

March 12, 2024

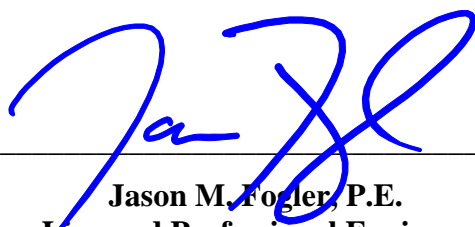
Project # BAR-2301

**STORMWATER MANAGEMENT REPORT
FOR
BEACHWAY AVENUE WATERFRONT REDEVELOPMENT**

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

**PREPARED FOR:
BEACHWAY AVENUE REALTY, LLC**

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I. INTRODUCTION

A. Project Description & Location

The proposed project outlined in this report consists of the construction of three (3) four-story condominium buildings each containing 32 units for a total of 96 units and associated parking, stormwater management measures, and associated grading. Each building has parking 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 Udorthents-Urban Land Complex (UdaUB) which is categorized as Hydrologic Soil Group 'D'.

C. Stormwater Management Description

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 specifications, 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. The proposed stormwater management system has been designed to maximize

water quality and to reduce peak flows for the 2, 10 and 100-year storm events per the NJDEP stormwater regulations.

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.

To accomplish these tasks, runoff from 2.16 acres of the 2.71 acre developed area is sent to one (1) subsurface stormwater management systems below pervious/porous paving, while the remaining 0.55 acres of disturbed area is directed overland toward the existing collection system in Beachway Avenue. The system consists of three (3) proposed 36" perforated HDPE pipes each 360 LF 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.

The NJDEP Stormwater rules also requires 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, "groundwater recharge does not apply to projects within the urban redevelopment area. The proposed project 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.

By minimizing 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 design criteria are discussed in further detail below.

1. Methodology and Software

The existing pre-development 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 of the undisturbed areas of the site have been assumed to be in good hydrologic condition, with good cover for the pre-development analysis. All of the 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.

2. Runoff Quantity

The proposed subsurface detention system below the porous/pervious pavement was designed to completely store and reduce flows generated by the proposed development. Flows will be reduced through the use of an outlet structure in the system. The site is supported by a stormwater management system consisting of three (3) 360 LF

36” perforated HDPE pipes, which have been sized to handle the flows generated by all contributory drainage areas. These systems were routed using the HydroCAD 10.00 software package. In accordance with NJAC 7:8-5.4(a)3iii, the proposed stormwater management system has been designed, “so that the post-construction peak runoff rates for the 2, 10 and 100-year storm events are 50%, 75% and 80%, respectively, of the pre-construction peak runoff rates.”

3. 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. To achieve this, 0.96 acres of the parking lot will be composed of porous pavement. Porous asphalt paving over a runoff storage bed of uniformly graded broken stone is approved for 80% TSS removal. The NJBMP Manual specifies that the maximum ratio of additional inflow drainage area to surface area of the porous pavement system is 3:1. The proposed porous pavement area is 0.96 acres, with a maximum allowable contributory drainage area of 2.88 acres. This area receives runoff from approximately 1.30 Ac., of which 1.16 Ac. is impervious area, and provides treatment prior to discharge to the underground detention system. Runoff that is infiltrated through the porous pavement and into the stone bed storage layer will be collected by 6” perforated PVC underdrains and conveyed directly to the subsurface detention system. Since the roof runoff is clean, an internal roof-leader collection system will discharge the runoff directly to the detention system, bypassing the porous pavement.

The proposed design achieves an 80% TSS removal rate for the impervious areas, thus satisfying the NJDEP requirements for water quality. Hydrograph calculations analyzing the storage bed capacity is provided in Appendix C.

4. Groundwater Recharge

According the New Jersey Best Management Practices manual, chapter 6, recharge can be proven given “That 100 percent of the difference between the site’s pre- and post-development 2-year runoff volumes be infiltrated.” Per N.J.A.C. 7:8-5.4(a)2.ii,

“groundwater recharge does not apply to projects within the urban redevelopment area. The proposed project 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. No further analysis is necessary for ground water recharge.

5. Green Infrastructure

The green infrastructure requirements set forth in N.J.A.C. 7:8-5.3 are met by limiting the contributing drainage areas to the associated green infrastructure best management practice as listed in said section. The porous/pervious paving system has a contributing drainage area of less than 3 times the area occupied by the BMP and meets the rules of this section as described in N.J.A.C. 7:8-5.3(b). The porous/pervious paving system is spread out throughout the site, close to the source of their respective runoff. Therefore, the project meets the intent and rules of the green infrastructure rule.

6. 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.

II. 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 two (2) existing drainage areas (EA-1 & EA-2). Drainage area EA-1 consists of 2.12 acres, of which 1.67 acres is impervious surfaces. This area is collected and conveyed to the existing subsurface detention system. Drainage area EA-2 consists of 0.59 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. Time of concentration was calculated assuming 150 LF of sheet flow and the remaining as shallow concentrated flow. Runoff for the pre-developed site was calculated using the HydroCAD 10.00 software package and is summarized in the table below:

Pre-Development Runoff Summary

2-Year Storm (cfs)	10-Year Storm (cfs)	100-Year Storm (cfs)
4.23	6.43	15.70

Table 1: Pre-Development Flow Summary

III. POST-DEVELOPMENT STORMWATER MANAGEMENT SUMMARY

It is the purpose of this report to provide information on the methods and techniques employed in the stormwater management analysis of the site under consideration. This analysis has been performed to address the requirements set forth in the NJDEP stormwater regulations while demonstrating that offsite flooding will be reduced and minimized. Accordingly, stormwater management analysis in this report consists of: (1) calculating runoff from the 2, 10 and 100-year storm events for the 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 points of analysis, including discharge from the proposed subsurface systems.

For the post development condition, the site was analyzed as two (2) proposed drainage areas (DA-1 & DA-2). Drainage area DA-1 consists of the 2.16 acre development area containing the proposed parking lot, concrete sidewalks and three (3) proposed buildings. Runoff from this area is collected by a proposed pipe network or directed overland to the porous pavement and conveyed directly through the porous pavement to a subsurface detention system below consisting of three (3) proposed 36" perforated HDPE pipes each 360 feet in length. Roof runoff will be conveyed directly to the subsurface detention system, bypassing the porous pavement since roof runoff is considered "clean". Drainage area DA-2 consists of 0.55 acres that conveys surface runoff to Beachway Avenue. Peak runoff rates for the post-developed site were determined using the HydroCAD (version 10.00) computer program. The allowable peak runoff rates for the post-developed site were found by applying the required reductions to the pre-developed peak flows for the onsite disturbed areas. The calculations to determine allowable flows are as follows:

Allowable Runoff Summary

Storm Event (yr)	Pre-Dev Runoff (cfs)	% Reduction	Allowable Runoff (cfs)	Post-Dev Runoff (cfs)
2	4.23	50%	2.11	2.04
10	6.43	75%	4.82	4.77
100	15.70	80%	12.56	12.55

Table 2: Allowable Runoff Summary

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

A. Porous/Pervious Pavement Subsurface Detention System (Methodology)

The stormwater management system has been designed as a subsurface detention basin below the porous pavement, which accepts stormwater runoff from 2.16 acres of the proposed development. The detention system consists of three (3) proposed 36" perforated HDPE pipes each 360 feet in length. This system is located at the front of the property along Beachway Avenue. Stormwater will be conveyed to this system via conventional gravity storm sewer systems and by infiltration through the porous pavement directly to the system. Roof runoff from the proposed buildings will be collected by a roof leader collection system and conveyed directly to the detention system, since roof runoff is considered "clean". Runoff discharging to the system was analyzed with the HydroCAD 10.00 computer program utilizing the proposed system volume characteristics. The summary of peak inflows, outflows, storage volumes, and basin elevations, are outlined below.

SUBSURFACE DETENTION
SYSTEM SUMMARY

Storm (Yr.)	Basin Inflow (cfs)	Basin Outflow (cfs)	Maximum Pond Storage (ac-ft)	Basin Elevation
2	5.96	1.75	0.166	8.96
10	9.30	4.11	0.234	9.63
100	16.21	10.45	0.338	11.16

Table 3: Subsurface Detention System Summary

Stormwater flows are attenuated by a proposed outlet structure with the first outlet being a 7.5” orifice set at the detention system invert elevation at 7.25. This outlet controls flows generated during the 2-year storm event. The second outlet is a 6” high by 15.5” wide orifice at the 2-year storm elevation of 8.96, which controls flows generated during the 10-year storm event. The third outlet is a 6” high by 17.0” wide orifice at elevation 9.96, which controls flows generated during the 100-year storm event. For storms larger than a 100-year storm or should the outlets become clogged, an emergency overflow weir is set at the 100-year storm elevation of 11.16. Discharge through the outlet structure is conveyed via a 15” RCP pipe at elevation 5.80 to the existing collection system in Beachway Avenue.

B. Soil Erosion and Sediment Control

In an effort to minimize the effects of erosion, the proposed design and construction concepts and practices 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, inlet protection, and around drainage inlets. In addition, dust control measures, stone tracking mats, and temporary and permanent vegetative cover will be utilized. The basin designs will provide a natural filter for the extraction of possible nutrients, pathogens, pesticides, hydrocarbons, oil and grease, metals, road salts and other sediments and particulates prior to discharge. General notes and guidelines are provided

on the Soil Erosion and Sediment Control Plans for the contractor in order to ensure against soil erosion on the site while construction is in progress.

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 appropriate.

Before construction can occur, the Freehold Soil Conservation District must approve the soil erosion and sediment control measures proposed, in addition to the approvals required at the local level.

The purpose of the proposed onsite stormwater management system described herein is to ensure that there will be no net increase in the rate of discharge into any surface water body from that which existed prior to the development of the parcel. The predevelopment peak rates of runoff from the 2 year, 10 year, and 100-year storms of twenty-four hour duration shall be reduced in post development.

C. 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. A minimum time of concentration (Tc) of 10 minutes was used.
 5. All proposed stormwater conduits are reinforced concrete pipe, Class III with an “n” value of 0.013.
- B. A minimum of 15” of cover is provided for all Class III Stormwater conduits.

IV. 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

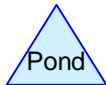
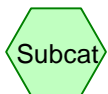
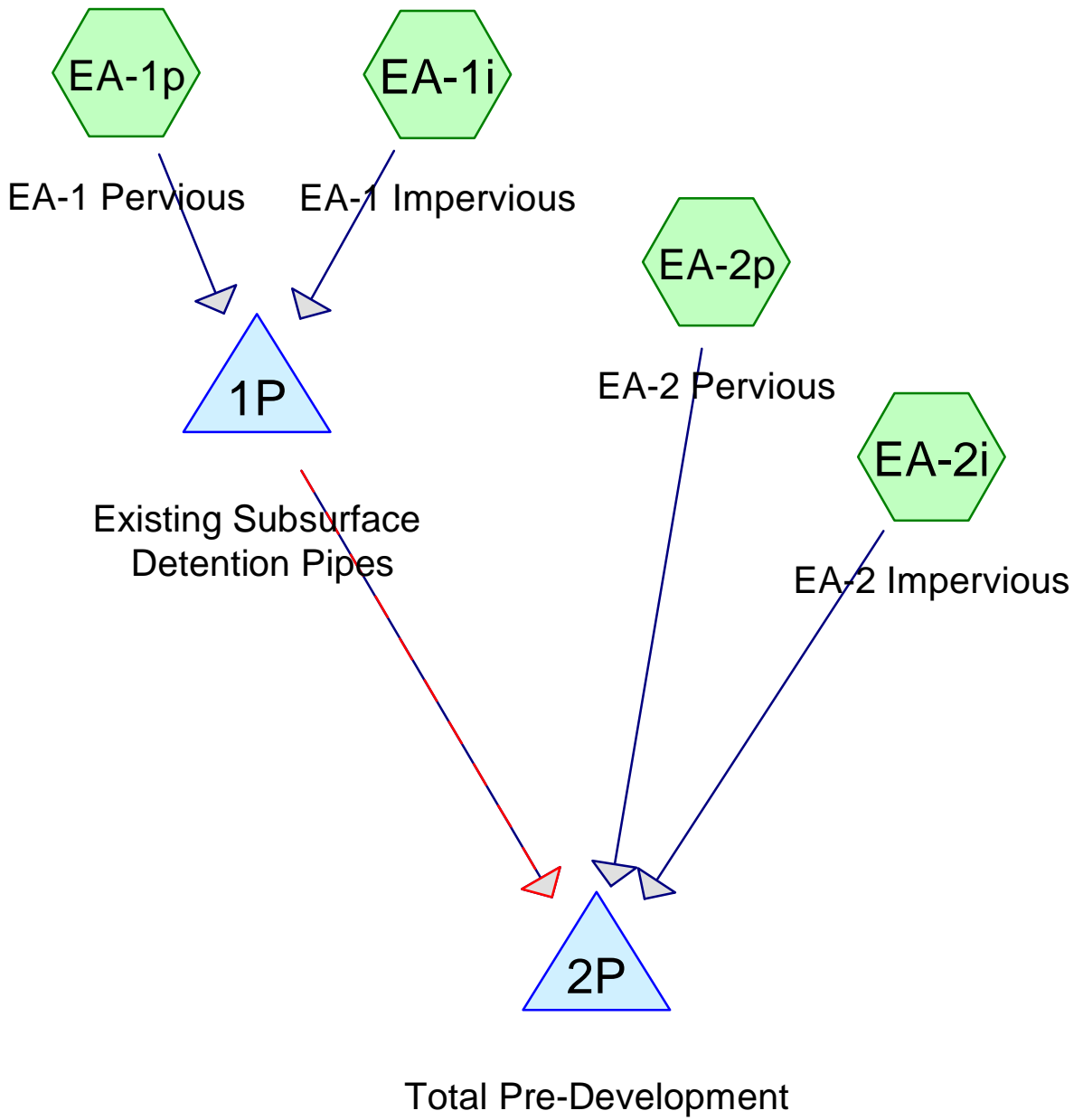
standards through the use of porous pavement to achieve 80% TSS removal. Also, groundwater recharge does not apply to this project as the site is located in the metropolitan planning area and therefore meets the definition of an urban redevelopment area as defined in N.J.A.C. 7:8.

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



Pre-Development

Prepared by {enter your company name here}
HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

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

Runoff = 4.84 cfs @ 12.13 hrs, Volume= 0.441 af, Depth= 3.17"

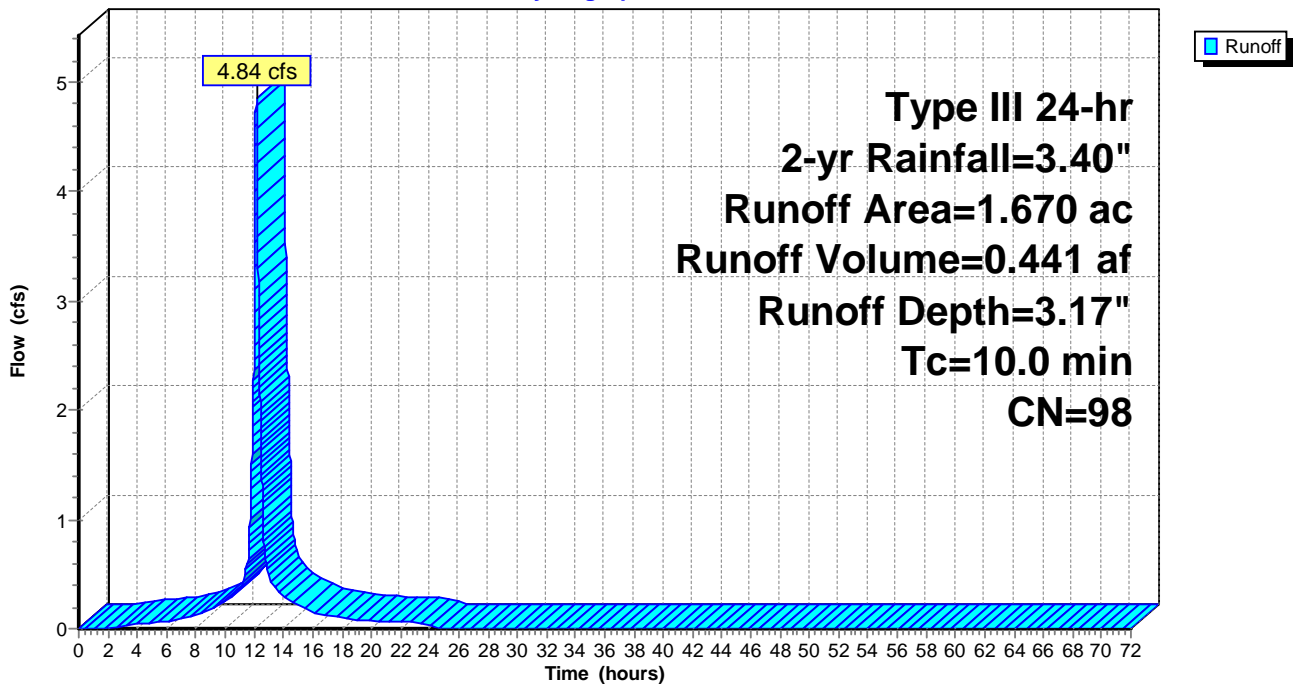
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (ac)	CN	Description
* 1.670	98	Impervious
1.670		100.00% Impervious Area

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

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

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

Runoff = 0.34 cfs @ 12.16 hrs, Volume= 0.032 af, Depth= 0.84"

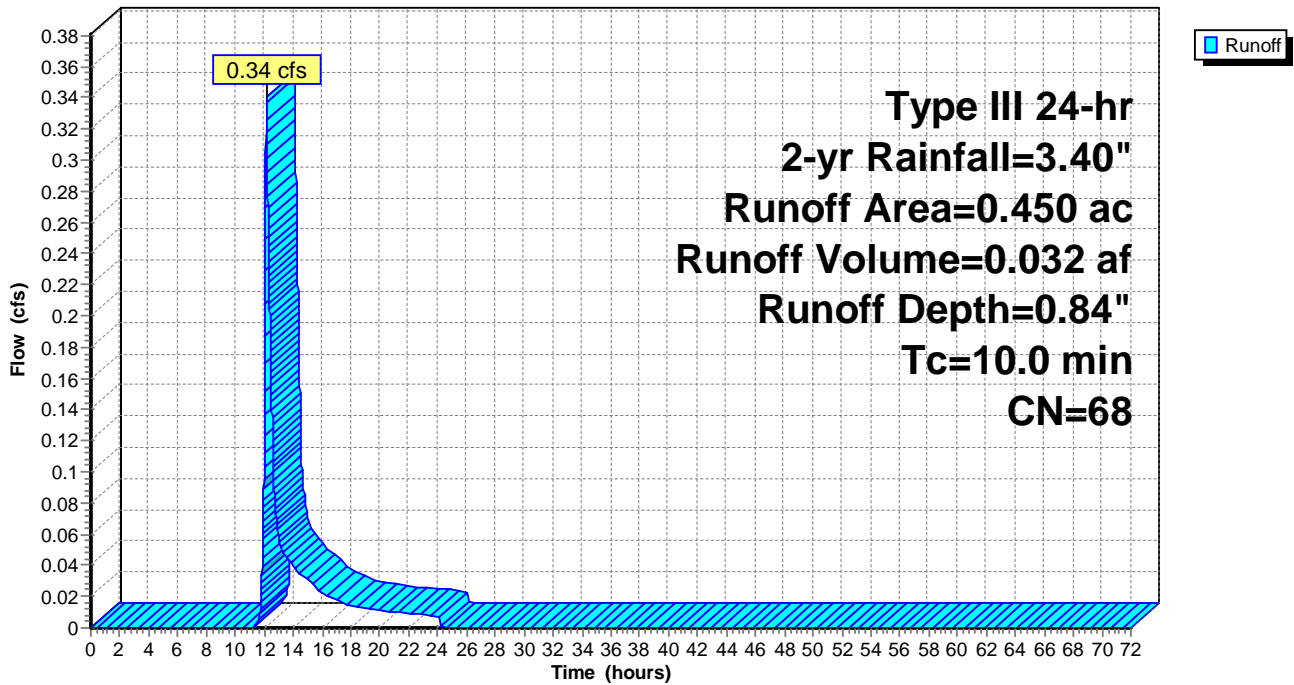
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (ac)	CN	Description
0.130	39	>75% Grass cover, Good, HSG A
0.320	80	>75% Grass cover, Good, HSG D
0.450	68	Weighted Average
0.450		100.00% Pervious Area

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

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

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

Runoff = 0.12 cfs @ 12.13 hrs, Volume= 0.011 af, Depth= 3.17"

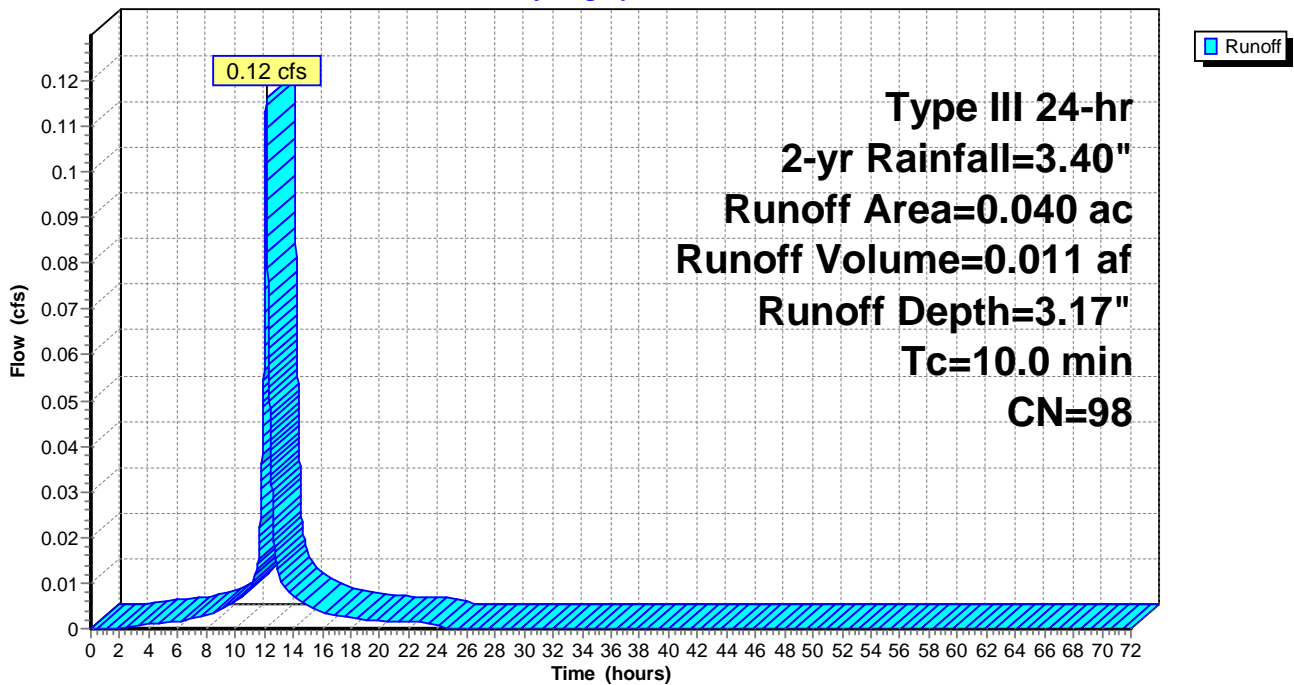
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (ac)	CN	Description
* 0.040	98	Impervious
0.040		100.00% Impervious Area

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

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

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

Runoff = 0.71 cfs @ 12.15 hrs, Volume= 0.059 af, Depth= 1.29"

