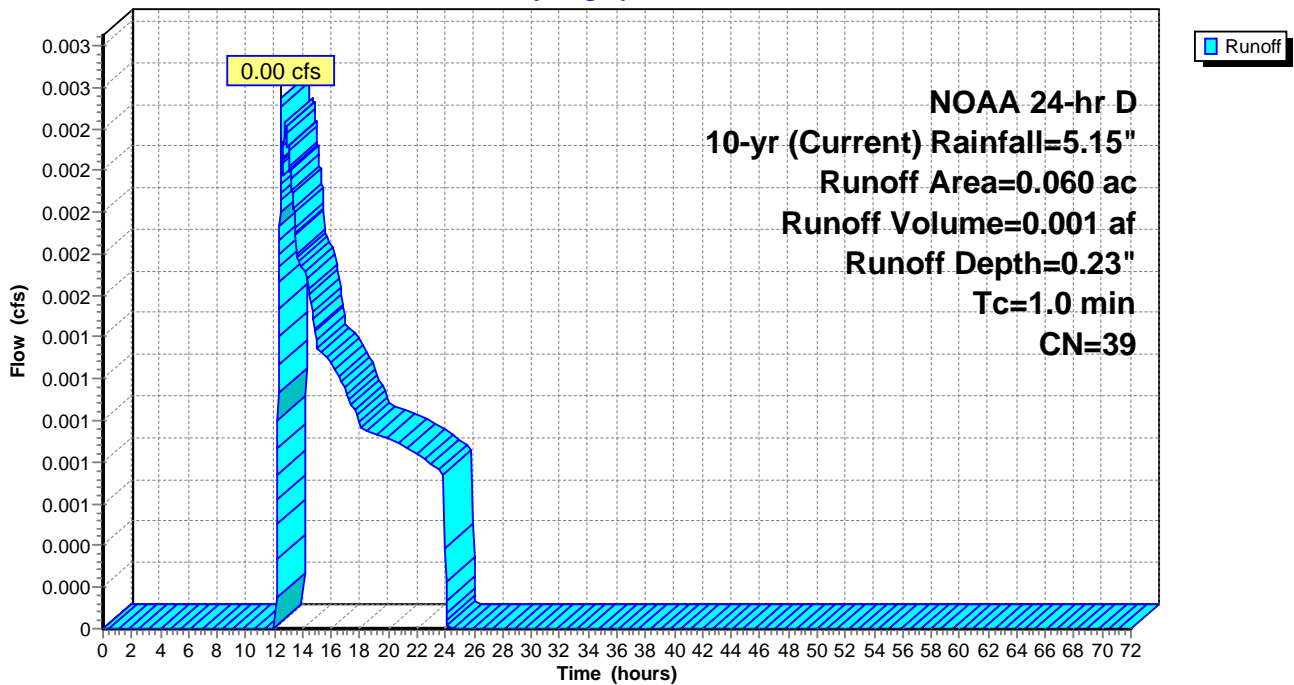
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.060		100.00% Pervious Area

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

Subcatchment DA-3p: DA-3 Pervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 10-yr (Current) Rainfall=5.15"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

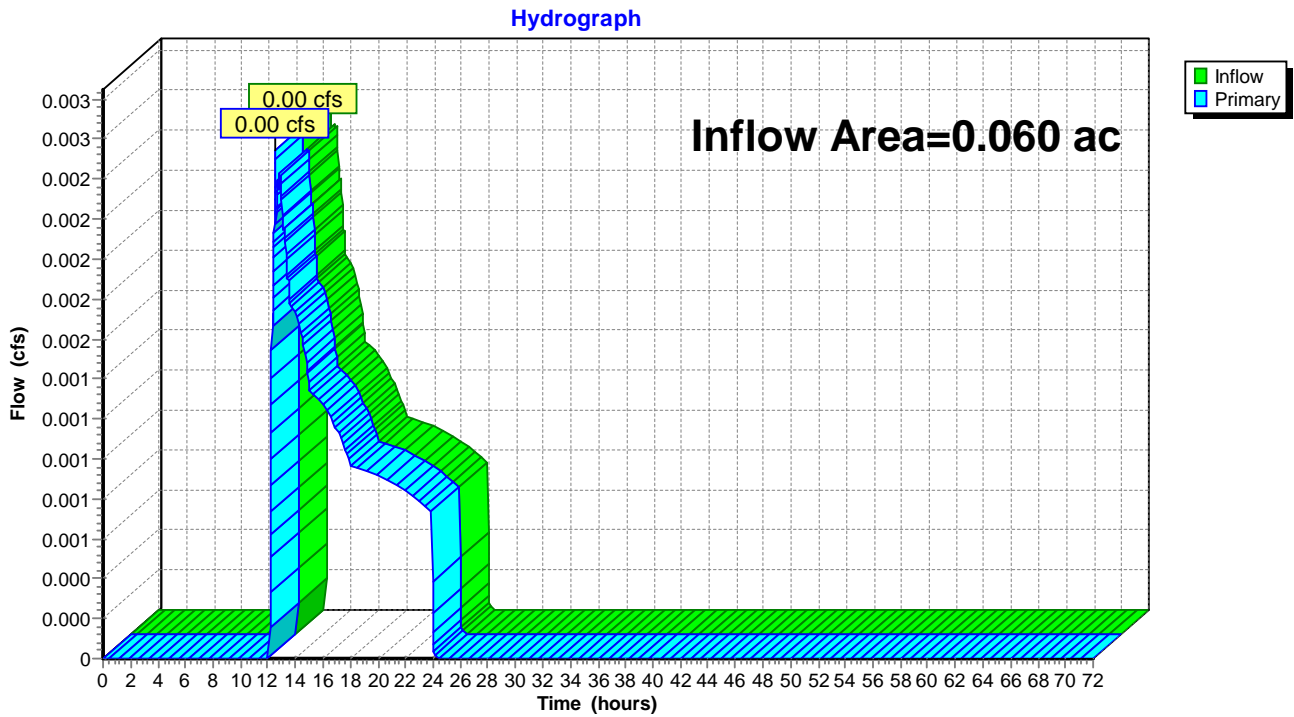
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 0.23" for 10-yr (Current) event
Inflow = 0.00 cfs @ 12.50 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 12.50 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

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Summary for Subcatchment DA-3p: DA-3 Pervious

Runoff = 0.02 cfs @ 12.11 hrs, Volume= 0.003 af, Depth= 0.55"

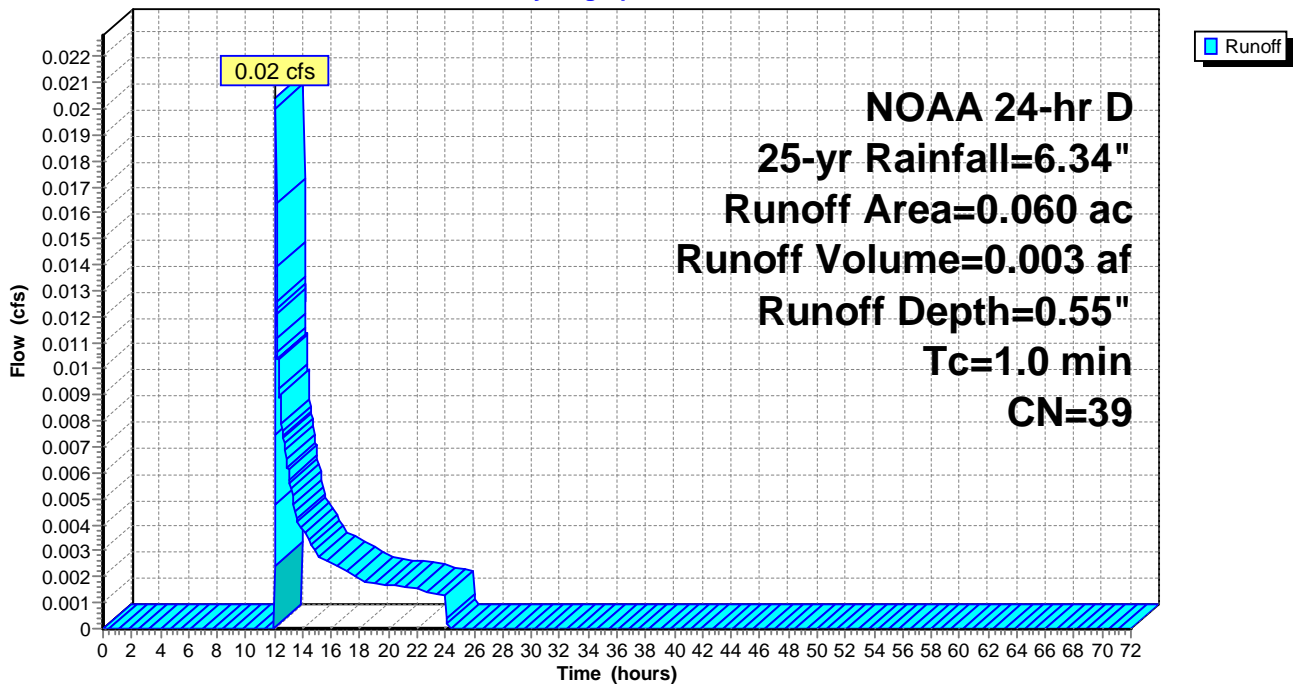
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.060		100.00% Pervious Area

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

Subcatchment DA-3p: DA-3 Pervious

Hydrograph



Post-Development (Current)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

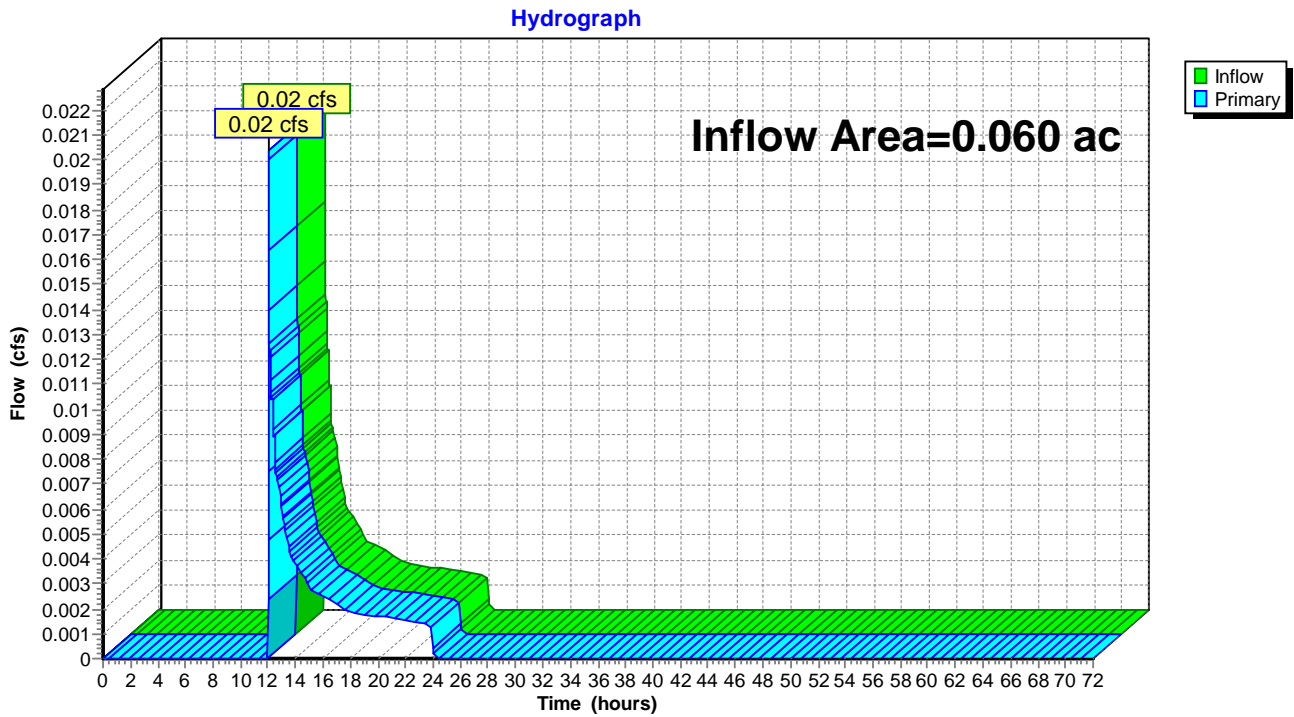
Printed 10/10/2025

Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 0.55" for 25-yr event
Inflow = 0.02 cfs @ 12.11 hrs, Volume= 0.003 af
Primary = 0.02 cfs @ 12.11 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment DA-3p: DA-3 Pervious

Runoff = 0.11 cfs @ 12.10 hrs, Volume= 0.008 af, Depth= 1.51"

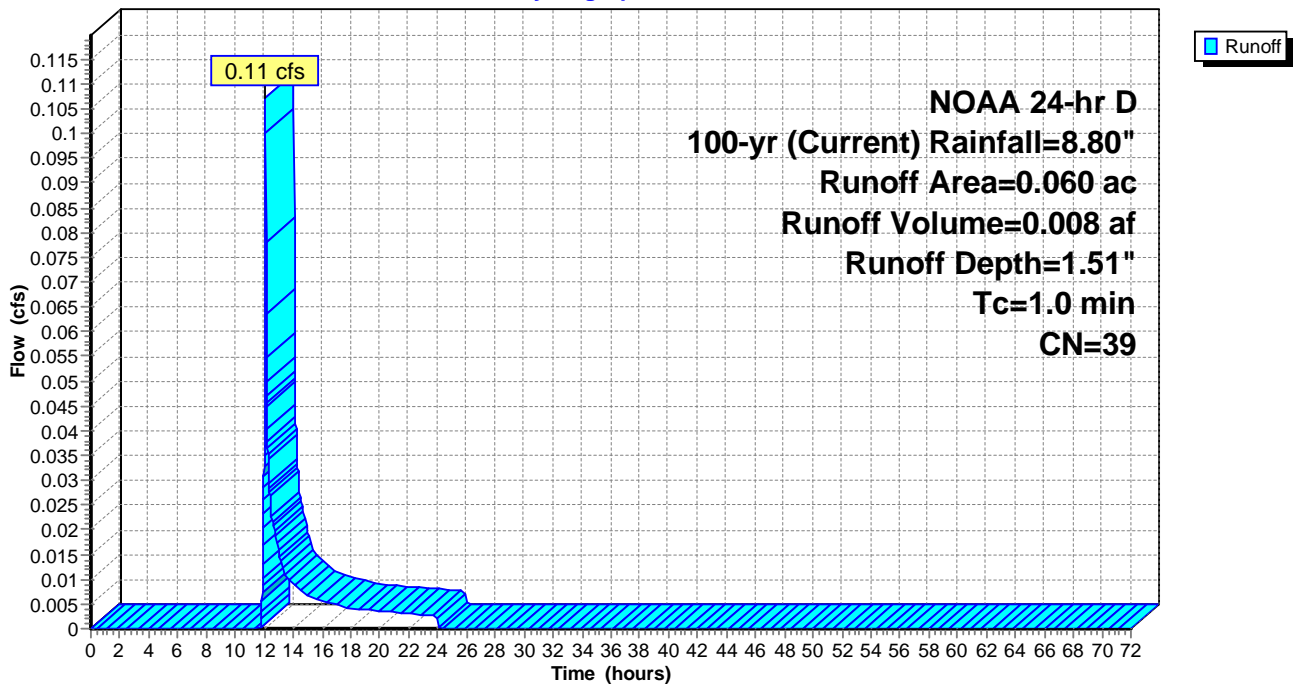
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.060		100.00% Pervious Area

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

Subcatchment DA-3p: DA-3 Pervious

Hydrograph



Post-Development (Current)

NOAA 24-hr D 100-yr (Current) Rainfall=8.80"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

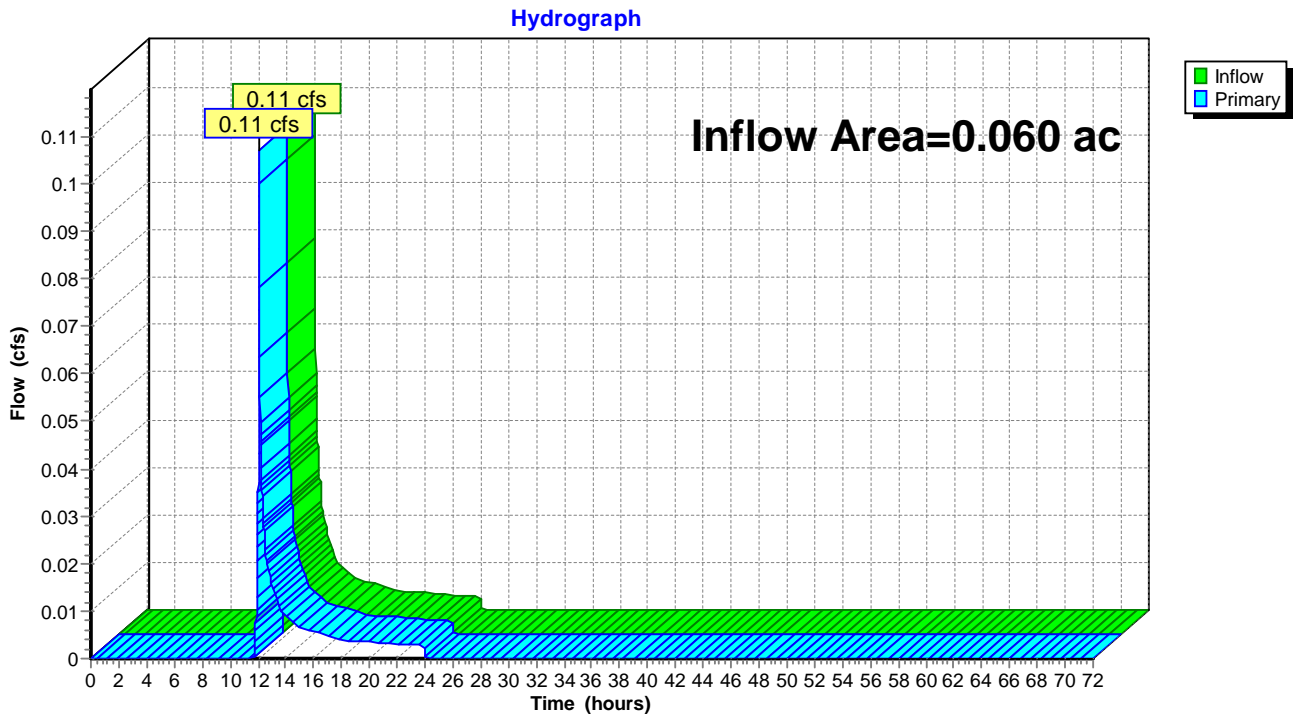
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 1.51" for 100-yr (Current) event
Inflow = 0.11 cfs @ 12.10 hrs, Volume= 0.008 af
Primary = 0.11 cfs @ 12.10 hrs, Volume= 0.008 af, Atten= 0%, Lag= 0.0 min

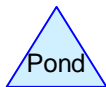
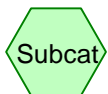
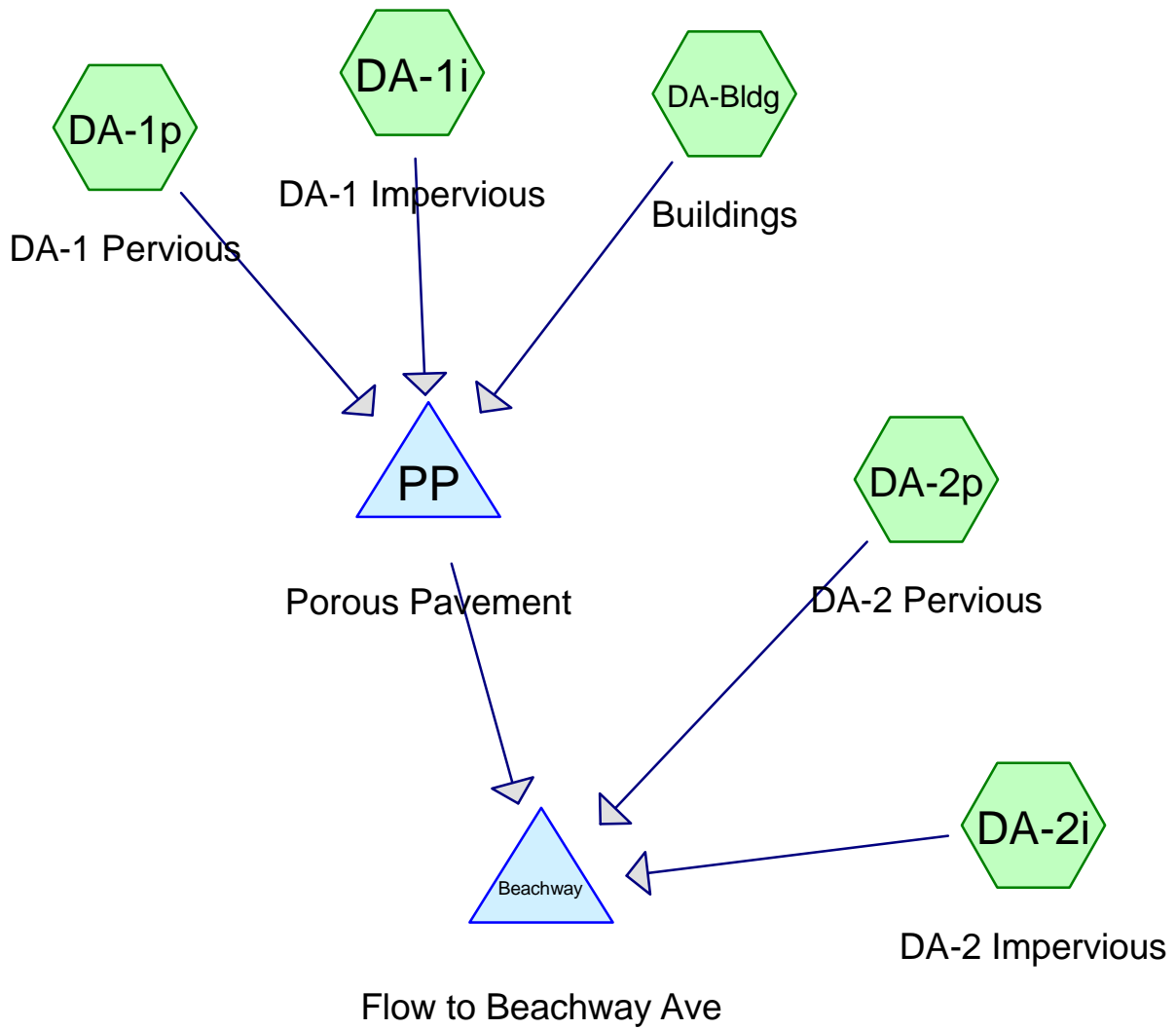
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



APPENDIX D

POST-DEVELOPMENT DRAINAGE ANALYSIS (FUTURE)



Routing Diagram for Post-Development (Future)
 Prepared by MidAtlantic Engineering Partners, Printed 10/10/2025
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Post-Development (Future)

Prepared by MidAtlantic Engineering Partners
 HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 3.16 cfs @ 1.11 hrs, Volume= 0.109 af, Depth= 1.03"

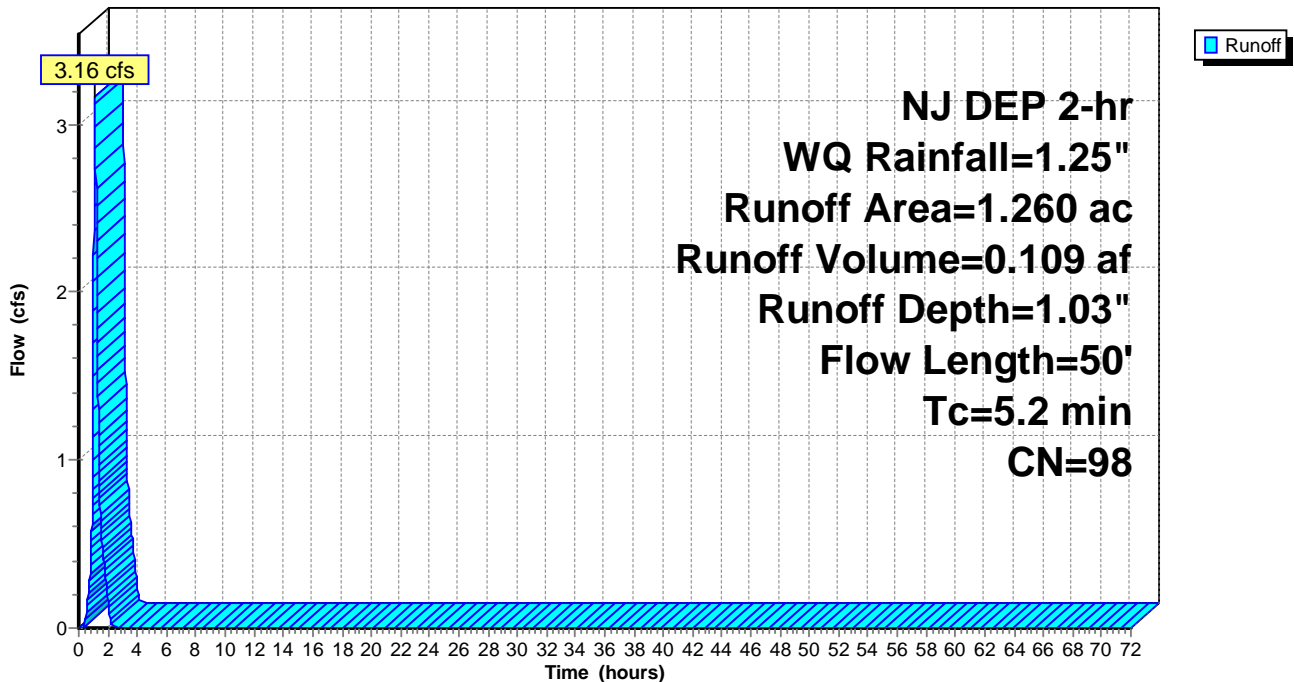
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-1p: DA-1 Pervious

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

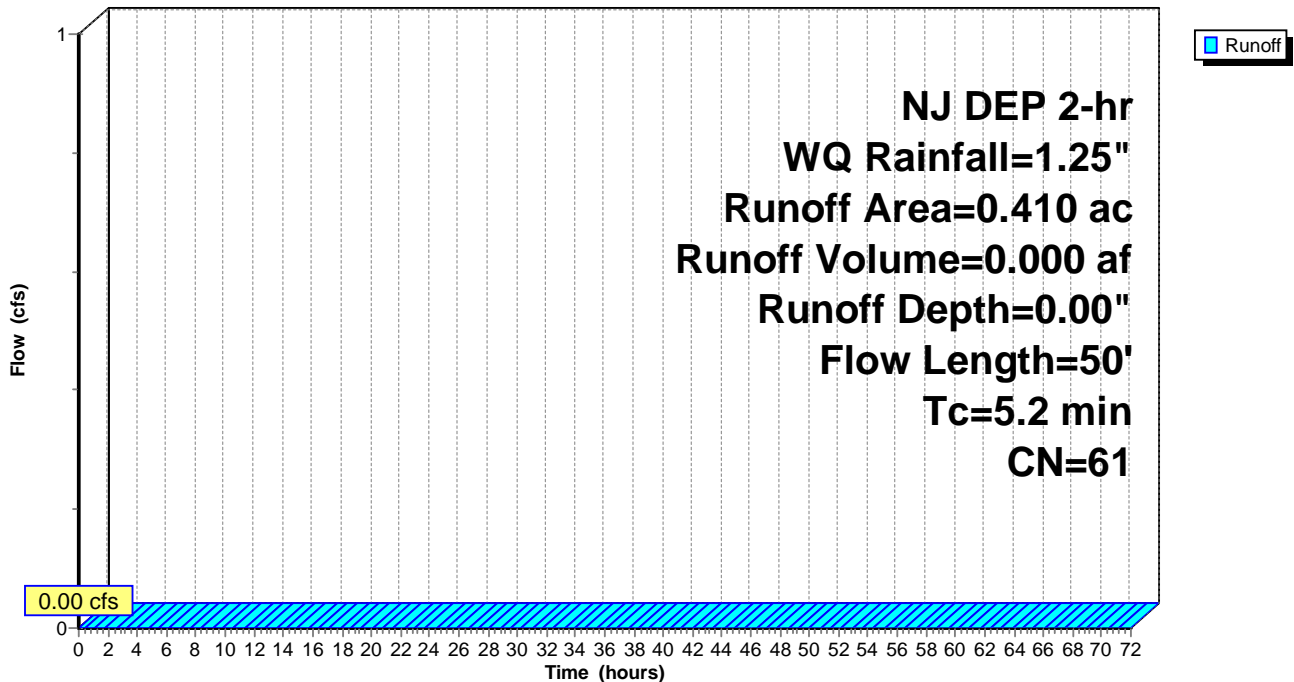
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 0.46 cfs @ 1.08 hrs, Volume= 0.013 af, Depth= 1.03"

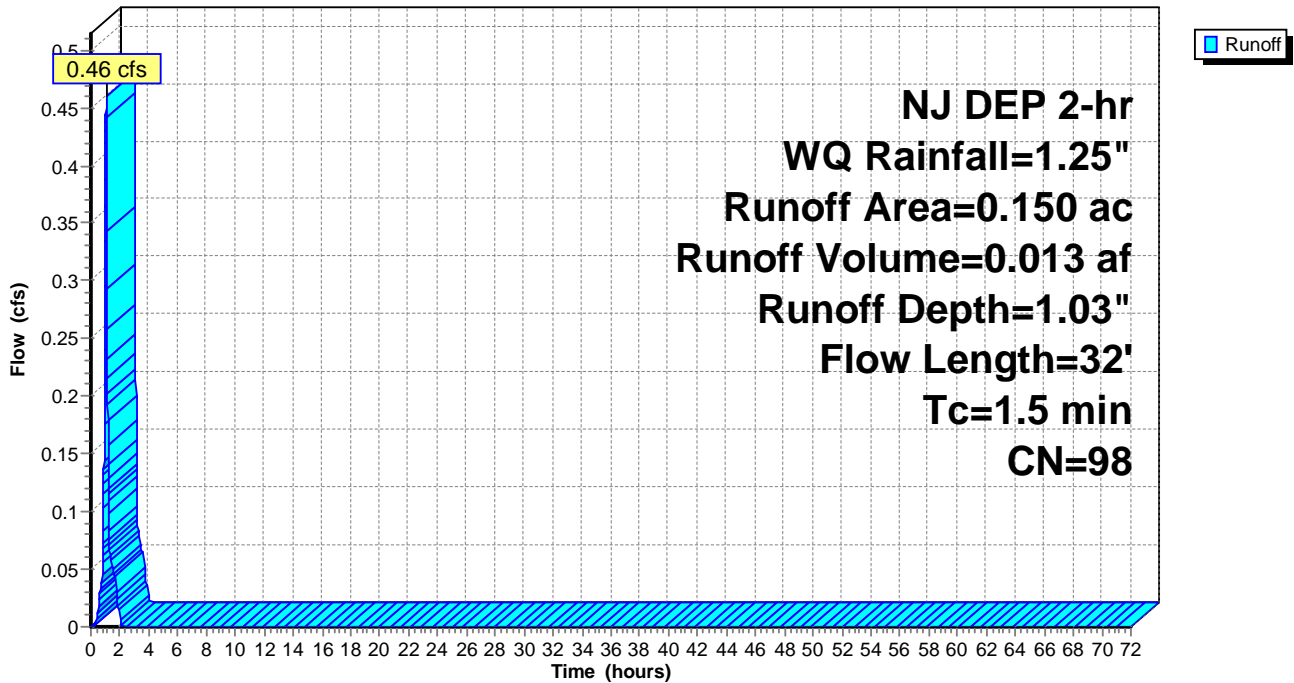
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Future)