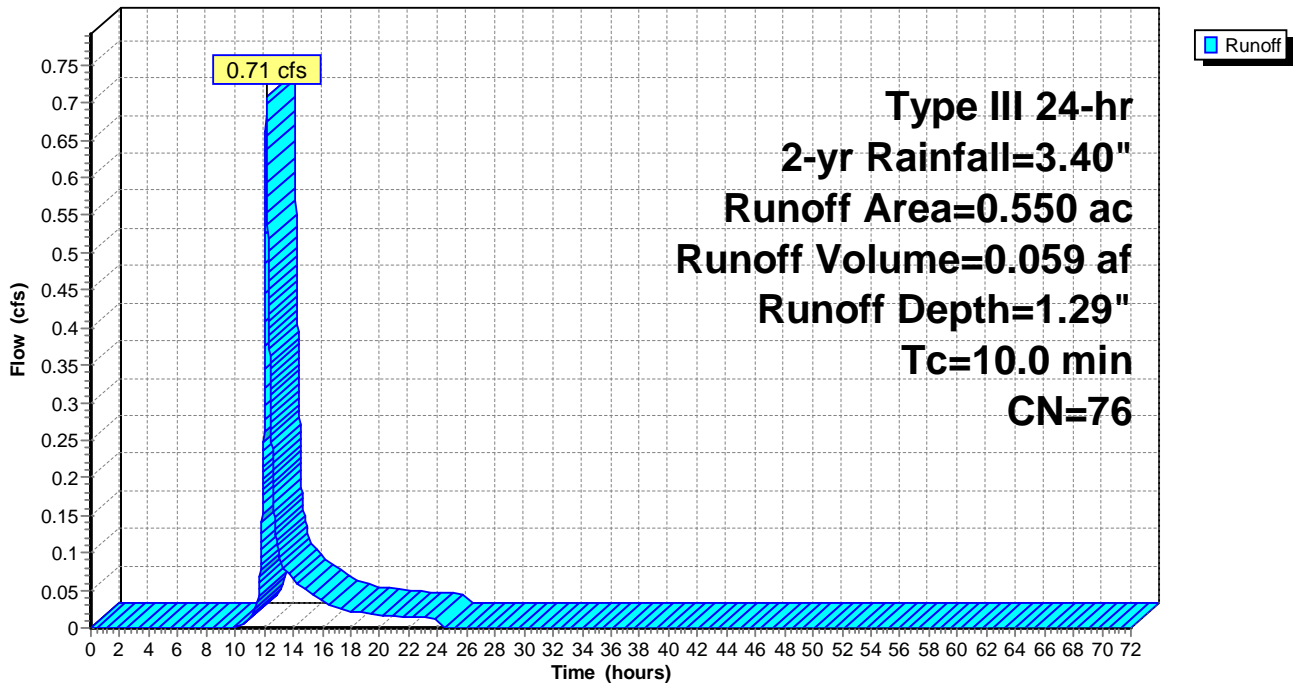
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.490	80	>75% Grass cover, Good, HSG D
0.550	76	Weighted Average
0.550		100.00% Pervious Area

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

Subcatchment EA-2p: EA-2 Pervious

Hydrograph



Pre-Development

Type III 24-hr 2-yr Rainfall=3.40"

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Summary for Pond 1P: Existing Subsurface Detention Pipes

Inflow Area = 2.120 ac, 78.77% Impervious, Inflow Depth = 2.67" for 2-yr event
 Inflow = 5.18 cfs @ 12.14 hrs, Volume= 0.472 af
 Outflow = 3.57 cfs @ 12.25 hrs, Volume= 0.472 af, Atten= 31%, Lag= 6.9 min
 Primary = 3.57 cfs @ 12.25 hrs, Volume= 0.472 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= 6.51' @ 12.25 hrs Surf.Area= 0.047 ac Storage= 0.050 af

Plug-Flow detention time= 11.5 min calculated for 0.472 af (100% of inflow)
 Center-of-Mass det. time= 11.5 min (778.6 - 767.1)

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=3.57 cfs @ 12.25 hrs HW=6.51' (Free Discharge)

↑**1=Culvert** (Passes 3.57 cfs of 4.72 cfs potential flow)

↑**2=Orifice/Grate** (Orifice Controls 3.57 cfs @ 4.55 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

Prepared by {enter your company name here}

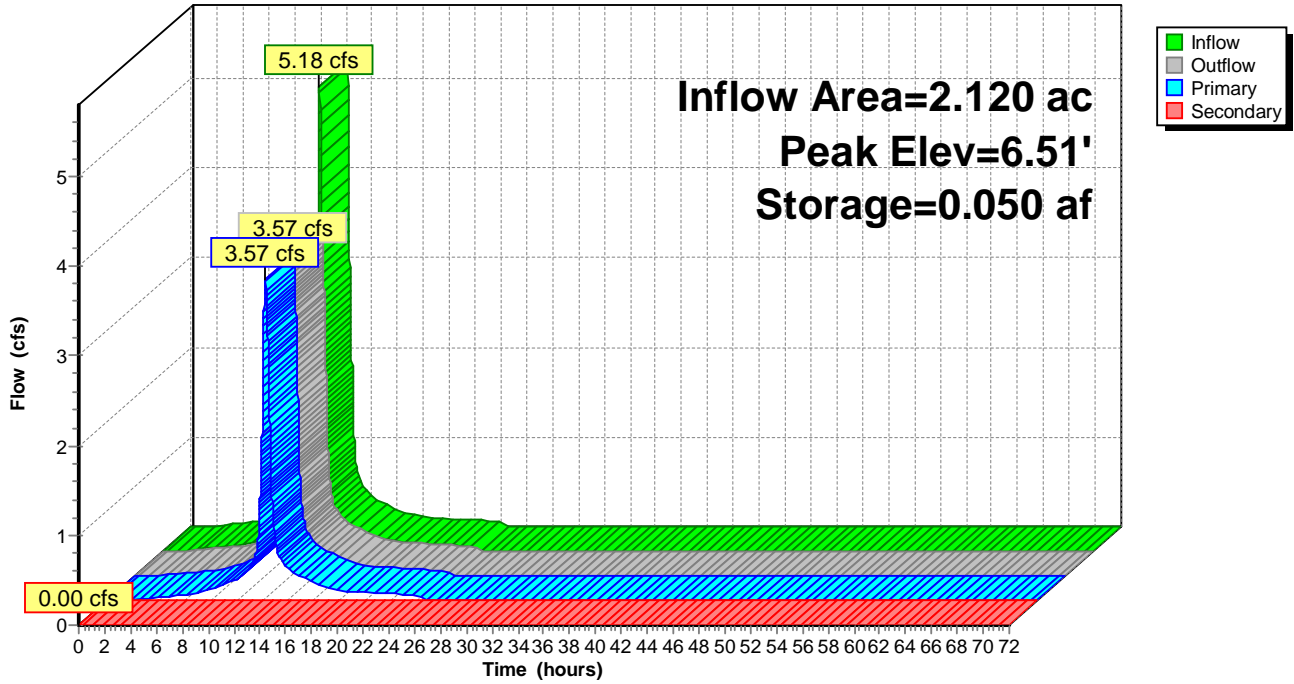
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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

Pond 1P: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development

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Type III 24-hr 2-yr Rainfall=3.40"

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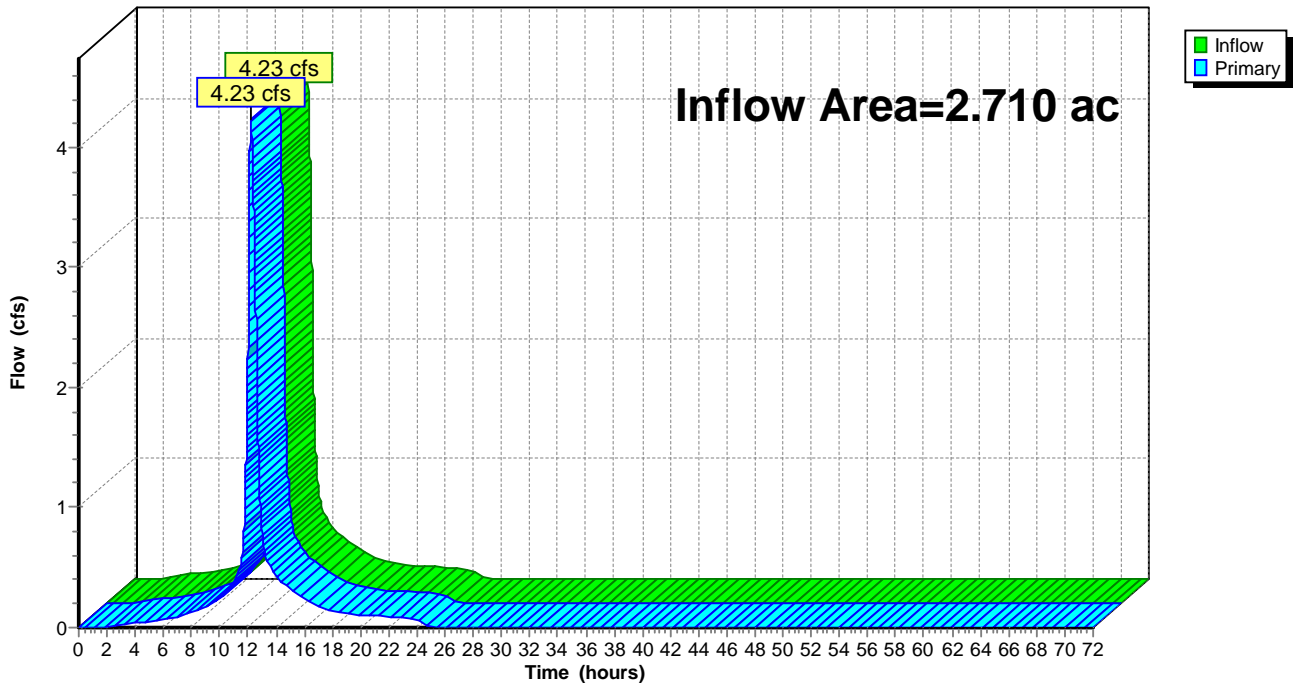
Summary for Pond 2P: Total Pre-Development

Inflow Area = 2.710 ac, 63.10% Impervious, Inflow Depth = 2.40" for 2-yr event
Inflow = 4.23 cfs @ 12.21 hrs, Volume= 0.542 af
Primary = 4.23 cfs @ 12.21 hrs, Volume= 0.542 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Total Pre-Development

Hydrograph



Pre-Development

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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

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

Runoff = 7.46 cfs @ 12.13 hrs, Volume= 0.691 af, Depth= 4.96"

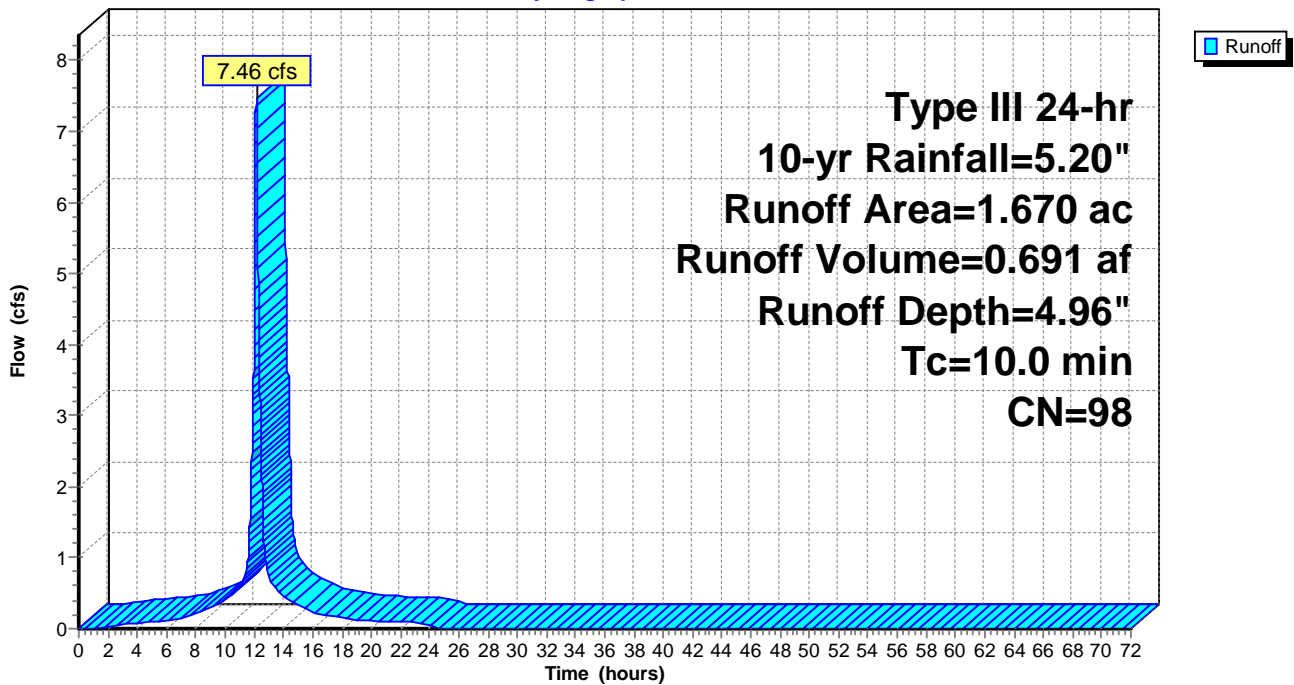
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

Area (ac)	CN	Description
* 1.670	98	Impervious
1.670		100.00% Impervious Area

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

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development

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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

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

Runoff = 0.91 cfs @ 12.15 hrs, Volume= 0.076 af, Depth= 2.02"

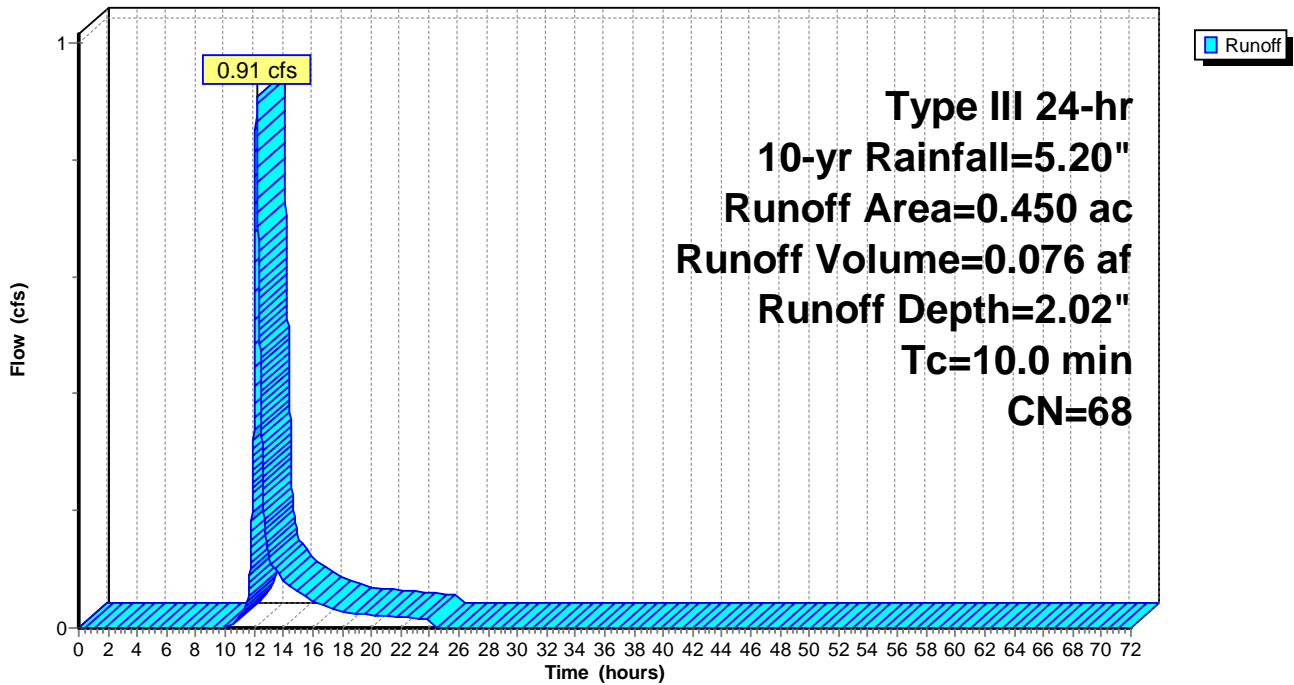
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

Area (ac)	CN	Description
0.130	39	>75% Grass cover, Good, HSG A
0.320	80	>75% Grass cover, Good, HSG D
0.450	68	Weighted Average
0.450		100.00% Pervious Area

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

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development

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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

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

Runoff = 0.18 cfs @ 12.13 hrs, Volume= 0.017 af, Depth= 4.96"

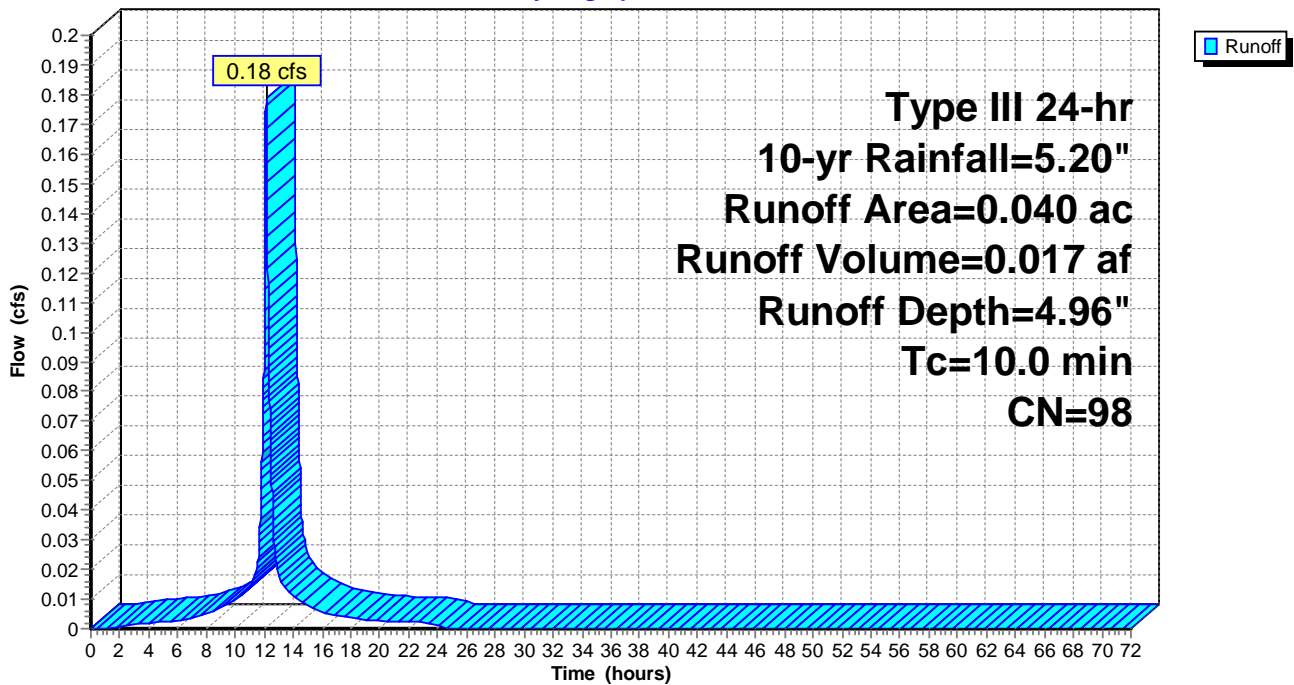
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

Area (ac)	CN	Description
* 0.040	98	Impervious
0.040		100.00% Impervious Area

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

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development

Prepared by {enter your company name here}
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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

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

Runoff = 1.52 cfs @ 12.14 hrs, Volume= 0.124 af, Depth= 2.70"

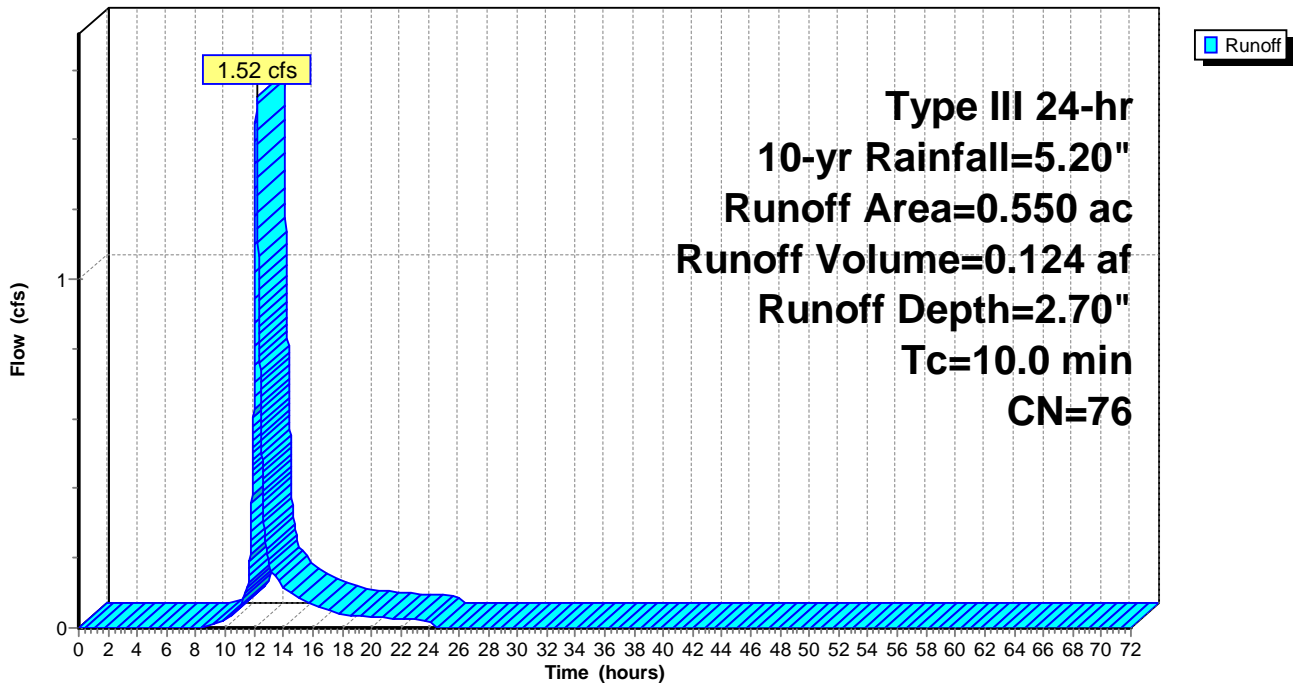
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.490	80	>75% Grass cover, Good, HSG D
0.550	76	Weighted Average
0.550		100.00% Pervious Area

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

Subcatchment EA-2p: EA-2 Pervious

Hydrograph



Pre-Development

Type III 24-hr 10-yr Rainfall=5.20"

Prepared by {enter your company name here}

Printed 9/12/2023

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Summary for Pond 1P: Existing Subsurface Detention Pipes

Inflow Area = 2.120 ac, 78.77% Impervious, Inflow Depth = 4.34" for 10-yr event
 Inflow = 8.36 cfs @ 12.14 hrs, Volume= 0.767 af
 Outflow = 5.16 cfs @ 12.28 hrs, Volume= 0.767 af, Atten= 38%, Lag= 8.6 min
 Primary = 5.16 cfs @ 12.28 hrs, Volume= 0.767 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= 7.48' @ 12.28 hrs Surf.Area= 0.038 ac Storage= 0.093 af

Plug-Flow detention time= 11.5 min calculated for 0.766 af (100% of inflow)
 Center-of-Mass det. time= 11.5 min (772.8 - 761.3)

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=5.16 cfs @ 12.28 hrs HW=7.48' (Free Discharge)

↑**1=Culvert** (Passes 5.16 cfs of 8.22 cfs potential flow)

↑**2=Orifice/Grate** (Orifice Controls 5.16 cfs @ 6.57 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

Prepared by {enter your company name here}

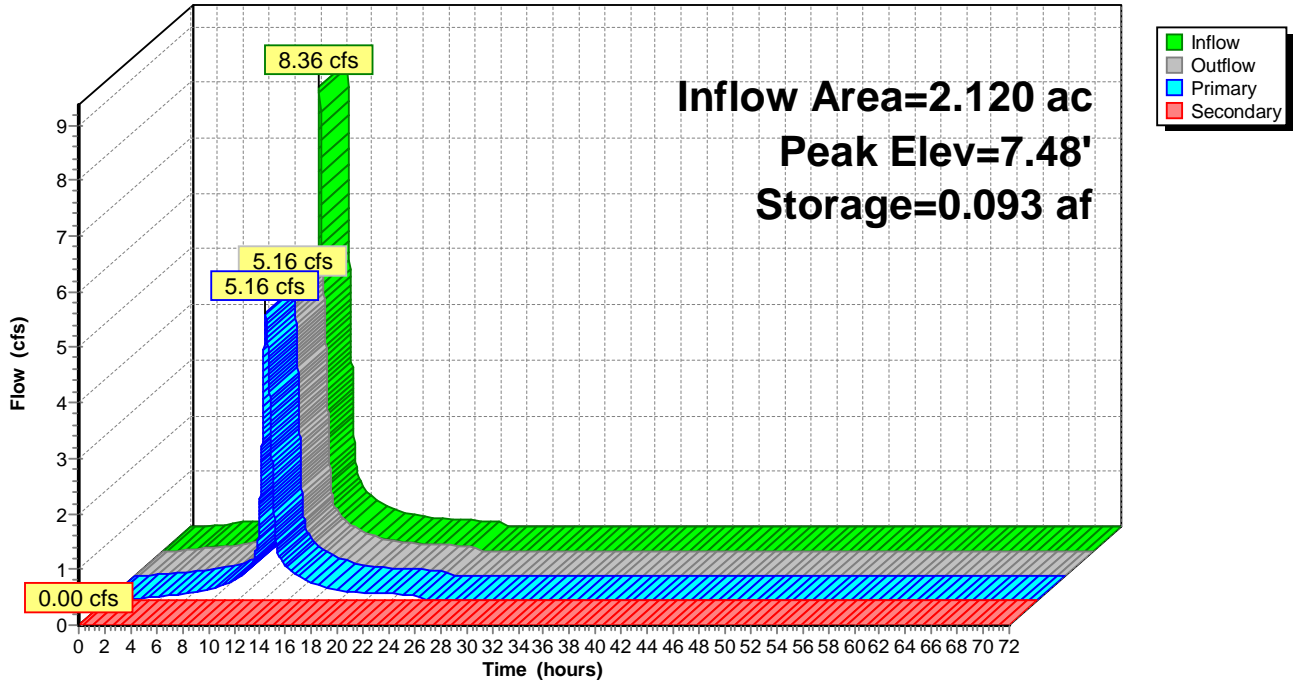
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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

Pond 1P: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development

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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

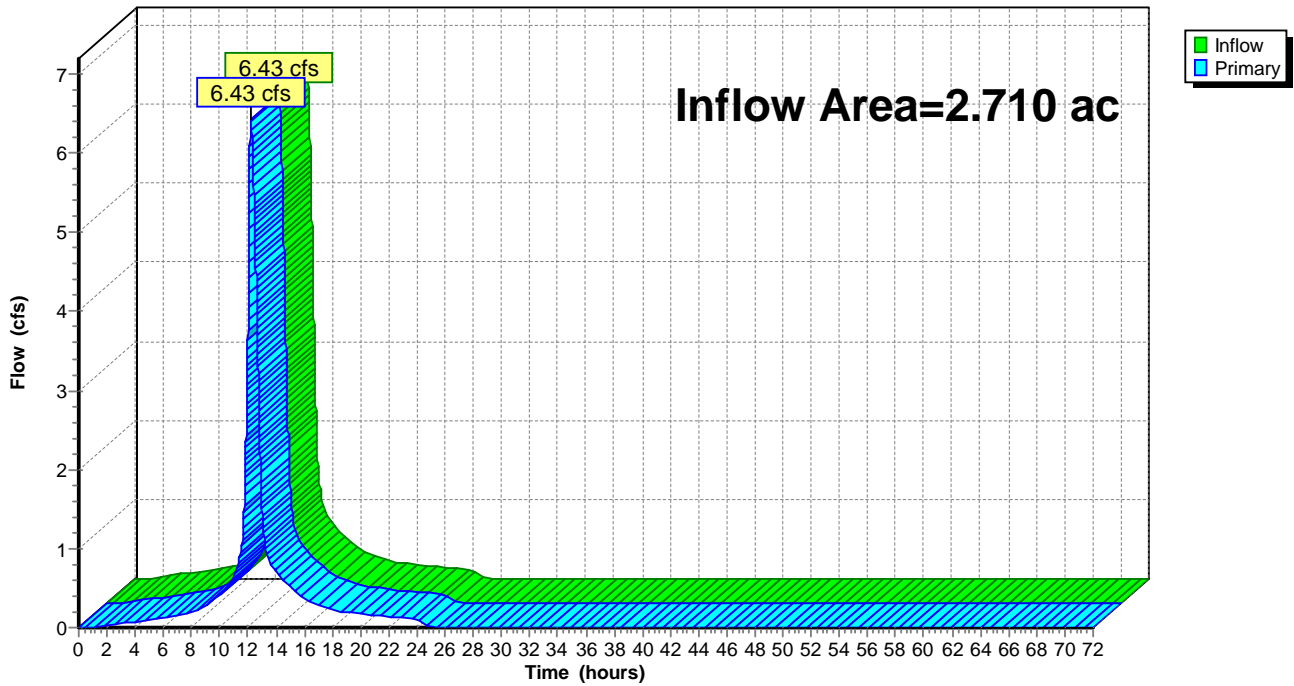
Summary for Pond 2P: Total Pre-Development

Inflow Area = 2.710 ac, 63.10% Impervious, Inflow Depth = 4.02" for 10-yr event
Inflow = 6.43 cfs @ 12.21 hrs, Volume= 0.907 af
Primary = 6.43 cfs @ 12.21 hrs, Volume= 0.907 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Total Pre-Development

Hydrograph



Pre-Development

Prepared by {enter your company name here}

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

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

Runoff = 12.81 cfs @ 12.13 hrs, Volume= 1.205 af, Depth= 8.66"

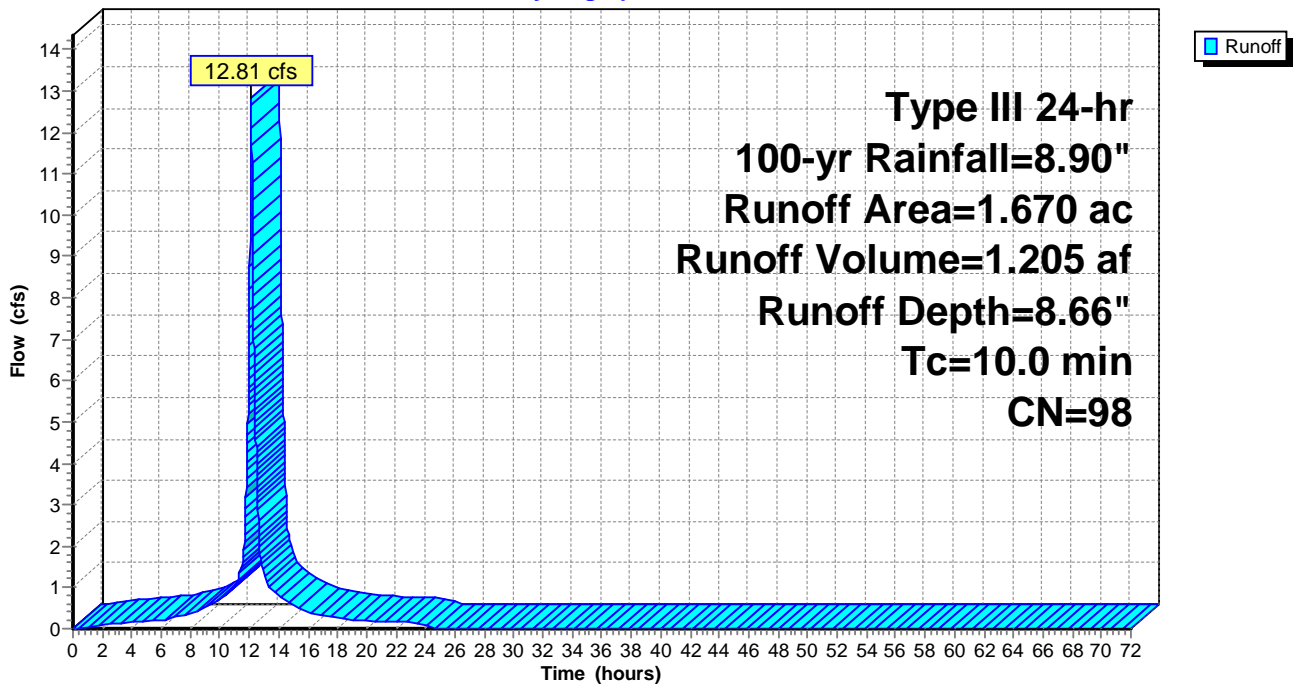
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.90"

Area (ac)	CN	Description
* 1.670	98	Impervious
1.670		100.00% Impervious Area

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

Subcatchment EA-1i: EA-1 Impervious

Hydrograph



Pre-Development

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

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

Runoff = 2.31 cfs @ 12.14 hrs, Volume= 0.188 af, Depth= 5.00"

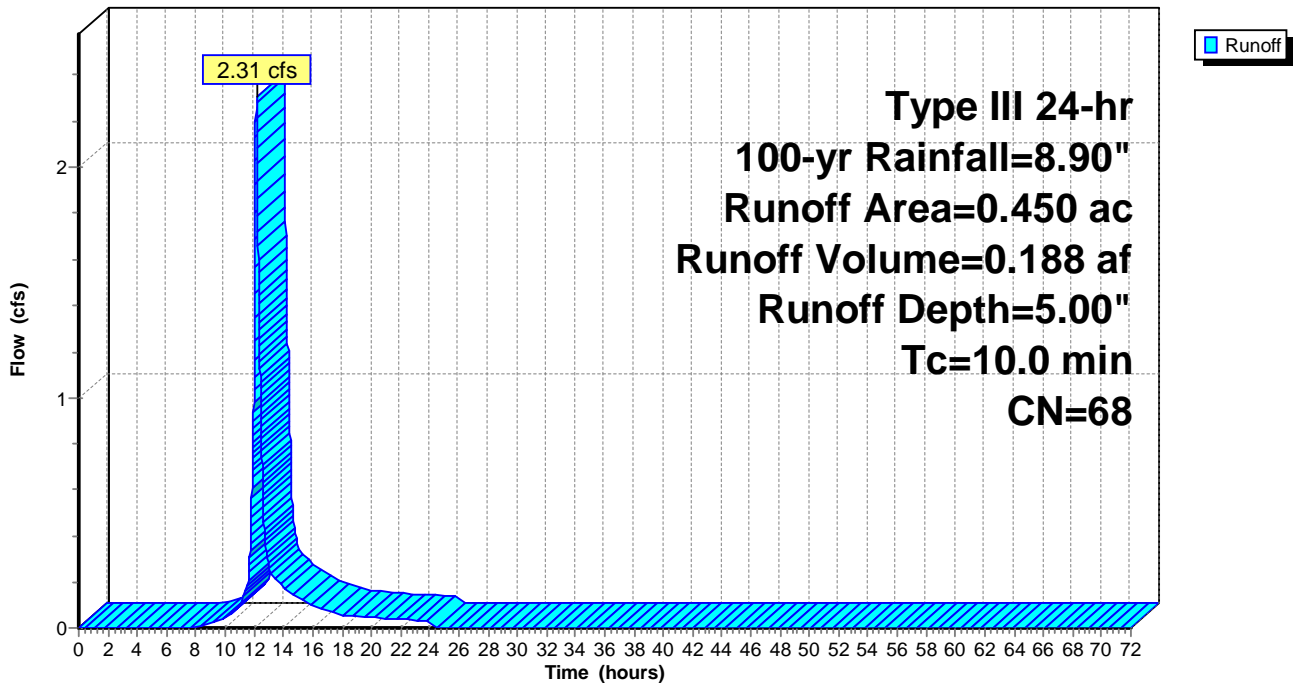
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.90"

Area (ac)	CN	Description
0.130	39	>75% Grass cover, Good, HSG A
0.320	80	>75% Grass cover, Good, HSG D
0.450	68	Weighted Average
0.450		100.00% Pervious Area

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

Subcatchment EA-1p: EA-1 Pervious

Hydrograph



Pre-Development

Prepared by {enter your company name here}

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

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

Runoff = 0.31 cfs @ 12.13 hrs, Volume= 0.029 af, Depth= 8.66"

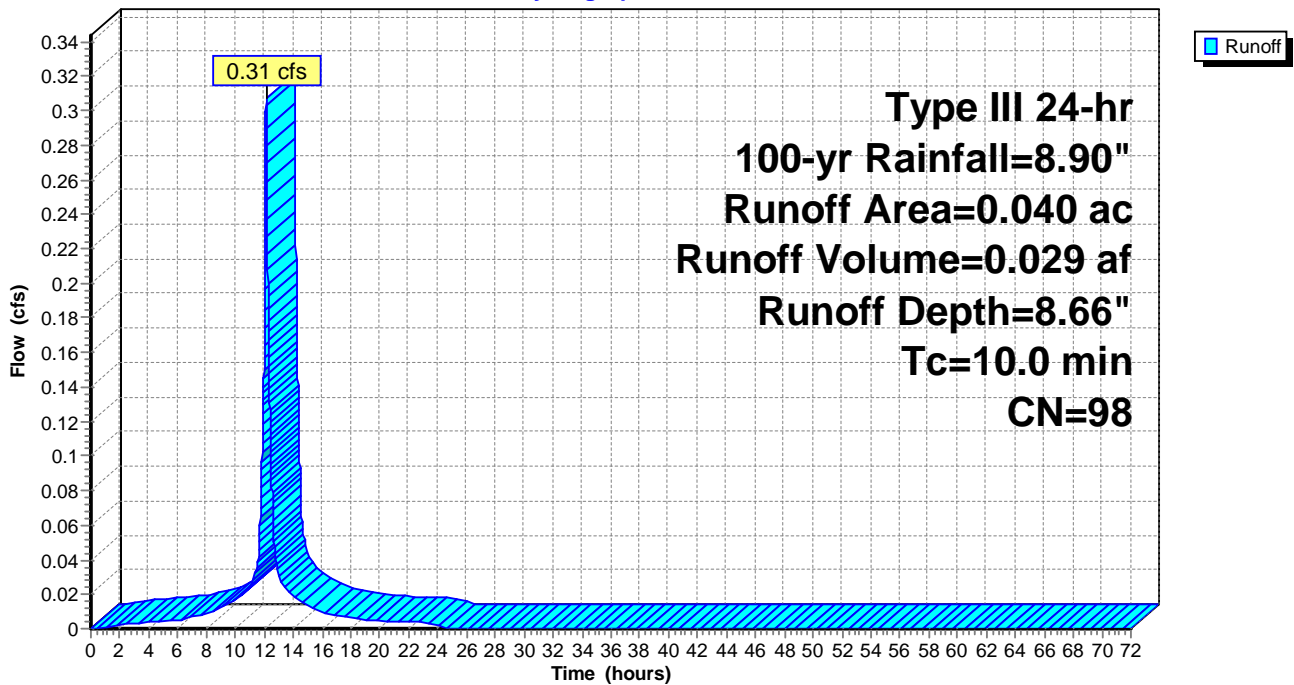
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100-yr Rainfall=8.90"

Area (ac)	CN	Description
* 0.040	98	Impervious
0.040		100.00% Impervious Area

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

Subcatchment EA-2i: EA-2 Impervious

Hydrograph



Pre-Development

Prepared by {enter your company name here}
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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

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

Runoff = 3.34 cfs @ 12.14 hrs, Volume= 0.274 af, Depth= 5.98"

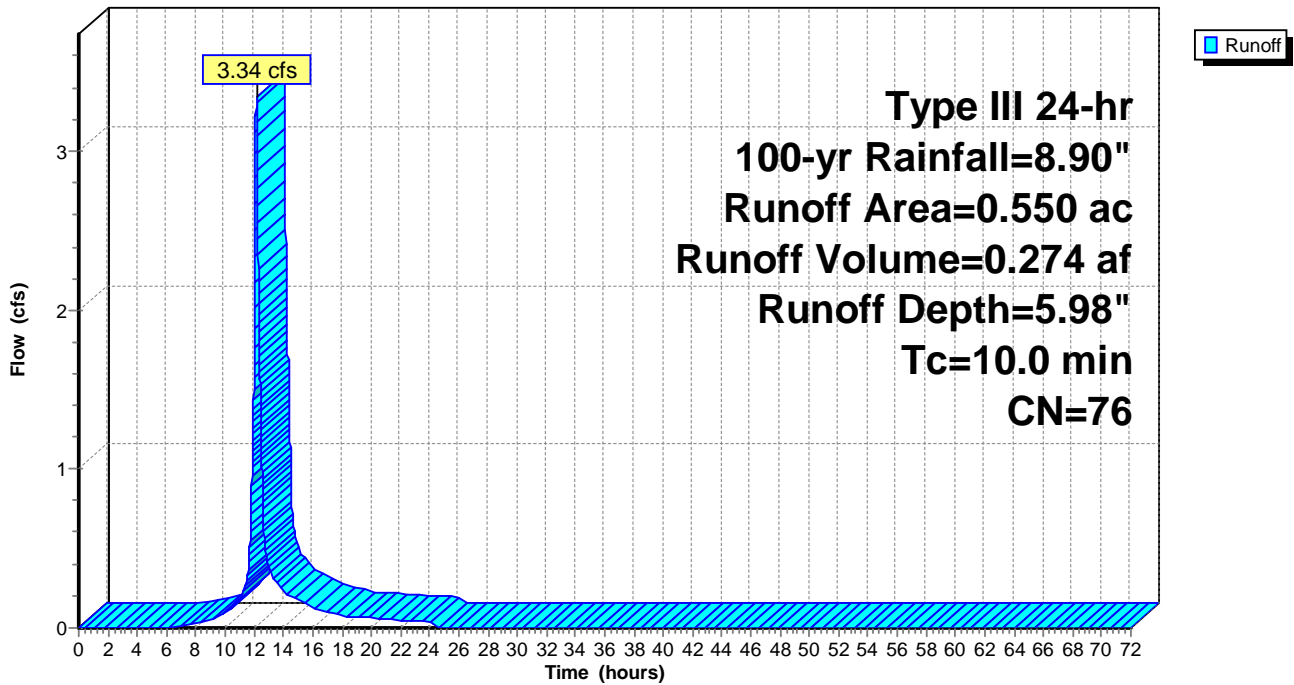
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.90"

Area (ac)	CN	Description
0.060	39	>75% Grass cover, Good, HSG A
0.490	80	>75% Grass cover, Good, HSG D
0.550	76	Weighted Average
0.550		100.00% Pervious Area

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

Subcatchment EA-2p: EA-2 Pervious

Hydrograph



Pre-Development

Type III 24-hr 100-yr Rainfall=8.90"

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Summary for Pond 1P: Existing Subsurface Detention Pipes

Inflow Area = 2.120 ac, 78.77% Impervious, Inflow Depth = 7.88" for 100-yr event
 Inflow = 15.11 cfs @ 12.13 hrs, Volume= 1.393 af
 Outflow = 12.05 cfs @ 12.13 hrs, Volume= 1.362 af, Atten= 20%, Lag= 0.0 min
 Primary = 7.48 cfs @ 12.13 hrs, Volume= 1.300 af
 Secondary = 4.57 cfs @ 12.13 hrs, Volume= 0.063 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 6
 Peak Elev= 9.54' @ 12.13 hrs Surf.Area= 0.000 ac Storage= 0.111 af

Plug-Flow detention time= 25.1 min calculated for 1.362 af (98% of inflow)
 Center-of-Mass det. time= 11.0 min (766.0 - 755.0)

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=7.48 cfs @ 12.13 hrs HW=9.54' (Free Discharge)

↑1=Culvert (Passes 7.48 cfs of 11.80 cfs potential flow)

↑2=Orifice/Grate (Orifice Controls 7.48 cfs @ 9.53 fps)

Secondary OutFlow Max=4.54 cfs @ 12.13 hrs HW=9.54' (Free Discharge)

↑3=Broad-Crested Rectangular Weir (Weir Controls 4.54 cfs @ 1.34 fps)

Pre-Development

Prepared by {enter your company name here}

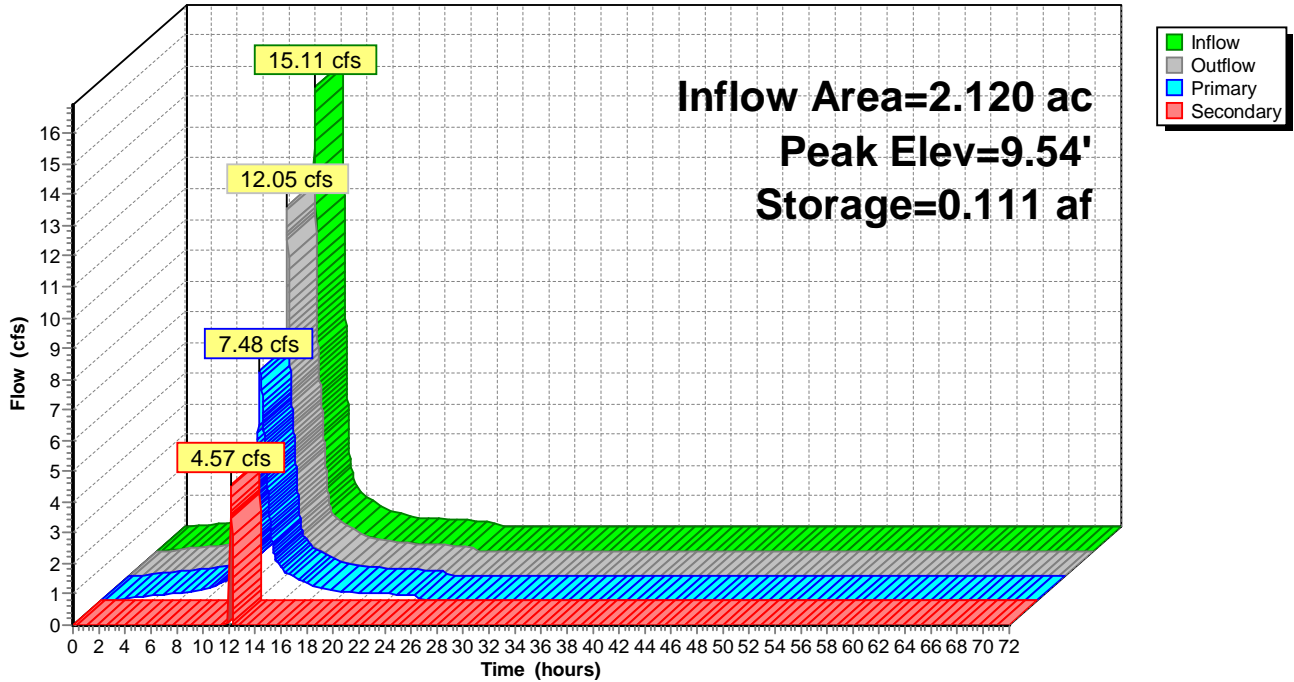
HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

Pond 1P: Existing Subsurface Detention Pipes

Hydrograph



Pre-Development

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

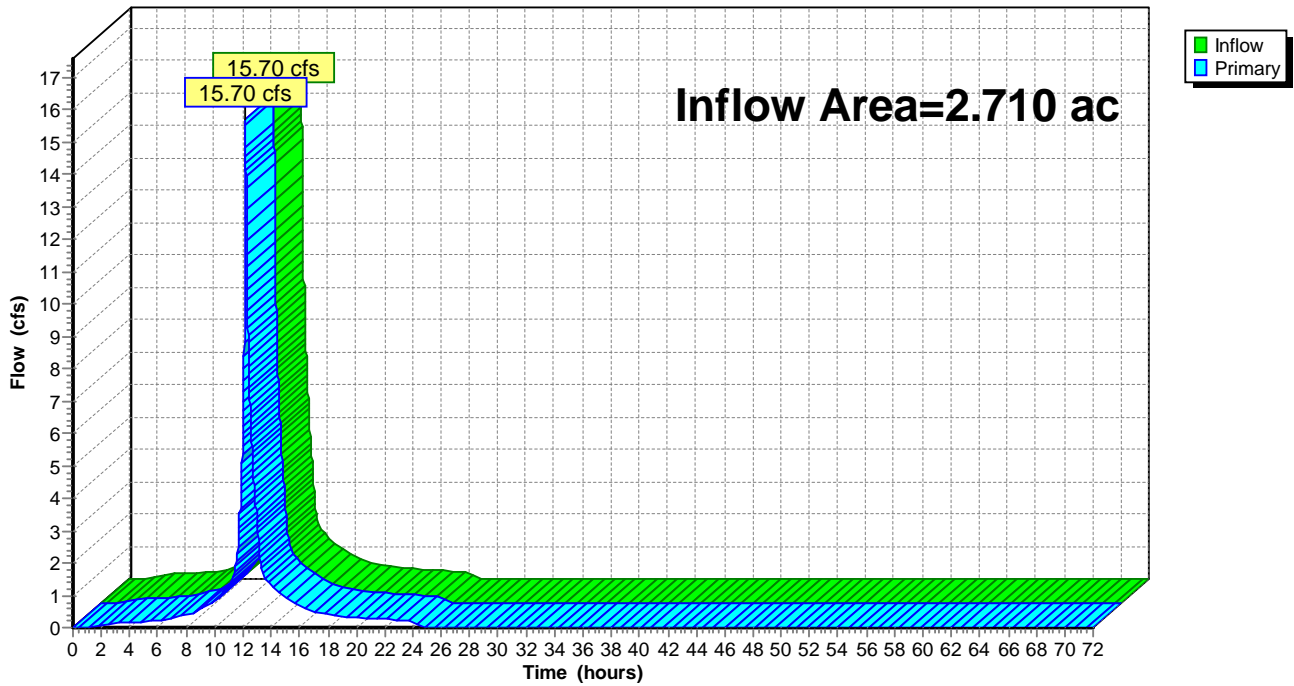
Summary for Pond 2P: Total Pre-Development