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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 0.13 cfs @ 1.09 hrs, Volume= 0.003 af, Depth= 0.17"

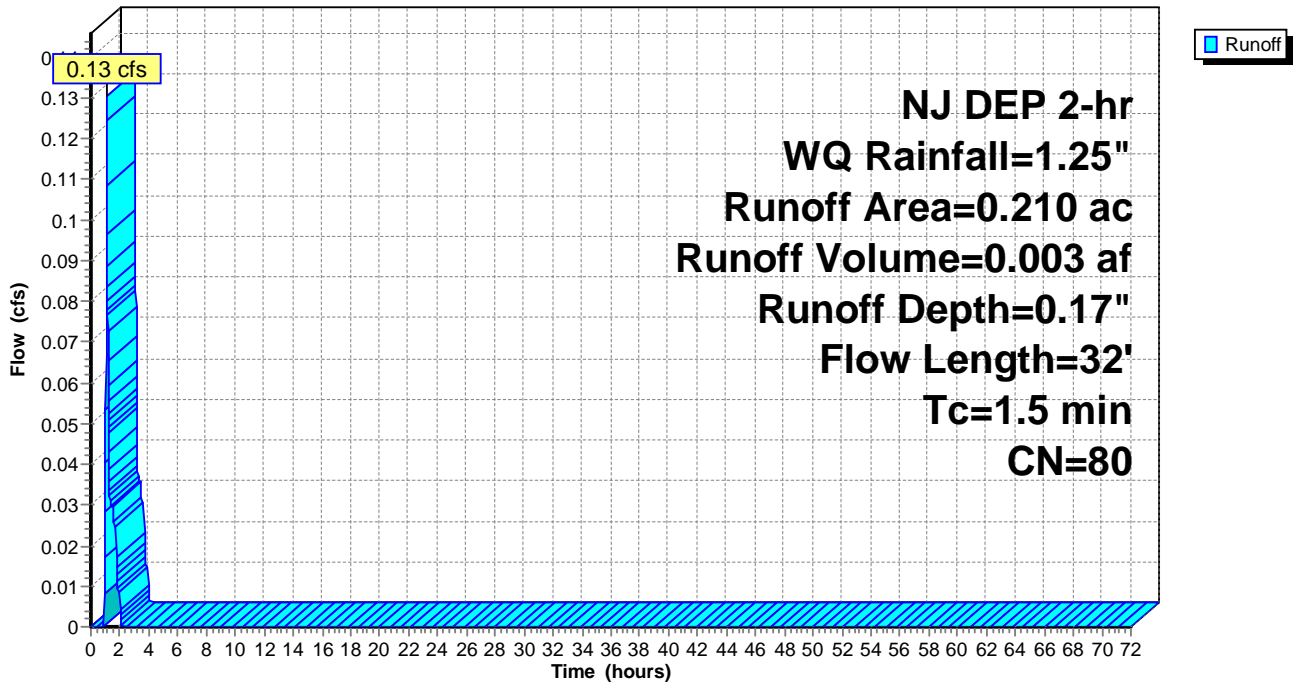
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 1.91 cfs @ 1.08 hrs, Volume= 0.053 af, Depth= 1.03"

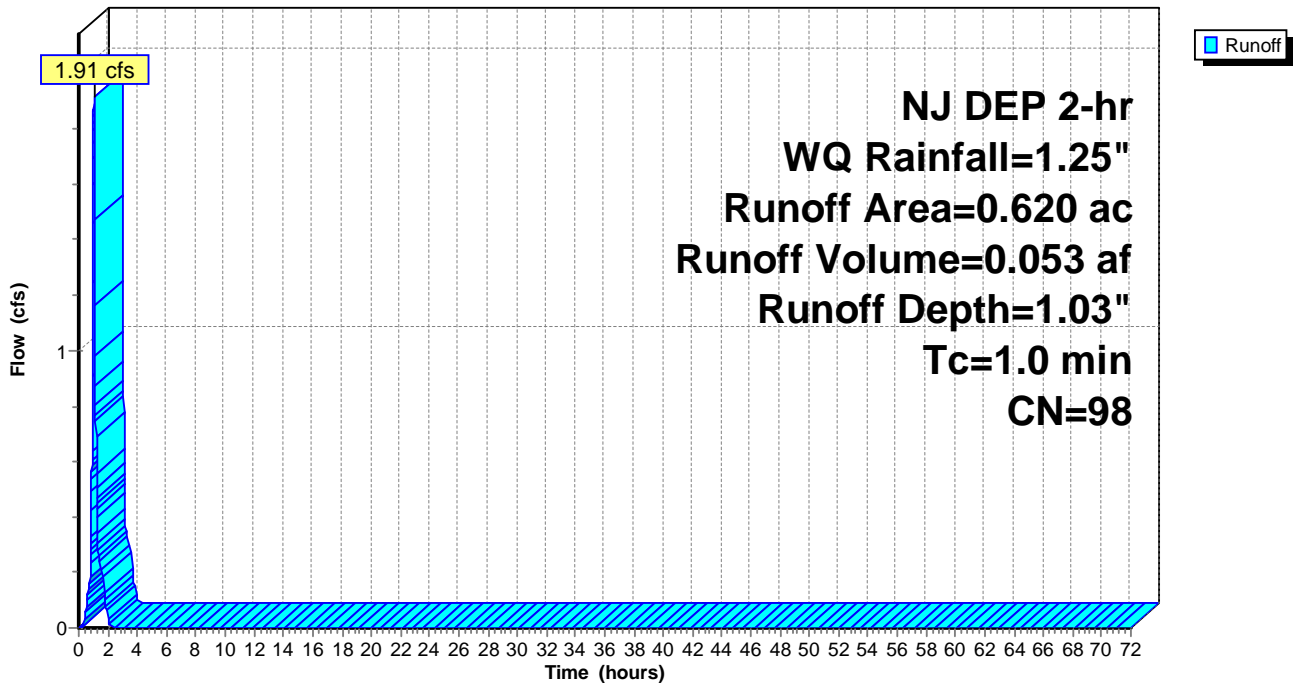
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NJ DEP 2-hr WQ Rainfall=1.25"

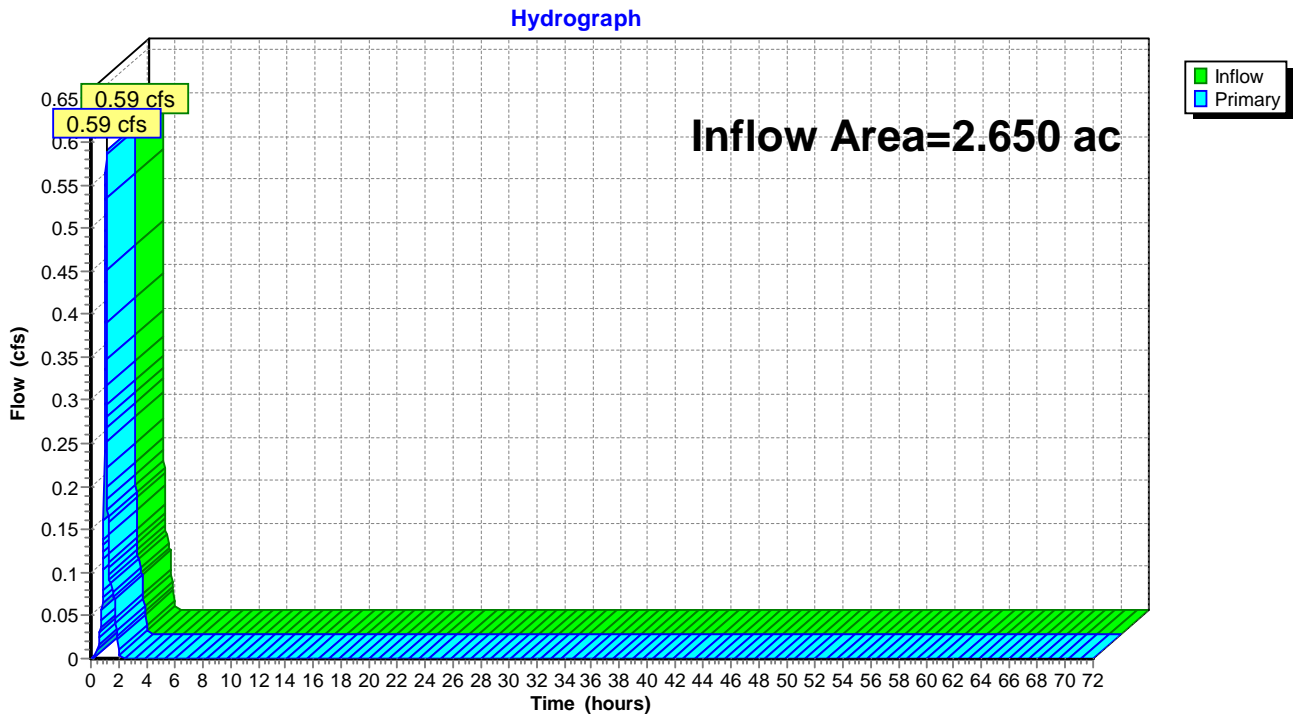
Printed 10/10/2025

Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth = 0.07" for WQ event
Inflow = 0.59 cfs @ 1.09 hrs, Volume= 0.016 af
Primary = 0.59 cfs @ 1.09 hrs, Volume= 0.016 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 0.85" for WQ event
 Inflow = 4.92 cfs @ 1.09 hrs, Volume= 0.162 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 9.35' @ 2.59 hrs Surf.Area= 34,020 sf Storage= 7,060 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=8.83' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.00 cfs of 8.61 cfs potential flow)
- ↑ **2=Orifice/Grate** (Controls 0.00 cfs)
- ↑ **3=Orifice/Grate** (Controls 0.00 cfs)
- ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- ↑ **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

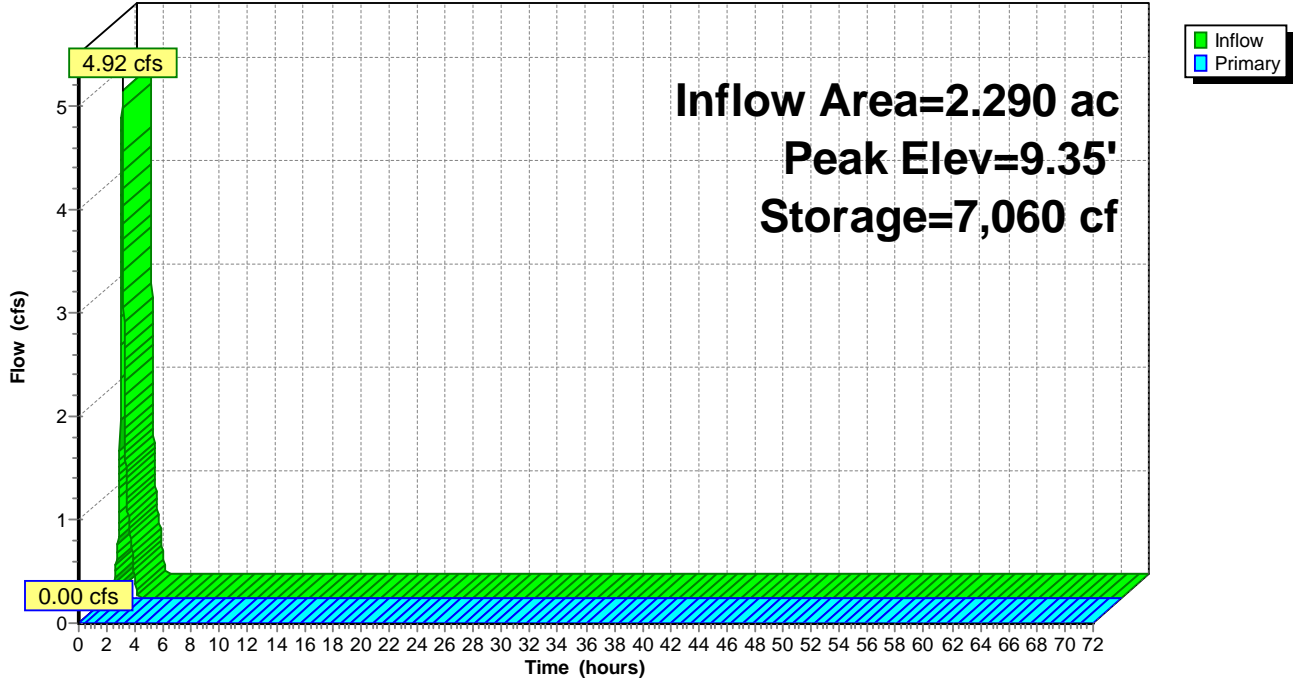
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.21	6,988	9.34	0.00
4.00	0.00	7,060	9.35	0.00
6.00	0.00	7,060	9.35	0.00
8.00	0.00	7,060	9.35	0.00
10.00	0.00	7,060	9.35	0.00
12.00	0.00	7,060	9.35	0.00
14.00	0.00	7,060	9.35	0.00
16.00	0.00	7,060	9.35	0.00
18.00	0.00	7,060	9.35	0.00
20.00	0.00	7,060	9.35	0.00
22.00	0.00	7,060	9.35	0.00
24.00	0.00	7,060	9.35	0.00
26.00	0.00	7,060	9.35	0.00
28.00	0.00	7,060	9.35	0.00
30.00	0.00	7,060	9.35	0.00
32.00	0.00	7,060	9.35	0.00
34.00	0.00	7,060	9.35	0.00
36.00	0.00	7,060	9.35	0.00
38.00	0.00	7,060	9.35	0.00
40.00	0.00	7,060	9.35	0.00
42.00	0.00	7,060	9.35	0.00
44.00	0.00	7,060	9.35	0.00
46.00	0.00	7,060	9.35	0.00
48.00	0.00	7,060	9.35	0.00
50.00	0.00	7,060	9.35	0.00
52.00	0.00	7,060	9.35	0.00
54.00	0.00	7,060	9.35	0.00
56.00	0.00	7,060	9.35	0.00
58.00	0.00	7,060	9.35	0.00
60.00	0.00	7,060	9.35	0.00
62.00	0.00	7,060	9.35	0.00
64.00	0.00	7,060	9.35	0.00
66.00	0.00	7,060	9.35	0.00
68.00	0.00	7,060	9.35	0.00
70.00	0.00	7,060	9.35	0.00
72.00	0.00	7,060	9.35	0.00

Post-Development (Future)

NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 4.06 cfs @ 12.13 hrs, Volume= 0.391 af, Depth= 3.73"

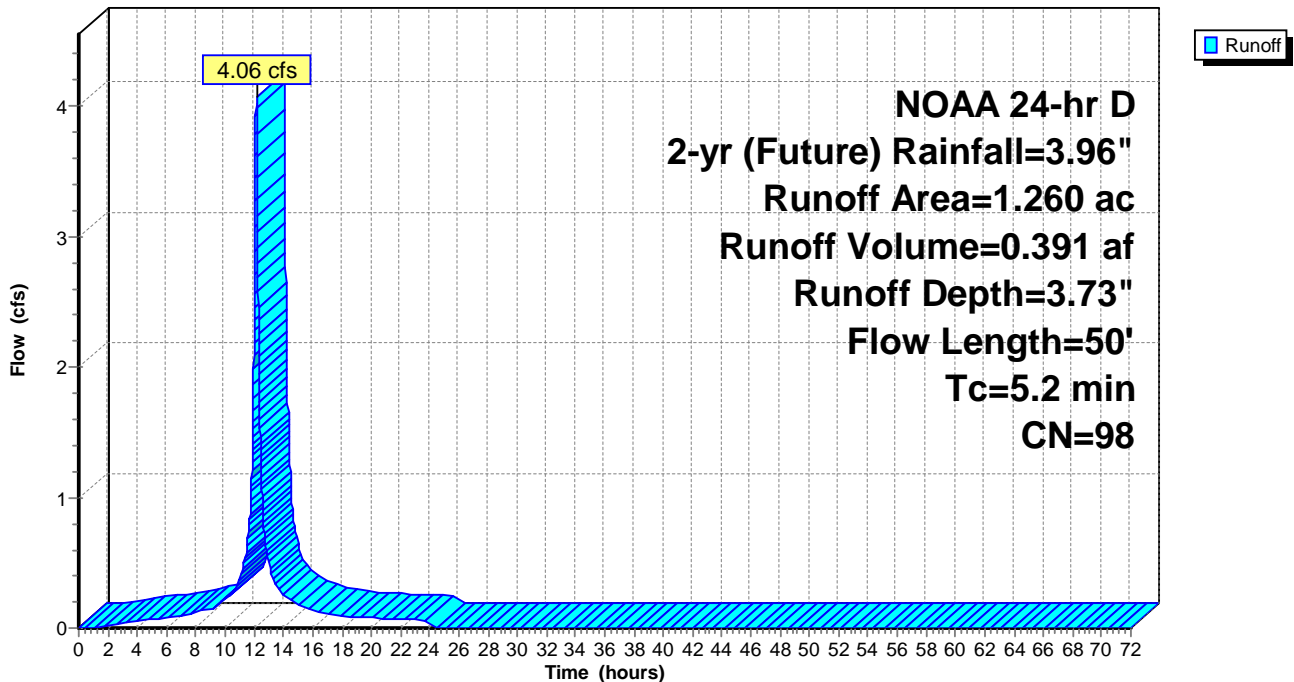
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Future)

NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

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Summary for Subcatchment DA-1p: DA-1 Pervious

Runoff = 0.26 cfs @ 12.14 hrs, Volume= 0.027 af, Depth= 0.79"

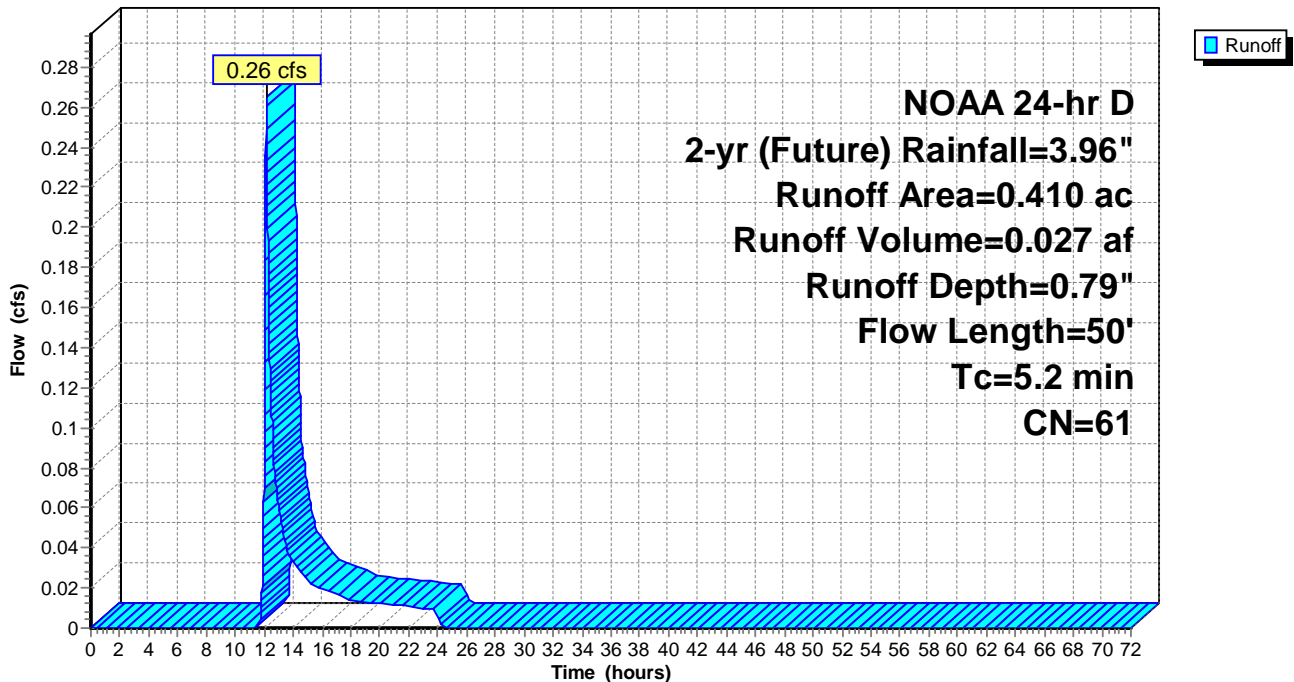
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Future)

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NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Printed 10/10/2025

Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 0.61 cfs @ 12.10 hrs, Volume= 0.047 af, Depth= 3.73"

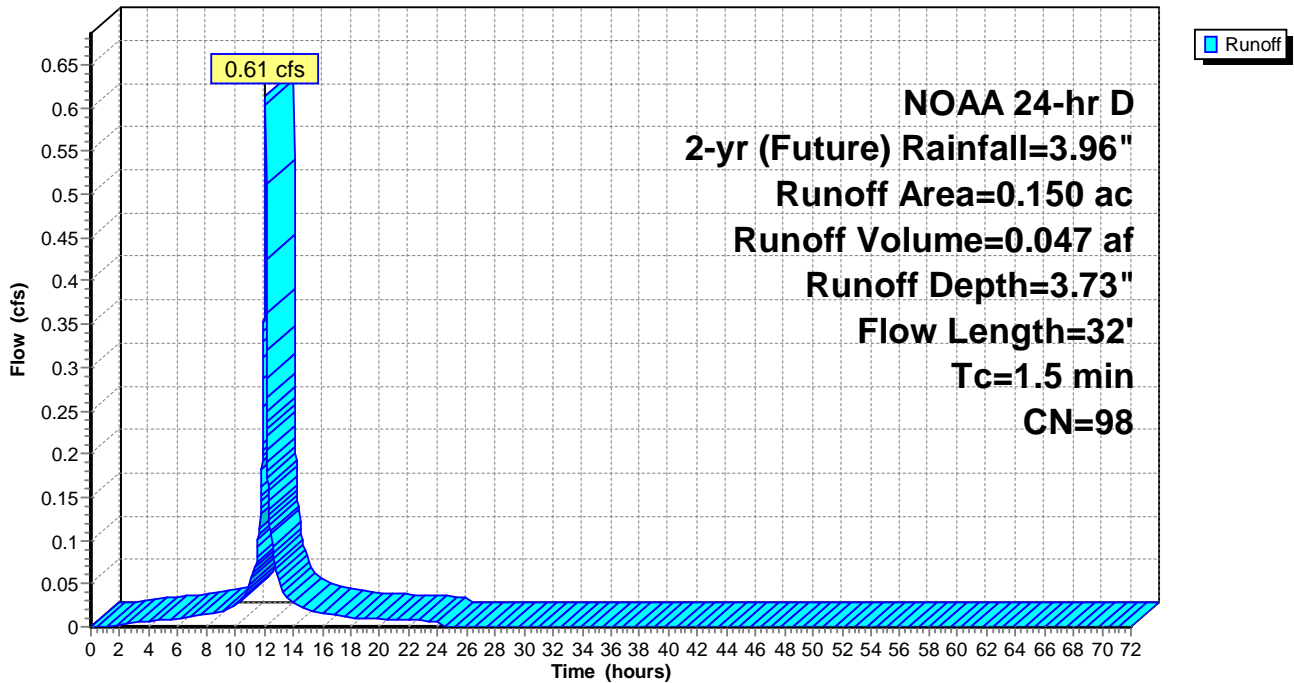
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Future)

NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

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Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 0.55 cfs @ 12.10 hrs, Volume= 0.035 af, Depth= 2.01"

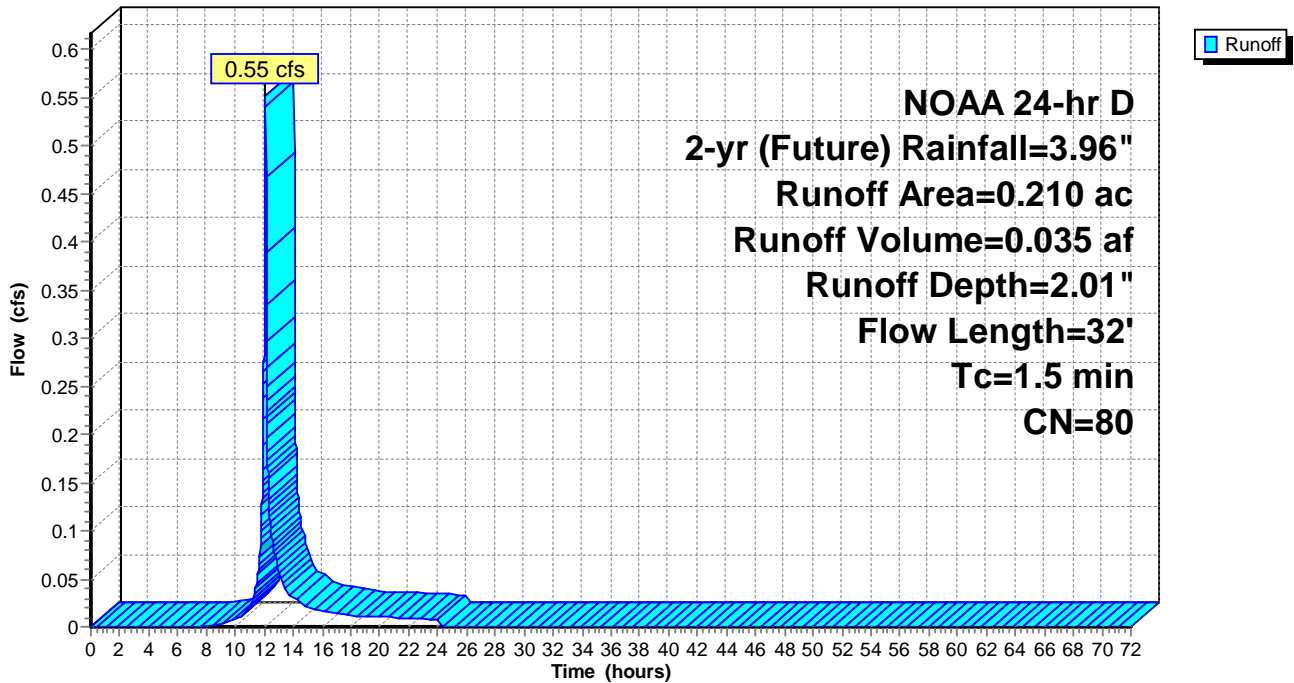
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Future)

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NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

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Summary for Subcatchment DA-Bldg: Buildings

Runoff = 2.56 cfs @ 12.10 hrs, Volume= 0.192 af, Depth= 3.73"

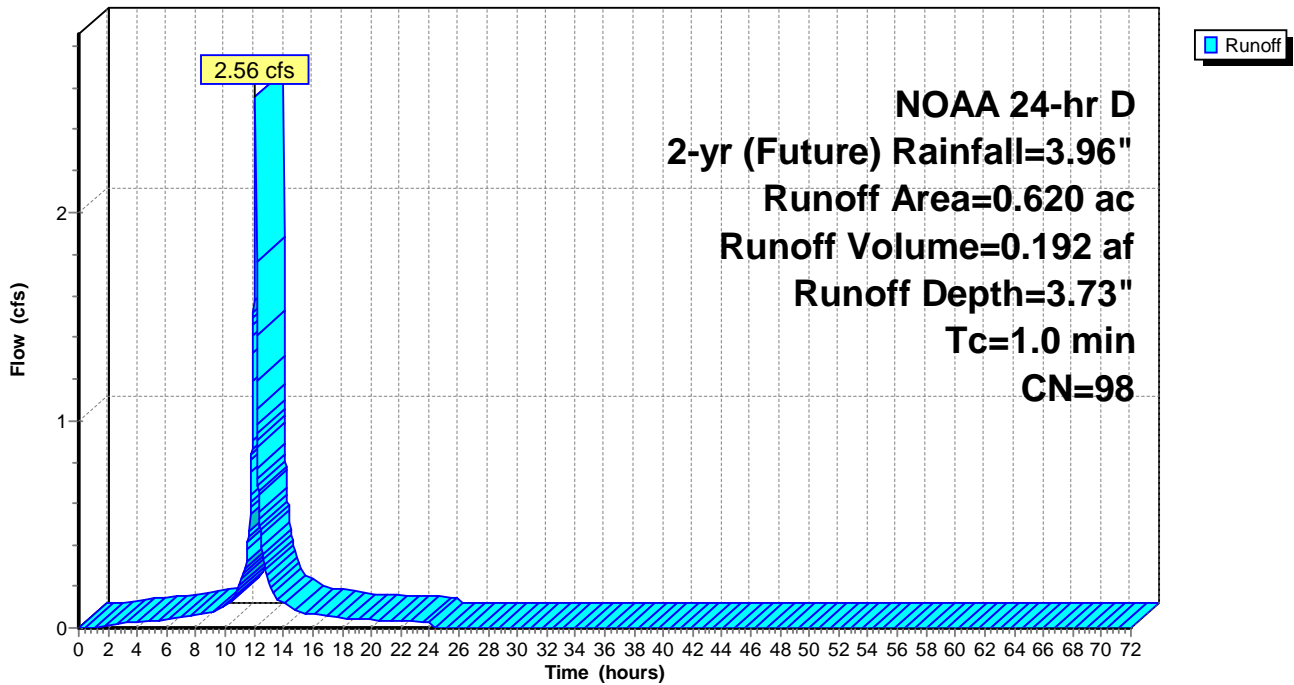
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Future)

NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Prepared by MidAtlantic Engineering Partners

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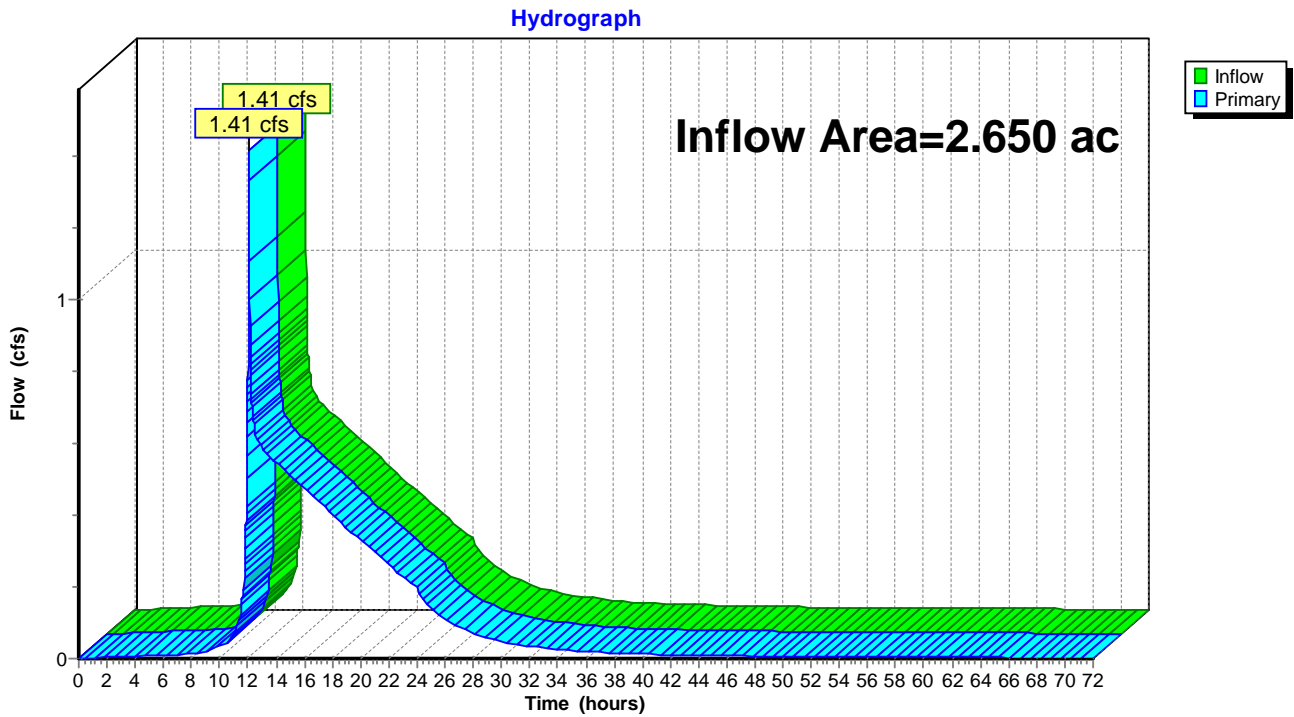
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Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth > 2.36" for 2-yr (Future) event
Inflow = 1.41 cfs @ 12.10 hrs, Volume= 0.522 af
Primary = 1.41 cfs @ 12.10 hrs, Volume= 0.522 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Future)

NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 3.20" for 2-yr (Future) event
 Inflow = 6.56 cfs @ 12.10 hrs, Volume= 0.611 af
 Outflow = 0.49 cfs @ 13.55 hrs, Volume= 0.441 af, Atten= 93%, Lag= 86.9 min
 Primary = 0.49 cfs @ 13.55 hrs, Volume= 0.441 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.11' @ 13.55 hrs Surf.Area= 34,020 sf Storage= 17,428 cf

Plug-Flow detention time= 541.5 min calculated for 0.441 af (72% of inflow)
 Center-of-Mass det. time= 439.4 min (1,200.3 - 760.9)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=0.49 cfs @ 13.55 hrs HW=10.11' (Free Discharge)

- ↑ **1=Culvert** (Passes 0.49 cfs of 10.90 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.49 cfs @ 3.58 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.09 fps)
- ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- ↑ **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

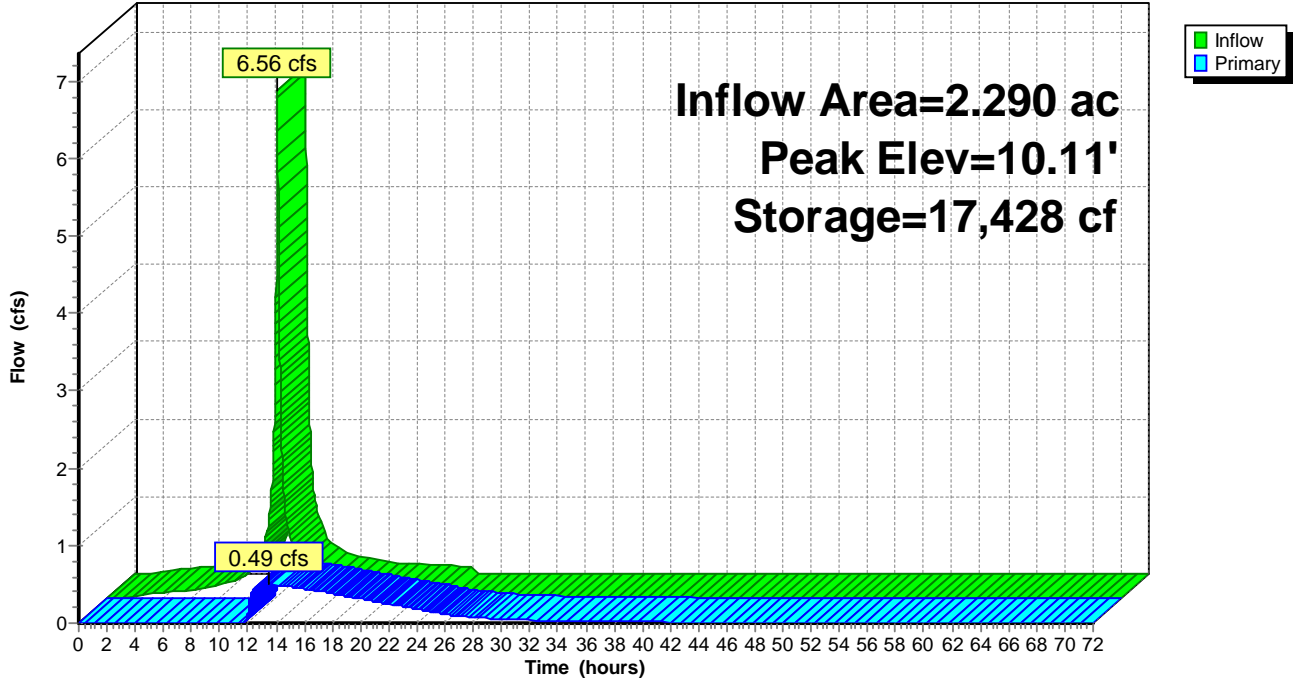
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NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Post-Development (Future)

NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.03	66	8.83	0.00
4.00	0.08	485	8.87	0.00
6.00	0.11	1,165	8.92	0.00
8.00	0.18	2,193	8.99	0.00
10.00	0.33	3,870	9.11	0.00
12.00	3.90	10,037	9.57	0.11
14.00	0.40	17,343	10.10	0.49
16.00	0.22	16,063	10.01	0.44
18.00	0.15	14,444	9.89	0.38
20.00	0.13	12,951	9.78	0.31
22.00	0.11	11,806	9.70	0.24
24.00	0.09	11,001	9.64	0.18
26.00	0.00	9,990	9.56	0.11
28.00	0.00	9,348	9.52	0.07
30.00	0.00	8,924	9.49	0.05
32.00	0.00	8,626	9.46	0.03
34.00	0.00	8,408	9.45	0.03
36.00	0.00	8,241	9.44	0.02
38.00	0.00	8,110	9.43	0.02
40.00	0.00	8,004	9.42	0.01
42.00	0.00	7,917	9.41	0.01
44.00	0.00	7,845	9.41	0.01
46.00	0.00	7,784	9.40	0.01
48.00	0.00	7,731	9.40	0.01
50.00	0.00	7,683	9.39	0.01
52.00	0.00	7,642	9.39	0.01
54.00	0.00	7,605	9.39	0.00
56.00	0.00	7,573	9.39	0.00
58.00	0.00	7,545	9.38	0.00
60.00	0.00	7,520	9.38	0.00
62.00	0.00	7,499	9.38	0.00
64.00	0.00	7,479	9.38	0.00
66.00	0.00	7,462	9.38	0.00
68.00	0.00	7,445	9.38	0.00
70.00	0.00	7,428	9.38	0.00
72.00	0.00	7,413	9.37	0.00

Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Printed 10/10/2025

Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 6.26 cfs @ 12.13 hrs, Volume= 0.612 af, Depth= 5.83"

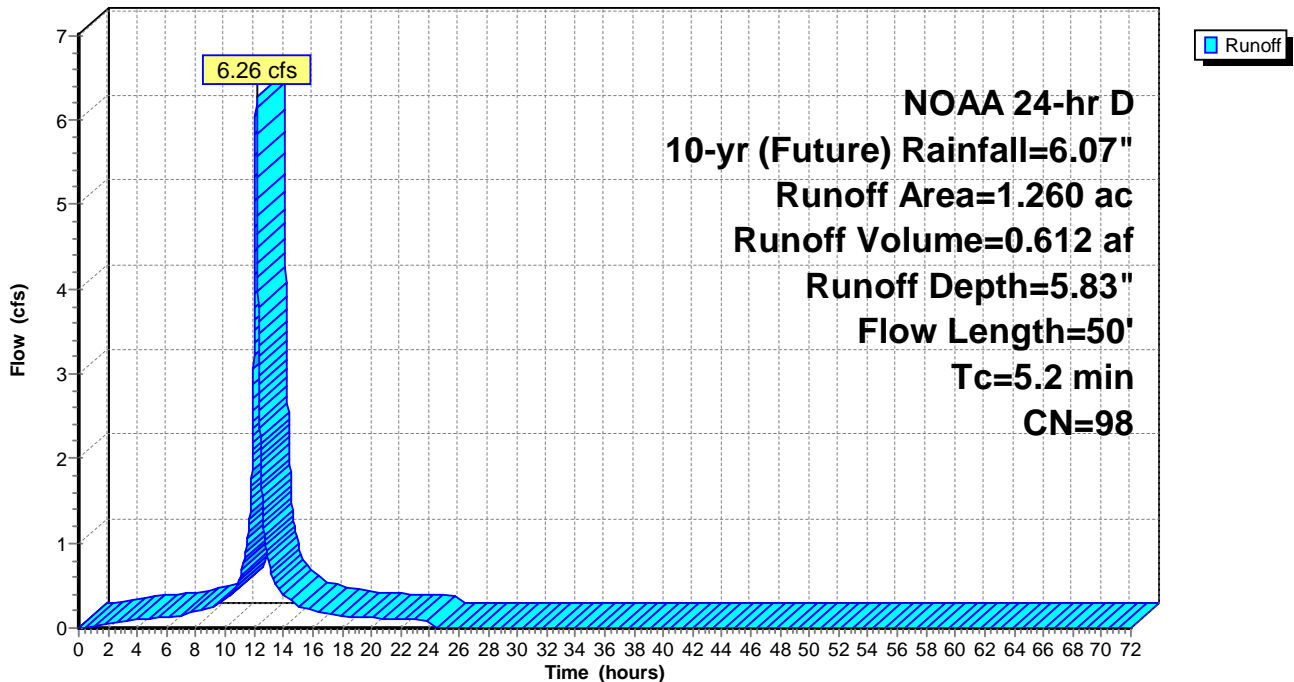
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Future)

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NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Printed 10/10/2025

Summary for Subcatchment DA-1p: DA-1 Pervious

Runoff = 0.80 cfs @ 12.14 hrs, Volume= 0.070 af, Depth= 2.05"

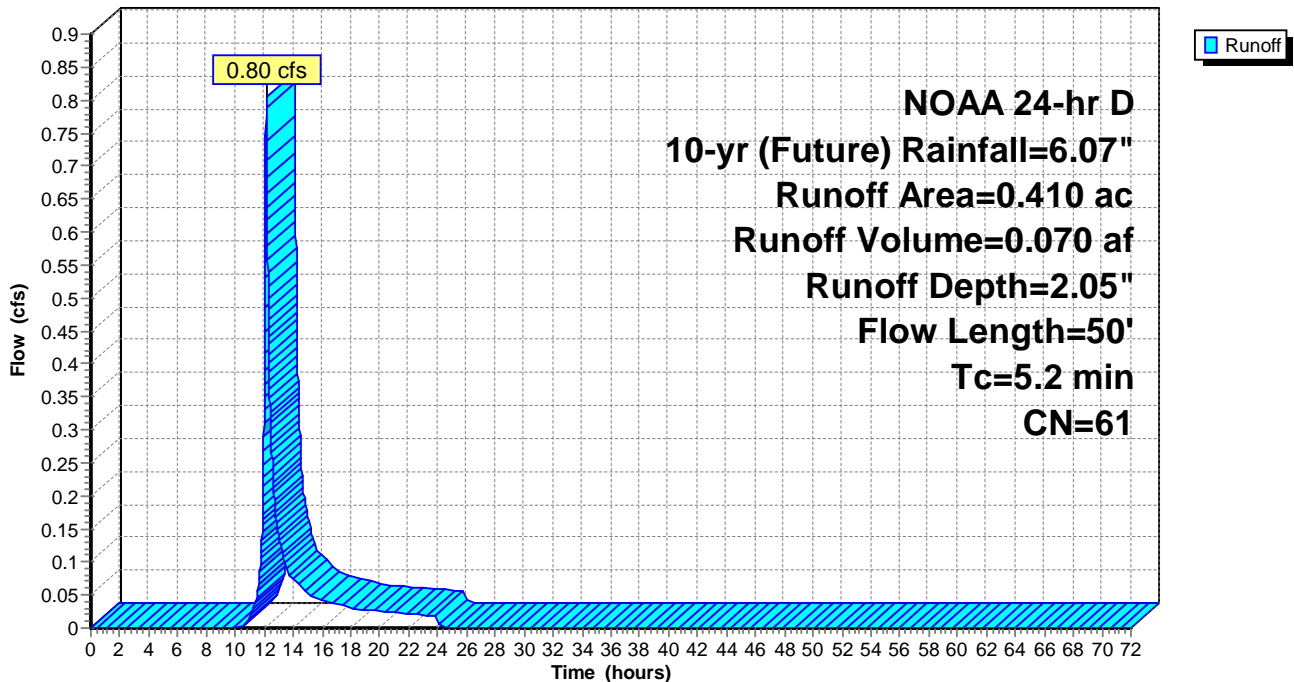
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 0.94 cfs @ 12.10 hrs, Volume= 0.073 af, Depth= 5.83"

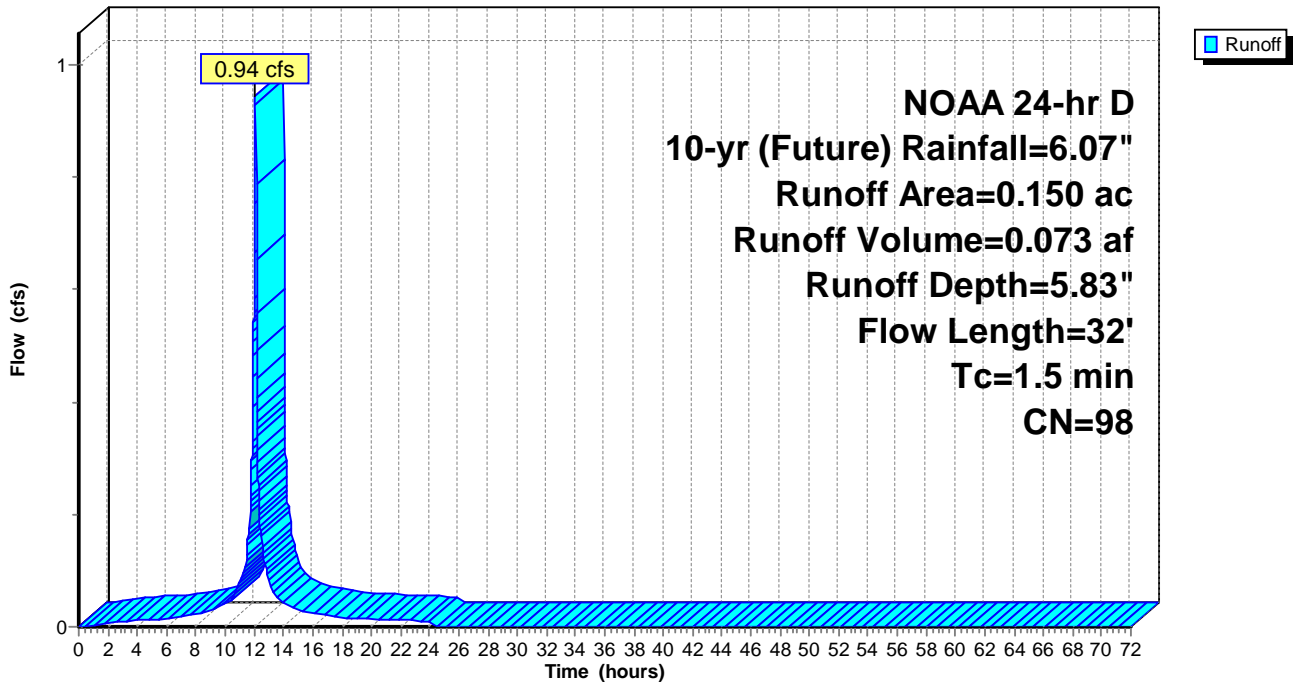
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

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Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 1.03 cfs @ 12.10 hrs, Volume= 0.067 af, Depth= 3.84"

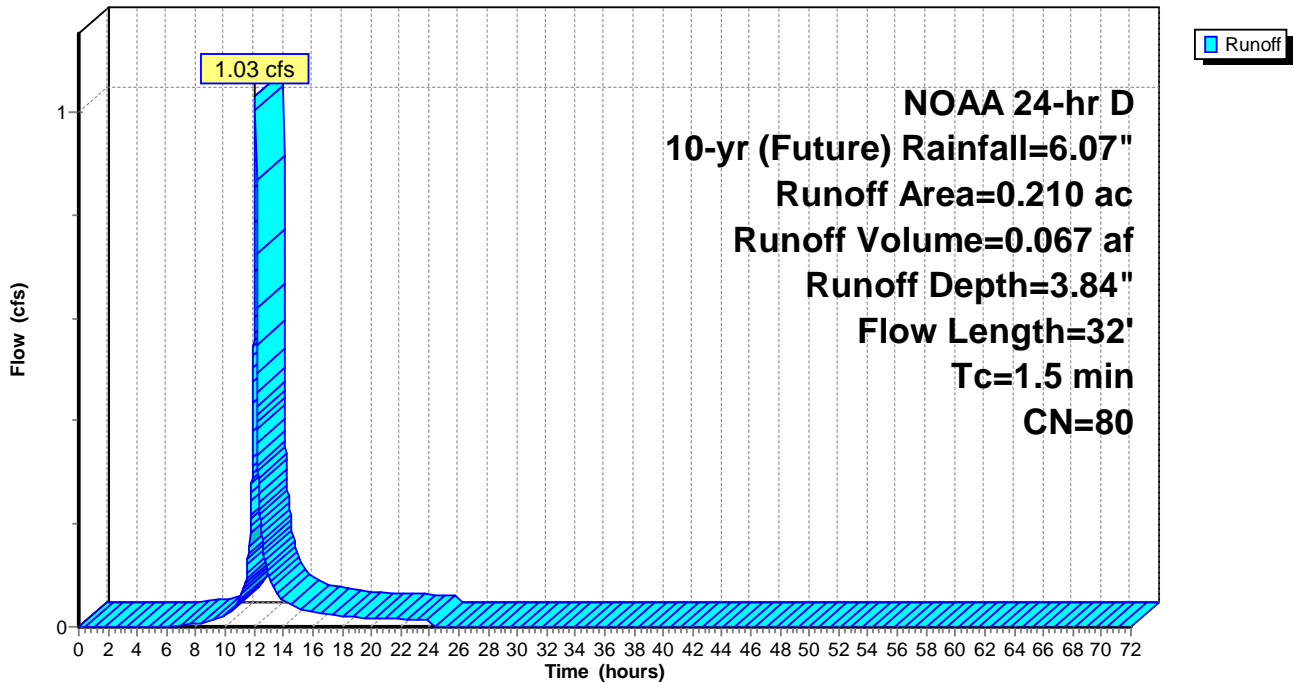
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Future)

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NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Printed 10/10/2025

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 3.94 cfs @ 12.10 hrs, Volume= 0.301 af, Depth= 5.83"

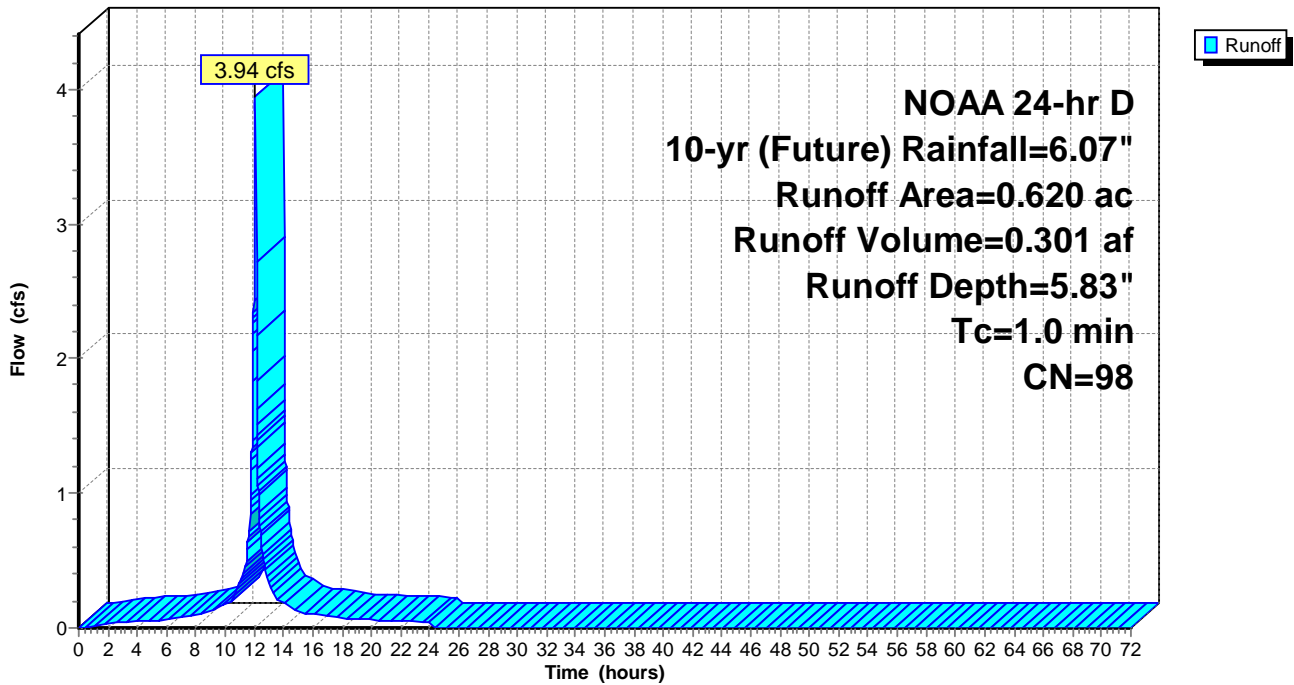
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

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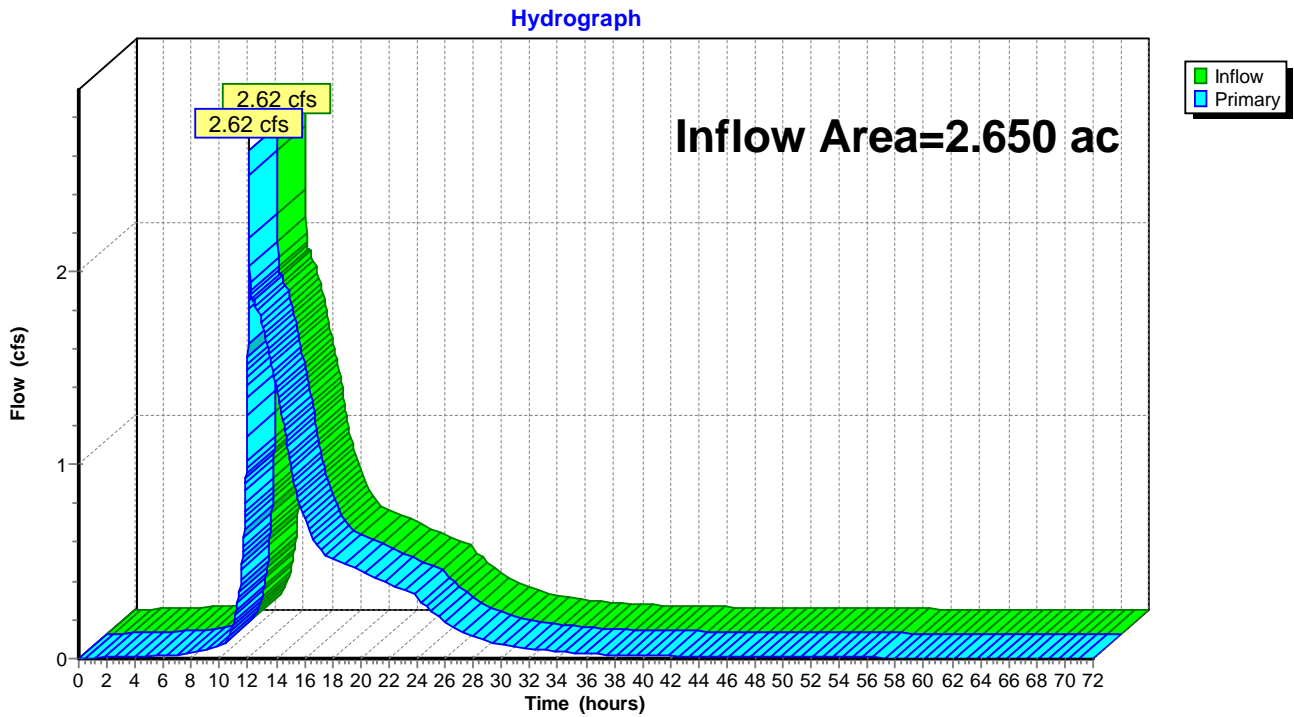
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Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth > 4.32" for 10-yr (Future) event
Inflow = 2.62 cfs @ 12.11 hrs, Volume= 0.953 af
Primary = 2.62 cfs @ 12.11 hrs, Volume= 0.953 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 5.16" for 10-yr (Future) event
 Inflow = 10.48 cfs @ 12.10 hrs, Volume= 0.984 af
 Outflow = 1.55 cfs @ 12.80 hrs, Volume= 0.813 af, Atten= 85%, Lag= 42.1 min
 Primary = 1.55 cfs @ 12.80 hrs, Volume= 0.813 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.65' @ 12.80 hrs Surf.Area= 34,020 sf Storage= 24,755 cf

Plug-Flow detention time= 427.0 min calculated for 0.813 af (83% of inflow)
 Center-of-Mass det. time= 348.4 min (1,103.9 - 755.5)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.55 cfs @ 12.80 hrs HW=10.65' (Free Discharge)

- 1=Culvert (Passes 1.55 cfs of 11.73 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.69 cfs @ 5.03 fps)
- 3=Orifice/Grate (Orifice Controls 0.87 cfs @ 3.09 fps)
- 4=Broad-Crested Rectangular Weir (Controls 0.00 cfs)
- 5=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Post-Development (Future)

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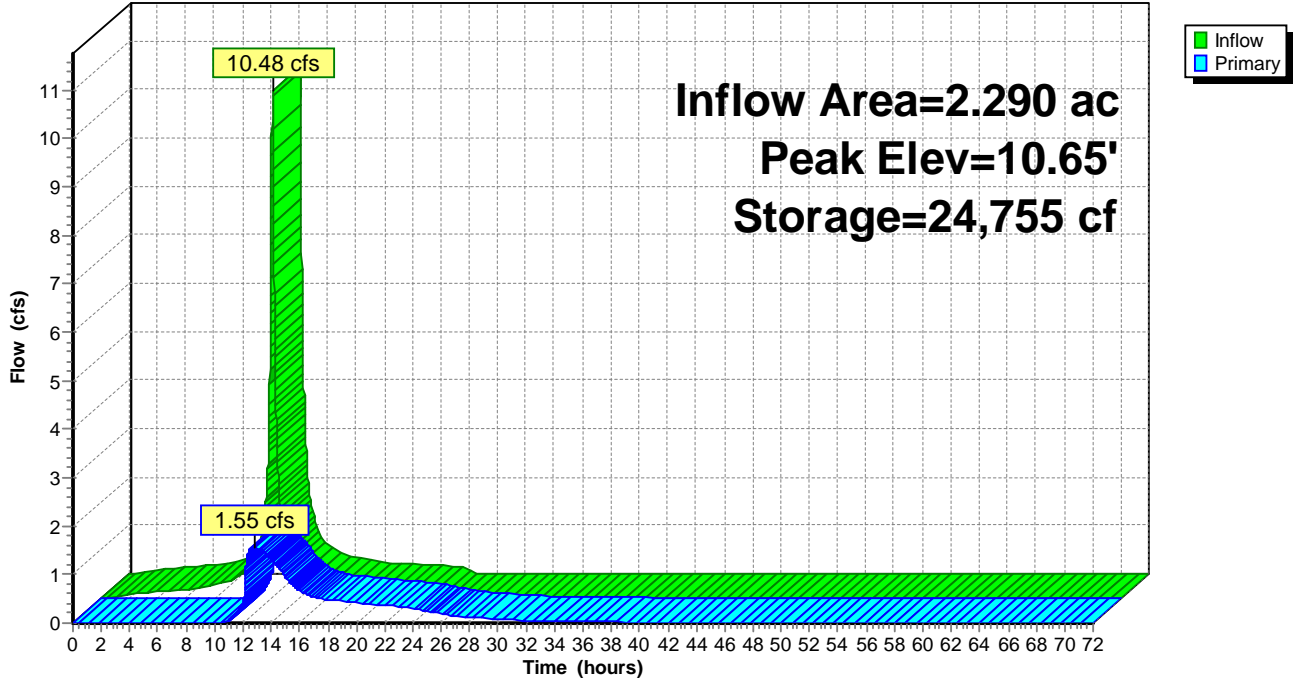
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NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Post-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.08	214	8.85	0.00
4.00	0.14	1,042	8.91	0.00
6.00	0.18	2,218	8.99	0.00
8.00	0.29	3,902	9.12	0.00
10.00	0.52	6,567	9.31	0.00
12.00	6.23	15,708	9.98	0.43
14.00	0.64	22,564	10.49	1.31
16.00	0.35	18,935	10.22	0.67
18.00	0.24	17,127	10.09	0.48
20.00	0.20	15,463	9.97	0.42
22.00	0.17	14,013	9.86	0.36
24.00	0.15	12,779	9.77	0.30
26.00	0.00	11,060	9.64	0.19
28.00	0.00	10,005	9.57	0.11
30.00	0.00	9,357	9.52	0.07
32.00	0.00	8,930	9.49	0.05
34.00	0.00	8,631	9.46	0.04
36.00	0.00	8,411	9.45	0.03
38.00	0.00	8,244	9.44	0.02
40.00	0.00	8,113	9.43	0.02
42.00	0.00	8,006	9.42	0.01
44.00	0.00	7,918	9.41	0.01
46.00	0.00	7,847	9.41	0.01
48.00	0.00	7,785	9.40	0.01
50.00	0.00	7,732	9.40	0.01
52.00	0.00	7,684	9.39	0.01
54.00	0.00	7,643	9.39	0.01
56.00	0.00	7,606	9.39	0.00
58.00	0.00	7,574	9.39	0.00
60.00	0.00	7,546	9.38	0.00
62.00	0.00	7,521	9.38	0.00
64.00	0.00	7,499	9.38	0.00
66.00	0.00	7,480	9.38	0.00
68.00	0.00	7,462	9.38	0.00
70.00	0.00	7,445	9.38	0.00
72.00	0.00	7,429	9.38	0.00

Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 6.54 cfs @ 12.13 hrs, Volume= 0.641 af, Depth= 6.10"

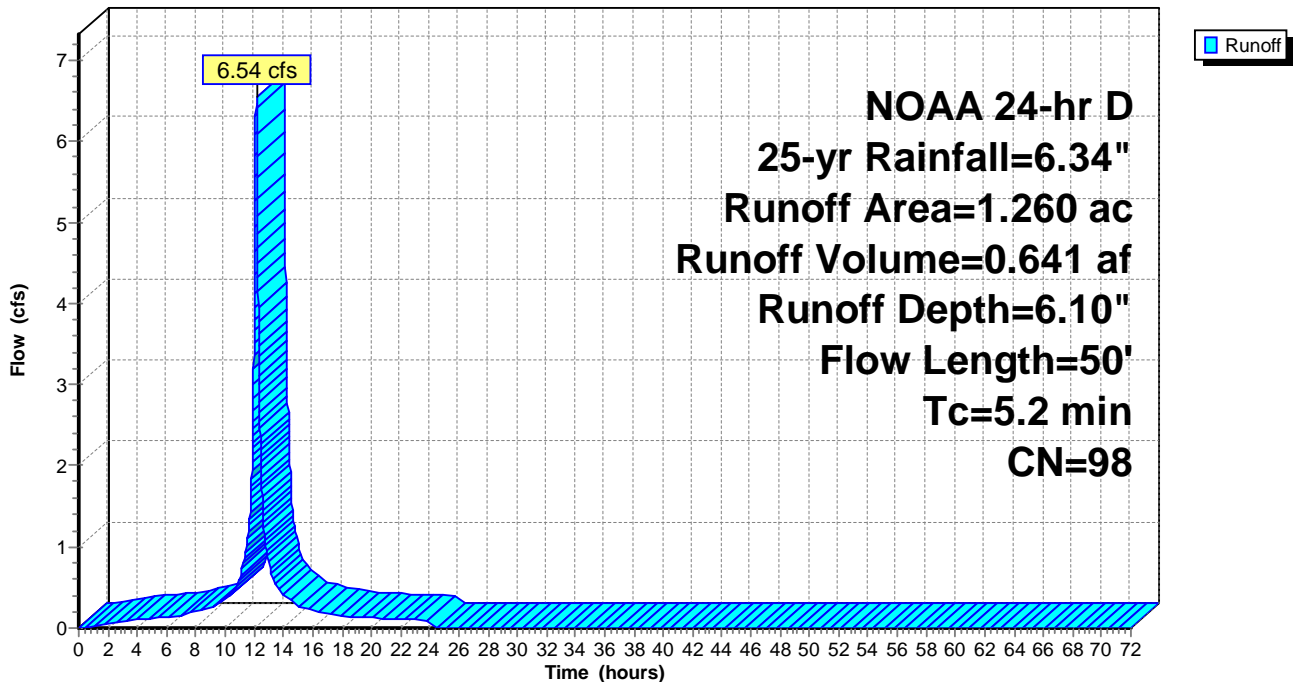
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-1p: DA-1 Pervious

Runoff = 0.88 cfs @ 12.14 hrs, Volume= 0.076 af, Depth= 2.24"

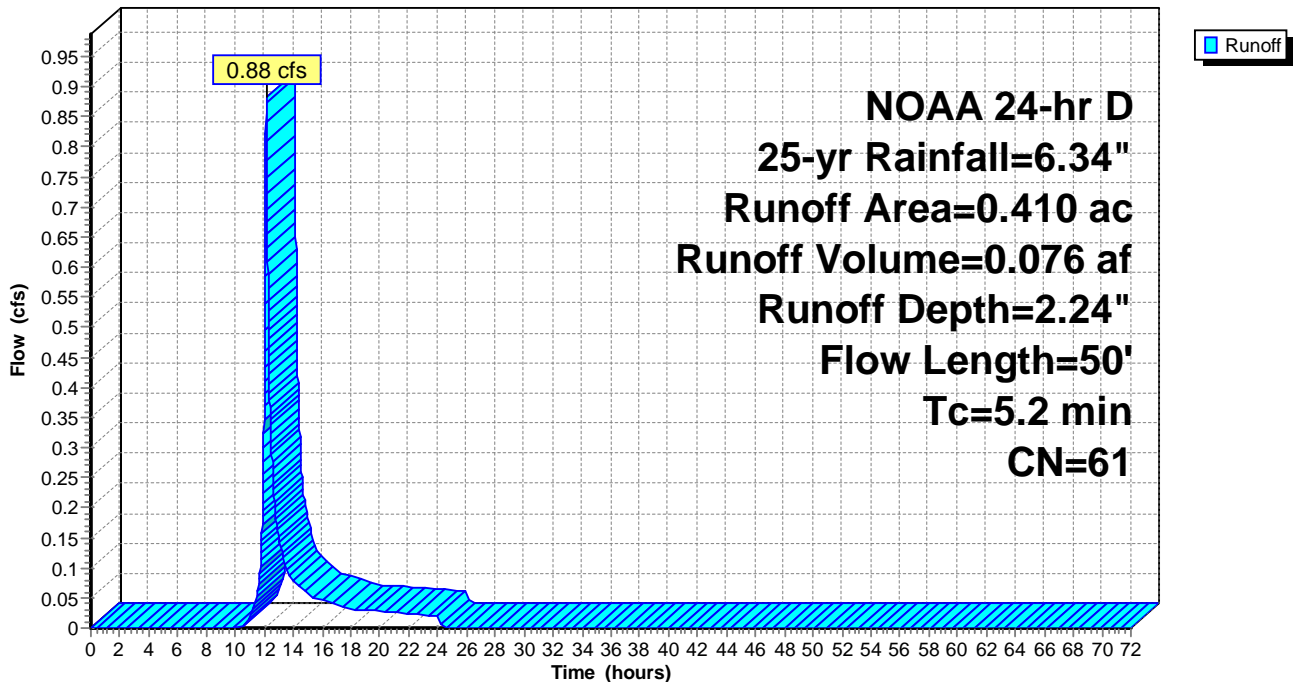
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Future)

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 0.99 cfs @ 12.10 hrs, Volume= 0.076 af, Depth= 6.10"

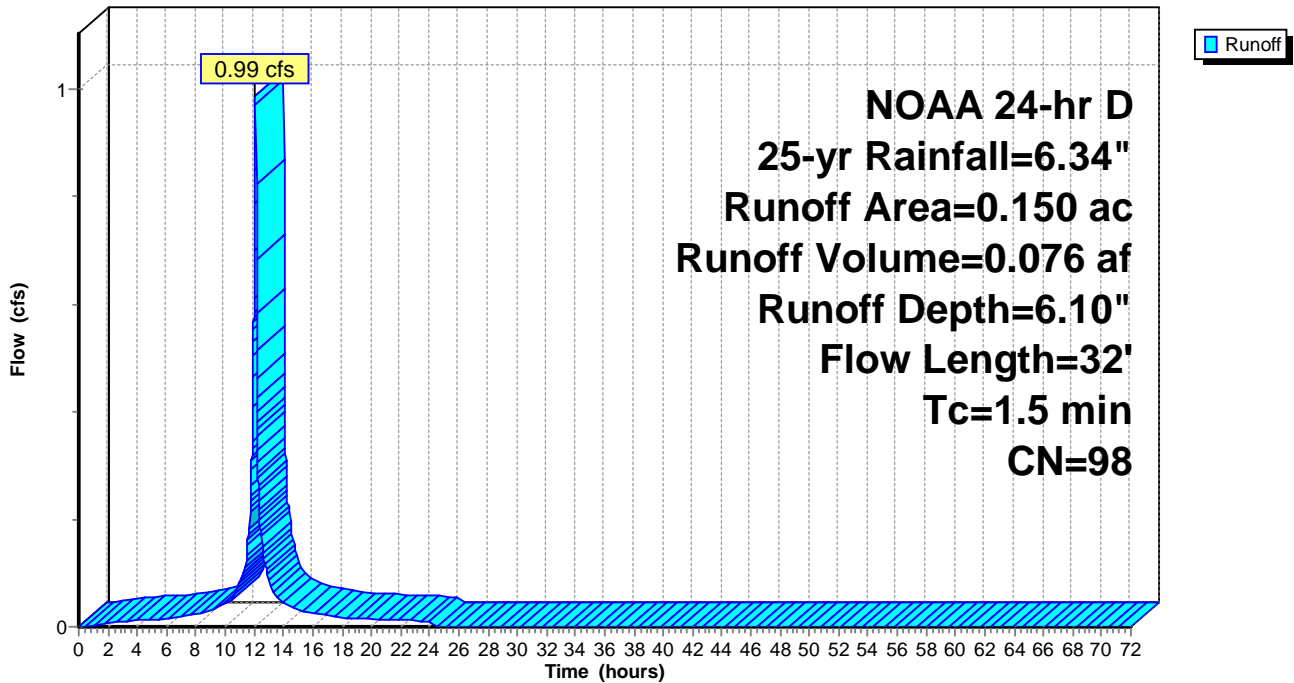
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 1.09 cfs @ 12.10 hrs, Volume= 0.072 af, Depth= 4.09"

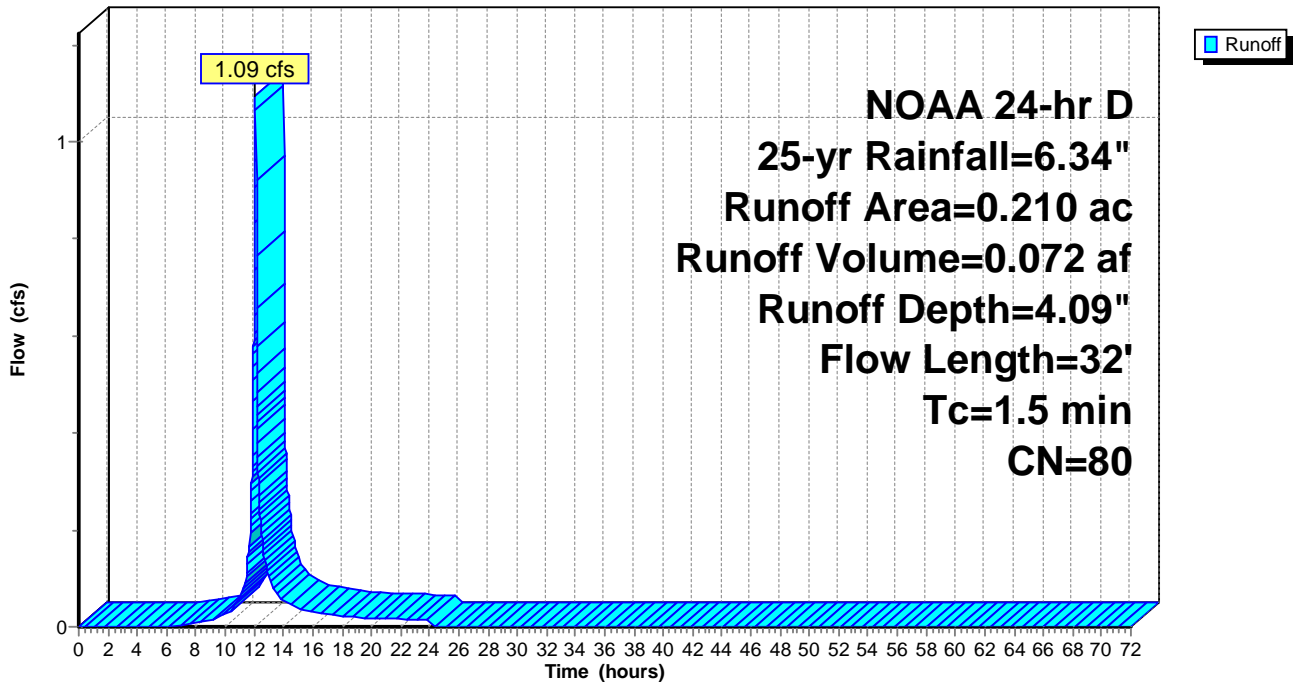
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Future)

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 4.12 cfs @ 12.10 hrs, Volume= 0.315 af, Depth= 6.10"

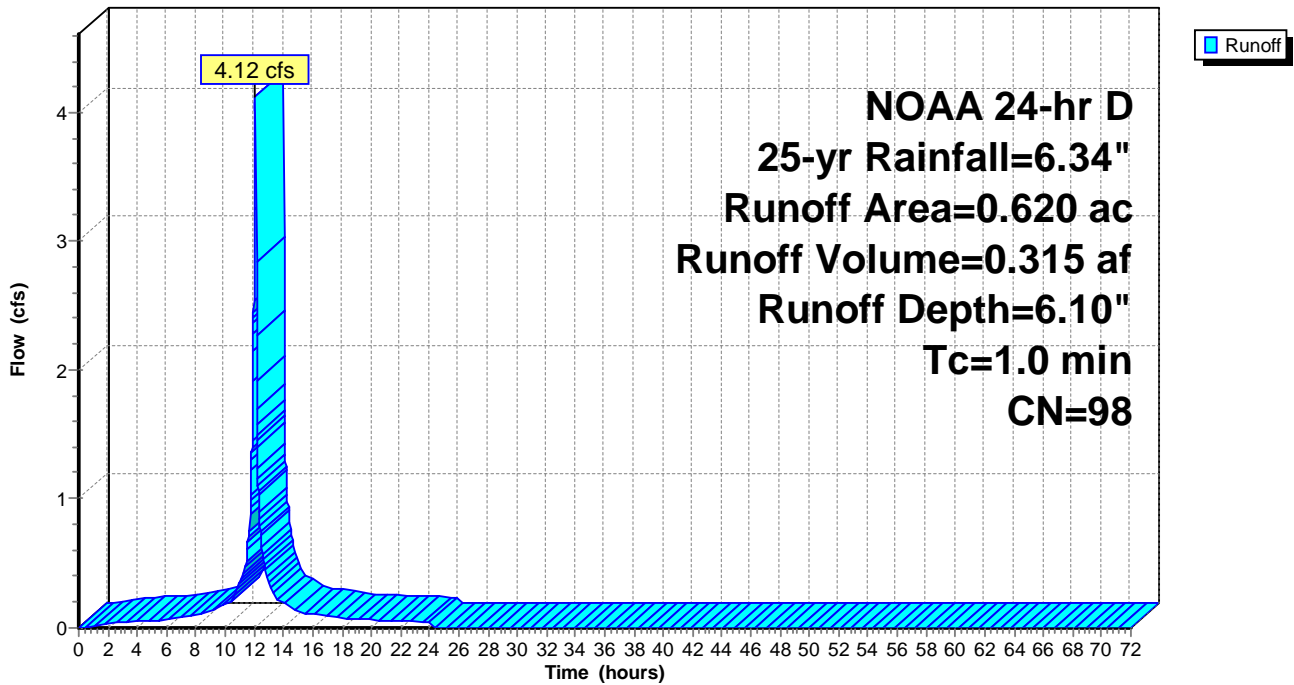
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

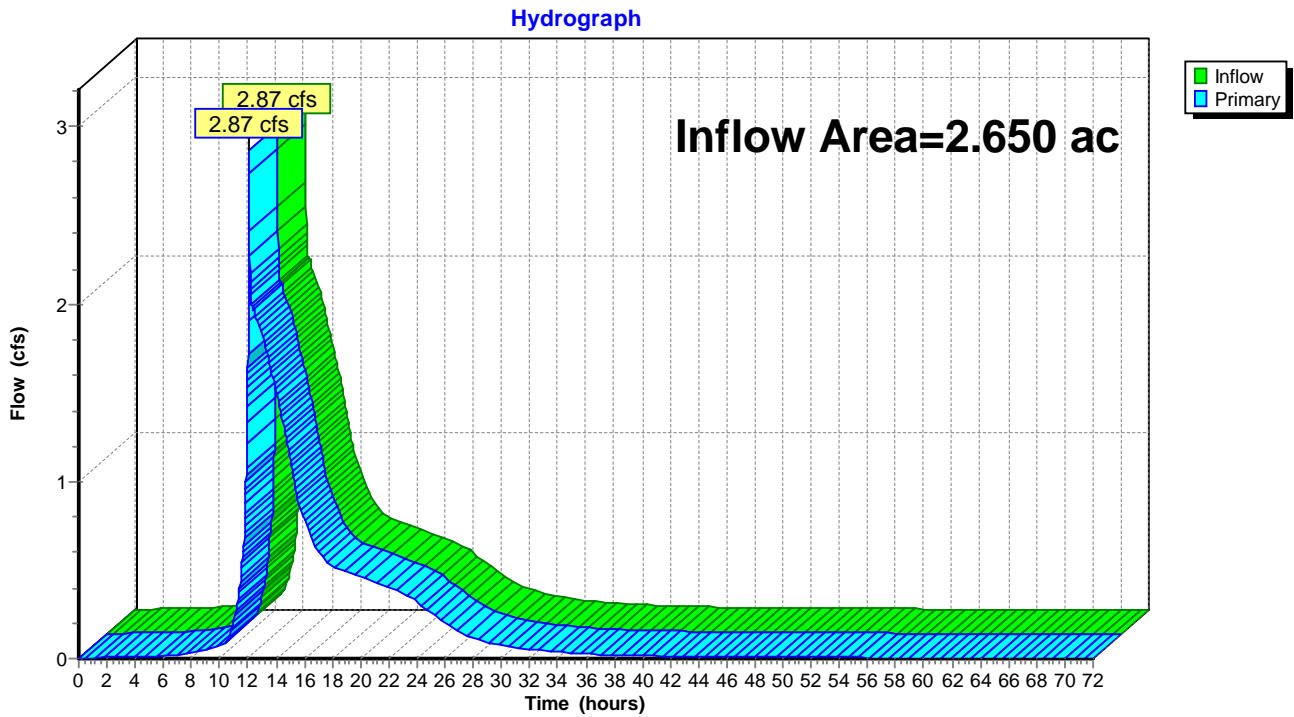
Printed 10/10/2025

Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth > 4.57" for 25-yr event
Inflow = 2.87 cfs @ 12.11 hrs, Volume= 1.010 af
Primary = 2.87 cfs @ 12.11 hrs, Volume= 1.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Future)

NOAA 24-hr D 25-yr Rainfall=6.34"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 5.41" for 25-yr event
 Inflow = 10.99 cfs @ 12.10 hrs, Volume= 1.032 af
 Outflow = 1.65 cfs @ 12.79 hrs, Volume= 0.862 af, Atten= 85%, Lag= 41.1 min
 Primary = 1.65 cfs @ 12.79 hrs, Volume= 0.862 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.72' @ 12.79 hrs Surf.Area= 34,020 sf Storage= 25,764 cf

Plug-Flow detention time= 417.9 min calculated for 0.862 af (83% of inflow)
 Center-of-Mass det. time= 341.2 min (1,096.2 - 755.0)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=1.65 cfs @ 12.79 hrs HW=10.72' (Free Discharge)

- ↑ **1=Culvert** (Passes 1.65 cfs of 11.84 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.71 cfs @ 5.20 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.94 cfs @ 3.36 fps)
- ↑ **4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)
- ↑ **5=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

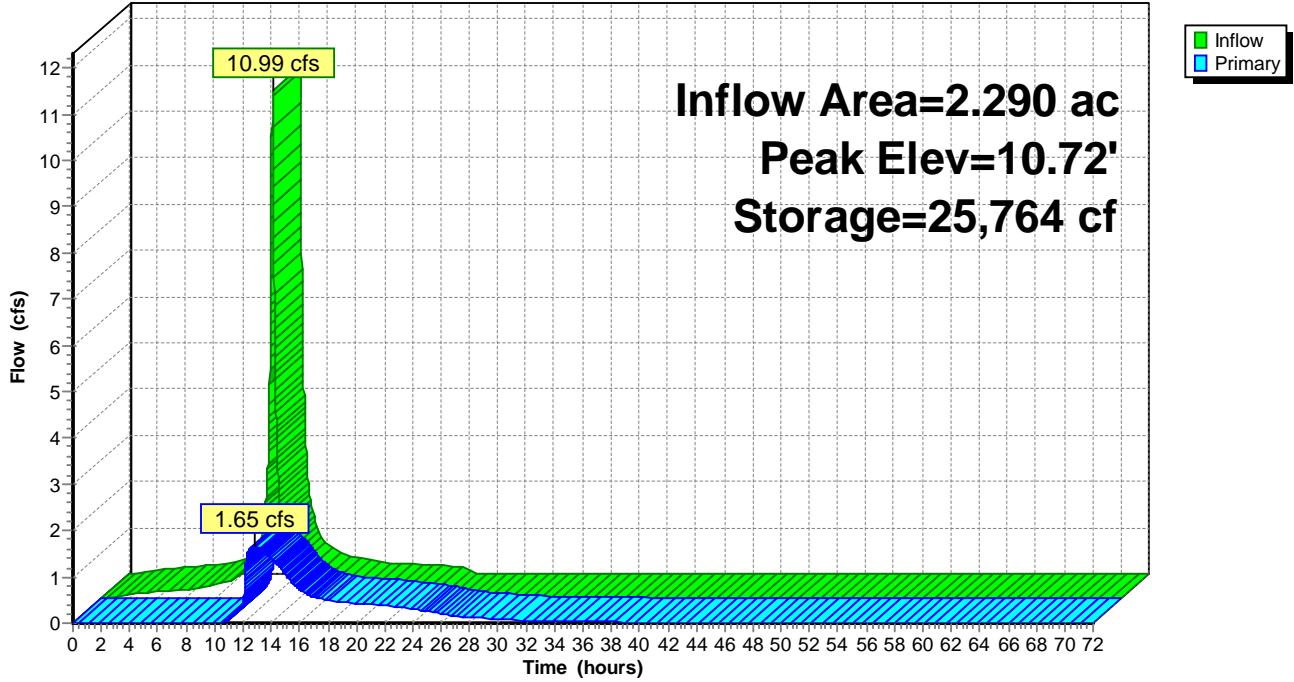
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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.09	237	8.85	0.00
4.00	0.15	1,119	8.91	0.00
6.00	0.19	2,358	9.00	0.00
8.00	0.30	4,126	9.13	0.00
10.00	0.54	6,916	9.34	0.00
12.00	6.54	16,402	10.04	0.45
14.00	0.67	23,356	10.55	1.40
16.00	0.37	19,242	10.24	0.72
18.00	0.25	17,339	10.10	0.49
20.00	0.21	15,694	9.98	0.43
22.00	0.18	14,242	9.88	0.37
24.00	0.15	12,988	9.78	0.31
26.00	0.00	11,192	9.65	0.20
28.00	0.00	10,084	9.57	0.12
30.00	0.00	9,407	9.52	0.07
32.00	0.00	8,964	9.49	0.05
34.00	0.00	8,655	9.47	0.04
36.00	0.00	8,430	9.45	0.03
38.00	0.00	8,258	9.44	0.02
40.00	0.00	8,124	9.43	0.02
42.00	0.00	8,015	9.42	0.01
44.00	0.00	7,926	9.41	0.01
46.00	0.00	7,853	9.41	0.01
48.00	0.00	7,791	9.40	0.01
50.00	0.00	7,736	9.40	0.01
52.00	0.00	7,689	9.39	0.01
54.00	0.00	7,646	9.39	0.01
56.00	0.00	7,609	9.39	0.00
58.00	0.00	7,577	9.39	0.00
60.00	0.00	7,548	9.38	0.00
62.00	0.00	7,523	9.38	0.00
64.00	0.00	7,501	9.38	0.00
66.00	0.00	7,482	9.38	0.00
68.00	0.00	7,464	9.38	0.00
70.00	0.00	7,446	9.38	0.00
72.00	0.00	7,430	9.38	0.00

Post-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment DA-1i: DA-1 Impervious

Runoff = 11.24 cfs @ 12.13 hrs, Volume= 1.116 af, Depth=10.63"

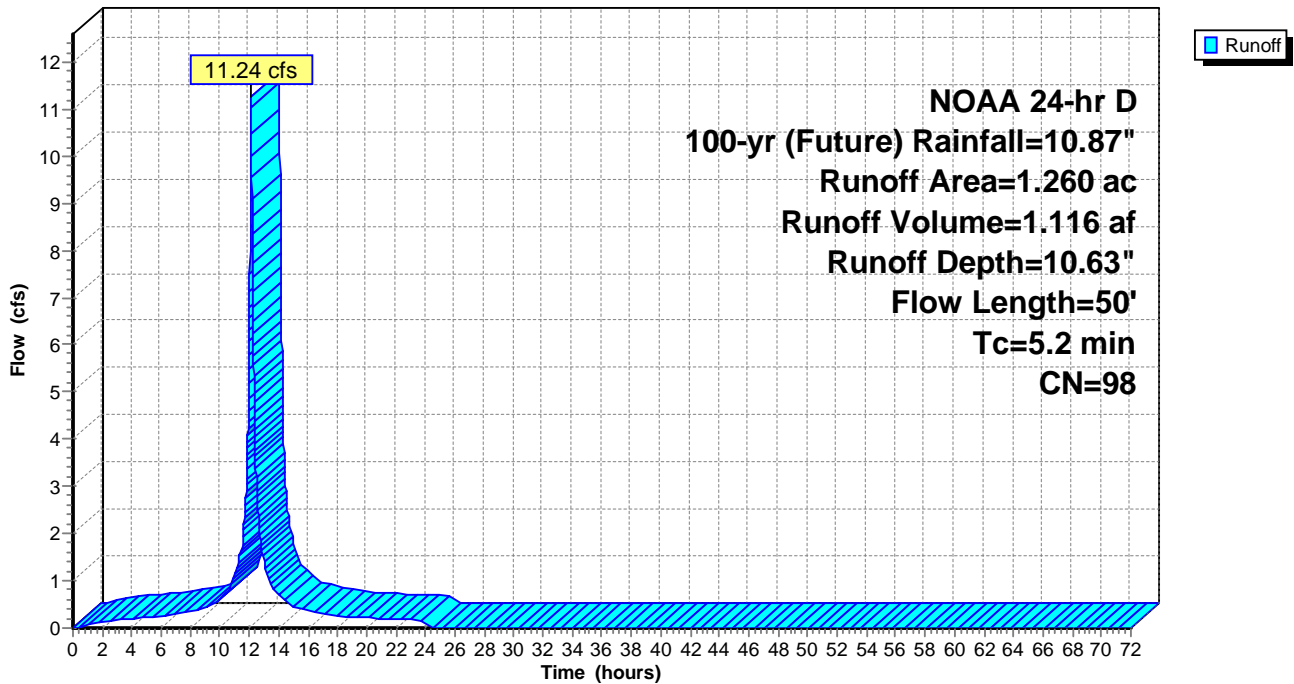
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
0.260	98	Paved parking, HSG A
1.000	98	Paved parking, HSG D
1.260	98	Weighted Average
1.260		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

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Summary for Subcatchment DA-1p: DA-1 Pervious

Runoff = 2.34 cfs @ 12.13 hrs, Volume= 0.197 af, Depth= 5.76"

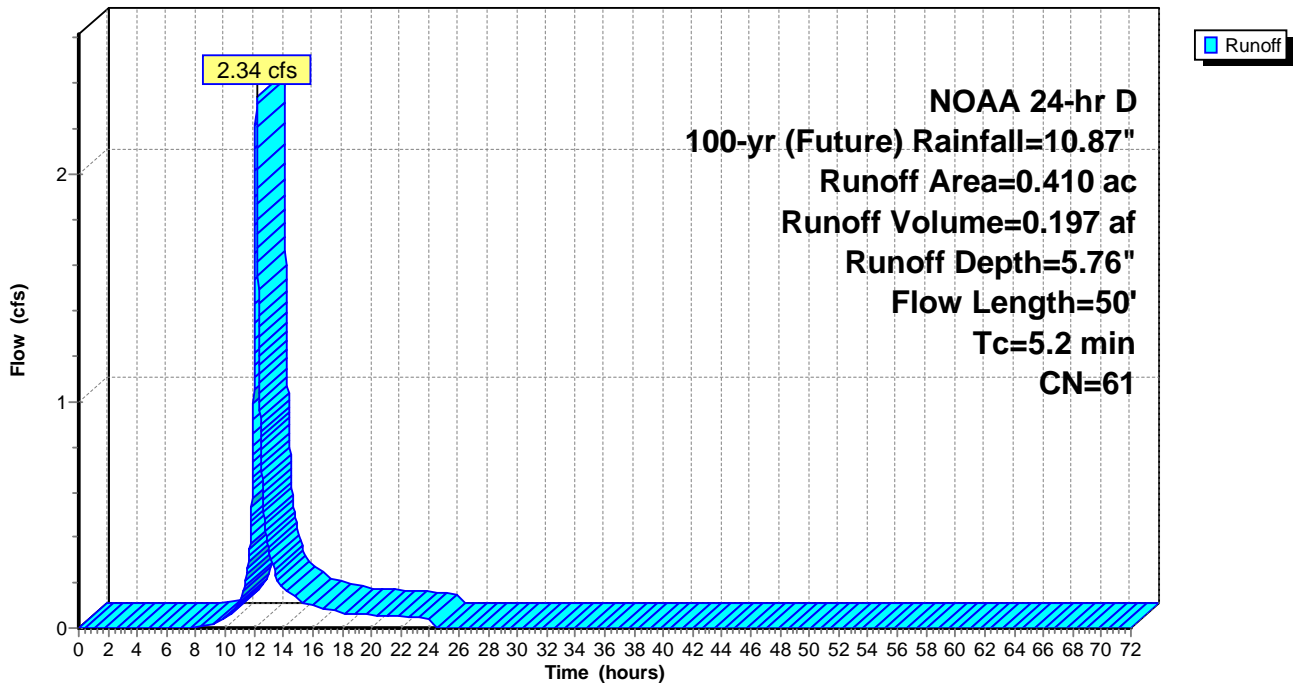
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
0.190	39	>75% Grass cover, Good, HSG A
0.220	80	>75% Grass cover, Good, HSG D
0.410	61	Weighted Average
0.410		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	47	0.0175	0.15		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	3	0.0181	0.73		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
5.2	50	Total			