Inflow Area = 2.710 ac, 63.10% Impervious, Inflow Depth = 7.37" for 100-yr event
Inflow = 15.70 cfs @ 12.14 hrs, Volume= 1.665 af
Primary = 15.70 cfs @ 12.14 hrs, Volume= 1.665 af, Atten= 0%, Lag= 0.0 min

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

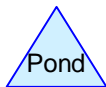
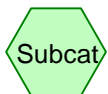
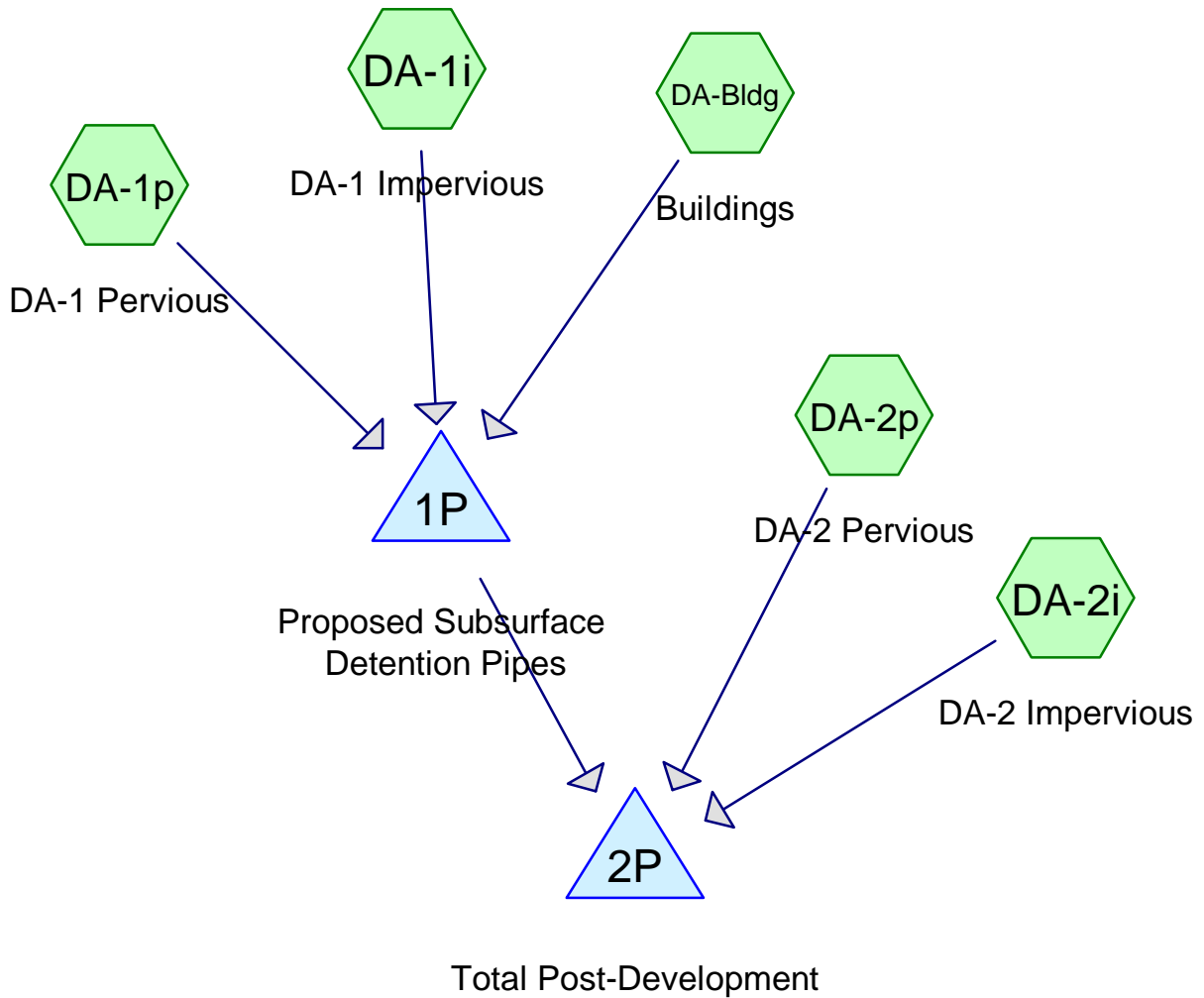
Pond 2P: Total Pre-Development

Hydrograph



APPENDIX B

POST-DEVELOPMENT DRAINAGE ANALYSIS



Routing Diagram for Post-Development
 Prepared by {enter your company name here}, Printed 9/12/2023
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Post-Development

Prepared by {enter your company name here}

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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 9/12/2023

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

Runoff = 3.02 cfs @ 1.15 hrs, Volume= 0.100 af, Depth= 1.03"

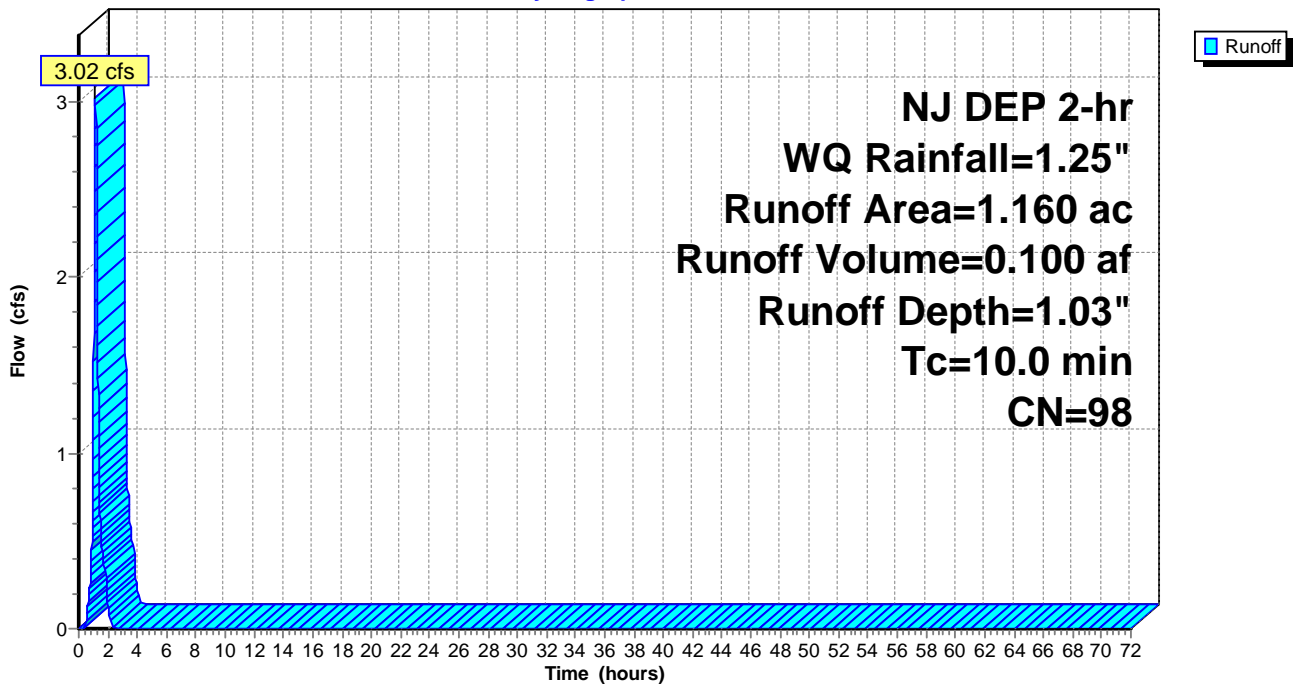
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 1.160	98	Impervious
1.160		100.00% Impervious Area

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

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development

Prepared by {enter your company name here}
 HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NJ DEP 2-hr WQ Rainfall=1.25"

Printed 9/12/2023

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

Runoff = 0.00 cfs @ 1.79 hrs, Volume= 0.000 af, Depth= 0.02"

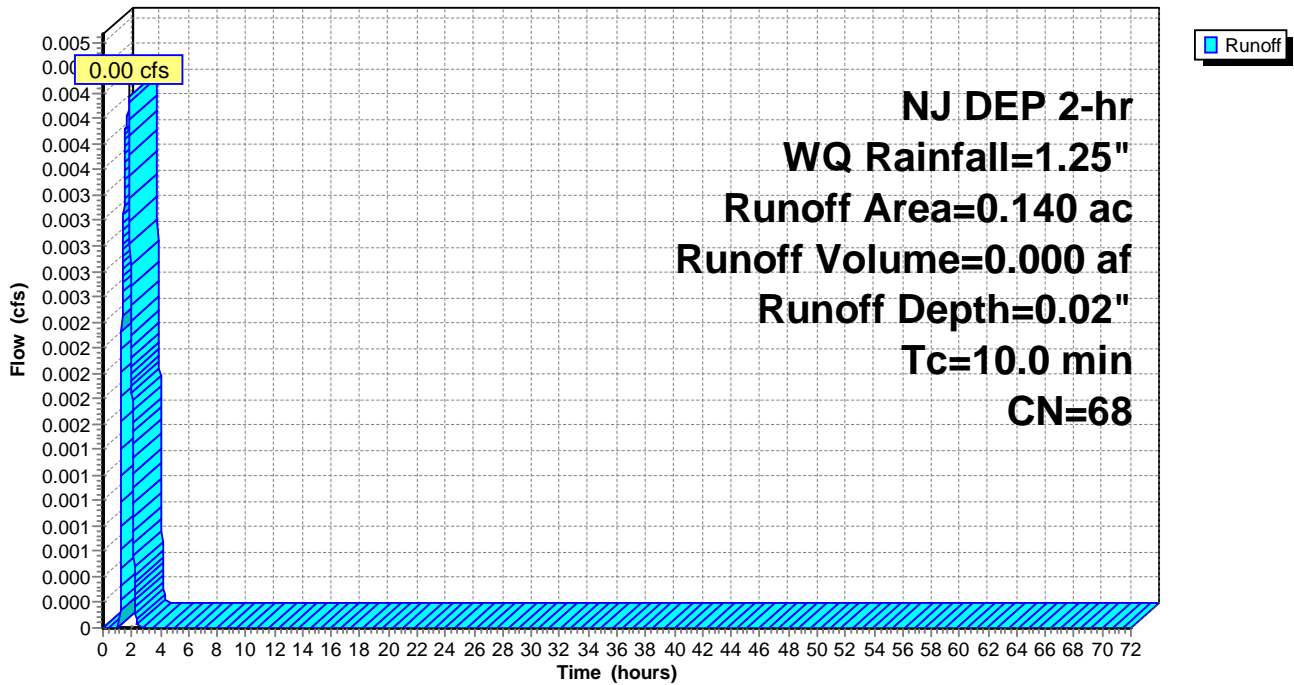
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.100	80	>75% Grass cover, Good, HSG D
0.140	68	Weighted Average
0.140		100.00% Pervious Area

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

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development

Prepared by {enter your company name here}
HydroCAD® 10.00-26 s/n 07360 © 2020 HydroCAD Software Solutions LLC

NJ DEP 2-hr WQ Rainfall=1.25"

Printed 9/12/2023

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

Runoff = 0.34 cfs @ 1.15 hrs, Volume= 0.011 af, Depth= 1.03"

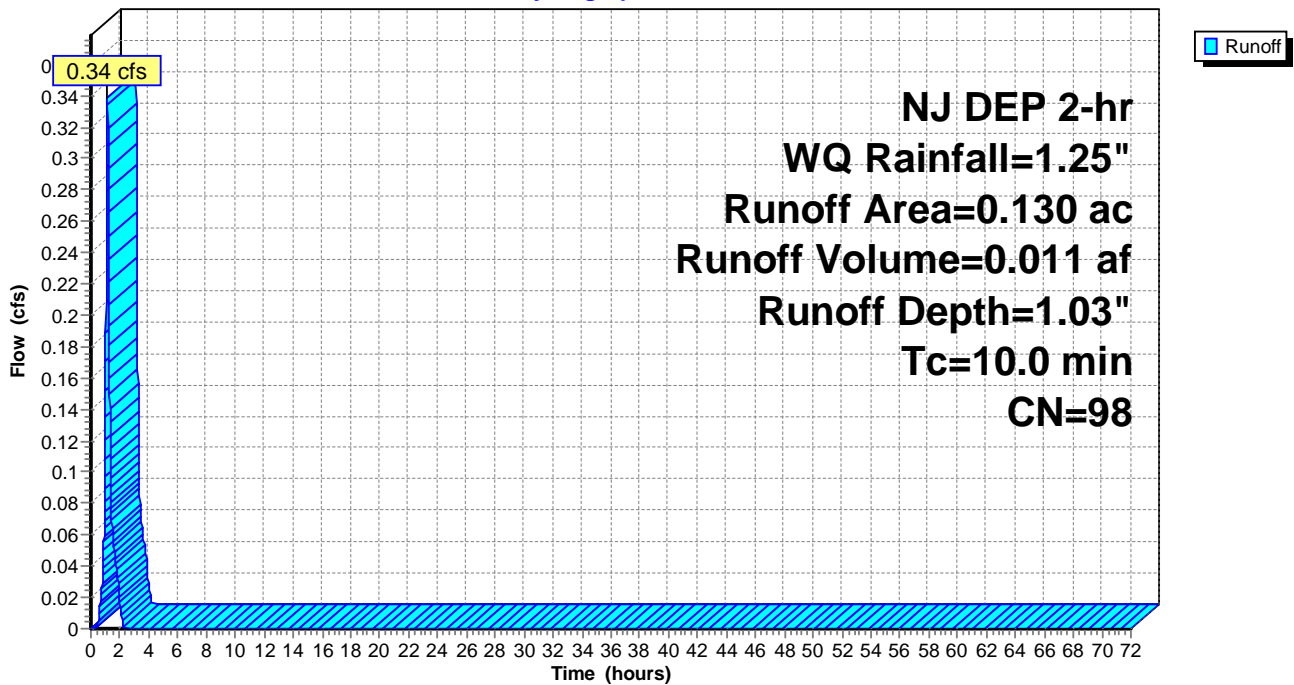
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.130	98	Impervious
0.130		100.00% Impervious Area

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

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/12/2023

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

Runoff = 0.00 cfs @ 1.85 hrs, Volume= 0.000 af, Depth= 0.00"

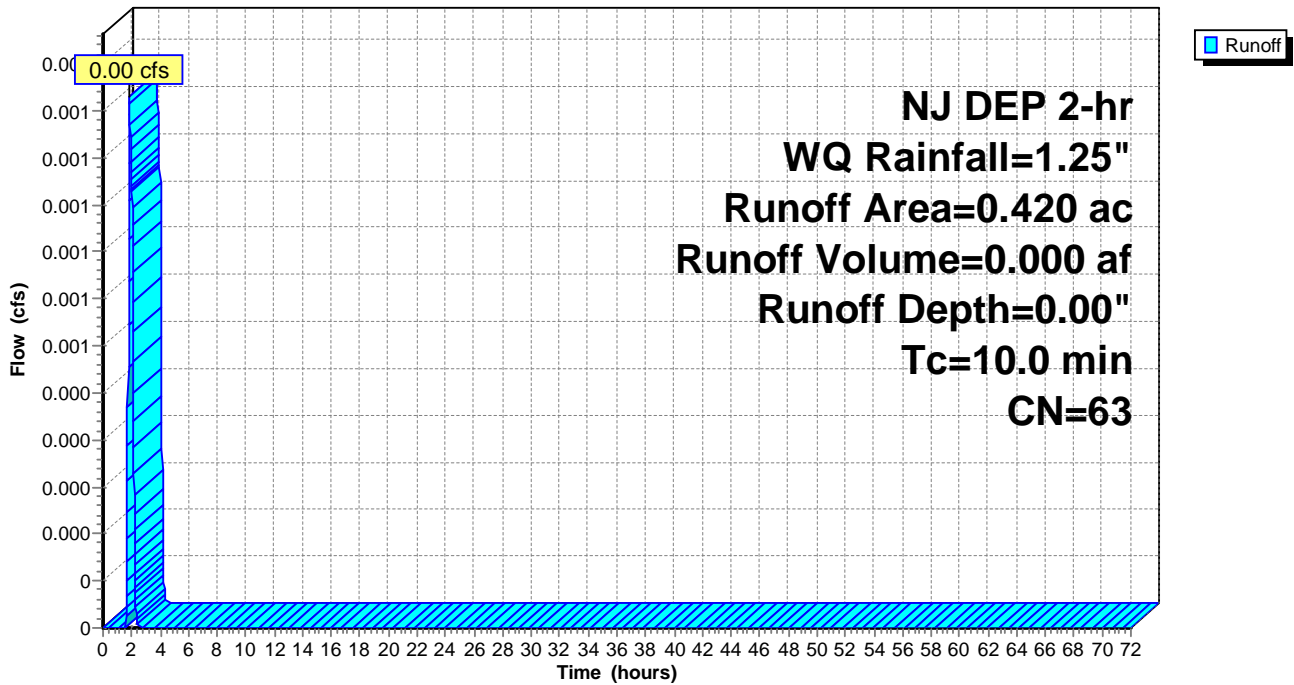
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.170	39	>75% Grass cover, Good, HSG A
0.250	80	>75% Grass cover, Good, HSG D
0.420	63	Weighted Average
0.420		100.00% Pervious Area

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

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development

Prepared by {enter your company name here}

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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 9/12/2023

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 2.24 cfs @ 1.15 hrs, Volume= 0.074 af, Depth= 1.03"

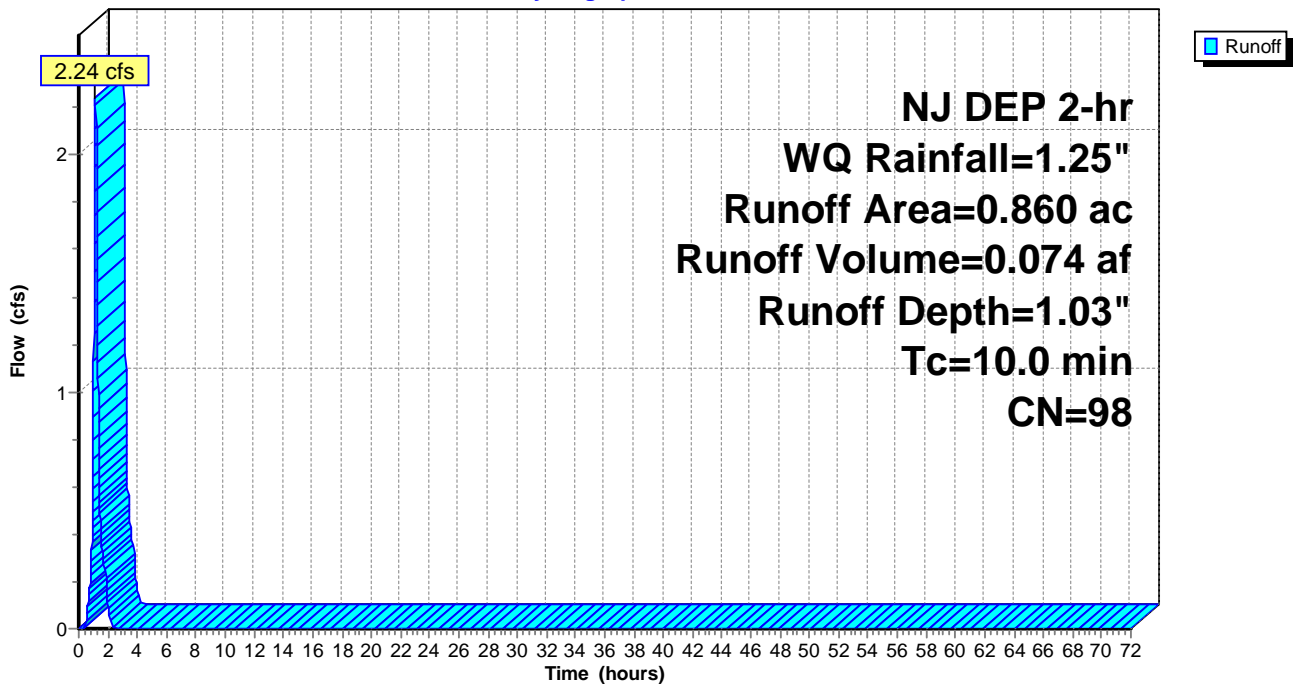
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.860	98	Impervious
0.860		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/12/2023

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Summary for Pond 1P: Proposed Subsurface Detention Pipes

Inflow Area = 2.160 ac, 93.52% Impervious, Inflow Depth = 0.97" for WQ event
 Inflow = 5.25 cfs @ 1.15 hrs, Volume= 0.174 af
 Outflow = 1.33 cfs @ 1.40 hrs, Volume= 0.174 af, Atten= 75%, Lag= 15.3 min
 Primary = 1.33 cfs @ 1.40 hrs, Volume= 0.174 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 8.37' @ 1.40 hrs Surf.Area= 0.169 ac Storage= 0.103 af

Plug-Flow detention time= 63.2 min calculated for 0.174 af (100% of inflow)
 Center-of-Mass det. time= 63.5 min (137.6 - 74.0)

Volume	Invert	Avail.Storage	Storage Description
#1	7.25'	0.165 af	20.00'W x 367.00'L x 4.00'H Prismaticoid 0.674 af Overall - 0.178 af Embedded = 0.496 af x 33.3% Voids
#2	7.25'	0.175 af	36.0" Round Pipe Storage x 3 Inside #1 L= 360.0'
#3	7.25'	0.002 af	36.0" Round Pipe Storage x 2 Inside #1 L= 7.0'
		0.343 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	5.80'	15.0" Round Culvert L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.80' / 4.92' S= 0.0259 '/' Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	7.25'	7.5" Vert. Orifice/Grate C= 0.600
#3	Device 1	8.96'	15.5" W x 6.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	9.96'	17.0" W x 6.0" H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.33 cfs @ 1.40 hrs HW=8.37' (Free Discharge)

- ↑ **1=Culvert** (Passes 1.33 cfs of 8.24 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 1.33 cfs @ 4.33 fps)
- ↑ **3=Orifice/Grate** (Controls 0.00 cfs)
- ↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Post-Development

Prepared by {enter your company name here}

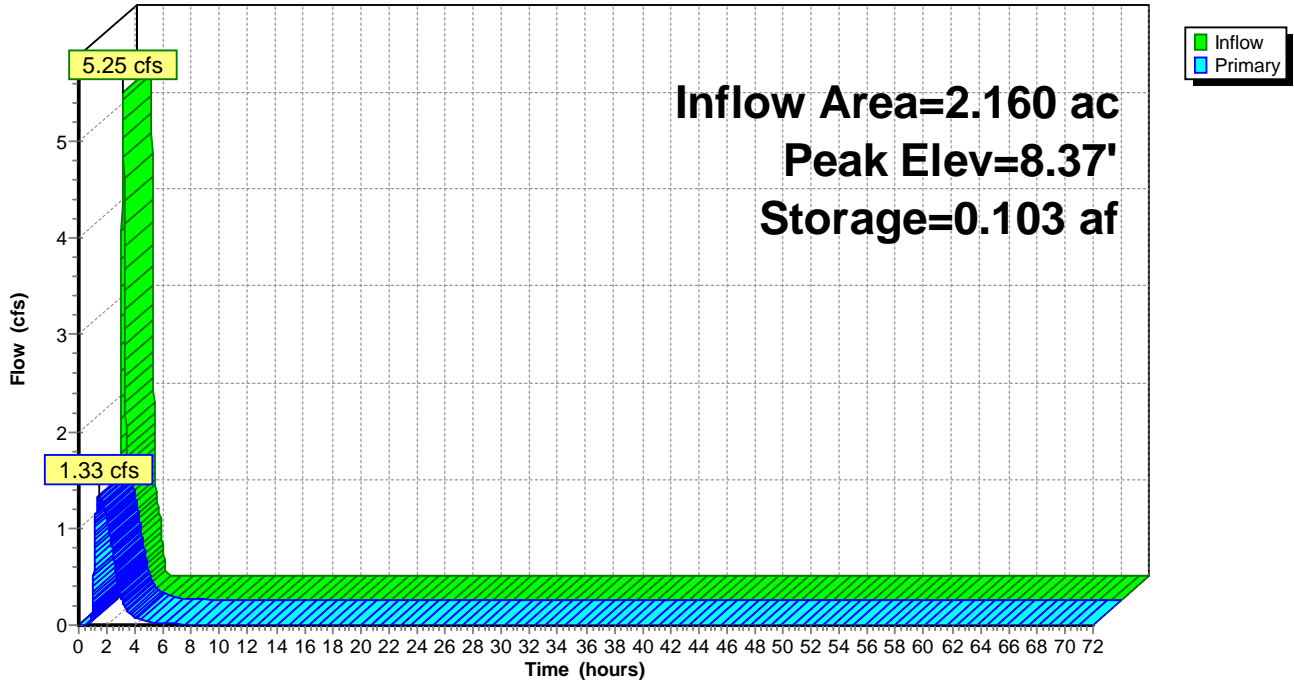
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 9/12/2023