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Printed 10/10/2025

Summary for Subcatchment DA-2i: DA-2 Impervious

Runoff = 1.69 cfs @ 12.10 hrs, Volume= 0.133 af, Depth=10.63"

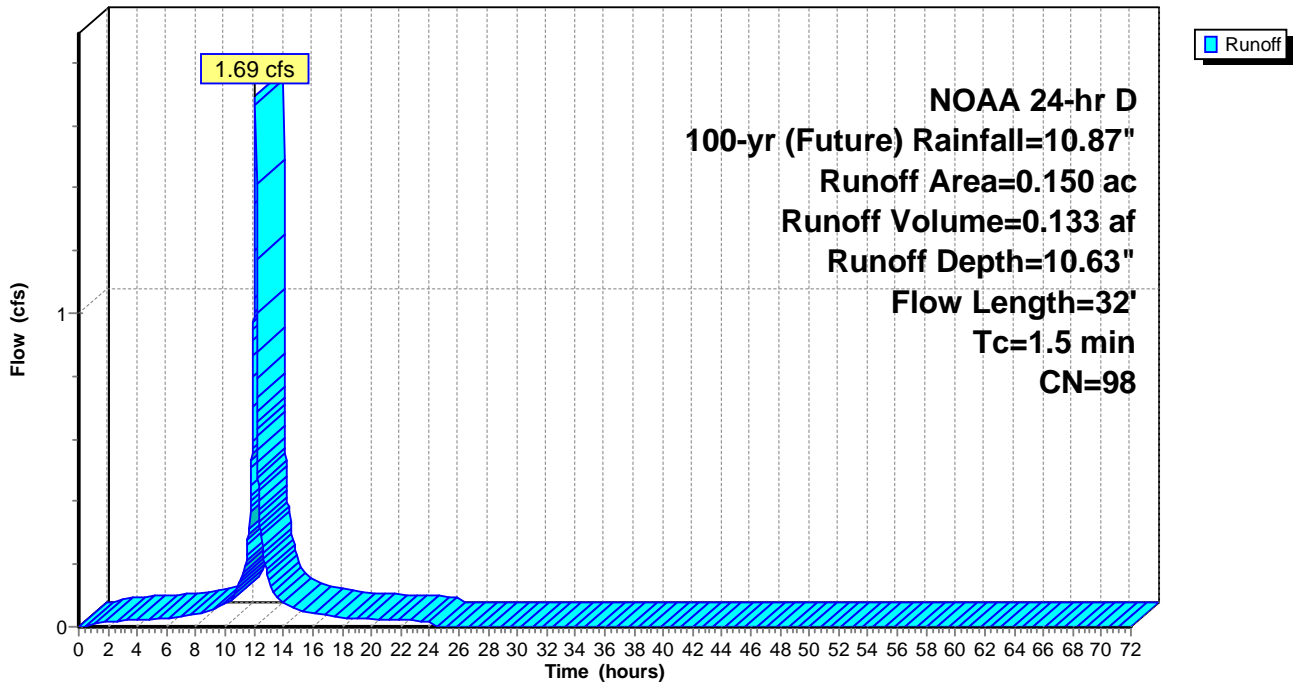
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
0.150	98	Paved parking, HSG D
0.150		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

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Summary for Subcatchment DA-2p: DA-2 Pervious

Runoff = 2.14 cfs @ 12.10 hrs, Volume= 0.146 af, Depth= 8.36"

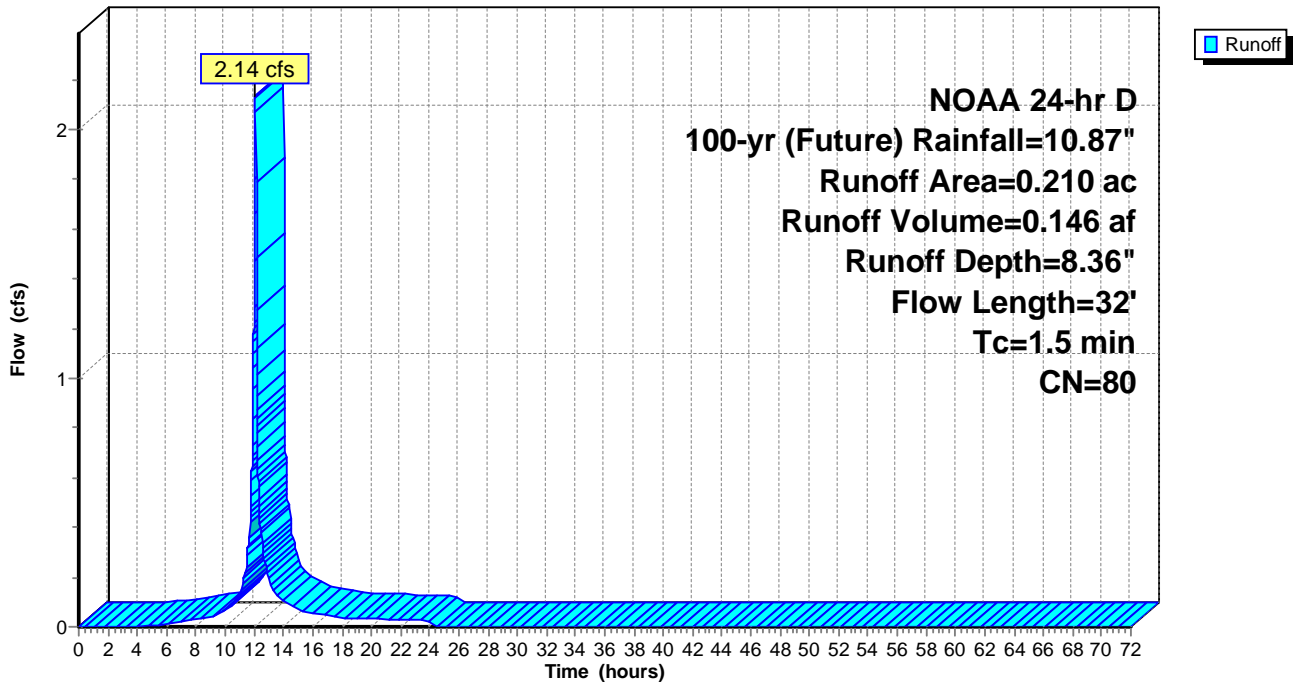
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
0.210	80	>75% Grass cover, Good, HSG D
0.210		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	27	0.1552	0.33		Sheet Flow, Grass: Short n= 0.150 P2= 3.96"
0.1	5	0.0150	0.75		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.96"
1.5	32	Total			

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

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Summary for Subcatchment DA-Bldg: Buildings

Runoff = 7.07 cfs @ 12.10 hrs, Volume= 0.549 af, Depth=10.63"

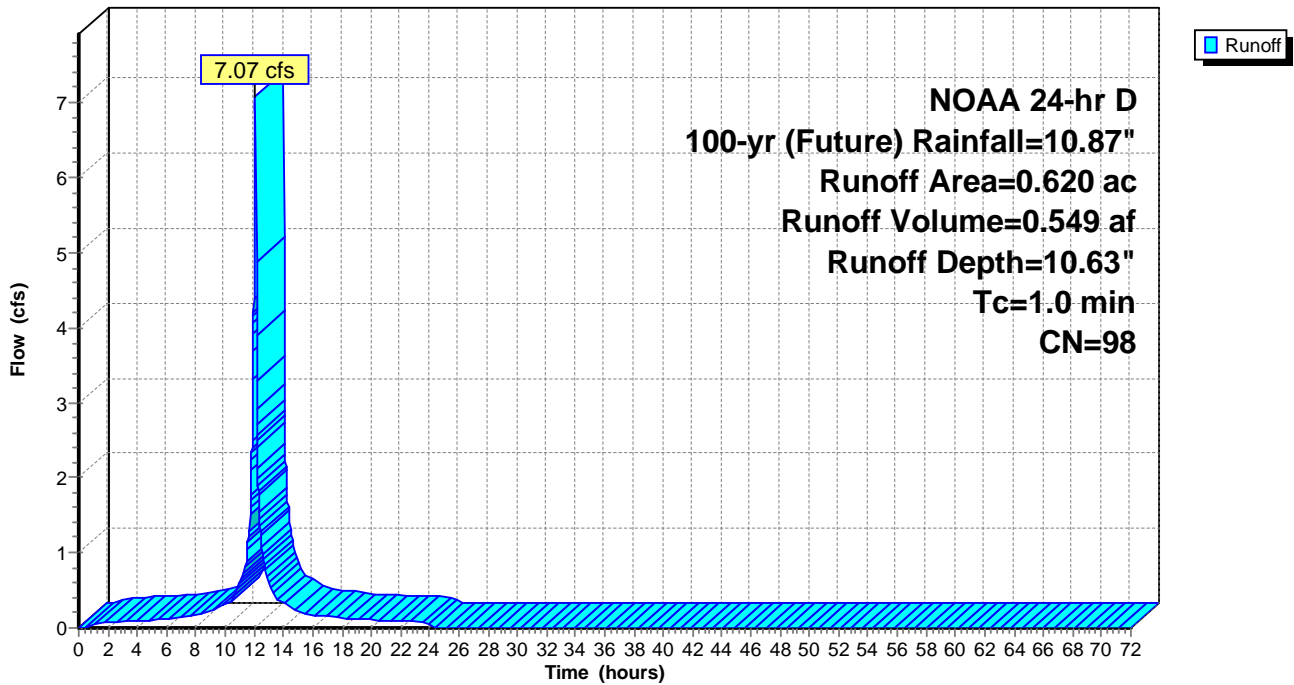
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
* 0.110	98	Building, HSG A
* 0.510	98	Building, HSG D
0.620	98	Weighted Average
0.620		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

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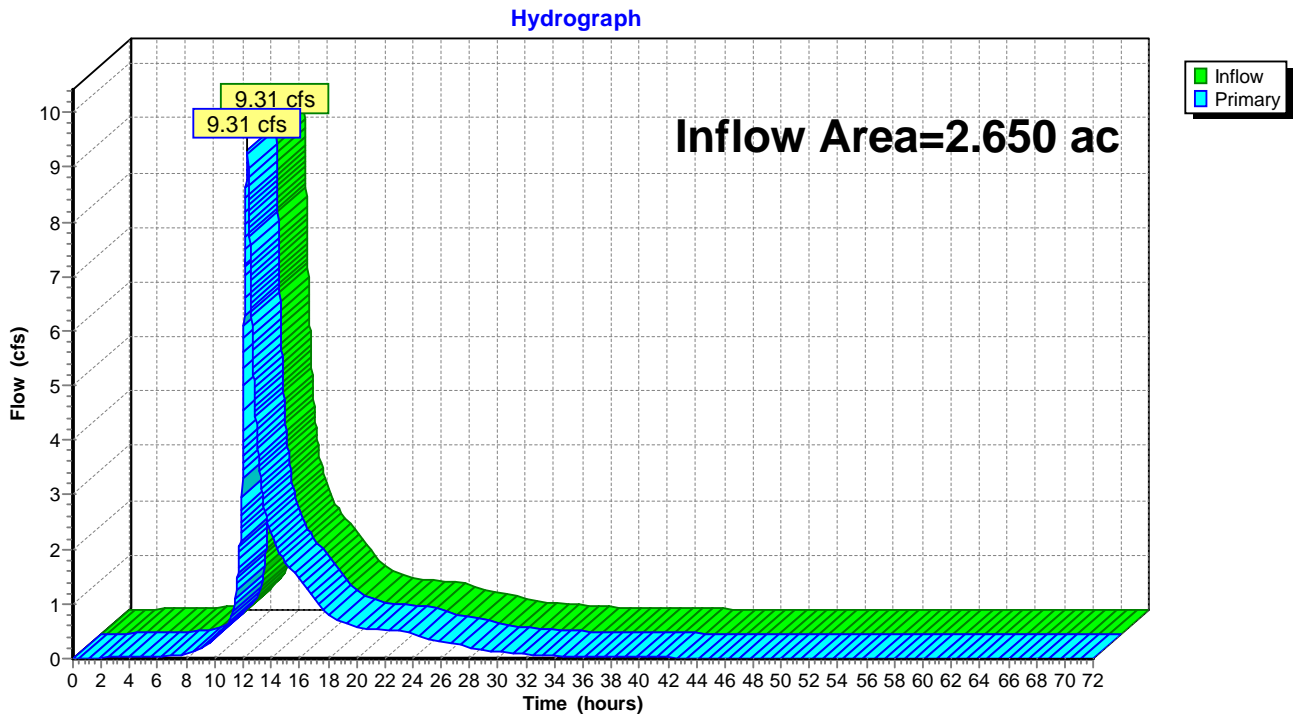
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Summary for Pond Beachway: Flow to Beachway Ave

Inflow Area = 2.650 ac, 76.60% Impervious, Inflow Depth > 8.92" for 100-yr (Future) event
Inflow = 9.31 cfs @ 12.30 hrs, Volume= 1.970 af
Primary = 9.31 cfs @ 12.30 hrs, Volume= 1.970 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Beachway: Flow to Beachway Ave



Post-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 9.76" for 100-yr (Future) event
 Inflow = 19.68 cfs @ 12.10 hrs, Volume= 1.862 af
 Outflow = 8.33 cfs @ 12.31 hrs, Volume= 1.691 af, Atten= 58%, Lag= 12.7 min
 Primary = 8.33 cfs @ 12.31 hrs, Volume= 1.691 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 11.53' @ 12.31 hrs Surf.Area= 34,020 sf Storage= 36,708 cf

Plug-Flow detention time= 299.6 min calculated for 1.691 af (91% of inflow)
 Center-of-Mass det. time= 248.7 min (998.2 - 749.5)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 ' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32

Primary OutFlow Max=8.32 cfs @ 12.31 hrs HW=11.53' (Free Discharge)

- 1=Culvert (Passes 8.32 cfs of 12.98 cfs potential flow)
- 2=Orifice/Grate (Orifice Controls 0.92 cfs @ 6.76 fps)
- 3=Orifice/Grate (Orifice Controls 1.54 cfs @ 5.47 fps)
- 4=Broad-Crested Rectangular Weir (Weir Controls 2.19 cfs @ 2.86 fps)
- 5=Broad-Crested Rectangular Weir (Weir Controls 3.67 cfs @ 2.01 fps)

Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

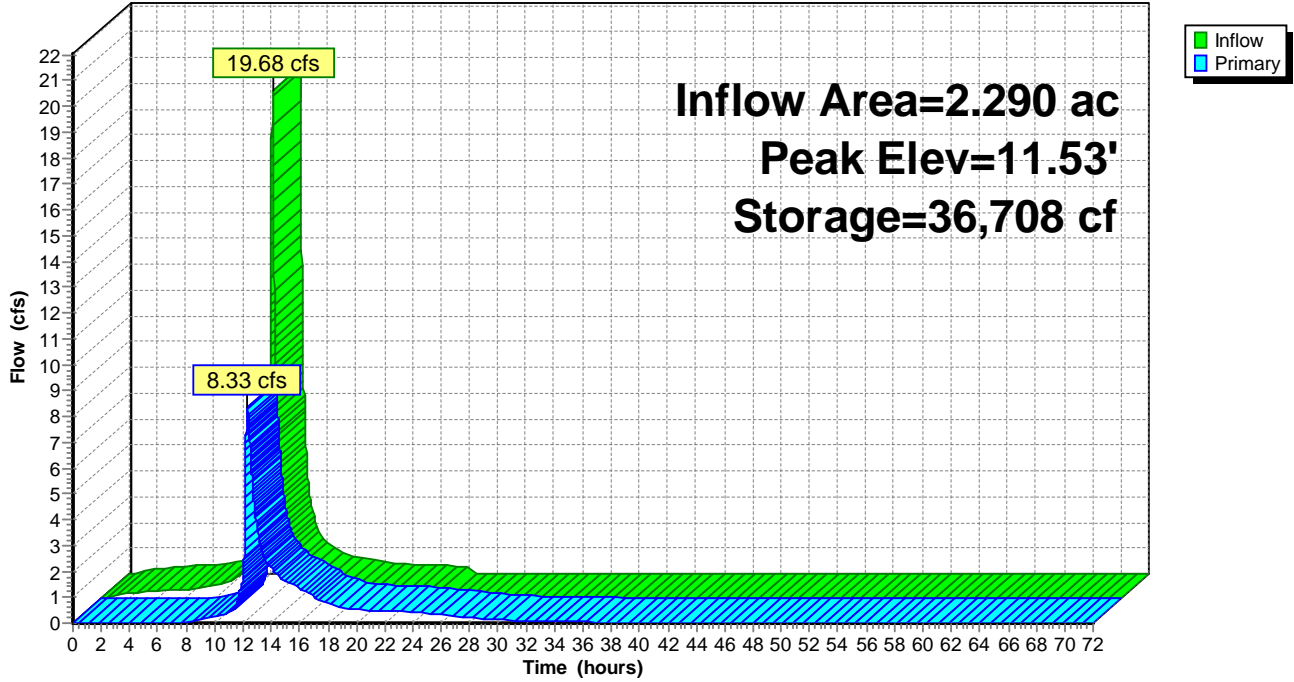
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NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Post-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

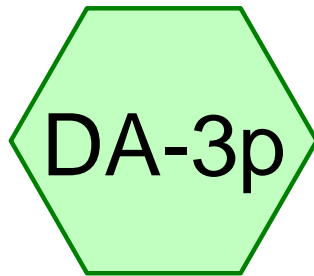
Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

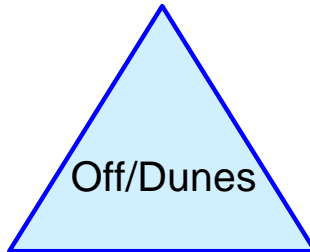
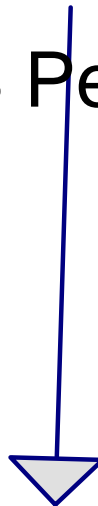
HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

Hydrograph for Pond PP: Porous Pavement

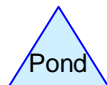
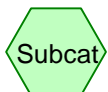
Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.20	708	8.88	0.00
4.00	0.29	2,506	9.01	0.00
6.00	0.35	4,800	9.18	0.00
8.00	0.53	7,944	9.41	0.01
10.00	0.98	12,123	9.72	0.27
12.00	11.74	26,740	10.80	1.76
14.00	1.19	28,644	10.93	2.11
16.00	0.66	22,830	10.51	1.34
18.00	0.44	19,390	10.25	0.75
20.00	0.38	17,878	10.14	0.53
22.00	0.32	16,860	10.07	0.47
24.00	0.27	15,744	9.99	0.43
26.00	0.00	13,135	9.80	0.32
28.00	0.00	11,249	9.66	0.20
30.00	0.00	10,117	9.57	0.12
32.00	0.00	9,428	9.52	0.08
34.00	0.00	8,978	9.49	0.05
36.00	0.00	8,665	9.47	0.04
38.00	0.00	8,437	9.45	0.03
40.00	0.00	8,264	9.44	0.02
42.00	0.00	8,129	9.43	0.02
44.00	0.00	8,019	9.42	0.01
46.00	0.00	7,929	9.41	0.01
48.00	0.00	7,855	9.41	0.01
50.00	0.00	7,793	9.40	0.01
52.00	0.00	7,738	9.40	0.01
54.00	0.00	7,690	9.40	0.01
56.00	0.00	7,648	9.39	0.01
58.00	0.00	7,611	9.39	0.00
60.00	0.00	7,578	9.39	0.00
62.00	0.00	7,549	9.38	0.00
64.00	0.00	7,524	9.38	0.00
66.00	0.00	7,502	9.38	0.00
68.00	0.00	7,482	9.38	0.00
70.00	0.00	7,464	9.38	0.00
72.00	0.00	7,447	9.38	0.00



DA-3 Pervious



Flow to Offsite/Dunes



Post-Development (Future)

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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Subcatchment DA-3p: DA-3 Pervious

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

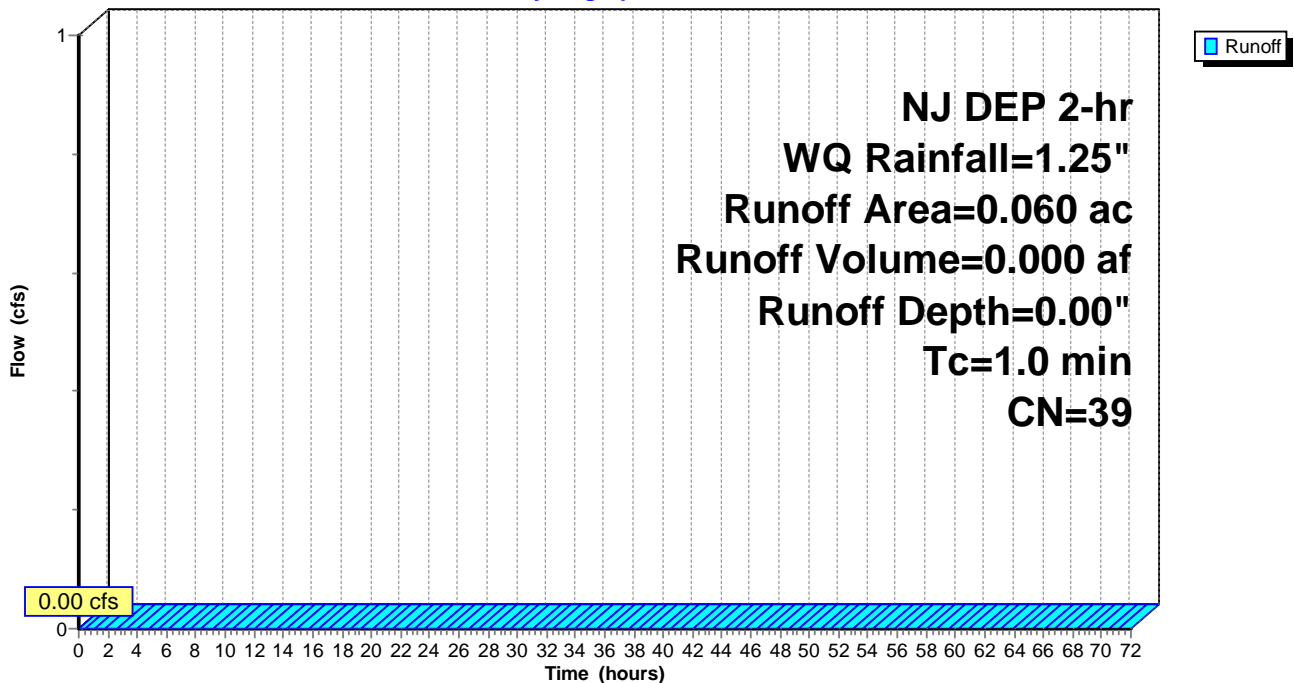
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.060		100.00% Pervious Area

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

Subcatchment DA-3p: DA-3 Pervious

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NJ DEP 2-hr WQ Rainfall=1.25"

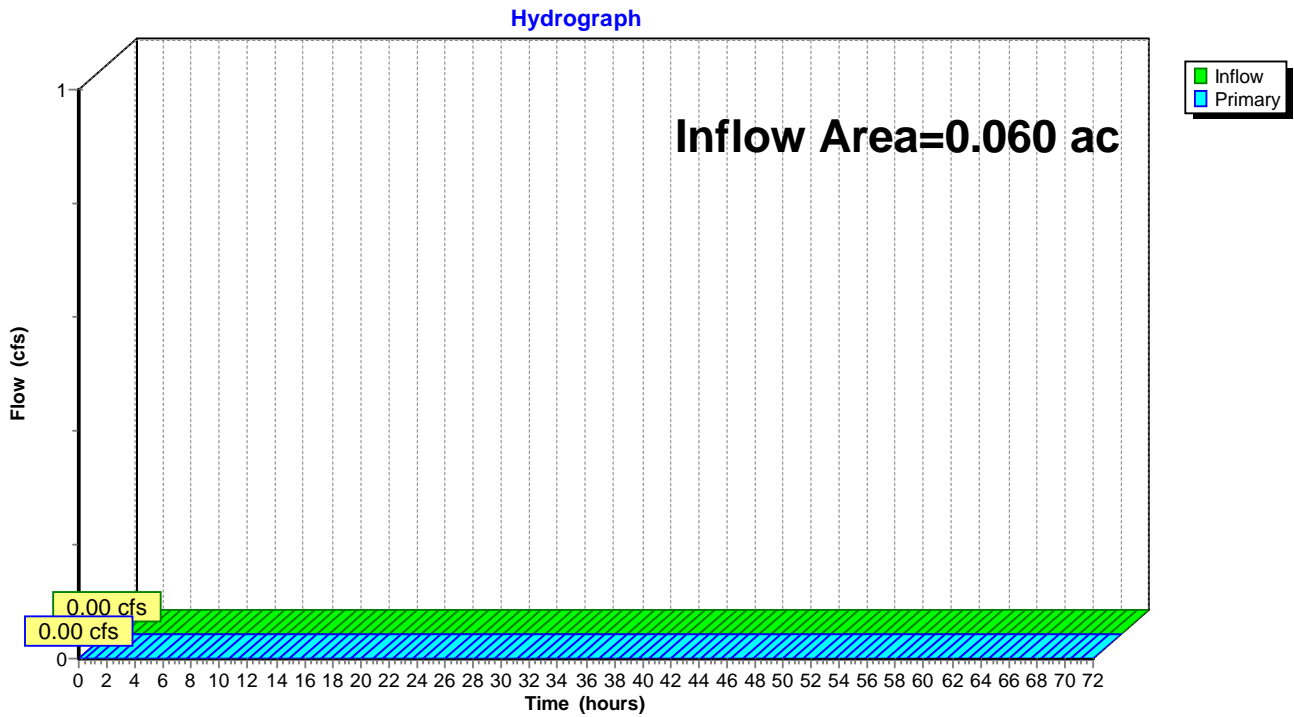
Printed 10/10/2025

Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 0.00" for WQ event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Post-Development (Future)

NOAA 24-hr D 2-yr (Future) Rainfall=3.96"

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Printed 10/10/2025

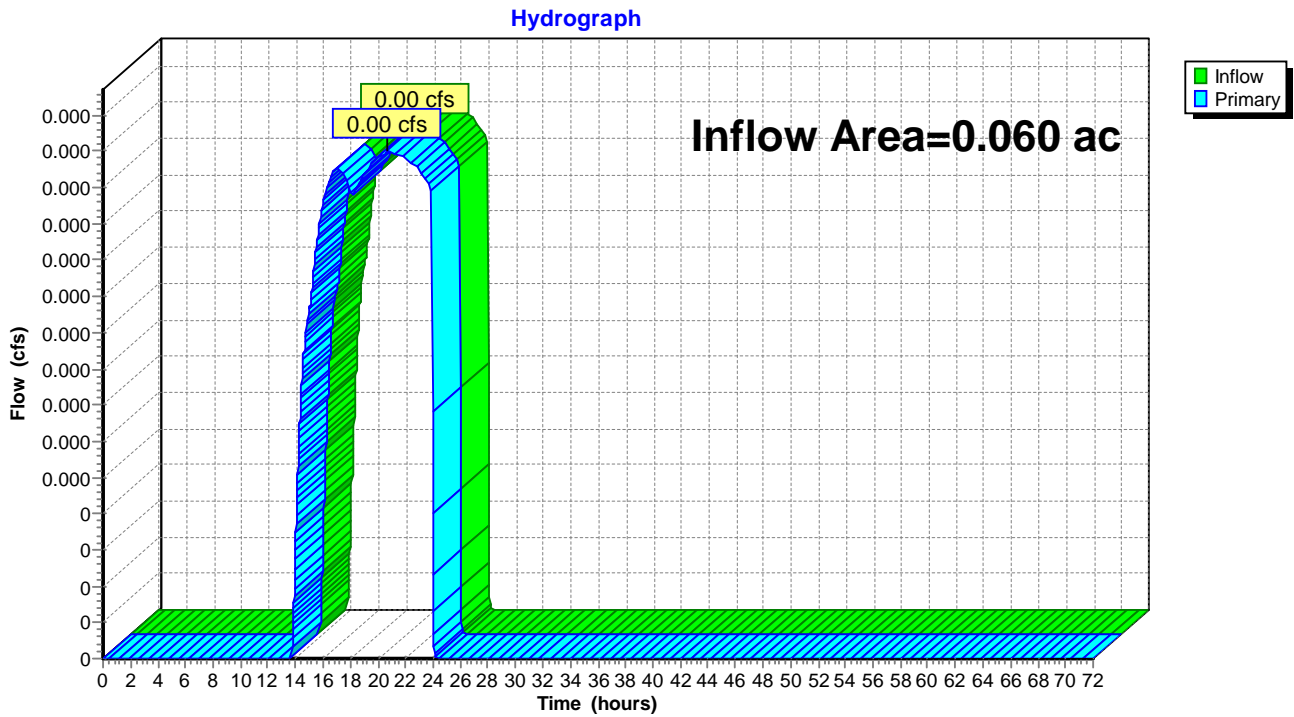
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 0.04" for 2-yr (Future) event
Inflow = 0.00 cfs @ 20.60 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 20.60 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Post-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

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Summary for Subcatchment DA-3p: DA-3 Pervious

Runoff = 0.01 cfs @ 12.11 hrs, Volume= 0.002 af, Depth= 0.47"

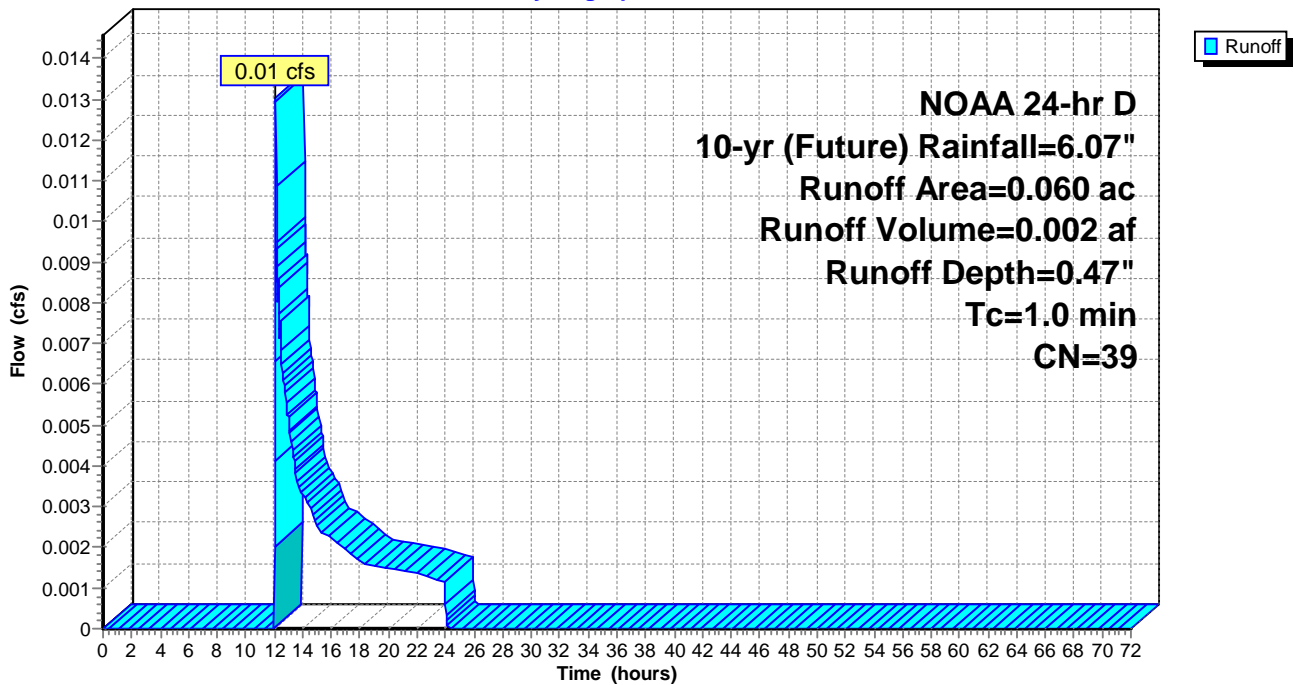
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.060		100.00% Pervious Area

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

Subcatchment DA-3p: DA-3 Pervious

Hydrograph



Post-Development (Future)

NOAA 24-hr D 10-yr (Future) Rainfall=6.07"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

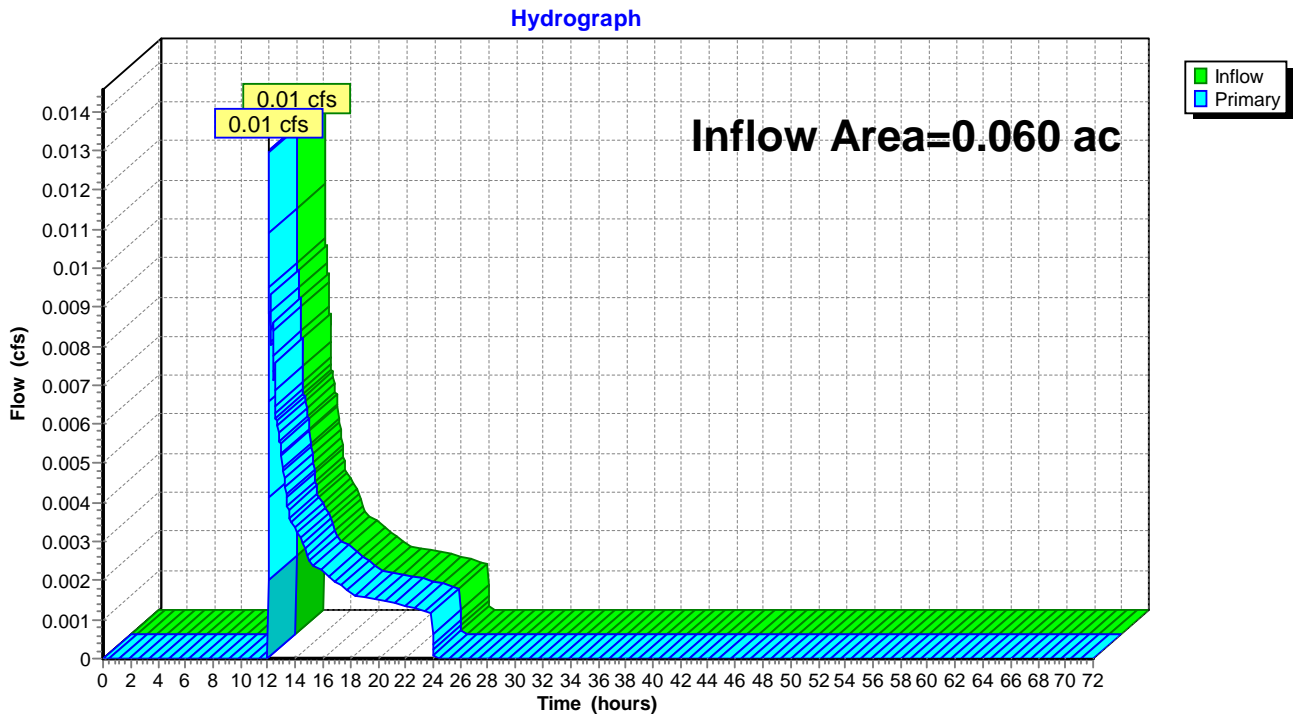
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 0.47" for 10-yr (Future) event
Inflow = 0.01 cfs @ 12.11 hrs, Volume= 0.002 af
Primary = 0.01 cfs @ 12.11 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

Printed 10/10/2025

Summary for Subcatchment DA-3p: DA-3 Pervious

Runoff = 0.02 cfs @ 12.11 hrs, Volume= 0.003 af, Depth= 0.55"

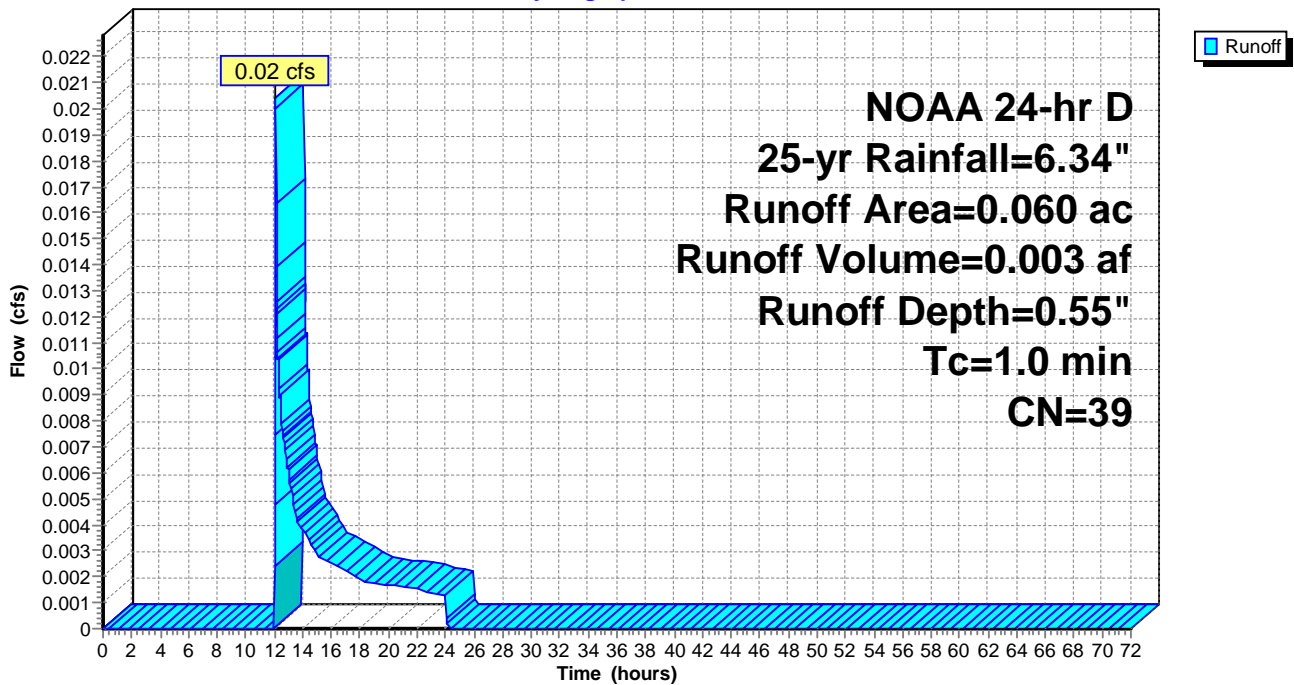
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NOAA 24-hr D 25-yr Rainfall=6.34"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.060		100.00% Pervious Area

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

Subcatchment DA-3p: DA-3 Pervious

Hydrograph



Post-Development (Future)

Prepared by MidAtlantic Engineering Partners

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NOAA 24-hr D 25-yr Rainfall=6.34"

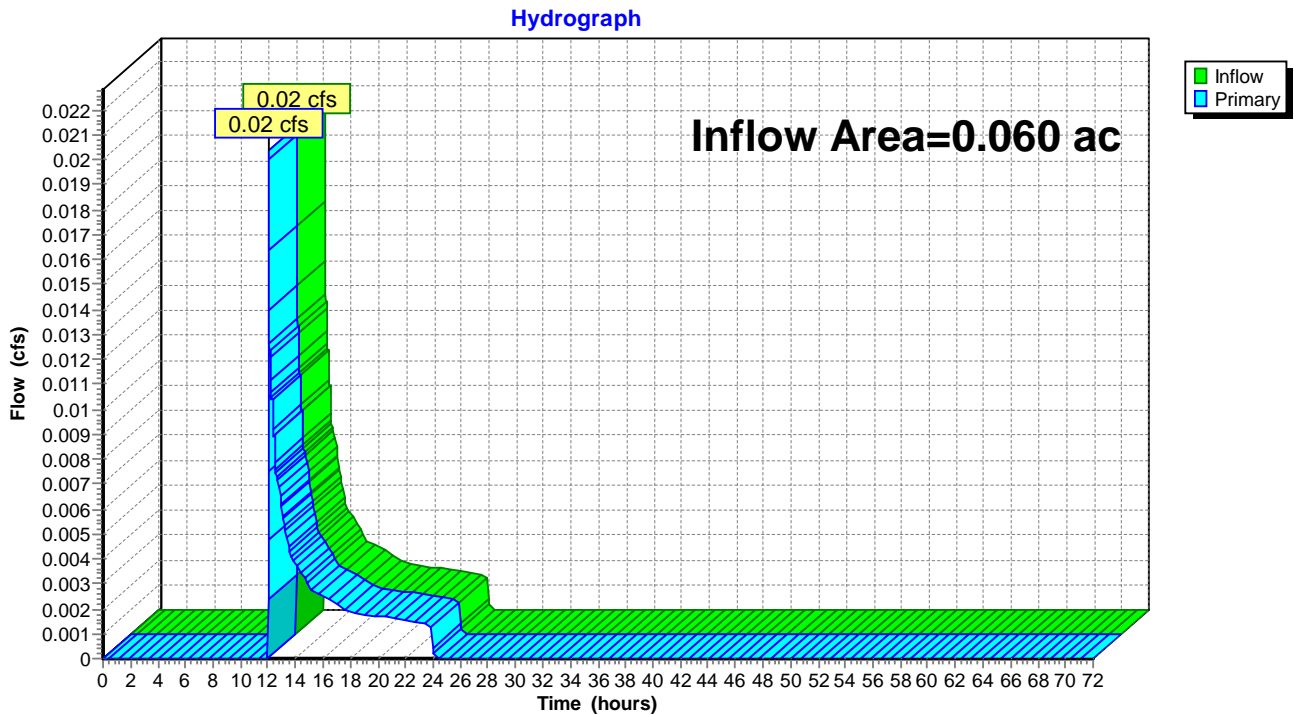
Printed 10/10/2025

Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 0.55" for 25-yr event
Inflow = 0.02 cfs @ 12.11 hrs, Volume= 0.003 af
Primary = 0.02 cfs @ 12.11 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



Post-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Summary for Subcatchment DA-3p: DA-3 Pervious

Runoff = 0.20 cfs @ 12.10 hrs, Volume= 0.013 af, Depth= 2.56"

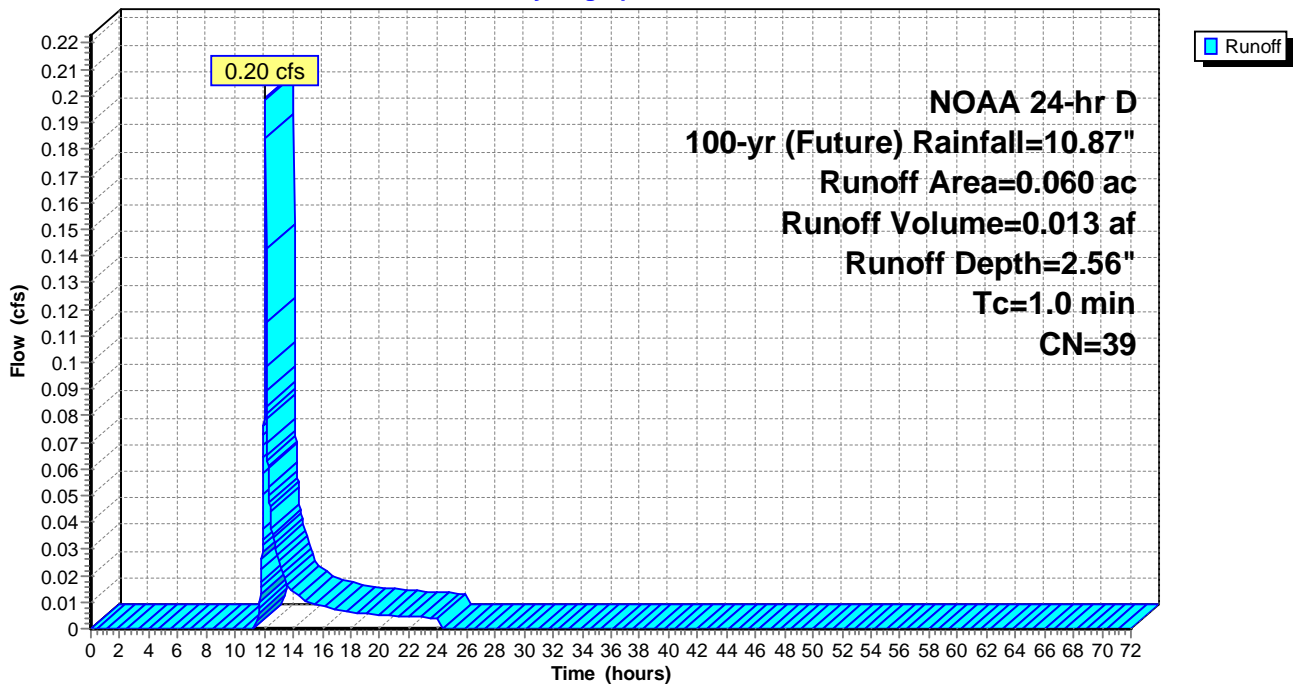
Runoff by SCS TR-20 method, UH=Delmarva, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.060		100.00% Pervious Area

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

Subcatchment DA-3p: DA-3 Pervious

Hydrograph



Post-Development (Future)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

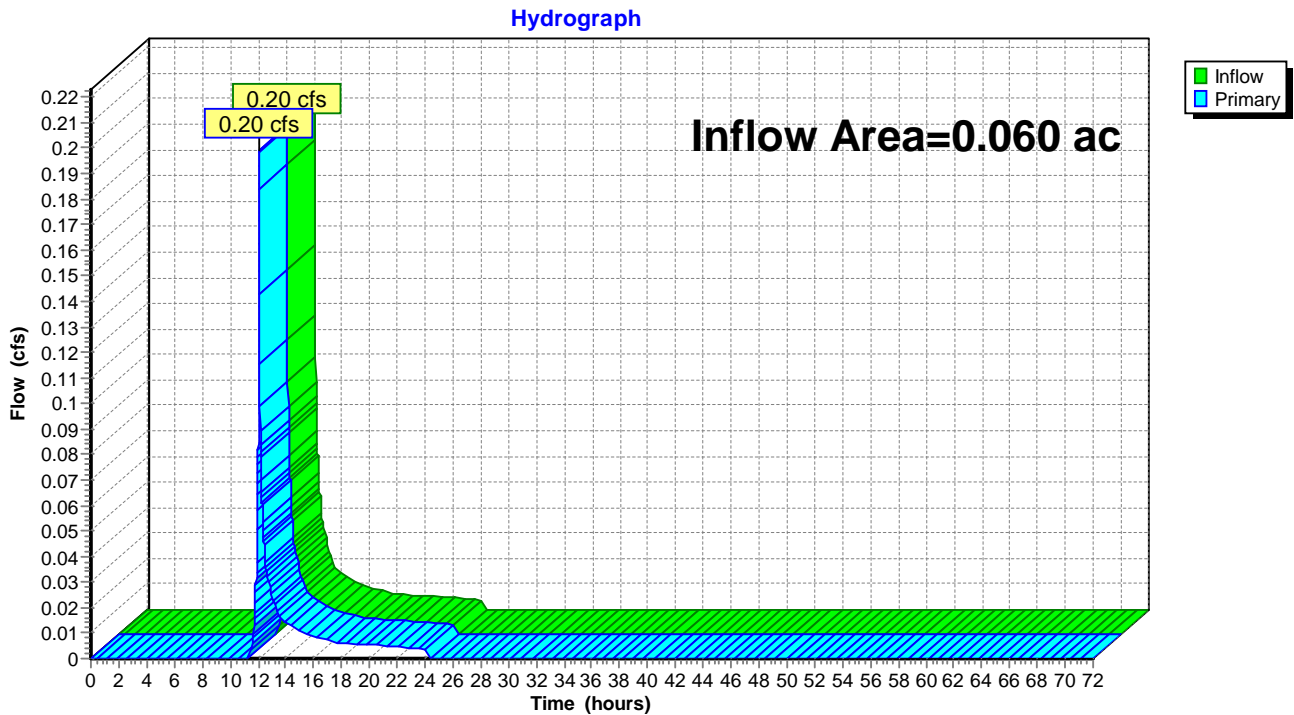
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Summary for Pond Off/Dunes: Flow to Offsite/Dunes

Inflow Area = 0.060 ac, 0.00% Impervious, Inflow Depth = 2.56" for 100-yr (Future) event
Inflow = 0.20 cfs @ 12.10 hrs, Volume= 0.013 af
Primary = 0.20 cfs @ 12.10 hrs, Volume= 0.013 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs

Pond Off/Dunes: Flow to Offsite/Dunes



APPENDIX E

POST -DEVELOPMENT DRAINAGE ANALYSIS (DRAIN TIME ANALYSIS)

Porous Pavement (Drain Time)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

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Printed 10/10/2025

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Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 9.76" for 100-yr (Future) event
 Inflow = 19.68 cfs @ 12.10 hrs, Volume= 1.862 af
 Outflow = 4.50 cfs @ 12.53 hrs, Volume= 1.862 af, Atten= 77%, Lag= 25.6 min
 Primary = 4.50 cfs @ 12.53 hrs, Volume= 1.862 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 11.24' @ 12.53 hrs Surf.Area= 34,020 sf Storage= 32,746 cf

Plug-Flow detention time= 191.7 min calculated for 1.862 af (100% of inflow)
 Center-of-Mass det. time= 191.7 min (941.2 - 749.5)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Device	Routing	Invert	Outlet Devices
#1	Primary	6.08'	15.0" Round Culvert L= 49.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 6.08' / 5.10' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf
#2	Device 1	9.35'	5.0" Vert. Orifice/Grate C= 0.600
#3	Device 1	10.11'	13.5" W x 3.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	10.76'	1.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#5	Device 1	11.07'	4.0' long x 0.5' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#6	Device 1	8.08'	6.0" Round 6" Underdrain X 2.00 L= 698.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 8.08' / 7.03' S= 0.0015 '/' Cc= 0.900 n= 0.012, Flow Area= 0.20 sf
#7	Device 6	8.83'	0.500 in/hr Exfiltration over Surface area Conductivity to Groundwater Elevation = 2.83'

Primary OutFlow Max=4.50 cfs @ 12.53 hrs HW=11.24' (Free Discharge)

- ↑ **1=Culvert** (Passes 4.50 cfs of 12.58 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 0.85 cfs @ 6.24 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 1.35 cfs @ 4.82 fps)
- ↑ **4=Broad-Crested Rectangular Weir** (Weir Controls 0.98 cfs @ 2.06 fps)
- ↑ **5=Broad-Crested Rectangular Weir** (Weir Controls 0.76 cfs @ 1.14 fps)
- ↑ **6=6" Underdrain** (Passes 0.55 cfs of 0.87 cfs potential flow)
- ↑ **7=Exfiltration** (Controls 0.55 cfs)

Porous Pavement (Drain Time)

Prepared by MidAtlantic Engineering Partners

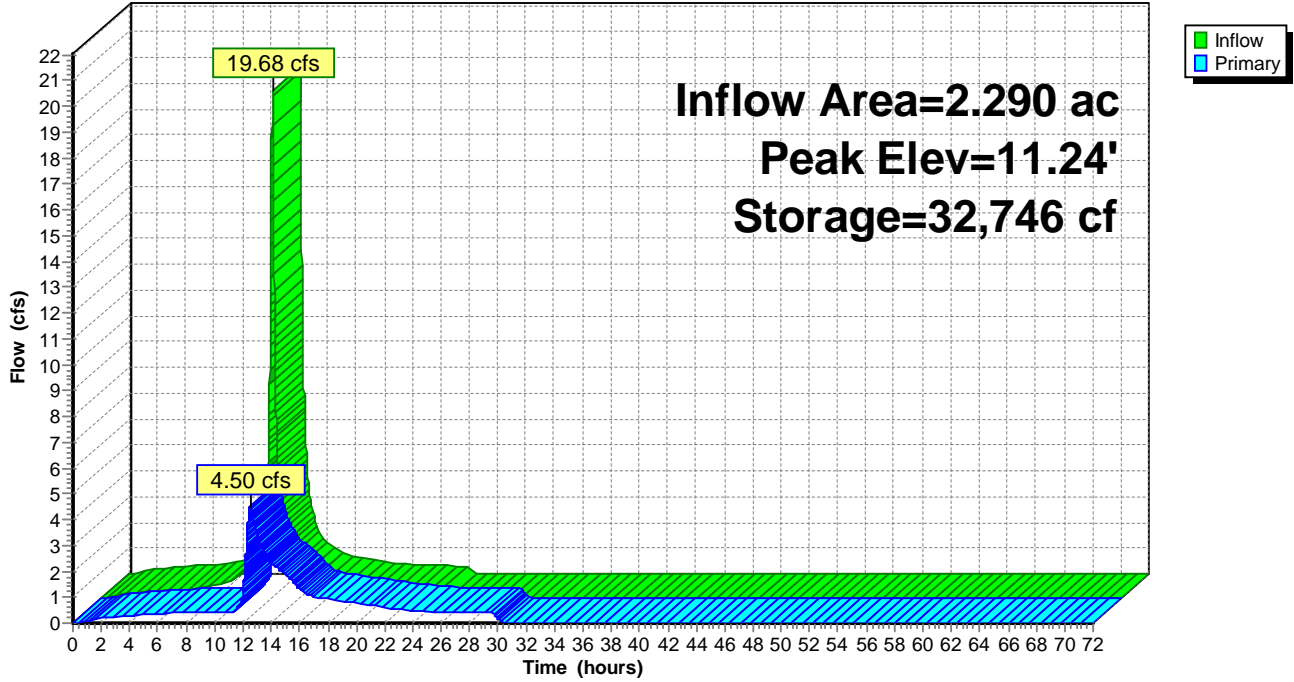
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NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Printed 10/10/2025

Pond PP: Porous Pavement

Hydrograph



Porous Pavement (Drain Time)

NOAA 24-hr D 100-yr (Future) Rainfall=10.87"

Prepared by MidAtlantic Engineering Partners

Printed 10/10/2025

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Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0	8.83	0.00
2.00	0.20	172	8.84	0.18
4.00	0.29	264	8.85	0.28
6.00	0.35	321	8.85	0.34
8.00	0.53	715	8.88	0.40
10.00	0.98	2,838	9.04	0.41
12.00	11.74	18,018	10.15	1.02
14.00	1.19	27,004	10.81	2.32
16.00	0.66	19,848	10.29	1.32
18.00	0.44	16,251	10.02	0.92
20.00	0.38	13,053	9.79	0.77
22.00	0.32	10,616	9.61	0.60
24.00	0.27	8,884	9.48	0.48
26.00	0.00	5,821	9.26	0.42
28.00	0.00	2,836	9.04	0.41
30.00	0.00	121	8.84	0.13
32.00	0.00	0	8.83	0.00
34.00	0.00	0	8.83	0.00
36.00	0.00	0	8.83	0.00
38.00	0.00	0	8.83	0.00
40.00	0.00	0	8.83	0.00
42.00	0.00	0	8.83	0.00
44.00	0.00	0	8.83	0.00
46.00	0.00	0	8.83	0.00
48.00	0.00	0	8.83	0.00
50.00	0.00	0	8.83	0.00
52.00	0.00	0	8.83	0.00
54.00	0.00	0	8.83	0.00
56.00	0.00	0	8.83	0.00
58.00	0.00	0	8.83	0.00
60.00	0.00	0	8.83	0.00
62.00	0.00	0	8.83	0.00
64.00	0.00	0	8.83	0.00
66.00	0.00	0	8.83	0.00
68.00	0.00	0	8.83	0.00
70.00	0.00	0	8.83	0.00
72.00	0.00	0	8.83	0.00

APPENDIX F

NOAA PRECIPITATION DATA & ADJUSTMENT FACTORS



NOAA Atlas 14, Volume 2, Version 3
Location name: Keansburg, New Jersey, USA*
Latitude: 40.4513°, Longitude: -74.1421°
Elevation: 11 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aerials](#)