Pond 1P: Proposed Subsurface Detention Pipes

Hydrograph



Post-Development

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/12/2023

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Hydrograph for Pond 1P: Proposed Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	7.25	0.00
2.00	0.24	0.076	8.10	1.09
4.00	0.00	0.011	7.40	0.08
6.00	0.00	0.005	7.32	0.02
8.00	0.00	0.003	7.29	0.01
10.00	0.00	0.002	7.28	0.00
12.00	0.00	0.001	7.27	0.00
14.00	0.00	0.001	7.26	0.00
16.00	0.00	0.001	7.26	0.00
18.00	0.00	0.000	7.26	0.00
20.00	0.00	0.000	7.25	0.00
22.00	0.00	0.000	7.25	0.00
24.00	0.00	0.000	7.25	0.00
26.00	0.00	0.000	7.25	0.00
28.00	0.00	0.000	7.25	0.00
30.00	0.00	0.000	7.25	0.00
32.00	0.00	0.000	7.25	0.00
34.00	0.00	0.000	7.25	0.00
36.00	0.00	0.000	7.25	0.00
38.00	0.00	0.000	7.25	0.00
40.00	0.00	0.000	7.25	0.00
42.00	0.00	0.000	7.25	0.00
44.00	0.00	0.000	7.25	0.00
46.00	0.00	0.000	7.25	0.00
48.00	0.00	0.000	7.25	0.00
50.00	0.00	0.000	7.25	0.00
52.00	0.00	0.000	7.25	0.00
54.00	0.00	0.000	7.25	0.00
56.00	0.00	0.000	7.25	0.00
58.00	0.00	0.000	7.25	0.00
60.00	0.00	0.000	7.25	0.00
62.00	0.00	0.000	7.25	0.00
64.00	0.00	0.000	7.25	0.00
66.00	0.00	0.000	7.25	0.00
68.00	0.00	0.000	7.25	0.00
70.00	0.00	0.000	7.25	0.00
72.00	0.00	0.000	7.25	0.00

Post-Development

Prepared by {enter your company name here}

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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 9/12/2023

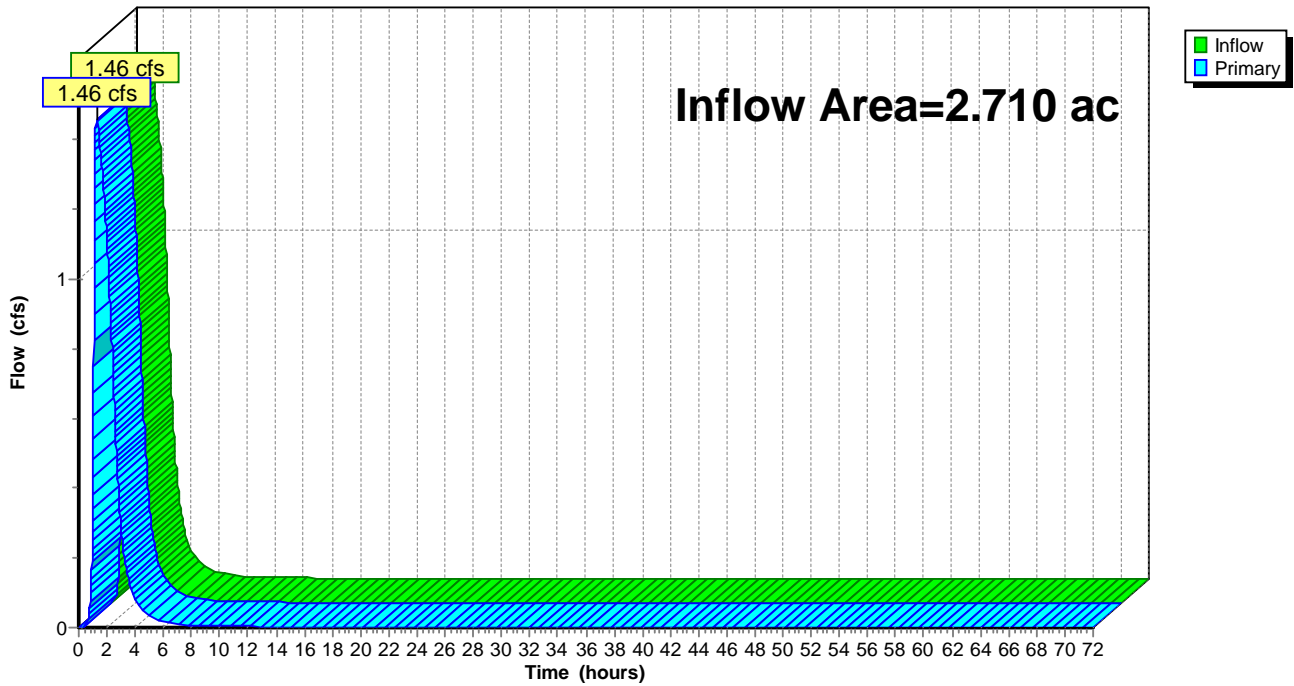
Summary for Pond 2P: Total Post-Development

Inflow Area = 2.710 ac, 79.34% Impervious, Inflow Depth = 0.82" for WQ event
Inflow = 1.46 cfs @ 1.26 hrs, Volume= 0.186 af
Primary = 1.46 cfs @ 1.26 hrs, Volume= 0.186 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Total Post-Development

Hydrograph



Post-Development

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

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

Runoff = 3.36 cfs @ 12.13 hrs, Volume= 0.306 af, Depth= 3.17"

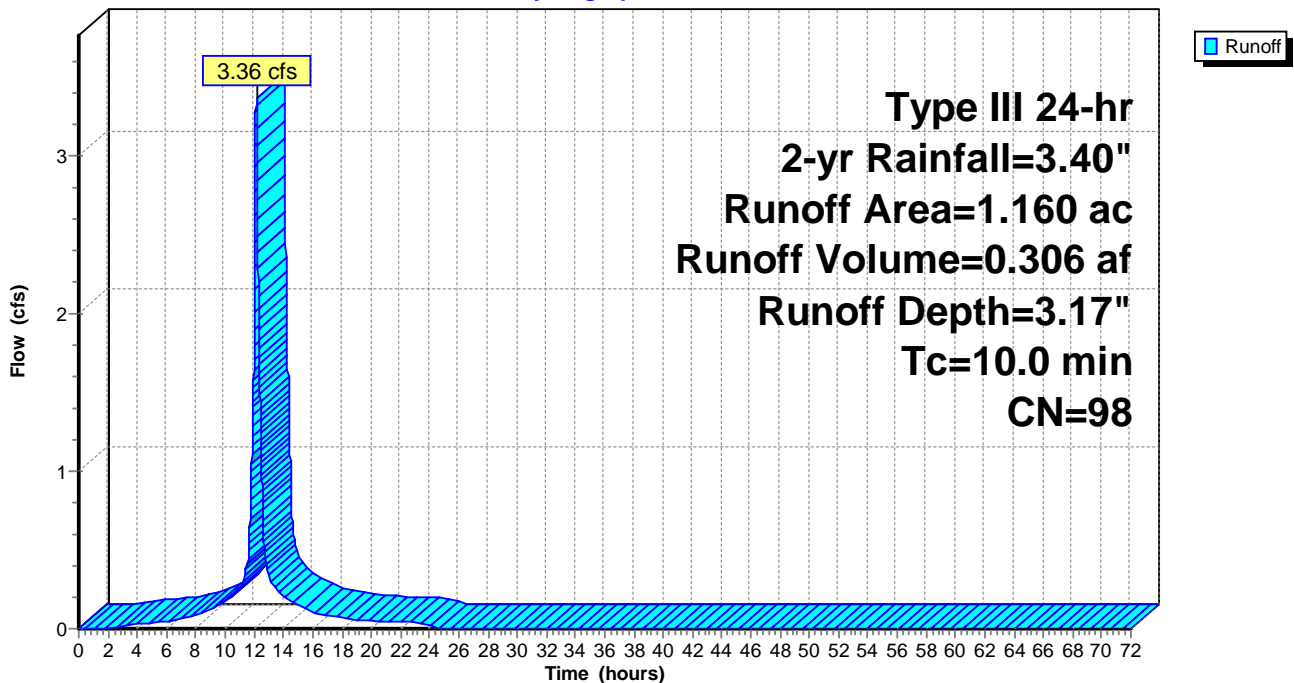
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (ac)	CN	Description
* 1.160	98	Impervious
1.160		100.00% Impervious Area

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

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

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

Runoff = 0.11 cfs @ 12.16 hrs, Volume= 0.010 af, Depth= 0.84"

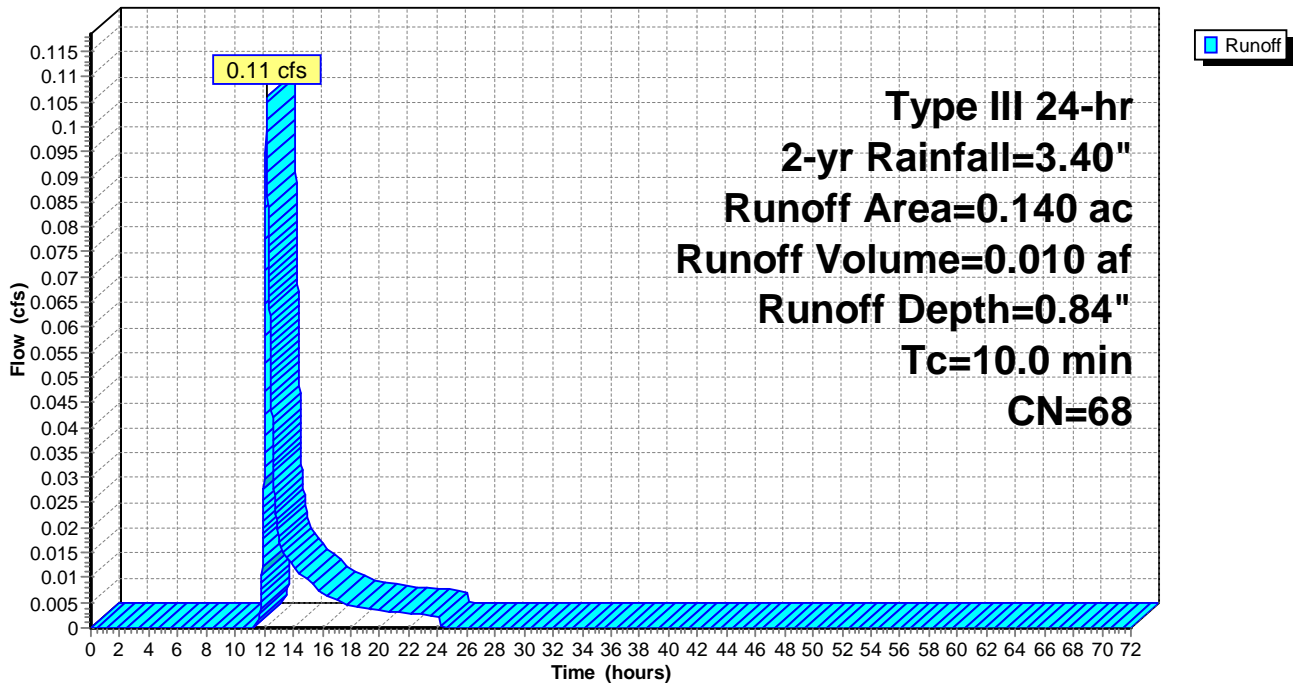
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.100	80	>75% Grass cover, Good, HSG D
0.140	68	Weighted Average
0.140		100.00% Pervious Area

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

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development

Prepared by {enter your company name here}

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

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

Runoff = 0.38 cfs @ 12.13 hrs, Volume= 0.034 af, Depth= 3.17"

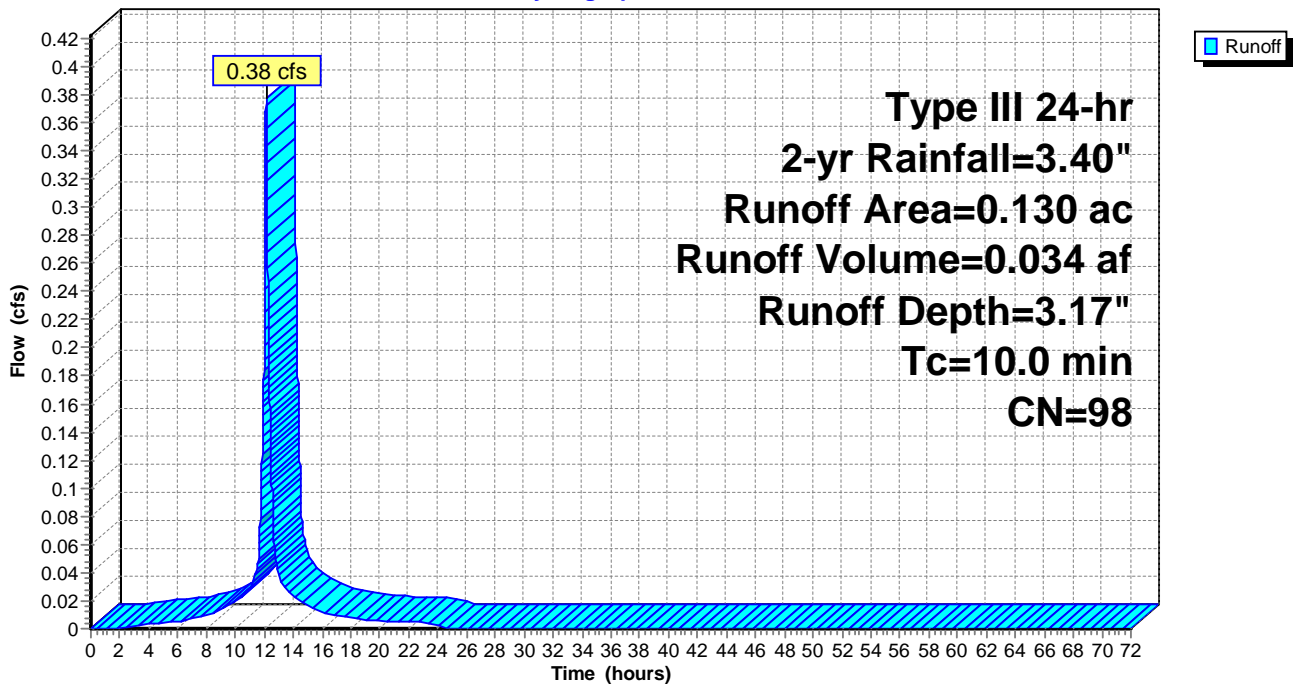
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (ac)	CN	Description
* 0.130	98	Impervious
0.130		100.00% Impervious Area

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

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

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

Runoff = 0.20 cfs @ 12.17 hrs, Volume= 0.021 af, Depth= 0.61"

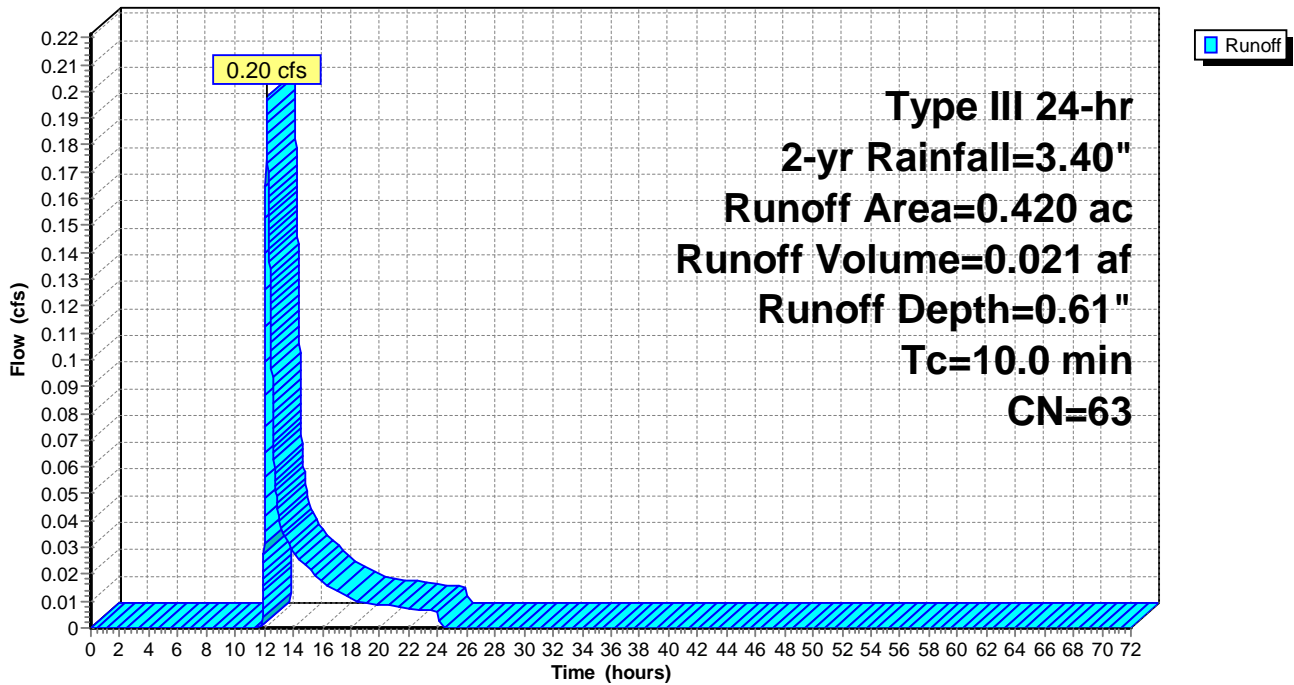
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (ac)	CN	Description
0.170	39	>75% Grass cover, Good, HSG A
0.250	80	>75% Grass cover, Good, HSG D
0.420	63	Weighted Average
0.420		100.00% Pervious Area

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

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 2.49 cfs @ 12.13 hrs, Volume= 0.227 af, Depth= 3.17"

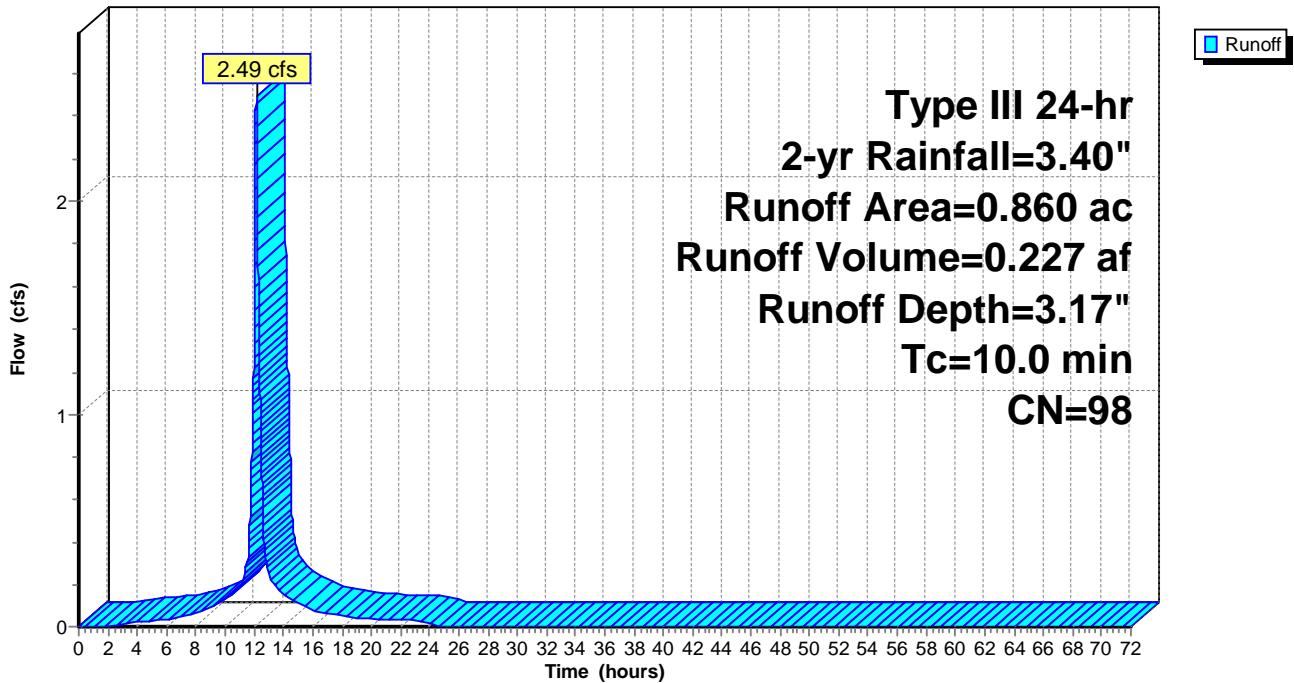
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-yr Rainfall=3.40"

Area (ac)	CN	Description
* 0.860	98	Impervious
0.860		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

Summary for Pond 1P: Proposed Subsurface Detention Pipes

Inflow Area = 2.160 ac, 93.52% Impervious, Inflow Depth = 3.02" for 2-yr event
Inflow = 5.96 cfs @ 12.13 hrs, Volume= 0.543 af
Outflow = 1.75 cfs @ 12.51 hrs, Volume= 0.543 af, Atten= 71%, Lag= 22.6 min
Primary = 1.75 cfs @ 12.51 hrs, Volume= 0.543 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 8.96' @ 12.51 hrs Surf.Area= 0.169 ac Storage= 0.166 af

Plug-Flow detention time= 66.6 min calculated for 0.543 af (100% of inflow)
Center-of-Mass det. time= 66.8 min (827.9 - 761.1)

Volume	Invert	Avail.Storage	Storage Description
#1	7.25'	0.165 af	20.00'W x 367.00'L x 4.00'H Prismatic 0.674 af Overall - 0.178 af Embedded = 0.496 af x 33.3% Voids
#2	7.25'	0.175 af	36.0" Round Pipe Storage x 3 Inside #1 L= 360.0'
#3	7.25'	0.002 af	36.0" Round Pipe Storage x 2 Inside #1 L= 7.0'
			0.343 af Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	5.80'	15.0" Round Culvert L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.80' / 4.92' S= 0.0259 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	7.25'	7.5" Vert. Orifice/Grate C= 0.600
#3	Device 1	8.96'	15.5" W x 6.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	9.96'	17.0" W x 6.0" H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=1.75 cfs @ 12.51 hrs HW=8.96' (Free Discharge)

- ↑ **1=Culvert** (Passes 1.75 cfs of 9.41 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 1.75 cfs @ 5.69 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 0.00 cfs @ 0.08 fps)
- ↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Post-Development

Prepared by {enter your company name here}

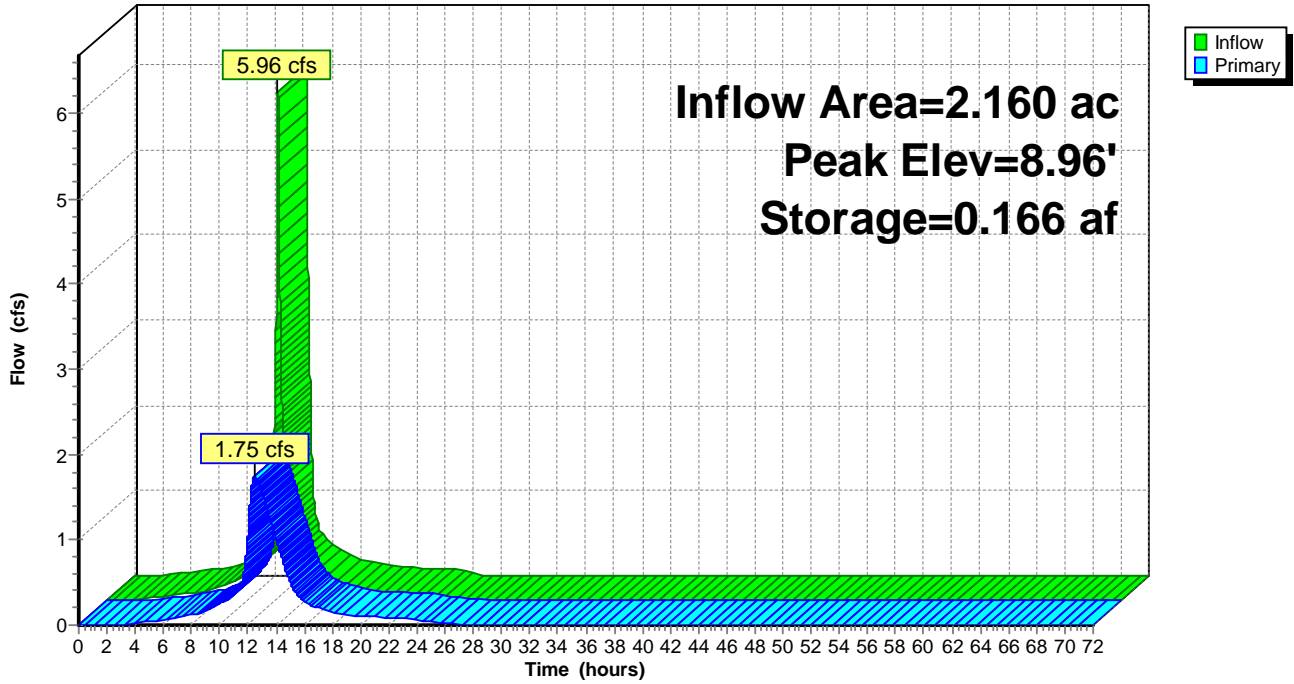
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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