PF tabular

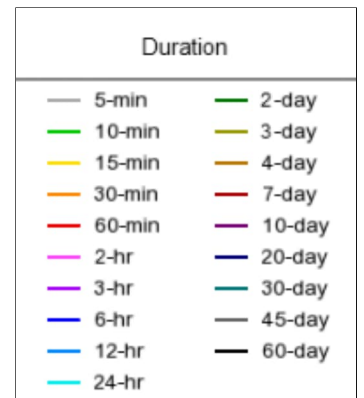
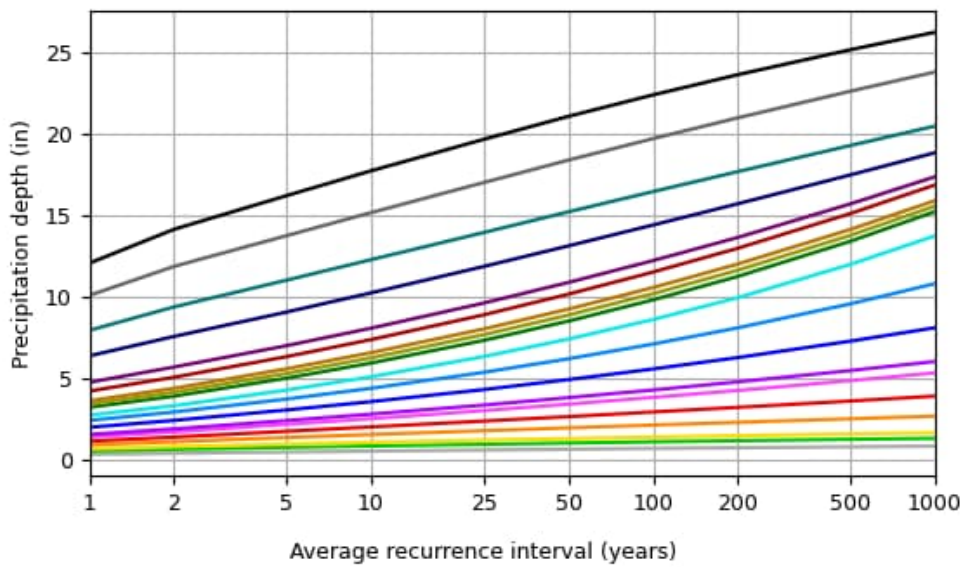
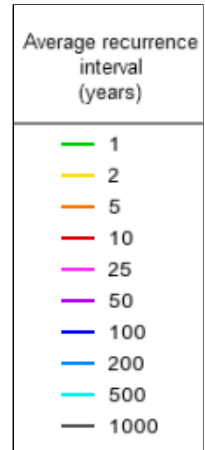
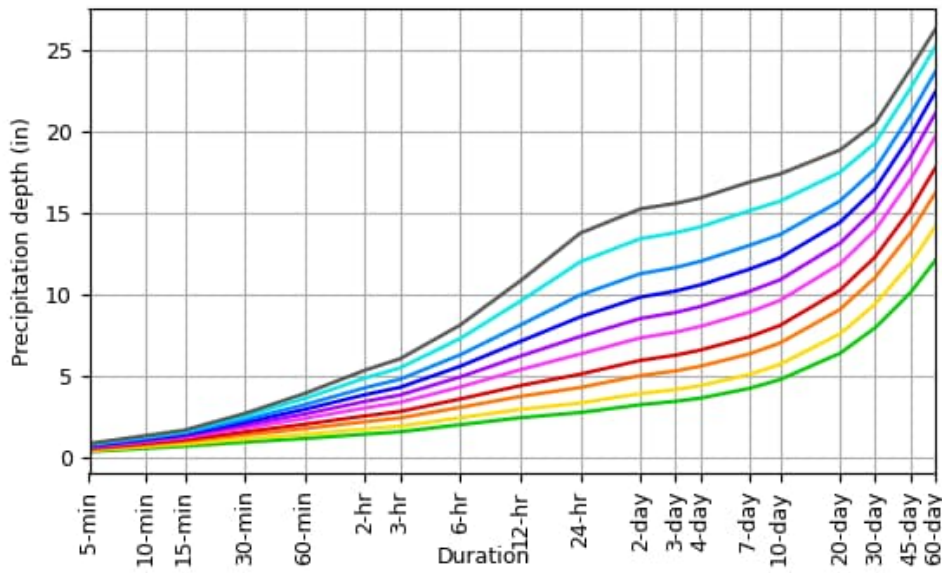
PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.337 (0.305-0.373)	0.402 (0.364-0.445)	0.477 (0.431-0.528)	0.532 (0.480-0.589)	0.600 (0.538-0.664)	0.648 (0.578-0.717)	0.697 (0.618-0.772)	0.742 (0.654-0.824)	0.799 (0.696-0.892)	0.842 (0.728-0.944)
10-min	0.538 (0.487-0.595)	0.643 (0.582-0.711)	0.763 (0.689-0.844)	0.849 (0.766-0.940)	0.954 (0.856-1.06)	1.03 (0.919-1.14)	1.11 (0.981-1.22)	1.17 (1.04-1.30)	1.26 (1.10-1.41)	1.32 (1.14-1.48)
15-min	0.672 (0.608-0.744)	0.807 (0.731-0.894)	0.964 (0.871-1.07)	1.07 (0.969-1.19)	1.21 (1.08-1.34)	1.30 (1.16-1.44)	1.40 (1.24-1.55)	1.48 (1.30-1.64)	1.59 (1.39-1.78)	1.66 (1.44-1.87)
30-min	0.921 (0.834-1.02)	1.12 (1.01-1.23)	1.37 (1.24-1.52)	1.56 (1.40-1.72)	1.79 (1.61-1.98)	1.96 (1.75-2.17)	2.14 (1.90-2.37)	2.30 (2.03-2.56)	2.52 (2.20-2.82)	2.69 (2.32-3.01)
60-min	1.15 (1.04-1.27)	1.40 (1.26-1.55)	1.75 (1.58-1.94)	2.02 (1.82-2.24)	2.38 (2.14-2.63)	2.66 (2.37-2.94)	2.94 (2.61-3.26)	3.23 (2.84-3.58)	3.62 (3.15-4.04)	3.92 (3.38-4.39)
2-hr	1.41 (1.27-1.57)	1.72 (1.55-1.91)	2.18 (1.96-2.42)	2.53 (2.28-2.81)	3.02 (2.70-3.35)	3.42 (3.04-3.80)	3.84 (3.38-4.26)	4.27 (3.73-4.75)	4.87 (4.21-5.44)	5.35 (4.58-6.00)
3-hr	1.56 (1.41-1.73)	1.90 (1.72-2.11)	2.41 (2.18-2.68)	2.81 (2.53-3.12)	3.36 (3.01-3.73)	3.82 (3.40-4.24)	4.29 (3.79-4.76)	4.79 (4.19-5.32)	5.49 (4.73-6.12)	6.05 (5.15-6.77)
6-hr	2.00 (1.80-2.22)	2.42 (2.18-2.70)	3.06 (2.75-3.40)	3.58 (3.20-3.97)	4.32 (3.83-4.78)	4.93 (4.35-5.46)	5.59 (4.88-6.18)	6.29 (5.44-6.97)	7.30 (6.21-8.12)	8.12 (6.84-9.07)
12-hr	2.42 (2.18-2.70)	2.94 (2.65-3.27)	3.73 (3.36-4.15)	4.40 (3.94-4.88)	5.38 (4.77-5.94)	6.21 (5.47-6.86)	7.12 (6.20-7.87)	8.12 (6.97-8.99)	9.59 (8.09-10.6)	10.8 (9.00-12.1)
24-hr	2.74 (2.51-3.02)	3.33 (3.04-3.67)	4.28 (3.91-4.72)	5.10 (4.64-5.61)	6.34 (5.73-6.94)	7.42 (6.65-8.11)	8.63 (7.66-9.42)	9.98 (8.76-10.9)	12.0 (10.4-13.1)	13.8 (11.7-15.1)
2-day	3.23 (2.94-3.58)	3.91 (3.56-4.34)	5.02 (4.56-5.56)	5.95 (5.39-6.58)	7.34 (6.60-8.11)	8.53 (7.62-9.42)	9.84 (8.73-10.9)	11.3 (9.90-12.5)	13.4 (11.6-14.9)	15.3 (13.0-17.0)
3-day	3.43 (3.14-3.77)	4.15 (3.80-4.57)	5.30 (4.85-5.83)	6.27 (5.71-6.88)	7.69 (6.96-8.43)	8.90 (8.01-9.75)	10.2 (9.12-11.2)	11.7 (10.3-12.8)	13.8 (12.0-15.2)	15.6 (13.4-17.2)
4-day	3.63 (3.34-3.96)	4.40 (4.04-4.80)	5.59 (5.13-6.10)	6.59 (6.03-7.18)	8.04 (7.33-8.75)	9.26 (8.39-10.1)	10.6 (9.52-11.5)	12.0 (10.7-13.1)	14.2 (12.4-15.5)	15.9 (13.8-17.5)
7-day	4.22 (3.92-4.57)	5.08 (4.71-5.49)	6.34 (5.87-6.86)	7.39 (6.83-7.99)	8.91 (8.19-9.62)	10.2 (9.30-11.0)	11.5 (10.5-12.5)	13.0 (11.7-14.1)	15.1 (13.4-16.5)	16.9 (14.8-18.5)
10-day	4.76 (4.44-5.12)	5.70 (5.32-6.13)	7.02 (6.54-7.54)	8.10 (7.52-8.70)	9.64 (8.91-10.3)	10.9 (10.0-11.7)	12.3 (11.2-13.2)	13.7 (12.4-14.7)	15.7 (14.1-17.0)	17.4 (15.4-18.9)
20-day	6.39 (6.01-6.80)	7.59 (7.14-8.08)	9.08 (8.53-9.66)	10.3 (9.63-10.9)	11.9 (11.1-12.6)	13.2 (12.3-14.0)	14.4 (13.4-15.4)	15.7 (14.5-16.8)	17.5 (16.0-18.7)	18.9 (17.1-20.3)
30-day	7.96 (7.55-8.40)	9.40 (8.92-9.93)	11.0 (10.5-11.6)	12.3 (11.7-13.0)	14.0 (13.2-14.7)	15.2 (14.4-16.1)	16.5 (15.5-17.4)	17.7 (16.6-18.8)	19.3 (18.0-20.5)	20.5 (19.0-21.9)
45-day	10.1 (9.61-10.6)	11.9 (11.3-12.5)	13.8 (13.1-14.5)	15.2 (14.4-16.0)	17.0 (16.1-17.9)	18.4 (17.4-19.4)	19.8 (18.6-20.8)	21.0 (19.7-22.2)	22.7 (21.2-24.0)	23.9 (22.2-25.3)
60-day	12.1 (11.5-12.7)	14.2 (13.5-14.9)	16.2 (15.5-17.0)	17.8 (16.9-18.6)	19.7 (18.7-20.7)	21.1 (20.0-22.2)	22.4 (21.2-23.6)	23.7 (22.4-24.9)	25.2 (23.7-26.6)	26.3 (24.6-27.8)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS). Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values. Please refer to NOAA Atlas 14 document for more information.

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PF graphical

PDS-based depth-duration-frequency (DDF) curves
 Latitude: 40.4513°, Longitude: -74.1421°



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Maps & aerials

Small scale terrain



Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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percentage of the drainage area in each county. Alternately, separate rainfall totals can be developed for each county using the values in Table 5-5 below.

Table 5-5: Current Precipitation Adjustment Factors

County	Current Precipitation Adjustment Factors		
	2-year Design Storm	10-year Design Storm	100-year Design Storm
Atlantic	1.01	1.02	1.03
Bergen	1.01	1.03	1.06
Burlington	0.99	1.01	1.04
Camden	1.03	1.04	1.05
Cape May	1.03	1.03	1.04
Cumberland	1.03	1.03	1.01
Essex	1.01	1.03	1.06
Gloucester	1.05	1.06	1.06
Hudson	1.03	1.05	1.09
Hunterdon	1.02	1.05	1.13
Mercer	1.01	1.02	1.04
Middlesex	1.00	1.01	1.03
Monmouth	1.00	1.01	1.02
Morris	1.01	1.03	1.06
Ocean	1.00	1.01	1.03
Passaic	1.00	1.02	1.05
Salem	1.02	1.03	1.03
Somerset	1.00	1.03	1.09
Sussex	1.03	1.04	1.07
Union	1.01	1.03	1.06
Warren	1.02	1.07	1.15

(d) Table 5-6 below sets forth the change factors to be used in determining the projected two-, 10-, and 100-year storm events for use in this chapter, which are organized alphabetically by county. The precipitation depth of the projected two-, 10-, and 100-year storm events of a site shall be determined by multiplying the precipitation depth of the

two-, 10-, and 100-year storm events determined from the National Weather Service's Atlas 14 Point Precipitation Frequency Estimates pursuant to (c)1 above, by the change factor in Table 5-6 below, in accordance with the county or counties where the drainage area(s) of the site is located. Where the major development and/or its drainage area lies in more than one county, the precipitation values shall be adjusted according to the percentage of the drainage area in each county. Alternately, separate rainfall totals can be developed for each county using the values in the table below.

Table 5-6: Future Precipitation Change Factors

County	Future Precipitation Change Factors		
	2-year Design Storm	10-year Design Storm	100-year Design Storm
Atlantic	1.22	1.24	1.39
Bergen	1.20	1.23	1.37
Burlington	1.17	1.18	1.32
Camden	1.18	1.22	1.39
Cape May	1.21	1.24	1.32
Cumberland	1.20	1.21	1.39
Essex	1.19	1.22	1.33
Gloucester	1.19	1.23	1.41
Hudson	1.19	1.19	1.23
Hunterdon	1.19	1.23	1.42
Mercer	1.16	1.17	1.36
Middlesex	1.19	1.21	1.33
Monmouth	1.19	1.19	1.26
Morris	1.23	1.28	1.46
Ocean	1.18	1.19	1.24
Passaic	1.21	1.27	1.50
Salem	1.20	1.23	1.32
Somerset	1.19	1.24	1.48
Sussex	1.24	1.29	1.50
Union	1.20	1.23	1.35
Warren	1.20	1.25	1.37

APPENDIX G

MCCUEN-SPIESS TC CALCULATIONS

MidAtlantic

$$l = \frac{100\sqrt{S}}{n}$$

Pre-Development					
DA	Surface	Slope	n	Calculated Sheet Flow Length (McCuen-Spiess)	Provided Sheet Flow Length (McCuen-Spiess)
EA-1	Grass	0.0237	0.15	103	25
EA-1	Grass	0.0091	0.15	64	12
EA-1	Grass	0.0016	0.15	27	27
EA-2	Grass	0.0259	0.15	107	37
EA-2	Grass	0.0168	0.15	86	16
EA-3	Grass	0.0328	0.15	121	39
EA-3	Grass	0.1565	0.15	264	13
Post-Development					
DA-1	Grass	0.0175	0.15	88	47
DA-1	Smooth Surfaces	0.0181	0.011	1223	3
DA-2	Grass	0.1552	0.15	263	27
DA-2	Grass	0.015	0.15	82	5

APPENDIX H
BASIN SUMMARY SHEETS

New Jersey Department of Agriculture
Hydrologic Modeling Database – Data Entry Form

Project Site Details

Chpt. 251 Application Number:

Start Date (if known):

Street Address: Beachway Ave

County: Monmouth County

Municipality: . Keansburg

Block: 184

Lot: 1

NJDEP Anderson Landuse Code (4 digits): 1110

Landuse description: Residential

Site Centroid Location (NJ State Plane Feet): ¹

 Northing: 589,523'

 Easting: 591,763'

Project Contact Details

Applicant: Borough of Keansburg

Address: 29 Church Street

Phone: 732-787-0215

Email:

Post Construction Operation & Maintenance:²

Party Name: Beachway Avenue Realty, LLC.

Address: 7 Heyward Hills Drive, Holmdel, NJ 07733

Phone: 732-888-3736

Email: tcritelli@danitom.com

Party type:

New Jersey Department of Agriculture
Hydrologic Modeling Database – Data Entry Form

Basin Details:³

Basin Centroid (NJ State Plane Feet):⁴

Northing: 589,471' Easting: 591,709

Basin Type: Sub-surface detention under porous pavement

Construction: Sub-surface

Status phase:⁵ Design As-built

Dam Height (ft) N/A top width (ft) N/A

Dam Classification: N/A

Drainage Area(s) to Basin [note- include any bypass areas]⁶

Drainage Area Name	Drainage Area (acres)	Post-Development CN#	Percent Impervious	Time of Concentration (min)
DA-1	1.67	89	75%	5.2
Buildings	0.62	98	100%	1

Basin Outlet Structure(s)⁷

ID: Outlet Structure-1

End of Pipe Location:⁸ Northing: 589,380' Easting: 591,607

Discharge Type ⁹ (weir, orifice, etc)	Dimensions (diameter, length)	Elevation (USGS)	Discharge ¹⁰ Coefficient	Equation Used ¹¹
Orifice	5" Dia.	9.35	0.60	$Q=CA(2gh)^{0.5}$
Orifice	3"H x 13.5"W	10.11	0.60	$Q=CA(2gh)^{0.5}$
Weir	1' Wide	10.76	-	$Q=1.71CL(H^{3/2})$
Weir	4' Wide	11.07	-	$Q=1.71CL(H^{3/2})$

New Jersey Department of Agriculture
Hydrologic Modeling Database – Data Entry Form

Basin Outlet Structure(s)

ID.

End of Pipe Location: Northing:

Easting:

Discharge Type (weir, orifice, etc)	Dimensions (diameter, length)	Elevation (USGS)	Discharge Coefficient	Equation Used

Basin Stage-Discharge Rating Table¹²

Elevation (USGS Feet)	Storage (Acre-Ft)	Total Outlet Structure Discharge (cfs)
8.83	0.000	0.00
9.00	0.054	0.00
9.50	0.209	0.06
10.00	0.367	0.44
10.51	0.525	1.34
10.96	0.664	2.17
11.53	0.842	8.31

New Jersey Department of Agriculture
Hydrologic Modeling Database – Data Entry Form

NJDEP BMP Water Quality Structures¹³

Type (rain garden, green roof, seepage pit etc)	Size	Size Units (cu ft, sq ft etc)	Northing (SPF)	Easting (SPF)
Porous Pavement	34,020	sq ft	589,471'	591,709

Explanatory Notes-

-
- ¹ Approximate location of center of site, coordinates in state plane feet
 - ² Indicate who will be responsible for permanent operation and maintenance
 - ³ Additional Basin Detail Pages can be used for more than one basin in a project.
 - ⁴ Approximate location of center of basin, coordinates in state plane feet
 - ⁵ Indicate “design” for basins not yet constructed
 - ⁶ Drainage areas which are modified by construction, but not directed to the basin should still be listed and described
 - ⁷ “Outlet structure” means the control box, outlet headwall, FES etc. This does not refer to an individual control on the structure such as a weir or orifice. There are two tables for more than one outlet structure
 - ⁸ Approximate location of terminal discharge end of basin outfall, coordinates in state plane feet
 - ⁹ Indicate the type of outlet – weir, orifice, hydro brake, etc.
 - ¹⁰ Discharge Coefficient specific to the type of outlet control i.e., 0.6 for circular orifice
 - ¹¹ List the discharge equation for each outlet (weir, orifice etc) used
 - ¹² For basins with dead storage below the primary outlet, indicate 0 cfs discharge until the lowest outlet is reached. Routing table should begin at the lowest basin elevation.
 - ¹³ Describe NJDEP BMP Manual water quality devices such as seepage pits, rain gardens etc. Size is appropriate for device – cubic feet, square feet or linear feet. Location of device using state plane feet coordinates.

APPENDIX I

SOIL LOGS & INFILTRATION RESULTS

LOG OF TEST PIT NO. TP-1

PROJECT: **Beachway Avenue**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **MidAtlantic Engineering Partners**

PROJECT NO.: **31230924X1**

DATE STARTED: **3/20/2025**
 DATE COMPLETED: **3/20/2025**
 CONTRACTOR: **KMF Companies**
 EQUIPMENT: **BobCat E32**

GROUNDWATER ENCOUNTERED: **7 Ft.**
 GROUND SURFACE ELEVATION: **10.3 Ft.**
 DATUM: **Provided**
 LOGGED BY: **CT**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
9.8	0			6 In. of Asphalt	
	2			FILL - Dark brown (10YR 3/3), moist, 10% gravel, single grain, loose, loamy sand - Very dark gray (10YR 3/1) at 2 Ft. - Black (10YR 2/1), moist, subangular blocky, firm, clay at 2 Ft.	- Buried lumber and hard digging at 6 In. - Infiltration Rate = 0.0 in/hr at 3 Ft.
4.3	6	SP-SM		- Dark yellow-brown (10YR 5/4), moist, 10% gravel, single grain, loose, sandy loam at 5 Ft. - buried organics at 5-1/2 to 6 Ft. Yellow-brown (10YR 5/4), moist, 3% gravel, single grain, loose, Loamy Sand - wet at 7 Ft.	- Infiltration Rate = 2.5 in/hr at 5 Ft.
1.3	10			Test pit complete at 9 Ft. due to sidewall collapse. Seasonal high water table encountered at 7 Ft.	

NOTES: **Elevation and location are approximate.**
Backfilled on completion.



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 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-1

LOG OF TEST PIT NO. TP-2

PROJECT: **Beachway Avenue**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **MidAtlantic Engineering Partners**

PROJECT NO.: **31230924X1**

DATE STARTED: **3/20/2025**
 DATE COMPLETED: **3/20/2025**
 CONTRACTOR: **KMF Companies**
 EQUIPMENT: **BobCat E32**

GROUNDWATER ENCOUNTERED: **9 Ft.**
 GROUND SURFACE ELEVATION: **11.2 Ft.**
 DATUM: **Provided**
 LOGGED BY: **CT**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
10.7	0		[Solid Black]	6 in. of Asphalt	
	2		[Cross-hatch]	FILL - Brown (10YR 4/3), moist, 10% gravel, single grain, loose, sandy loam	- Infiltration Rate = 3.3 in/hr at 3 Ft.
	4			- buried organics at 4-1/2 to 5 Ft.	
6.2	6	SC	[Diagonal Lines]	Dark yellow-brown (10YR 3/4), moist, single grain, loose, Sandy Clay Loam	
4.2	8	SP	[Dotted]	Yellow-brown (10YR 5/6), moist, single grain, loose, Sand	
	10			- wet at 9 Ft.	▼
1.2	10			Test pit complete at 10 Ft. due to sidewall collapse. Seasonal high water table encountered at 9 Ft.	
	12				
	14				
	16				
	18				

NOTES: **Elevation and location are approximate.**
Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.
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LOG OF TEST PIT NO. TP-2

LOG OF TEST PIT NO. TP-3

PROJECT: **Beachway Avenue**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **MidAtlantic Engineering Partners**

PROJECT NO.: **31230924X1**

DATE STARTED: **3/20/2025**
 DATE COMPLETED: **3/20/2025**
 CONTRACTOR: **KMF Companies**
 EQUIPMENT: **BobCat E32**

GROUNDWATER ENCOUNTERED: **8 Ft.**
 GROUND SURFACE ELEVATION: **11.9 Ft.**
 DATUM: **Provided**
 LOGGED BY: **CT**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0			FILL - Dark yellow-brown (10YR 3/4), moist, 5% gravel, single grain, loose, sandy loam	
	2			- Yellow-brown (10YR 5/4), gravel grades out at 3 Ft.	- Hardening digging at 2 Ft.
	4				- Infiltration Rate = 0.0 in/hr at 3-1/2 Ft.
6.9	6	SP		Yellow (10YR 7/6), moist, single grain, loose, Sand	- Infiltration Rate = 30+ in/hr at 5-1/2 Ft.
	8			- Very pale brown (10YR 7/3), wet at 8 Ft.	▼
1.9	10			Test pit complete at 10 Ft. due to sidewall collapse. Seasonal high water table encountered at 8 Ft.	
	12				
	14				
	16				
	18				

NOTES: **Elevation and location are approximate.**
Backfilled on completion.



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14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-3

LOG OF TEST PIT NO. TP-4

PROJECT: **Beachway Avenue**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **MidAtlantic Engineering Partners**

PROJECT NO.: **31230924X1**

DATE STARTED: **3/21/2025**
 DATE COMPLETED: **3/21/2025**
 CONTRACTOR: **KMF Companies**
 EQUIPMENT: **BobCat E32**

GROUNDWATER ENCOUNTERED: **8 Ft.**
 GROUND SURFACE ELEVATION: **11.5 Ft.**
 DATUM: **Provided**
 LOGGED BY: **CT**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
11.0	0		[Solid Black]	6 In. of Asphalt	
	1		[Cross-hatch]	FILL - Dark yellow-brown (10YR 3/4), moist, 5% gravel, single grain, loose, sandy loam	
	2		[Cross-hatch]	- Black (10YR 2/1), moist, subangular blocky, soft, sandy clay at 3 Ft.	- Hard digging at 2 Ft.
	3		[Cross-hatch]	- buried organics at 4 Ft.	- Infiltration Rate = 0.0 in/hr at 3 Ft.
7.0	4	SP	[Dotted]	Yellow-brown (10YR 5/6), moist, single grain, loose, Sand	
	5		[Dotted]		- Infiltration Rate = 30+ in/hr at 5-1/2 Ft.
	6		[Dotted]		
	7		[Dotted]		
	8		[Dotted]	- wet at 8 Ft.	▼
2.5	9			Test pit complete at 9 Ft. due to sidewall collapse. Seasonal high water table encountered at 8 Ft.	
	10				
	12				
	14				
	16				
	18				

NOTES: **Elevation and location are approximate.**
Backfilled on completion.



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LOG OF TEST PIT NO. TP-4

LOG OF TEST PIT NO. TP-5

PROJECT: **Beachway Avenue**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **MidAtlantic Engineering Partners**

PROJECT NO.: **31230924X1**

DATE STARTED: **3/21/2025**
 DATE COMPLETED: **3/21/2025**
 CONTRACTOR: **KMF Companies**
 EQUIPMENT: **BobCat E32**

GROUNDWATER ENCOUNTERED: **8 Ft.**
 GROUND SURFACE ELEVATION: **10.8 Ft.**
 DATUM: **Provided**
 LOGGED BY: **CT**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
10.6	0			3 In. of Topsoil	
	2			FILL - Yellow-brown (10YR 5/4), moist, 5% gravel, single grain, loose, loamy sand - Dark yellow-brown (10YR 3/4) at 2 Ft.	- Hard digging at 2 Ft.
	4			- Brown-yellow (10YR 6/6), moist, single grain to subangular blocky, loose to friable, sandy clay loam at 4 Ft.	- Infiltration Rate = 0.0 in/hr at 4 Ft.
	6				- Infiltration Rate = 1.1 in/hr at 6 Ft.
3.6	7			3 In. layer of roofing shingles at 7 Ft.	
	8	SP		Gray-brown (10YR 5/2), moist, single grain, loose, Sand - wet at 8 Ft.	▼
0.8	10			Test pit complete at 10 Ft. due to sidewall collapse. Seasonal high water table encountered at 8 Ft.	
	12				
	14				
	16				
	18				

NOTES: **Elevation and location are approximate.**
Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

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LOG OF TEST PIT NO. TP-5

LOG OF TEST PIT NO. TP-6

PROJECT: **Beachway Avenue**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **MidAtlantic Engineering Partners**

PROJECT NO.: **31230924X1**

DATE STARTED: **3/20/2025**
 DATE COMPLETED: **3/21/2025**
 CONTRACTOR: **KMF Companies**
 EQUIPMENT: **BobCat E32**

GROUNDWATER ENCOUNTERED: **9 Ft.**
 GROUND SURFACE ELEVATION: **11.5 Ft.**
 DATUM: **Provided**
 LOGGED BY: **CT**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
11.0	0		[Solid Black]	6 in. of Asphalt	
	2		[Cross-hatch]	FILL - Dark brown (10YR 3/3), 5% gravel, single grain, loose, loamy sand - Very dark gray-brown (10YR 3/2) at 2 Ft. - Very dark gray (10YR 3/1), subangular blocky, firm, clay - buried organics at 3-1/2 Ft.	- Hard digging at 2 Ft. - Infiltration Rate = 0.0 in/hr at 3 Ft.
7.5	4	SP	[Dotted]	Dark yellow-brown (10YR 3/6), moist, single grain, loose, Sand	
	6				- Infiltration Rate = 30+ in/hr at 7 Ft.
	8				
	9			- wet at 9 Ft.	▼
1.5	10			Test pit complete at 9 Ft. due to sidewall collapse. Seasonal high water table encountered at 9 Ft.	
	12				
	14				
	16				
	18				

NOTES: **Elevation and location are approximate.**
Backfilled on completion.



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 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-6

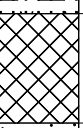

LOG OF TEST PIT NO. TP-7

PROJECT: **Beachway Avenue**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **MidAtlantic Engineering Partners**

PROJECT NO.: **31230924X1**

DATE STARTED: **3/21/2025**
 DATE COMPLETED: **3/21/2025**
 CONTRACTOR: **KMF Companies**
 EQUIPMENT: **BobCat E32**

GROUNDWATER ENCOUNTERED: **9 Ft.**
 GROUND SURFACE ELEVATION: **11.4 Ft.**
 DATUM: **Provided**
 LOGGED BY: **CT**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
11.2	0			3 In. of Topsoil	
				FILL- Dark brown (10YR 3/3), moist, 5% gravel, single grain, loose, sandy loam	
9.4	2	SP		Gray-brown (10YR 5/2), moist, single grain, loose, Sand	
	4				
	6				
	8				
				- Yellow-brown (10YR 5/4), wet at 9 Ft.	▼
1.4	10			Test pit complete at 10 Ft. due to sidewall collapse. Seasonal high water table encountered at 9 Ft.	
	12				
	14				
	16				
	18				

NOTES: **Elevation and location are approximate.**
Backfilled on completion.



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LOG OF TEST PIT NO. TP-7





LOG OF TEST PIT NO. TP-8

PROJECT: **Beachway Avenue**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **MidAtlantic Engineering Partners**

PROJECT NO.: **31230924X1**

DATE STARTED: **3/21/2025**
 DATE COMPLETED: **3/21/2025**
 CONTRACTOR: **KMF Companies**
 EQUIPMENT: **BobCat E32**

GROUNDWATER ENCOUNTERED: **9 Ft.**
 GROUND SURFACE ELEVATION: **10.5 Ft.**
 DATUM: **Provided**
 LOGGED BY: **CT**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
	0			12 In. Topsoil	
9.5				FILL - Dark brown (10YR 3/3), moist, 5% gravel, single grain, loose, loamy sand	
8.5	2	SP		Gray-brown (10YR 5/2), moist, single grain, loose, Sand	- Infiltration Rate = 22.1 in/hr at 2 Ft.
	4				
	6			- Yellow-brown (10YR 5/6) at 6 Ft.	
	8				
1.0				- wet at 9 Ft.	
	10			Test pit complete at 9-1/2 Ft. due to sidewall collapse. Seasonal high water table encountered at 9 Ft.	
	12				
	14				
	16				
	18				

NOTES: **Elevation and location are approximate.**
Backfilled on completion.



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 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-8

APPENDIX J

POROUS PAVEMENT STORAGE VOLUME ANALYSIS

Porous Pavement (WQ Volume)

Prepared by MidAtlantic Engineering Partners

HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Summary for Pond PP: Porous Pavement

Inflow Area = 2.290 ac, 82.10% Impervious, Inflow Depth = 0.85" for WQ event
Inflow = 4.92 cfs @ 1.09 hrs, Volume= 0.162 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

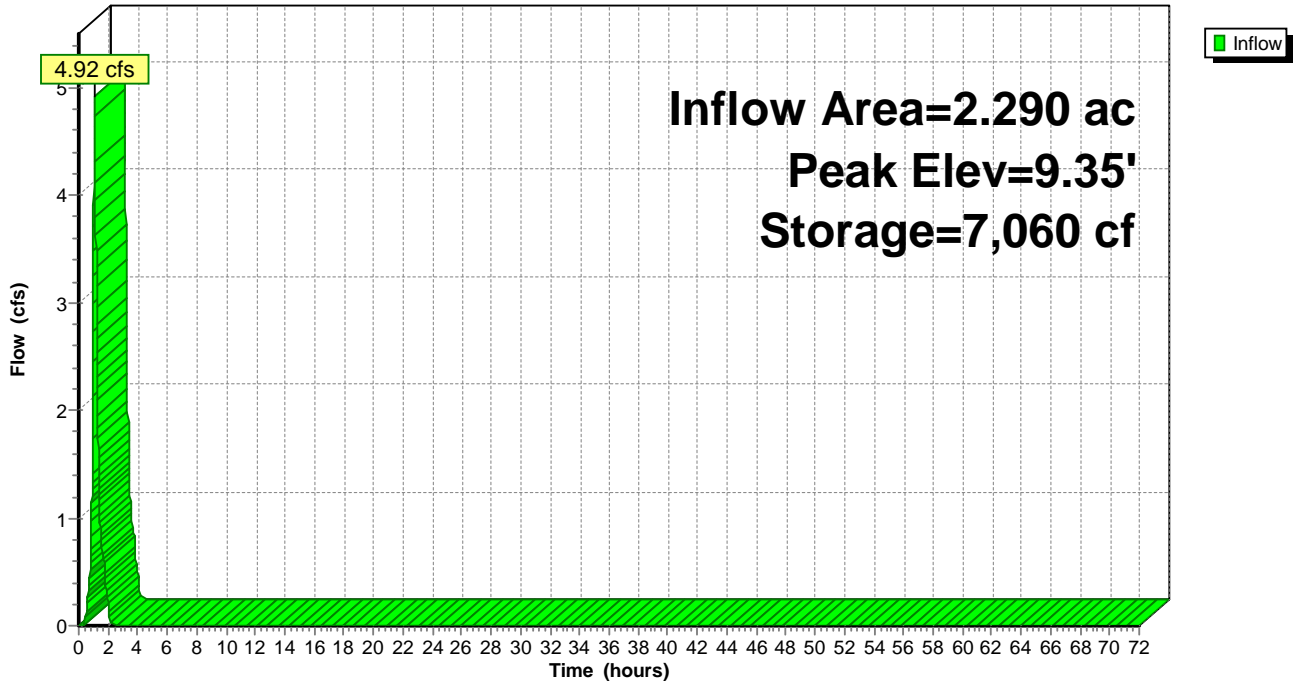
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 9.35' @ 2.59 hrs Surf.Area= 34,020 sf Storage= 7,060 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	8.83'	37,422 cf	24.00'W x 1,417.50'L x 2.75'H 24' Wide Drive Aisle 93,555 cf Overall x 40.0% Voids

Pond PP: Porous Pavement

Hydrograph



Porous Pavement (WQ Volume)

Prepared by MidAtlantic Engineering Partners

HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NJ DEP 2-hr WQ Rainfall=1.25"

Printed 10/10/2025

Hydrograph for Pond PP: Porous Pavement

Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)	Time (hours)	Inflow (cfs)	Storage (cubic-feet)	Elevation (feet)
0.00	0.00	0	8.83	54.00	0.00	7,060	9.35
1.00	3.71	1,608	8.95	55.00	0.00	7,060	9.35
2.00	0.21	6,988	9.34	56.00	0.00	7,060	9.35
3.00	0.00	7,060	9.35	57.00	0.00	7,060	9.35
4.00	0.00	7,060	9.35	58.00	0.00	7,060	9.35
5.00	0.00	7,060	9.35	59.00	0.00	7,060	9.35
6.00	0.00	7,060	9.35	60.00	0.00	7,060	9.35
7.00	0.00	7,060	9.35	61.00	0.00	7,060	9.35
8.00	0.00	7,060	9.35	62.00	0.00	7,060	9.35
9.00	0.00	7,060	9.35	63.00	0.00	7,060	9.35
10.00	0.00	7,060	9.35	64.00	0.00	7,060	9.35
11.00	0.00	7,060	9.35	65.00	0.00	7,060	9.35
12.00	0.00	7,060	9.35	66.00	0.00	7,060	9.35
13.00	0.00	7,060	9.35	67.00	0.00	7,060	9.35
14.00	0.00	7,060	9.35	68.00	0.00	7,060	9.35
15.00	0.00	7,060	9.35	69.00	0.00	7,060	9.35
16.00	0.00	7,060	9.35	70.00	0.00	7,060	9.35
17.00	0.00	7,060	9.35	71.00	0.00	7,060	9.35
18.00	0.00	7,060	9.35	72.00	0.00	7,060	9.35
19.00	0.00	7,060	9.35				
20.00	0.00	7,060	9.35				
21.00	0.00	7,060	9.35				
22.00	0.00	7,060	9.35				
23.00	0.00	7,060	9.35				
24.00	0.00	7,060	9.35				
25.00	0.00	7,060	9.35				
26.00	0.00	7,060	9.35				
27.00	0.00	7,060	9.35				
28.00	0.00	7,060	9.35				
29.00	0.00	7,060	9.35				
30.00	0.00	7,060	9.35				
31.00	0.00	7,060	9.35				
32.00	0.00	7,060	9.35				
33.00	0.00	7,060	9.35				
34.00	0.00	7,060	9.35				
35.00	0.00	7,060	9.35				
36.00	0.00	7,060	9.35				
37.00	0.00	7,060	9.35				
38.00	0.00	7,060	9.35				
39.00	0.00	7,060	9.35				
40.00	0.00	7,060	9.35				
41.00	0.00	7,060	9.35				
42.00	0.00	7,060	9.35				
43.00	0.00	7,060	9.35				
44.00	0.00	7,060	9.35				
45.00	0.00	7,060	9.35				
46.00	0.00	7,060	9.35				
47.00	0.00	7,060	9.35				
48.00	0.00	7,060	9.35				
49.00	0.00	7,060	9.35				
50.00	0.00	7,060	9.35				
51.00	0.00	7,060	9.35				
52.00	0.00	7,060	9.35				
53.00	0.00	7,060	9.35				

APPENDIX K

LOW IMPACT DEVELOPMENT CHECKLIST

New Jersey Stormwater Best Management Practices Manual

February 2004

A P P E N D I X A

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

According to the NJDEP Stormwater Management Rules at N.J.A.C. 7:8, the groundwater recharge, stormwater quality, and stormwater quantity standards established by the Rules for major land development projects must be met by incorporating nine specific nonstructural stormwater management strategies into the project's design to the maximum extent practicable.