Pond 1P: Proposed Subsurface Detention Pipes

Hydrograph



Post-Development

Type III 24-hr 2-yr Rainfall=3.40"

Prepared by {enter your company name here}

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Hydrograph for Pond 1P: Proposed Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	7.25	0.00
2.00	0.01	0.000	7.26	0.00
4.00	0.05	0.004	7.32	0.02
6.00	0.08	0.009	7.38	0.06
8.00	0.15	0.014	7.44	0.12
10.00	0.30	0.022	7.54	0.25
12.00	3.16	0.069	8.04	1.02
14.00	0.38	0.068	8.03	1.01
16.00	0.20	0.023	7.55	0.28
18.00	0.12	0.016	7.47	0.15
20.00	0.09	0.013	7.43	0.11
22.00	0.08	0.012	7.41	0.09
24.00	0.06	0.010	7.39	0.07
26.00	0.00	0.005	7.32	0.02
28.00	0.00	0.003	7.29	0.01
30.00	0.00	0.002	7.28	0.00
32.00	0.00	0.001	7.27	0.00
34.00	0.00	0.001	7.26	0.00
36.00	0.00	0.001	7.26	0.00
38.00	0.00	0.000	7.26	0.00
40.00	0.00	0.000	7.25	0.00
42.00	0.00	0.000	7.25	0.00
44.00	0.00	0.000	7.25	0.00
46.00	0.00	0.000	7.25	0.00
48.00	0.00	0.000	7.25	0.00
50.00	0.00	0.000	7.25	0.00
52.00	0.00	0.000	7.25	0.00
54.00	0.00	0.000	7.25	0.00
56.00	0.00	0.000	7.25	0.00
58.00	0.00	0.000	7.25	0.00
60.00	0.00	0.000	7.25	0.00
62.00	0.00	0.000	7.25	0.00
64.00	0.00	0.000	7.25	0.00
66.00	0.00	0.000	7.25	0.00
68.00	0.00	0.000	7.25	0.00
70.00	0.00	0.000	7.25	0.00
72.00	0.00	0.000	7.25	0.00

Post-Development

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Type III 24-hr 2-yr Rainfall=3.40"

Printed 9/12/2023

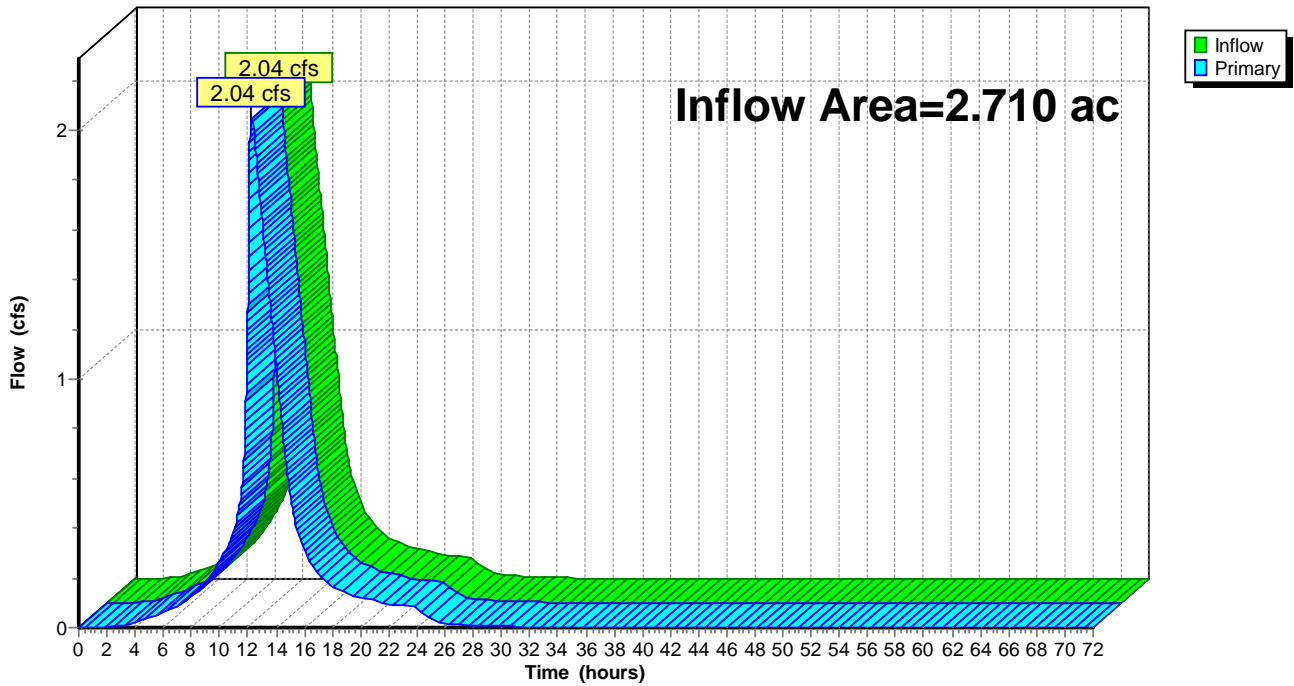
Summary for Pond 2P: Total Post-Development

Inflow Area = 2.710 ac, 79.34% Impervious, Inflow Depth = 2.65" for 2-yr event
Inflow = 2.04 cfs @ 12.22 hrs, Volume= 0.599 af
Primary = 2.04 cfs @ 12.22 hrs, Volume= 0.599 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Total Post-Development

Hydrograph



Post-Development

Prepared by {enter your company name here}

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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

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

Runoff = 5.18 cfs @ 12.13 hrs, Volume= 0.480 af, Depth= 4.96"

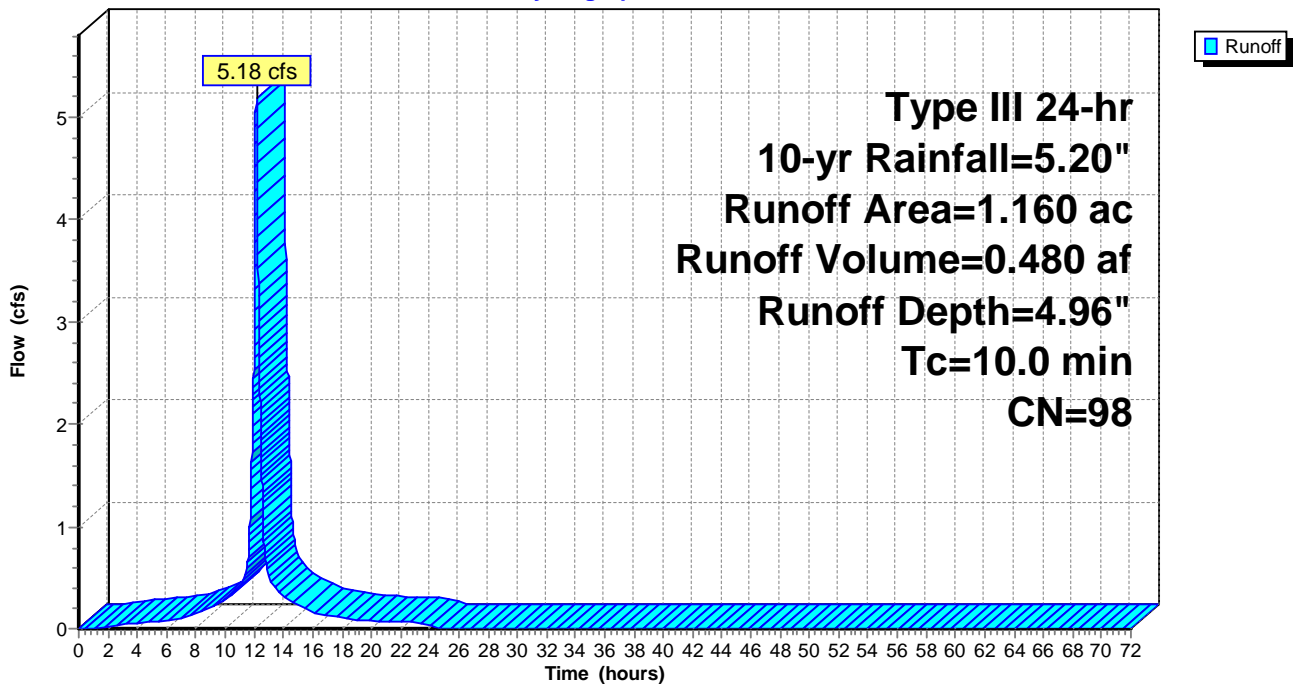
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

Area (ac)	CN	Description
* 1.160	98	Impervious
1.160		100.00% Impervious Area

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

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development

Type III 24-hr 10-yr Rainfall=5.20"

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

Runoff = 0.28 cfs @ 12.15 hrs, Volume= 0.024 af, Depth= 2.02"

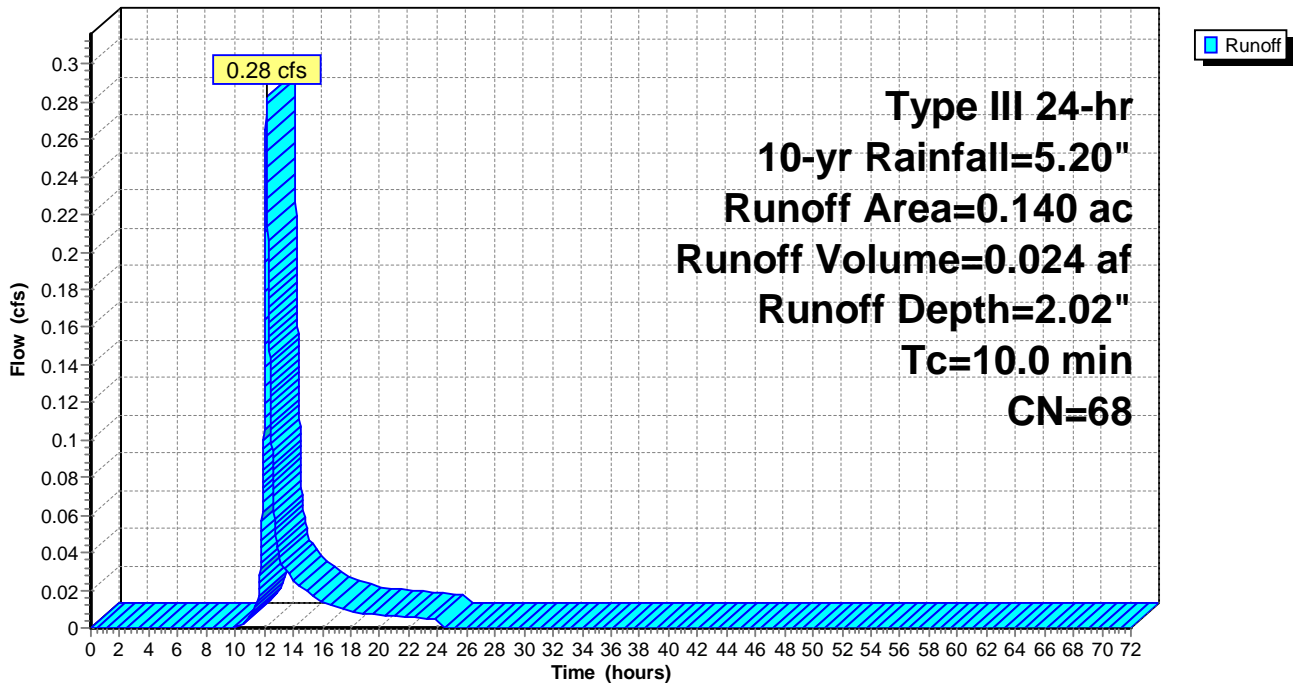
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10-yr Rainfall=5.20"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.100	80	>75% Grass cover, Good, HSG D
0.140	68	Weighted Average
0.140		100.00% Pervious Area

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

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development

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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

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

Runoff = 0.58 cfs @ 12.13 hrs, Volume= 0.054 af, Depth= 4.96"

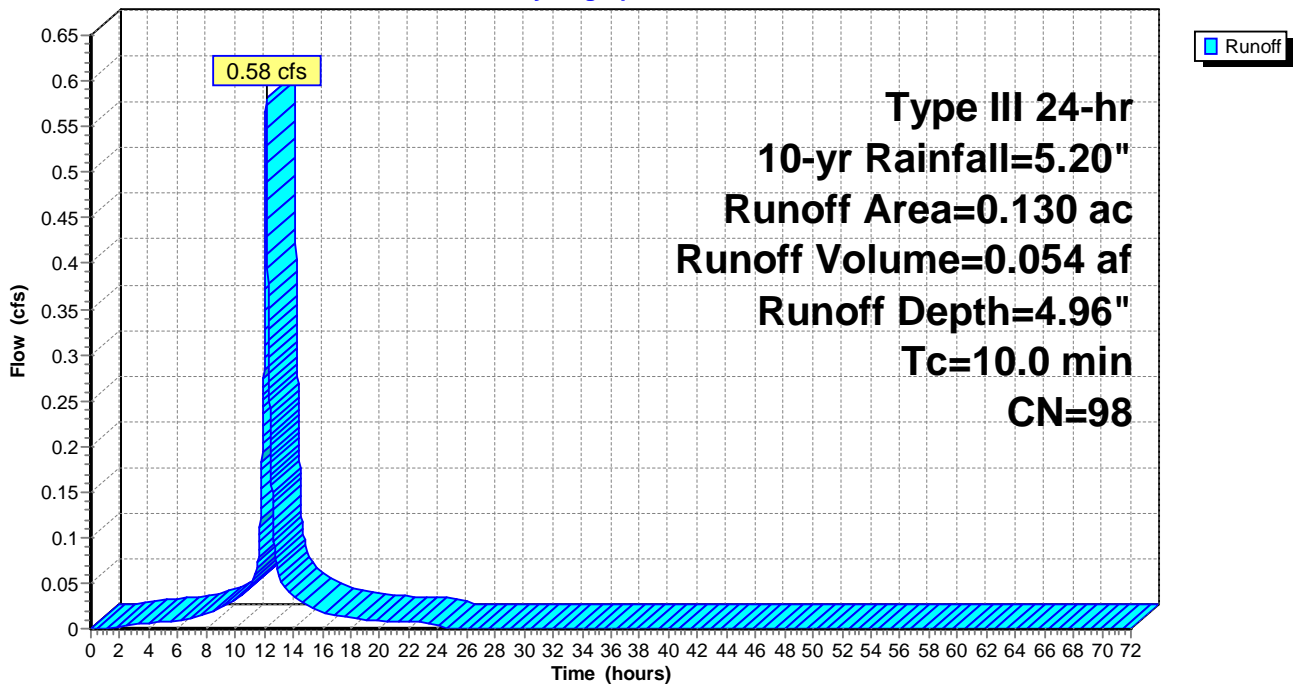
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

Area (ac)	CN	Description
* 0.130	98	Impervious
0.130		100.00% Impervious Area

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

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development

Type III 24-hr 10-yr Rainfall=5.20"

Prepared by {enter your company name here}

Printed 9/12/2023

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

Runoff = 0.66 cfs @ 12.15 hrs, Volume= 0.057 af, Depth= 1.64"

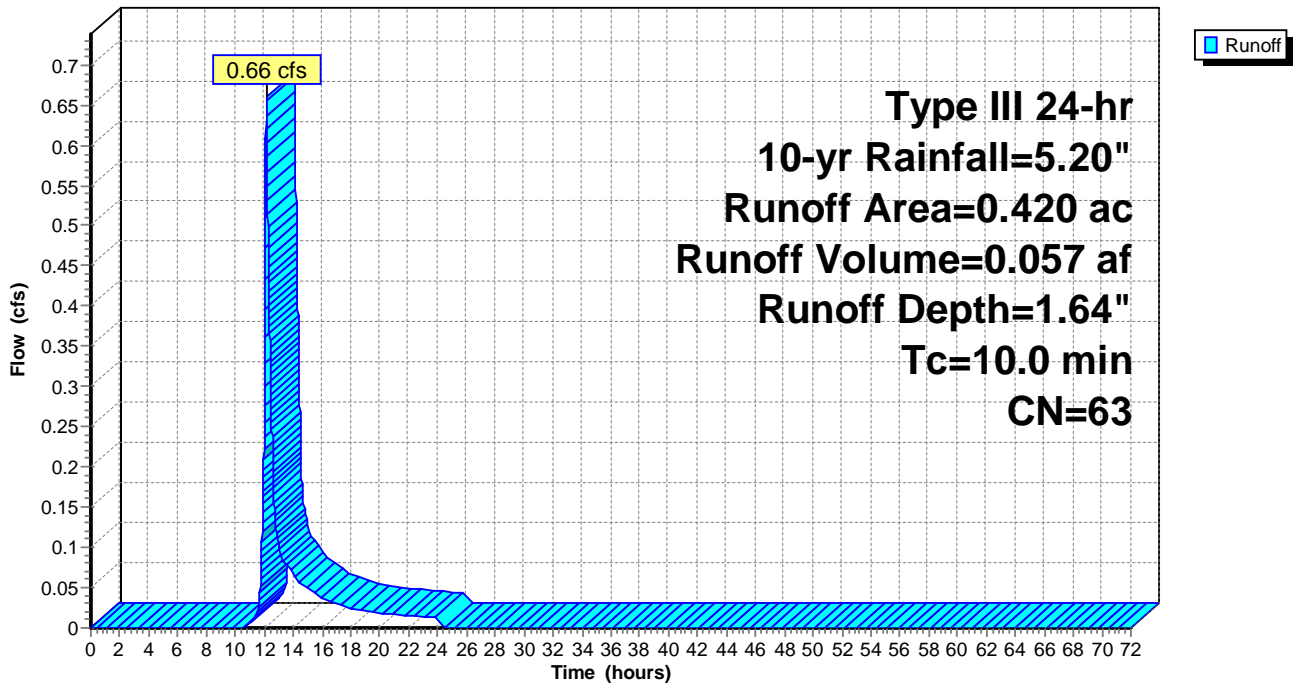
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

Area (ac)	CN	Description
0.170	39	>75% Grass cover, Good, HSG A
0.250	80	>75% Grass cover, Good, HSG D
0.420	63	Weighted Average
0.420		100.00% Pervious Area

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

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development

Prepared by {enter your company name here}

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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 3.84 cfs @ 12.13 hrs, Volume= 0.356 af, Depth= 4.96"

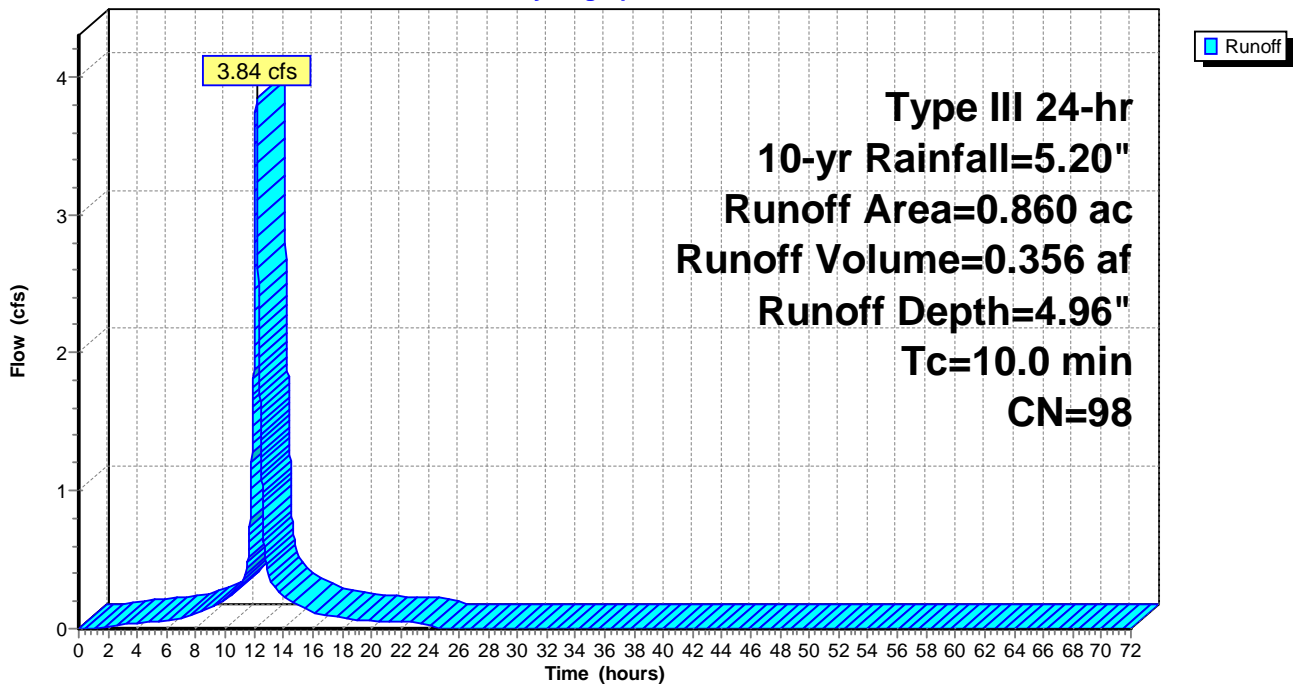
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-yr Rainfall=5.20"

Area (ac)	CN	Description
* 0.860	98	Impervious
0.860		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development

Type III 24-hr 10-yr Rainfall=5.20"

Prepared by {enter your company name here}

Printed 9/12/2023

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Summary for Pond 1P: Proposed Subsurface Detention Pipes

Inflow Area = 2.160 ac, 93.52% Impervious, Inflow Depth = 4.77" for 10-yr event
 Inflow = 9.30 cfs @ 12.13 hrs, Volume= 0.859 af
 Outflow = 4.11 cfs @ 12.38 hrs, Volume= 0.859 af, Atten= 56%, Lag= 14.9 min
 Primary = 4.11 cfs @ 12.38 hrs, Volume= 0.859 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 9.63' @ 12.38 hrs Surf.Area= 0.169 ac Storage= 0.234 af

Plug-Flow detention time= 59.1 min calculated for 0.859 af (100% of inflow)
 Center-of-Mass det. time= 59.3 min (813.2 - 753.9)

Volume	Invert	Avail.Storage	Storage Description
#1	7.25'	0.165 af	20.00'W x 367.00'L x 4.00'H Prismaticoid 0.674 af Overall - 0.178 af Embedded = 0.496 af x 33.3% Voids
#2	7.25'	0.175 af	36.0" Round Pipe Storage x 3 Inside #1 L= 360.0'
#3	7.25'	0.002 af	36.0" Round Pipe Storage x 2 Inside #1 L= 7.0'
		0.343 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	5.80'	15.0" Round Culvert L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.80' / 4.92' S= 0.0259 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	7.25'	7.5" Vert. Orifice/Grate C= 0.600
#3	Device 1	8.96'	15.5" W x 6.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	9.96'	17.0" W x 6.0" H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=4.11 cfs @ 12.38 hrs HW=9.63' (Free Discharge)

- ↑ **1=Culvert** (Passes 4.11 cfs of 10.58 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 2.12 cfs @ 6.92 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 1.98 cfs @ 3.07 fps)
- ↑ **4=Orifice/Grate** (Controls 0.00 cfs)