To accomplish this, the Rules require an applicant seeking land development approval from a regulatory board or agency to identify those nonstructural strategies that have been incorporated into the project's design. In addition, if an applicant contends that it is not feasible to incorporate any of the specific strategies into the project's design, particularly for engineering, environmental, or safety reasons, the Rules further require that the applicant provide a basis for that contention.

This checklist has been prepared to assist applicants, site designers, and regulatory boards and agencies in ensuring that the nonstructural stormwater management requirements of the Rules are met. It provides an applicant with a means to identify both the nonstructural strategies incorporated into the development's design and the specific low impact development BMPs (LID-BMPs) that have been used to do so. It can also help an applicant explain the engineering, environmental, and/or safety reasons that a specific nonstructural strategy could not be incorporated into the development's design.

The checklist can also assist municipalities and other land development review agencies in the development of specific requirements for both nonstructural strategies and LID-BMPs in zoning and/or land use ordinances and regulations. As such, where requirements consistent with the Rules have been adopted, they may supersede this checklist.

Finally, the checklist can be used during a pre-design meeting between an applicant and pertinent review personnel to discuss local nonstructural strategies and LID-BMPs requirements in order to optimize the development's nonstructural stormwater management design.

Since this checklist is intended to promote the use of nonstructural stormwater management strategies and provide guidance in their incorporation in land development projects, municipalities are permitted to revise it as necessary to meet the goals and objectives of their specific stormwater management program and plan within the limits of N.J.A.C. 7:8.

Low Impact Development Checklist

A checklist for identifying nonstructural stormwater management strategies incorporated into proposed land development

Municipality: Borough of Keansburg

County: Monmouth Date: 05/19/25

Review board or agency: Borough of Keansburg

Proposed land development name: Beachway Avenue Waterfront Redevelopment

Lot(s): 1 Block(s): 184

Project or application number: _____

Applicant's name: Borough of Keansburg

Applicant's address: 29 Church Street

Keansburg, nj 07734

Telephone: 732-787-0215 Fax: _____

Email address: _____

Designer's name: Jason M. Fogler, P.E., MidAtlantic Engineering Partners LLC

Designer's address: 1971 Highway 34, Suite 201

Wall, NJ 07719

Telephone: 609-910-4450 x 1002 Fax: 609-910-4467

Email address: jfogler@midatlanticeng.com

Part 1: Description of Nonstructural Approach to Site Design

In narrative form, provide an overall description of the nonstructural stormwater management approach

The proposed project site is located between Beachway Avenue and the Raritan Bay. The site is previously developed with existing bituminous pavement and utility infrastructure. A dune line exists between the current improvements and the Raritan Bay. In general, the topography of the subject project area slopes, in varying degrees, to the southeast toward an existing collection system in Beachway Avenue. Elevations onsite within the disturbed areas range approximately from a high point of 17.2 feet at the northwestern corner of the disturbed area to a low point of 5.5 feet on the north side of the existing retaining wall. Soils onsite consist of Hooksan Sand (HorBr), which is categorized as Hydrologic Soil Group 'A' and Urban Land - Klej Complex (USKLEA) which does not have a Hydrologic Soil Group according to the NRCS Web Soil Survey. Since Urban Land - Klej Complex does not have a hydrologic soil group (HSG), the default HSG provided in Table 12-1 of the NJ Stormwater Management Best Practices Manual is used. The default HSG within the Coastal Plain is HSG A for the pre-developed condition and HSG D in the post-developed condition.

To accomplish these tasks, runoff from 2.29 acres of the 2.71 acre developed area is sent to one (1) subsurface stormwater management systems, while 0.06 acres is directed overland towards the existing dunes, the remaining 0.36 acres of disturbed area is directed overland toward the existing collection system in Beachway Avenue. The subsurface stormwater management system consists of 2.5 ft of stone storage designed to entirely store and reduce the developed runoff to 50%, 75% and 80% of the 2, 10 and 100-year storm of the pre-development.

In accordance with the NJDEP Stormwater rules, the proposed stormwater management measures must achieve an 80% reduction in the post-developed total suspended solids (TSS) runoff from the new impervious surfaces through the use of prescribed best management practices (BMPs). Water quality will be addressed through the use of porous pavement with underdrains within the parking areas approved for 80% TSS removal.

Site design has been adjusted to minimize the increase in stormwater runoff generated by any major development in the associated drainage areas, the adequacy of existing culverts and channels will be ensured, and the likelihood of damage to life and property from flooding will be reduced. This approach will also reduce the possibility of soil erosion discharges to surrounding streams, thereby establishing protection of the stream corridors in order to maintain the integrity of the stream channels for their biological functions, as well as for drainage.

The system meets the technical requirements as well as the overall intent of the NJDEP regulations in an aesthetically pleasing and technically compliant manner.

Part 3: Nonstructural Strategies and LID-BMPs in Design

3.1 Vegetation and Landscaping

Effective management of both existing and proposed site vegetation can reduce a development's adverse impacts on groundwater recharges and runoff quality and quantity. This section of the checklist helps identify the vegetation and landscaping strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to help maintain existing recharge rates and/or minimize or prevent increases in runoff quantity and pollutant loading.

A. Has an inventory of existing site vegetation been performed? Yes: No:

If yes, was this inventory a factor in the site's layout and design? Yes: No:

B. Does the site design utilize any of the following nonstructural LID-BMPs?

Preservation of natural areas? Yes: No: If yes, specify % of site: 2%

Native ground cover? Yes: No: If yes, specify % of site:

Vegetated buffers? Yes: No: If yes, specify % of site:

C. Do the land development regulations require these nonstructural LID-BMPs?

Preservation of natural areas? Yes: No: If yes, specify % of site:

Native ground cover? Yes: No: If yes, specify % of site:

Vegetated buffers? Yes: No: If yes, specify % of site:

D. If vegetated filter strips or buffers are utilized, specify their functions:

Reduce runoff volume increases through lower runoff coefficient: Yes: No:

Reduce runoff pollutant loads through runoff treatment: Yes: No:

Maintain groundwater recharge by preserving natural areas: Yes: No:

E. What design criteria and/or site changes would be required to reduce the percentages in C and D above?

The existing project area is developed with bituminous parking. No new disturbance is proposed. Reduction of percentages in C & D will result in a loss of parking and/or units, making the project no longer viable.

F. Specify site's hydrologic soil group (HSG) percentages:

HSG A: 100% HSG B: _____ HSG C: _____ HSG D: 0%

G. Specify percentage of each HSG that will be permanently disturbed:

HSG A: 100% HSG B: _____ HSG C: _____ HSG D: 100%

H. Locating site disturbance within areas with less permeable soils (HSG C and D) and minimizing disturbance within areas with greater permeable soils (HSG A and B) can help maintain groundwater recharge rates and reduce runoff volume increases. In light of the HSG percentages in F and G above, what other practical measures if any can be taken to achieve this?

No additional practical measures can be taken to achieve this.

I. Does the site include Karst topography? Yes: _____ No: X

If yes, discuss measures taken to limit Karst impacts:

3.3 Impervious Area Management

New impervious surfaces at a development site can have the greatest adverse effect on groundwater recharge and stormwater quality and quantity. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into a proposed development's design to comprehensively manage the extent and impacts of new impervious surfaces.

A. Specify impervious cover at site: Existing: 63.1% Proposed: 74.9%

B. Specify maximum site impervious coverage allowed by regulations: 80%

C. Compare proposed street cartway widths with those required by regulations:

Type of Street	Proposed Cartway Width (feet)	Required Cartway Width (feet)
Residential access – low intensity		
Residential access – medium intensity		
Residential access – high intensity with parking	24'	24'
Residential access – high intensity without parking		
Neighborhood		
Minor collector – low intensity without parking		
Minor collector – with one parking lane		
Minor collector – with two parking lanes		
Minor collector – without parking		
Major collector		

D. Compare proposed parking space dimensions with those required by regulations:

Proposed: 9' x 18' Regulations: RSIS – 9' x 18'

E. Compare proposed number of parking spaces with those required by regulations:

Proposed: 88 – Driveway/Garage Regulations: RSIS – 128
44 – Guest parking

F. Specify percentage of total site impervious cover created by buildings: 30.5%
By driveways and parking: 69.5% By roadways: 0%

G. What design criteria and/or site changes would be required to reduce the percentages in F above?
In order to reduce with percentages above, parking and/or
buildings/units would need to be removed, which is not a
viable option.

H. Specify percentage of total impervious area that will be unconnected:
Total site: 0% Buildings: _____ Driveways and parking: _____ Roads: _____

I. Specify percentage of total impervious area that will be porous:
Total site: 38.5% Buildings: _____ Driveways and parking: 55.4% Roads: _____

J. Specify percentage of total building roof area that will be vegetated: 0%

K. Specify percentage of total parking area located beneath buildings: 0.8%

L. Specify percentage of total parking located within multi-level parking deck: 0%

3.4 Time of Concentration Modifications

Decreasing a site's time of concentration (Tc) can lead directly to increased site runoff rates which, in turn, can create new and/or aggravate existing erosion and flooding problems downstream. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to effectively minimize such Tc decreases.

When reviewing Tc modification strategies, it is important to remember that a drainage area's Tc should reflect the general conditions throughout the area. As a result, Tc modifications must generally be applied throughout a drainage area, not just along a specific Tc route.

A. Specify percentage of site's total stormwater conveyance system length that will be:

Storm sewer: 100% Vegetated swale: _____ Natural channel: _____

Stormwater management facility: _____ Other: _____

Note: the total length of the stormwater conveyance system should be measured from the site's downstream property line to the downstream limit of sheet flow at the system's headwaters.

B. What design criteria and/or site changes would be required to reduce the storm sewer percentages and increase the vegetated swale and natural channel percentages in A above?

Any changes to the site design to increase vegetated swales and natural channels would impact the site layout and require the loss of parking spaces or residential units which is not viable.

C. In conveyance system subareas that have overland or sheet flow over impervious surfaces or turf grass, what practical and effective site changes can be made to:

Decrease overland flow slope: N/A _____

Increase overland flow roughness: N/A _____

3.5 Preventative Source Controls

The most effective way to address water quality concerns is by pollution prevention. This section of the checklist helps identify those nonstructural strategies and LID-BMPs that have been incorporated into the proposed development's design to reduce the exposure of pollutants to prevent their release into the stormwater runoff.

A. Trash Receptacles

Specify the number of trash receptacles provided: 0

Specify the spacing between the trash receptacles: N/A

Compare trash receptacles proposed with those required by regulations:

Proposed: N/A Regulations: N/A

B. Pet Waste Stations

Specify the number of pet waste stations provided: 0

Specify the spacing between the pet waste stations: N/A

Compare pet waste stations proposed with those required by regulations:

Proposed: N/A Regulations: N/A

C. Inlets, Trash Racks, and Other Devices that Prevent Discharge of Large Trash and Debris

Specify percentage of total inlets that comply with the NJPDES storm drain inlet criteria: 100%

D. Maintenance

Specify the frequency of the following maintenance activities:

Street sweeping: Proposed: Monthly Regulations: N/A

Litter collection: Proposed: Weekly Regulations: N/A

Identify other stormwater management measures on the site that prevent discharge of large trash and debris:

Internal trash collection areas are provided and wheeled out for pickup.

Part 4: Compliance with Nonstructural Requirements of NJDEP Stormwater Management Rules

1. Based upon the checklist responses above, indicate which nonstructural strategies have been incorporated into the proposed development's design in accordance with N.J.A.C. 7:8-5.3(b):

No.	Nonstructural Strategy	Yes	No
1.	Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.		X
2.	Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.	X	
3.	Maximize the protection of natural drainage features and vegetation.	X	
4.	Minimize the decrease in the pre-construction time of concentration.		X
5.	Minimize land disturbance including clearing and grading.		X
6.	Minimize soil compaction.	X	
7.	Provide low maintenance landscaping that encourages retention and planting of native vegetation and minimizes the use of lawns, fertilizers, and pesticides.	X	
8.	Provide vegetated open-channel conveyance systems discharge into and through stable vegetated areas.		X
9.	Provide preventative source controls.	X	

2. For those strategies that have not been incorporated into the proposed development's design, provide engineering, environmental, and/or safety reasons. Attached additional pages as necessary.

The existing site was previously developed as part of a previous application. A 0.06 acre portion of the site will remain undisturbed due to the location of the dune line that encroaches onto the back of the property. The proposed improvements do not encroach into this area and preserving natural areas to the maximum extent. Impervious areas are limited to the maximum extent allowable by local ordinance to provide the minimum parking and pedestrian walkways needed for the residential buildings. The 24ft wide drive aisle will be constructed with porous pavement to provide water quality. The subsurface stormwater basin discharge to existing drainage system within Beachway Ave. There are no existing drainage swales or areas where vegetated conveyance could be achieved. Low maintenance landscaping is provided where practical. Parking areas near the proposed detention system will discharge overland through the porous pavement directly to the system rather than by piped conveyance. In order to comply with Borough requirements for parking for the residential buildings, the use of proposed vegetated conveyance channels to discharge into stable vegetated areas and to minimize time of concentration is not feasible. Preventative source controls such as trash receptacles, enclosed trash areas, and trash racks/grates for stormwater structures are provided.

APPENDIX L
ROOF LEADER CALCULATIONS

Roof Leader Calculations

Ref: 2021 NSPC Table 13.6.2- SIZE OF HORIZONTAL STORM DRAIN PIPING

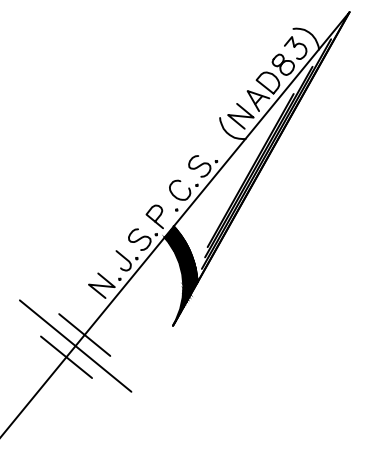
Rainfall Rate: 12"/hr

Pipe Slope: 1/16 in./ft.

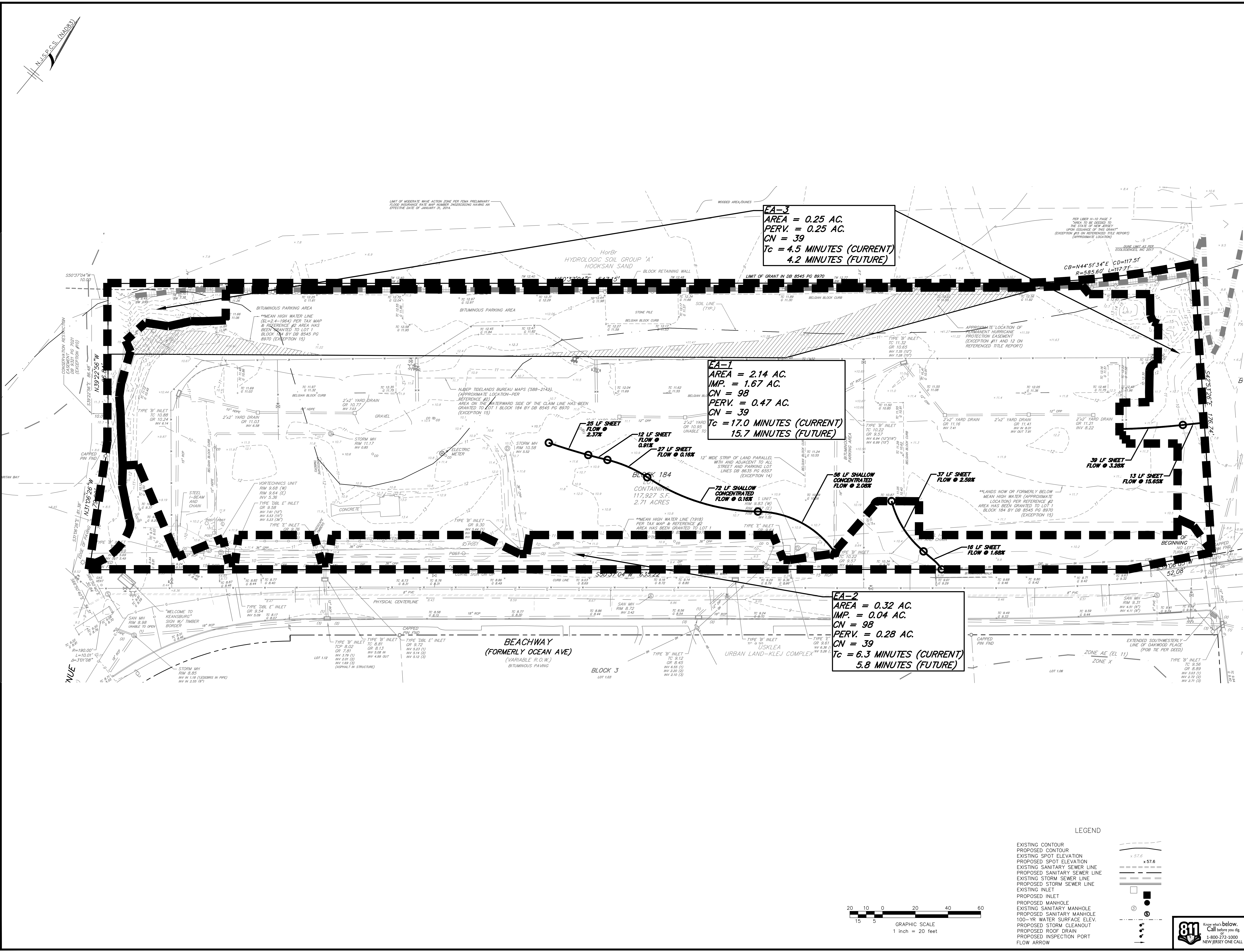
Size of Drain (in.)	Allowable Projected Roof Area at 6"/hr Rainfall
2	-
3	-
4	850
5	1,556
6	2,519
8	5,438
10	9,866
12	16,026
15	29,068

Roof Leader No.	Roof Area (SF)	Required Size of Drain (in.)	Proposed Size of Drain (in.)
RL #1	1917	6	8
RL #2	1917	6	8
RL #3	2201	6	8
RL #4	2201	6	8
RL #5	2338	6	8
RL #6	2338	6	8
RL #7	2701	8	8
RL #8	2701	8	8
RL #9	1917	6	8
RL #10	1917	6	8
RL #11	2201	6	8
RL #12	2201	6	8

APPENDIX M
DRAINAGE AREA MAPS



File Name: C:\Beachway Avenue\Drawings\Drawings\2001 Beachway Ave - Keansburg\Civil\DWG\98-Drainage Area Maps.dwg
Plot Date: 05/15/2025 12:20pm



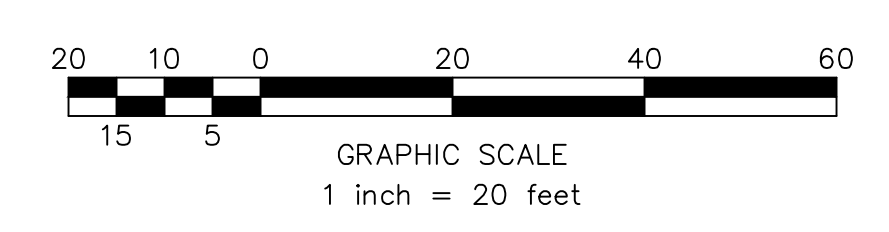
EA-3
AREA = 0.25 AC.
PERV. = 0.25 AC.
CN = 39
Tc = 4.5 MINUTES (CURRENT)
4.2 MINUTES (FUTURE)

EA-1
AREA = 2.14 AC.
IMP. = 1.67 AC.
CN = 98
PERV. = 0.47 AC.
CN = 39
Tc = 17.0 MINUTES (CURRENT)
15.7 MINUTES (FUTURE)

EA-2
AREA = 0.32 AC.
IMP. = 0.04 AC.
CN = 98
PERV. = 0.28 AC.
CN = 39
Tc = 6.3 MINUTES (CURRENT)
5.8 MINUTES (FUTURE)

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- EXISTING SANITARY SEWER LINE
- PROPOSED SANITARY SEWER LINE
- EXISTING STORM SEWER LINE
- PROPOSED STORM SEWER LINE
- EXISTING INLET
- PROPOSED INLET
- PROPOSED MANHOLE
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- 100-YR WATER SURFACE ELEV.
- PROPOSED STORM CLEANOUT
- PROPOSED ROOF DRAIN
- PROPOSED INSPECTION PORT
- FLOW ARROW



PRELIMINARY/FINAL MAJOR SITE PLAN
BEACHWAY AVENUE WATERFRONT REDEVELOPMENT
BLOCK 184; LOT 1
PRE-DEVELOPMENT DRAINAGE AREA MAP

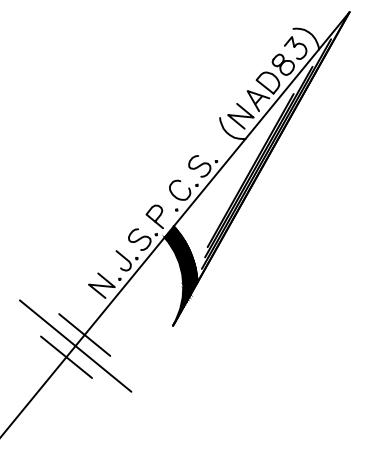
SITUATED IN
BOROUGH OF KEANSBURG, MONMOUTH COUNTY, NEW JERSEY

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609-110-4400
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Drawn By: PFB
Checked By: AUB
Horizontal Scale: 1"=20'
Vertical Scale: N/A
Project No.: BAR-2301
Date: 05/19/25

Revised Per NJCEP Comments: JMF
Revisions: JMF
Drawn By: CHECKED BY: JMF

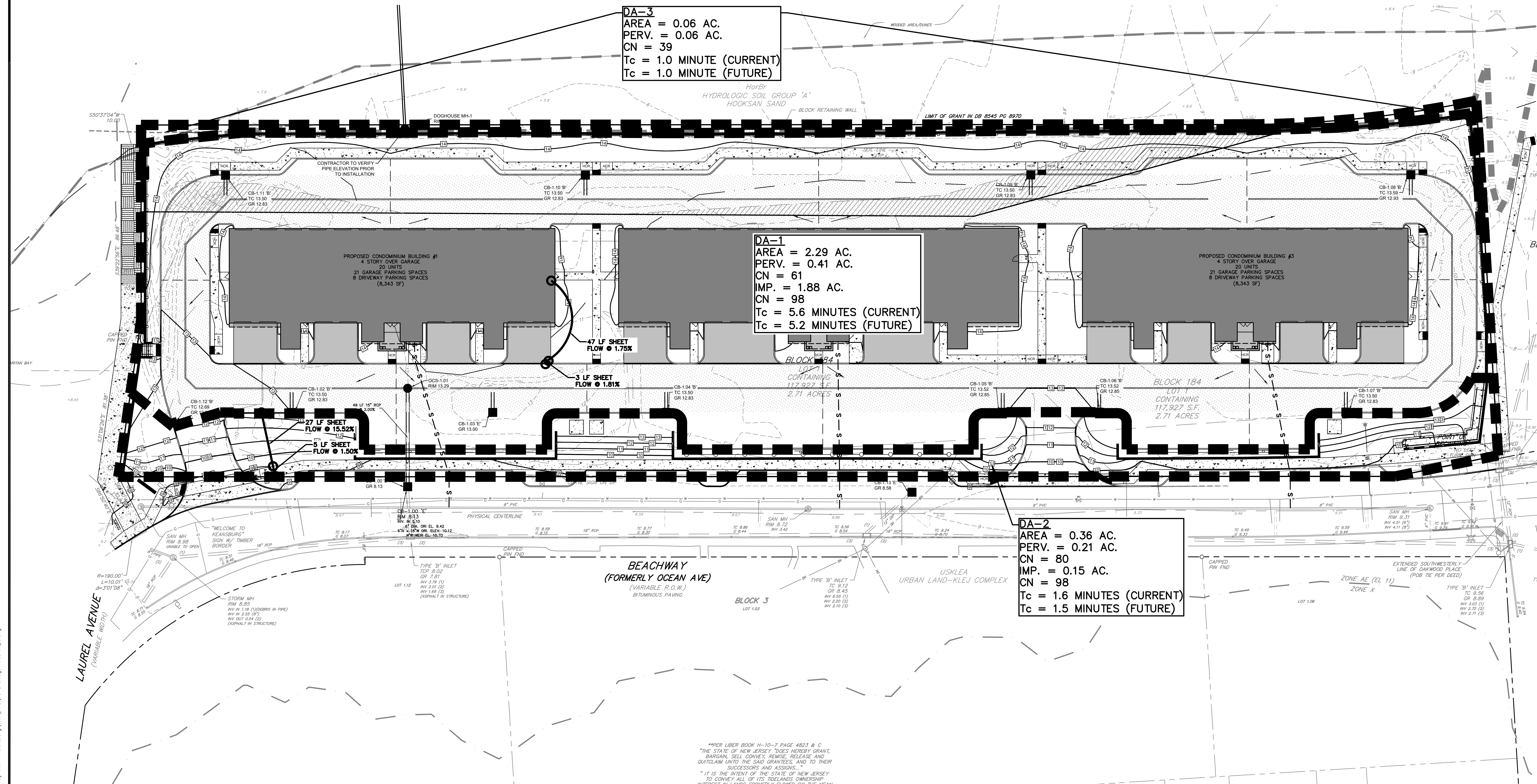
Sheet Number: 1 OF 2



DA-3
 AREA = 0.06 AC.
 PERV. = 0.06 AC.
 CN = 39
 Tc = 1.0 MINUTE (CURRENT)
 Tc = 1.0 MINUTE (FUTURE)

DA-1
 AREA = 2.29 AC.
 PERV. = 0.41 AC.
 CN = 61
 IMP. = 1.88 AC.
 CN = 98
 Tc = 5.6 MINUTES (CURRENT)
 Tc = 5.2 MINUTES (FUTURE)

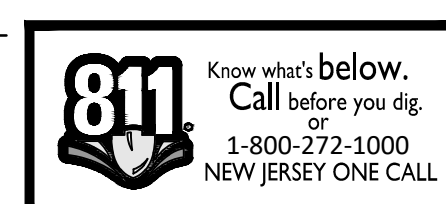
DA-2
 AREA = 0.36 AC.
 PERV. = 0.21 AC.
 CN = 80
 IMP. = 0.15 AC.
 CN = 98
 Tc = 1.6 MINUTES (CURRENT)
 Tc = 1.5 MINUTES (FUTURE)



**PER LIBER BOOK H-10-7 PAGE 4823 & C
 "THE STATE OF NEW JERSEY DOES HEREBY GRANT,
 BARGAIN, SELL, CONVEY, REWISE, RELEASE AND
 OUTSLAWE UNTO THE SAID GRANTEE, AND TO THEIR
 SUCCESSORS AND ASSIGNS...
 *IT IS THE INTENT OF THE STATE OF NEW JERSEY
 TO CONVEY ALL OF ITS TIDELANDS OWNERSHIP
 INTEREST IN LANDS FORMERLY FLOWED BY THE MEAN

LEGEND

- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- EXISTING SANITARY SEWER LINE
- PROPOSED SANITARY SEWER LINE
- EXISTING STORM SEWER LINE
- PROPOSED STORM SEWER LINE
- EXISTING INLET
- PROPOSED INLET
- PROPOSED MANHOLE
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- PROPOSED ROOF DRAIN
- PROPOSED INSPECTION PORT
- FLOW ARROW



CHECKED BY:	JMB
DATE:	05/19/25
DESIGNED BY:	JMB
DATE:	05/19/25
REVISIONS:	

PROJECT No.:	BAR-2301
DATE:	05/19/25
REVISIONS:	

PRELIMINARY/FINAL MAJOR SITE PLAN
 BEACHWAY AVENUE WATERFRONT REDEVELOPMENT
 BLOCK 184, LOT 1
 POST-DEVELOPMENT DRAINAGE AREA MAP
 SITUATED IN
 BOROUGH OF KEANSBURG, MONMOUTH COUNTY, NEW JERSEY

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Sheet Number
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