Post-Development

Prepared by {enter your company name here}

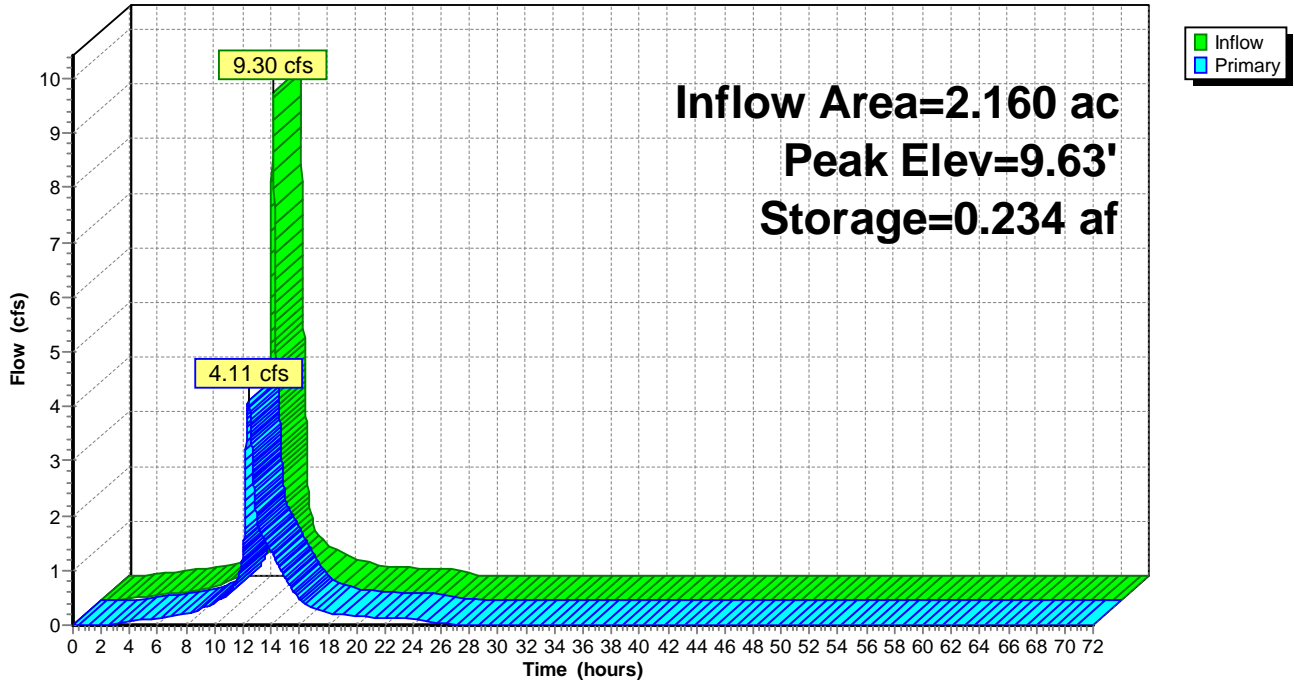
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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

Pond 1P: Proposed Subsurface Detention Pipes

Hydrograph



Post-Development

Type III 24-hr 10-yr Rainfall=5.20"

Prepared by {enter your company name here}

Printed 9/12/2023

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Hydrograph for Pond 1P: Proposed Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	7.25	0.00
2.00	0.04	0.002	7.28	0.00
4.00	0.10	0.009	7.38	0.06
6.00	0.14	0.014	7.44	0.12
8.00	0.25	0.019	7.51	0.21
10.00	0.48	0.030	7.63	0.41
12.00	4.95	0.108	8.42	1.36
14.00	0.58	0.104	8.38	1.34
16.00	0.31	0.033	7.66	0.46
18.00	0.19	0.021	7.52	0.23
20.00	0.15	0.017	7.48	0.16
22.00	0.12	0.015	7.45	0.13
24.00	0.10	0.013	7.43	0.11
26.00	0.00	0.005	7.33	0.02
28.00	0.00	0.003	7.30	0.01
30.00	0.00	0.002	7.28	0.00
32.00	0.00	0.001	7.27	0.00
34.00	0.00	0.001	7.27	0.00
36.00	0.00	0.001	7.26	0.00
38.00	0.00	0.000	7.26	0.00
40.00	0.00	0.000	7.26	0.00
42.00	0.00	0.000	7.25	0.00
44.00	0.00	0.000	7.25	0.00
46.00	0.00	0.000	7.25	0.00
48.00	0.00	0.000	7.25	0.00
50.00	0.00	0.000	7.25	0.00
52.00	0.00	0.000	7.25	0.00
54.00	0.00	0.000	7.25	0.00
56.00	0.00	0.000	7.25	0.00
58.00	0.00	0.000	7.25	0.00
60.00	0.00	0.000	7.25	0.00
62.00	0.00	0.000	7.25	0.00
64.00	0.00	0.000	7.25	0.00
66.00	0.00	0.000	7.25	0.00
68.00	0.00	0.000	7.25	0.00
70.00	0.00	0.000	7.25	0.00
72.00	0.00	0.000	7.25	0.00

Post-Development

Prepared by {enter your company name here}

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Type III 24-hr 10-yr Rainfall=5.20"

Printed 9/12/2023

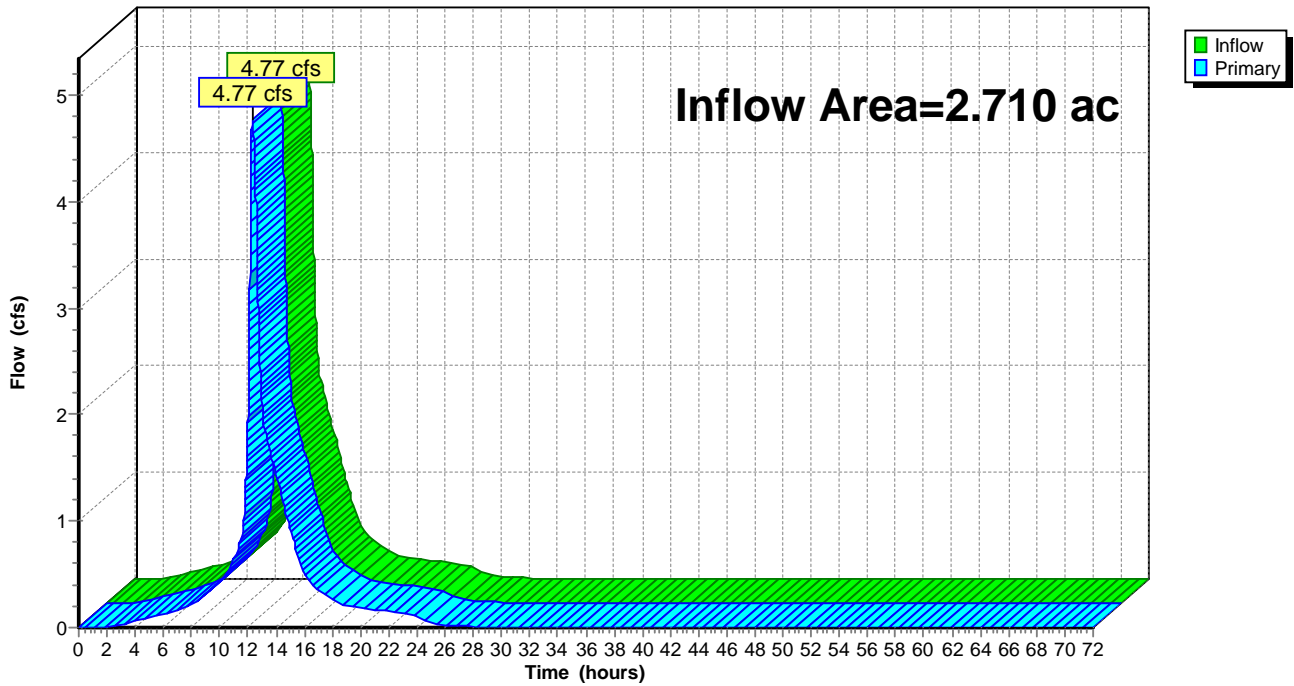
Summary for Pond 2P: Total Post-Development

Inflow Area = 2.710 ac, 79.34% Impervious, Inflow Depth = 4.30" for 10-yr event
Inflow = 4.77 cfs @ 12.33 hrs, Volume= 0.970 af
Primary = 4.77 cfs @ 12.33 hrs, Volume= 0.970 af, Atten= 0%, Lag= 0.0 min

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

Pond 2P: Total Post-Development

Hydrograph



Post-Development

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

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

Runoff = 8.90 cfs @ 12.13 hrs, Volume= 0.837 af, Depth= 8.66"

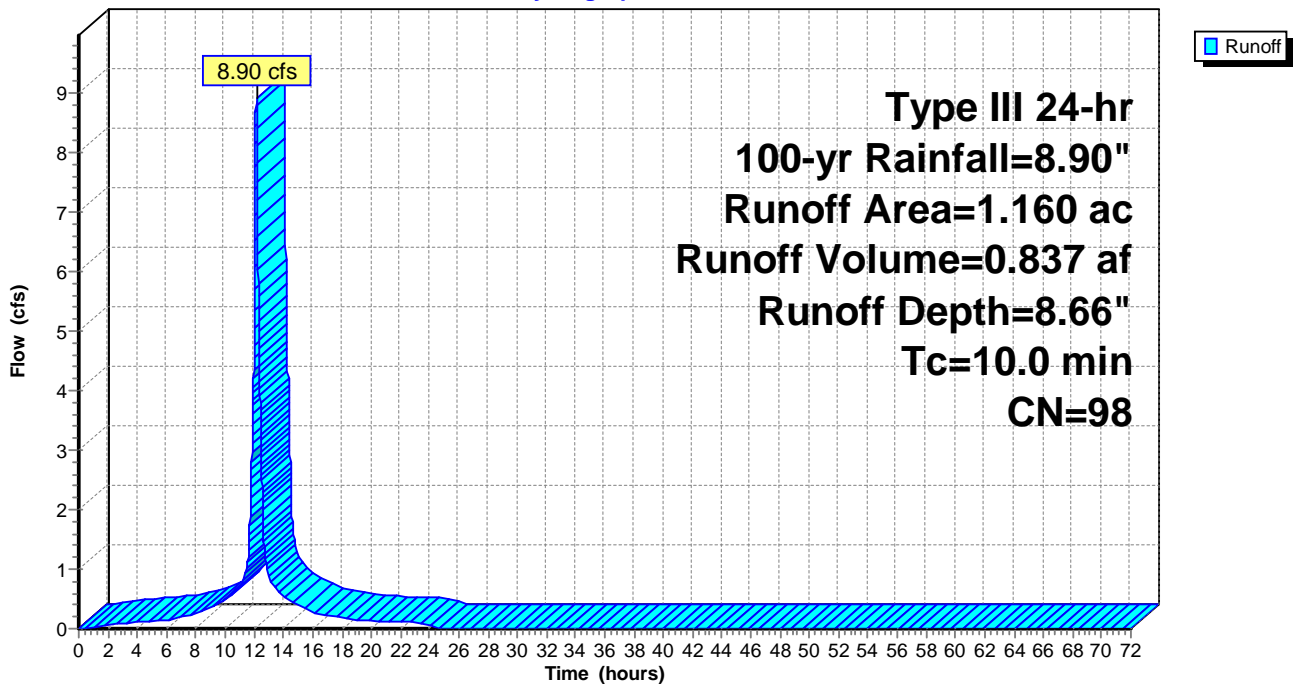
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.90"

Area (ac)	CN	Description
* 1.160	98	Impervious
1.160		100.00% Impervious Area

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

Subcatchment DA-1i: DA-1 Impervious

Hydrograph



Post-Development

Prepared by {enter your company name here}

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

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

Runoff = 0.72 cfs @ 12.14 hrs, Volume= 0.058 af, Depth= 5.00"

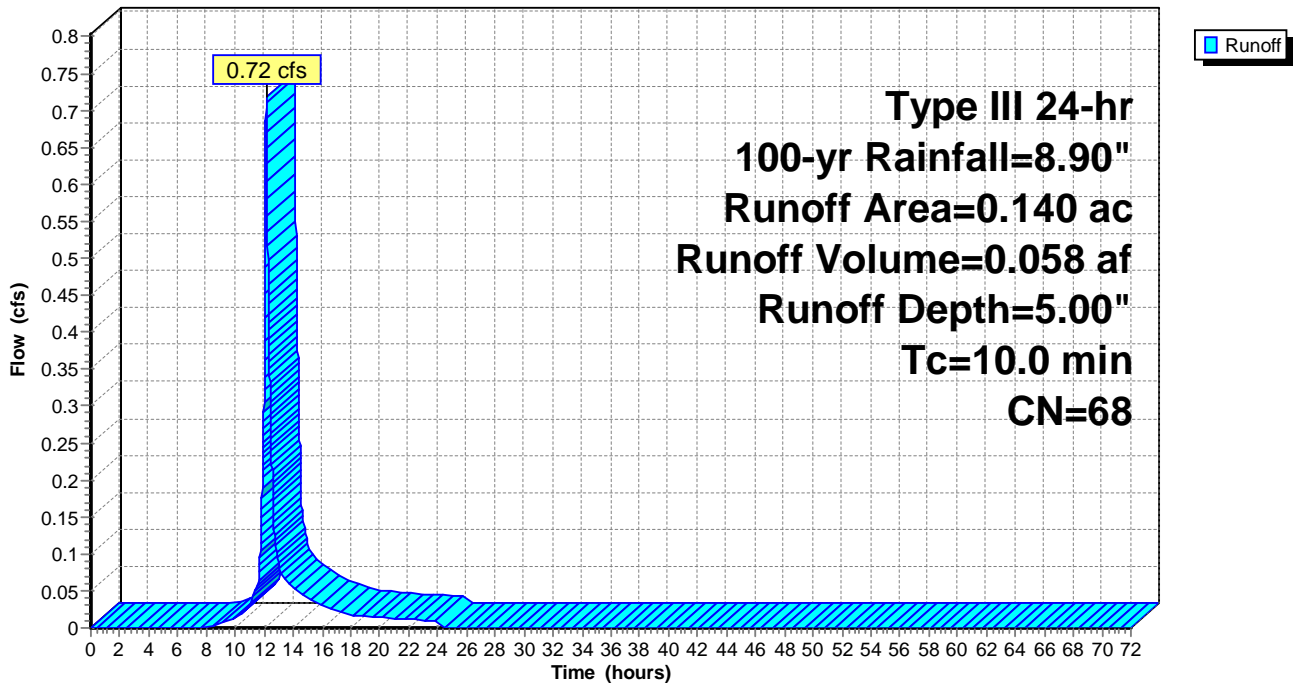
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.90"

Area (ac)	CN	Description
0.040	39	>75% Grass cover, Good, HSG A
0.100	80	>75% Grass cover, Good, HSG D
0.140	68	Weighted Average
0.140		100.00% Pervious Area

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

Subcatchment DA-1p: DA-1 Pervious

Hydrograph



Post-Development

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

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

Runoff = 1.00 cfs @ 12.13 hrs, Volume= 0.094 af, Depth= 8.66"

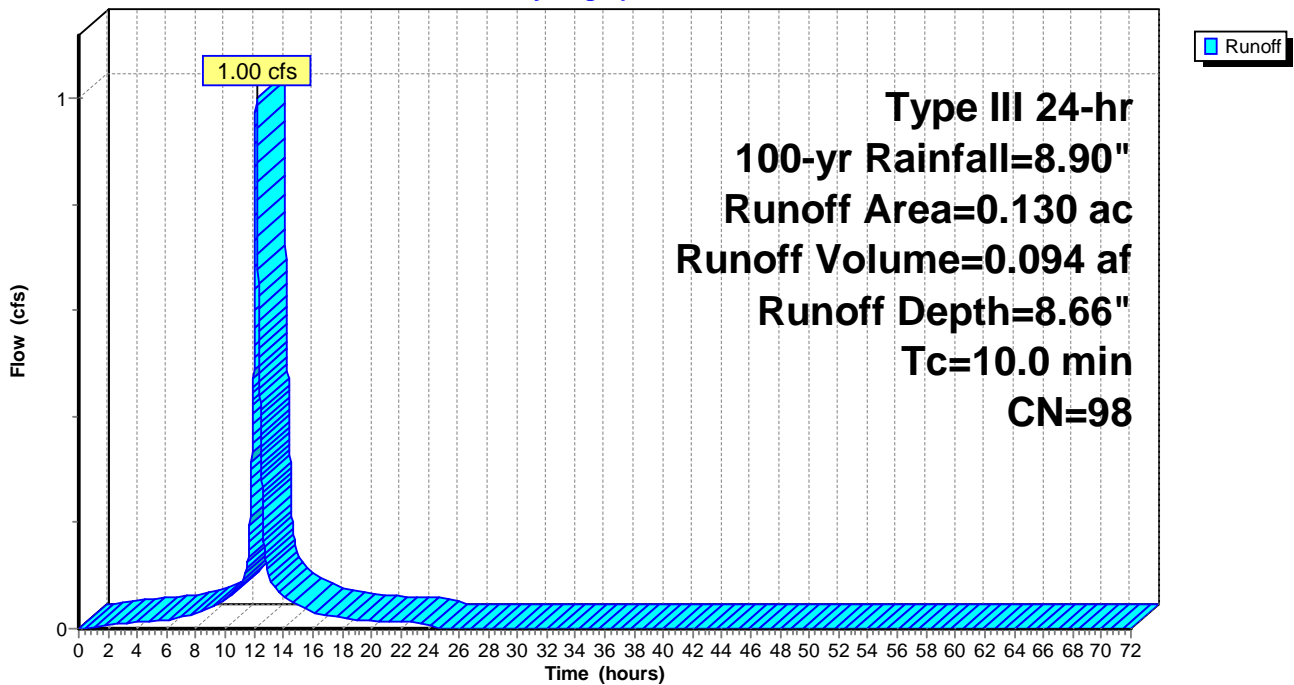
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.90"

Area (ac)	CN	Description
* 0.130	98	Impervious
0.130		100.00% Impervious Area

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

Subcatchment DA-2i: DA-2 Impervious

Hydrograph



Post-Development

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

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

Runoff = 1.88 cfs @ 12.14 hrs, Volume= 0.154 af, Depth= 4.39"

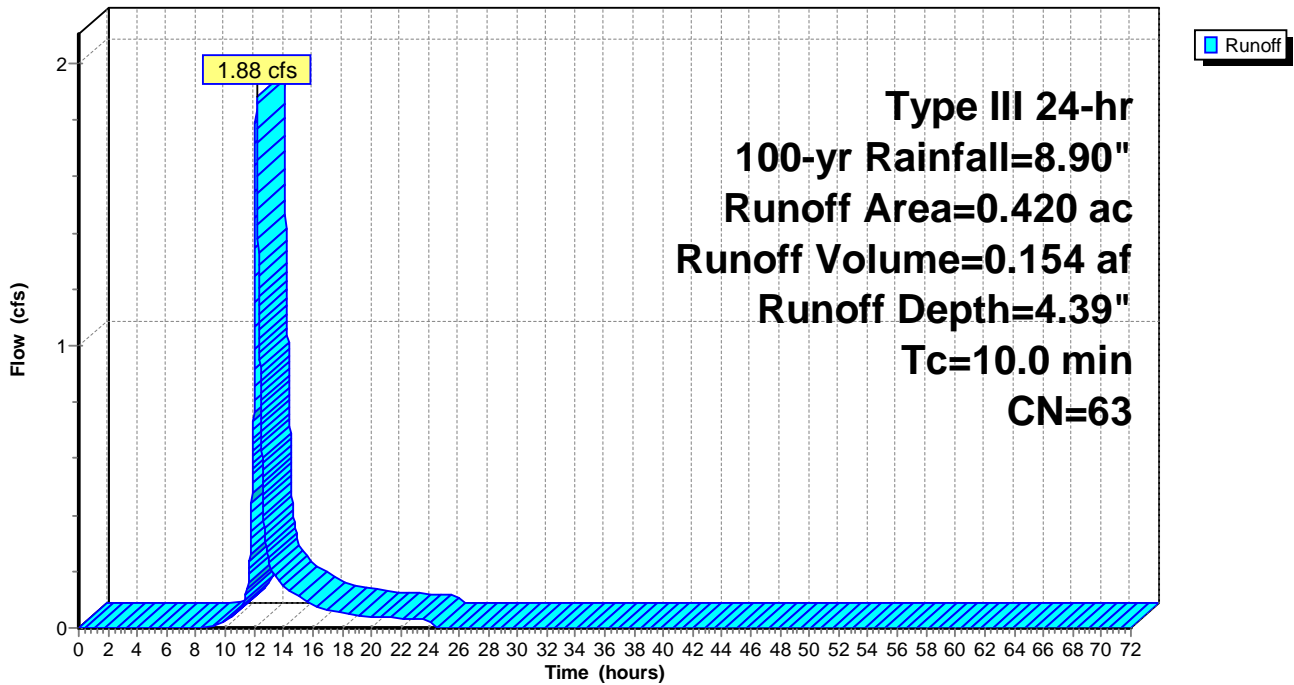
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.90"

Area (ac)	CN	Description
0.170	39	>75% Grass cover, Good, HSG A
0.250	80	>75% Grass cover, Good, HSG D
0.420	63	Weighted Average
0.420		100.00% Pervious Area

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

Subcatchment DA-2p: DA-2 Pervious

Hydrograph



Post-Development

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

Summary for Subcatchment DA-Bldg: Buildings

Runoff = 6.60 cfs @ 12.13 hrs, Volume= 0.621 af, Depth= 8.66"

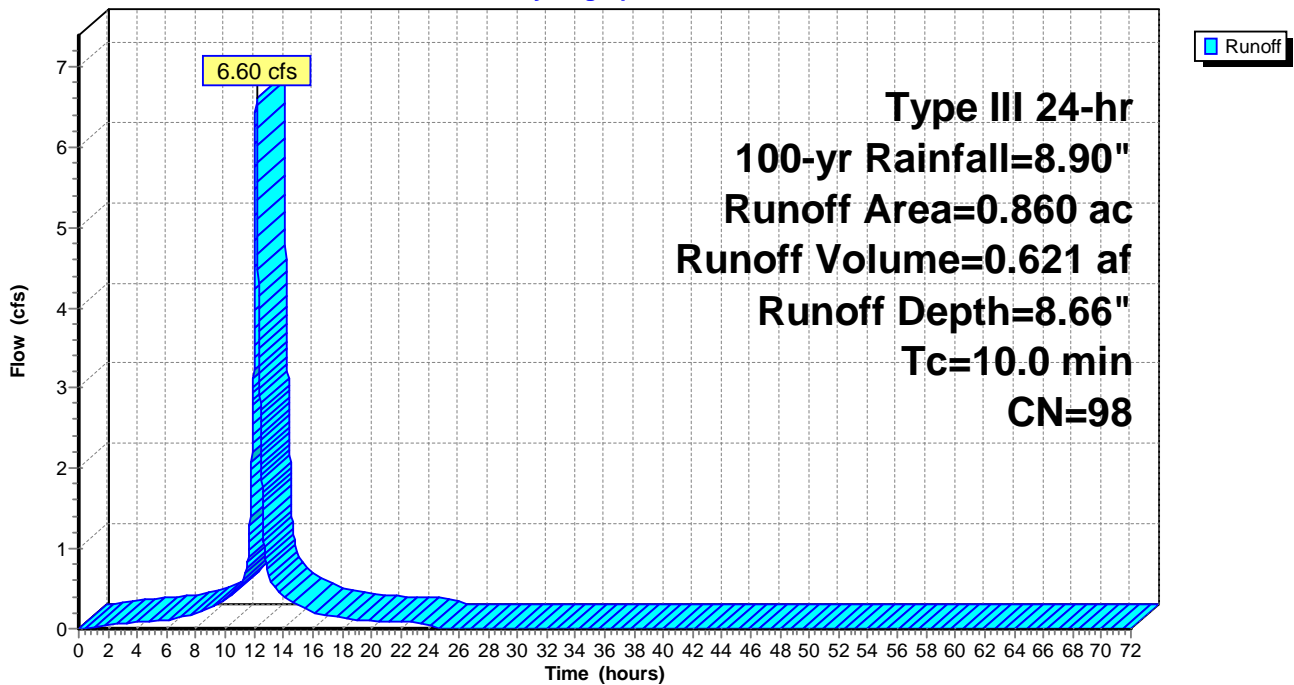
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-yr Rainfall=8.90"

Area (ac)	CN	Description
* 0.860	98	Impervious
0.860		100.00% Impervious Area

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

Subcatchment DA-Bldg: Buildings

Hydrograph



Post-Development

Type III 24-hr 100-yr Rainfall=8.90"

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Summary for Pond 1P: Proposed Subsurface Detention Pipes

Inflow Area = 2.160 ac, 93.52% Impervious, Inflow Depth = 8.42" for 100-yr event
 Inflow = 16.21 cfs @ 12.13 hrs, Volume= 1.516 af
 Outflow = 10.45 cfs @ 12.26 hrs, Volume= 1.516 af, Atten= 36%, Lag= 7.8 min
 Primary = 10.45 cfs @ 12.26 hrs, Volume= 1.516 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs / 2
 Peak Elev= 11.16' @ 12.26 hrs Surf.Area= 0.169 ac Storage= 0.338 af

Plug-Flow detention time= 49.2 min calculated for 1.516 af (100% of inflow)
 Center-of-Mass det. time= 49.4 min (796.3 - 746.9)

Volume	Invert	Avail.Storage	Storage Description
#1	7.25'	0.165 af	20.00'W x 367.00'L x 4.00'H Prismatic 0.674 af Overall - 0.178 af Embedded = 0.496 af x 33.3% Voids
#2	7.25'	0.175 af	36.0" Round Pipe Storage x 3 Inside #1 L= 360.0'
#3	7.25'	0.002 af	36.0" Round Pipe Storage x 2 Inside #1 L= 7.0'
		0.343 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	5.80'	15.0" Round Culvert L= 34.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.80' / 4.92' S= 0.0259 '/ Cc= 0.900 n= 0.013, Flow Area= 1.23 sf
#2	Device 1	7.25'	7.5" Vert. Orifice/Grate C= 0.600
#3	Device 1	8.96'	15.5" W x 6.0" H Vert. Orifice/Grate C= 0.600
#4	Device 1	9.96'	17.0" W x 6.0" H Vert. Orifice/Grate C= 0.600

Primary OutFlow Max=10.45 cfs @ 12.26 hrs HW=11.16' (Free Discharge)

- ↑ **1=Culvert** (Passes 10.45 cfs of 12.86 cfs potential flow)
- ↑ **2=Orifice/Grate** (Orifice Controls 2.80 cfs @ 9.13 fps)
- ↑ **3=Orifice/Grate** (Orifice Controls 4.34 cfs @ 6.72 fps)
- ↑ **4=Orifice/Grate** (Orifice Controls 3.31 cfs @ 4.68 fps)

Post-Development

Prepared by {enter your company name here}

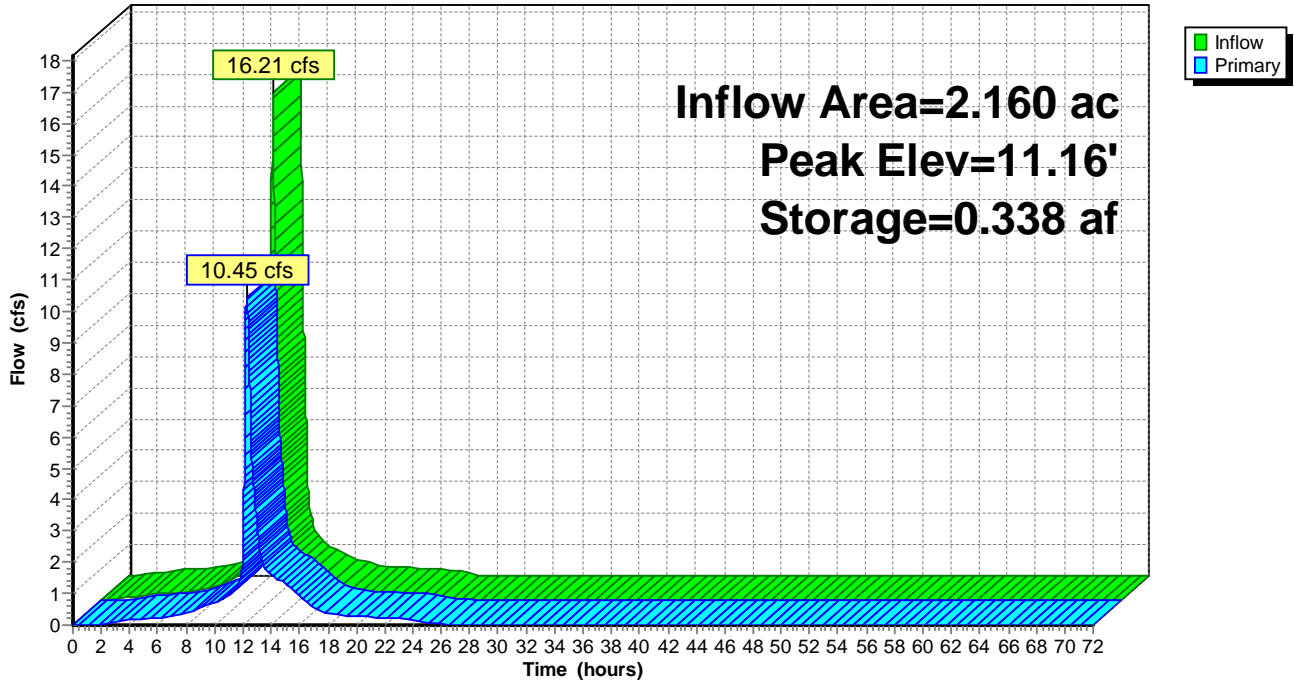
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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

Pond 1P: Proposed Subsurface Detention Pipes

Hydrograph



Post-Development

Type III 24-hr 100-yr Rainfall=8.90"

Prepared by {enter your company name here}

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Hydrograph for Pond 1P: Proposed Subsurface Detention Pipes

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	7.25	0.00
2.00	0.11	0.007	7.35	0.03
4.00	0.20	0.016	7.47	0.16
6.00	0.27	0.021	7.53	0.24
8.00	0.44	0.029	7.62	0.39
10.00	0.86	0.046	7.80	0.73
12.00	8.66	0.199	9.28	2.67
14.00	1.01	0.147	8.78	1.63
16.00	0.53	0.060	7.95	0.91
18.00	0.32	0.029	7.62	0.40
20.00	0.25	0.023	7.55	0.28
22.00	0.21	0.020	7.52	0.22
24.00	0.17	0.018	7.49	0.18
26.00	0.00	0.006	7.34	0.03
28.00	0.00	0.003	7.30	0.01
30.00	0.00	0.002	7.28	0.00
32.00	0.00	0.002	7.27	0.00
34.00	0.00	0.001	7.27	0.00
36.00	0.00	0.001	7.26	0.00
38.00	0.00	0.001	7.26	0.00
40.00	0.00	0.000	7.26	0.00
42.00	0.00	0.000	7.25	0.00
44.00	0.00	0.000	7.25	0.00
46.00	0.00	0.000	7.25	0.00
48.00	0.00	0.000	7.25	0.00
50.00	0.00	0.000	7.25	0.00
52.00	0.00	0.000	7.25	0.00
54.00	0.00	0.000	7.25	0.00
56.00	0.00	0.000	7.25	0.00
58.00	0.00	0.000	7.25	0.00
60.00	0.00	0.000	7.25	0.00
62.00	0.00	0.000	7.25	0.00
64.00	0.00	0.000	7.25	0.00
66.00	0.00	0.000	7.25	0.00
68.00	0.00	0.000	7.25	0.00
70.00	0.00	0.000	7.25	0.00
72.00	0.00	0.000	7.25	0.00

Post-Development

Prepared by {enter your company name here}

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Type III 24-hr 100-yr Rainfall=8.90"

Printed 9/12/2023

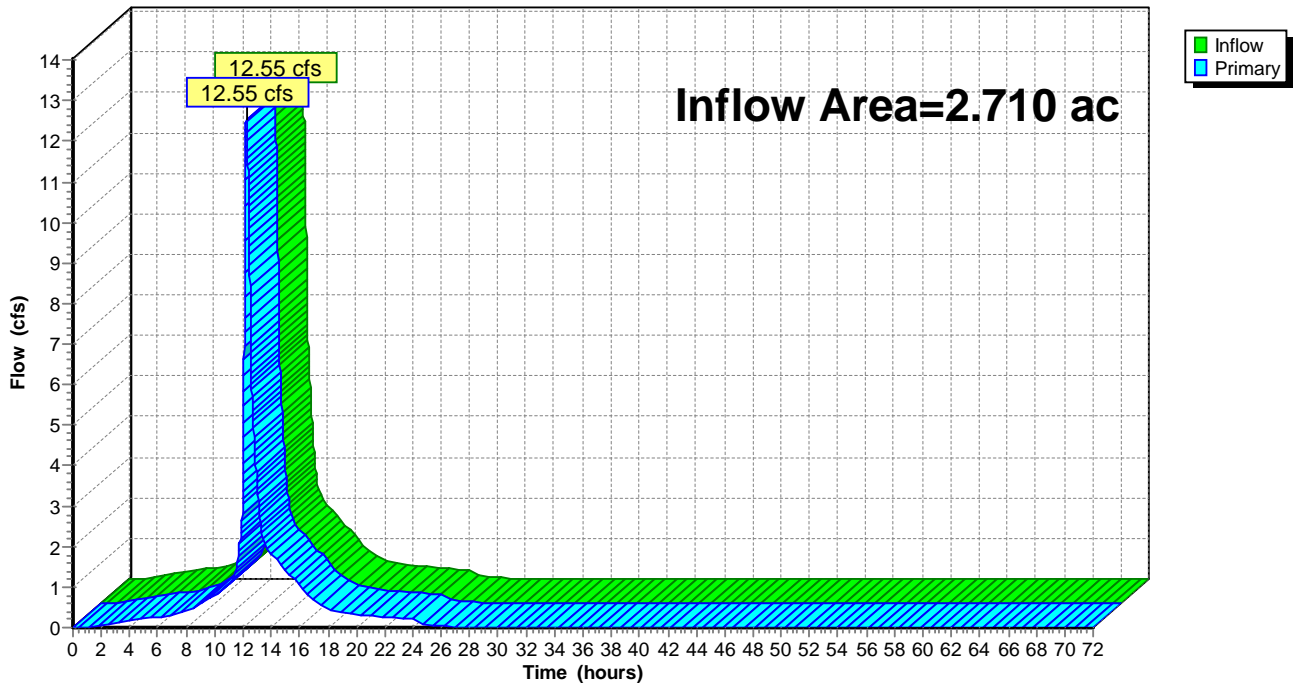
Summary for Pond 2P: Total Post-Development

Inflow Area = 2.710 ac, 79.34% Impervious, Inflow Depth = 7.81" for 100-yr event
Inflow = 12.55 cfs @ 12.23 hrs, Volume= 1.763 af
Primary = 12.55 cfs @ 12.23 hrs, Volume= 1.763 af, Atten= 0%, Lag= 0.0 min

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

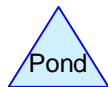
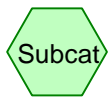
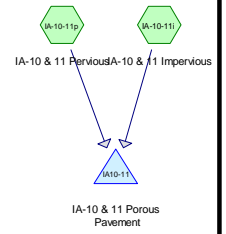
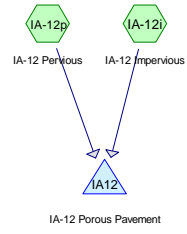
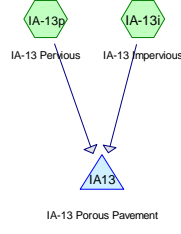
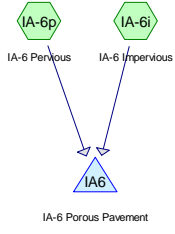
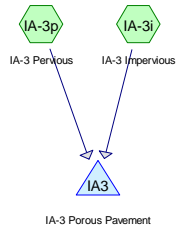
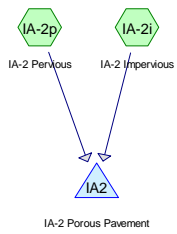
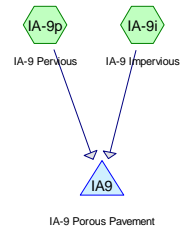
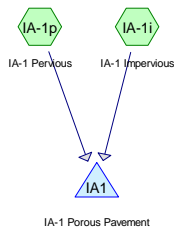
Pond 2P: Total Post-Development

Hydrograph



APPENDIX C

POROUS PAVEMENT STORAGE VOLUME ANALYSIS



Routing Diagram for Porous Pavement (WQ Storage)
 Prepared by {enter your company name here}, Printed 9/13/2023
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Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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

Runoff = 0.29 cfs @ 1.15 hrs, Volume= 0.009 af, Depth= 1.03"

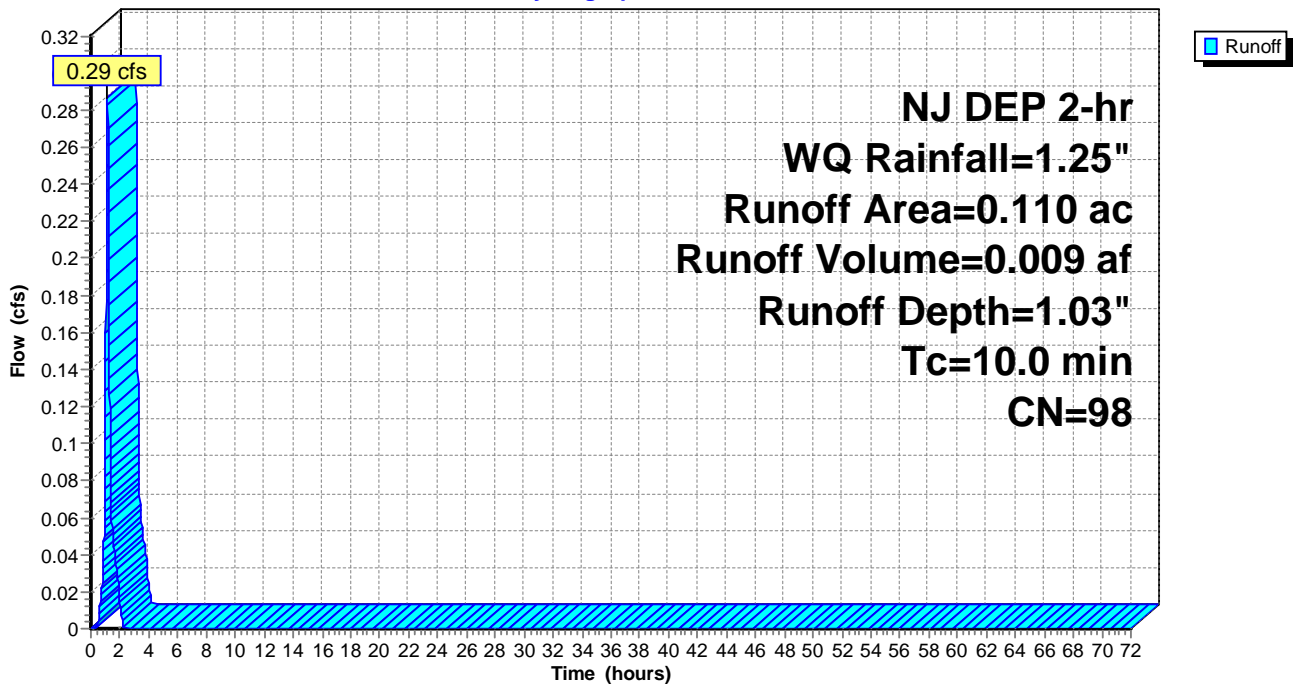
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.110	98	Impervious
0.110		100.00% Impervious Area

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

Subcatchment IA-1i: IA-1 Impervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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

Runoff = 0.00 cfs @ 1.21 hrs, Volume= 0.000 af, Depth= 0.17"

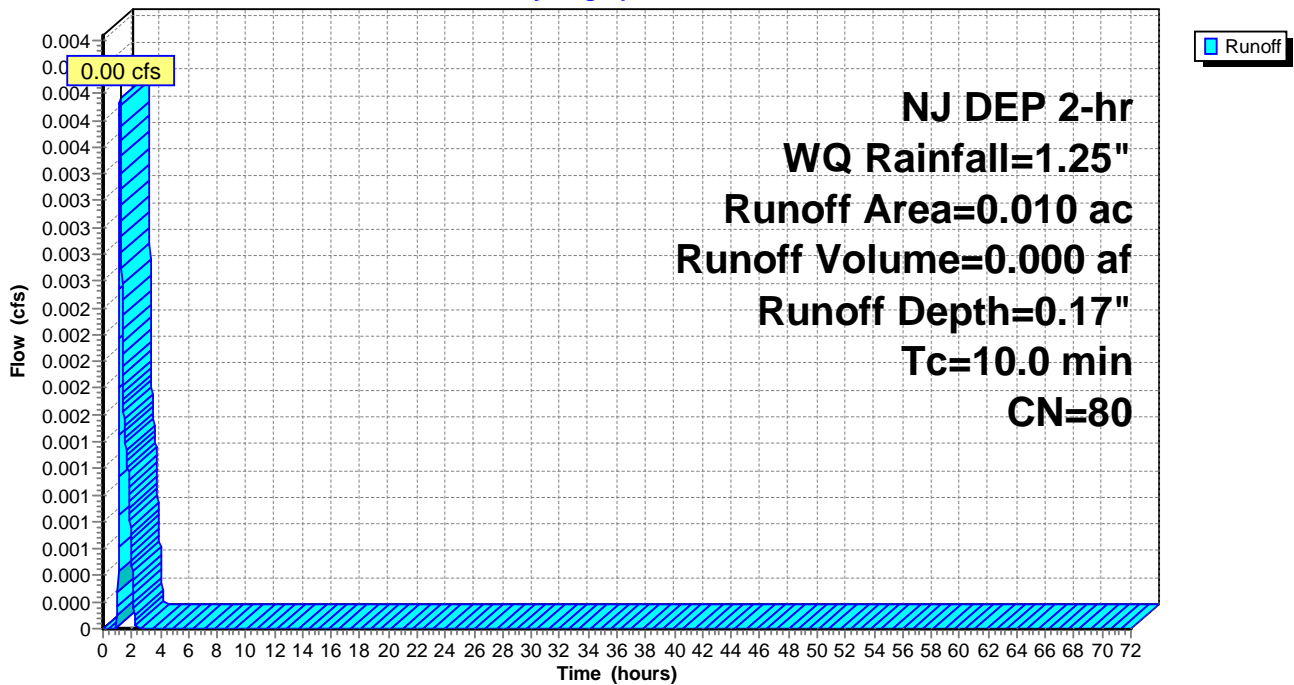
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.010	80	>75% Grass cover, Good, HSG D
0.010		100.00% Pervious Area

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

Subcatchment IA-1p: IA-1 Pervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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Summary for Pond IA1: IA-1 Porous Pavement

Inflow Area = 0.120 ac, 91.67% Impervious, Inflow Depth = 0.96" for WQ event
Inflow = 0.29 cfs @ 1.15 hrs, Volume= 0.010 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

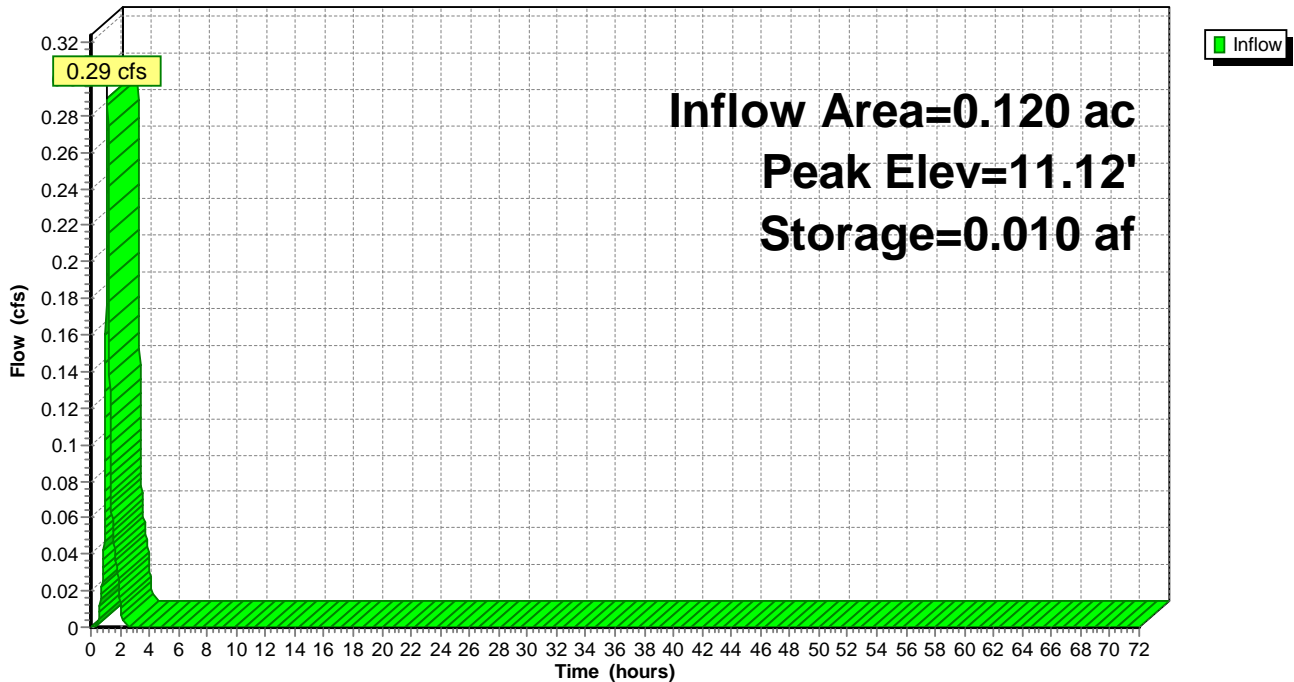
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.12' @ 2.57 hrs Surf.Area= 0.105 ac Storage= 0.010 af

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	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prisma-toid 0.030 af Overall x 33.3% Voids
#2	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prisma-toid 0.030 af Overall x 33.3% Voids
#3	10.84'	0.015 af	24.00'W x 82.00'L x 1.00'H Prisma-toid 0.045 af Overall x 33.3% Voids
			0.035 af Total Available Storage

Pond IA1: IA-1 Porous Pavement

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

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

Runoff = 0.26 cfs @ 1.15 hrs, Volume= 0.009 af, Depth= 1.03"

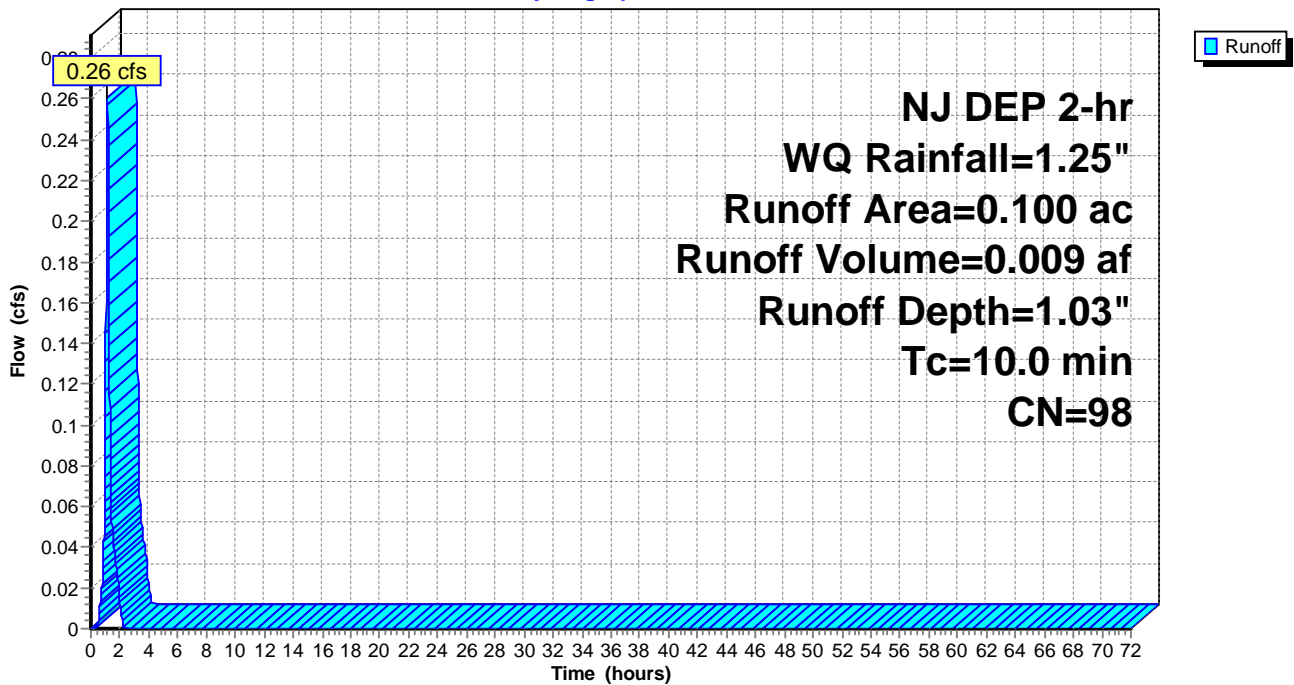
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.100	98	Impervious
0.100		100.00% Impervious Area

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

Subcatchment IA-2i: IA-2 Impervious

Hydrograph



Porous Pavement (WQ Storage)

Prepared by {enter your company name here}

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NJ DEP 2-hr WQ Rainfall=1.25"

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

Runoff = 0.00 cfs @ 1.21 hrs, Volume= 0.000 af, Depth= 0.17"

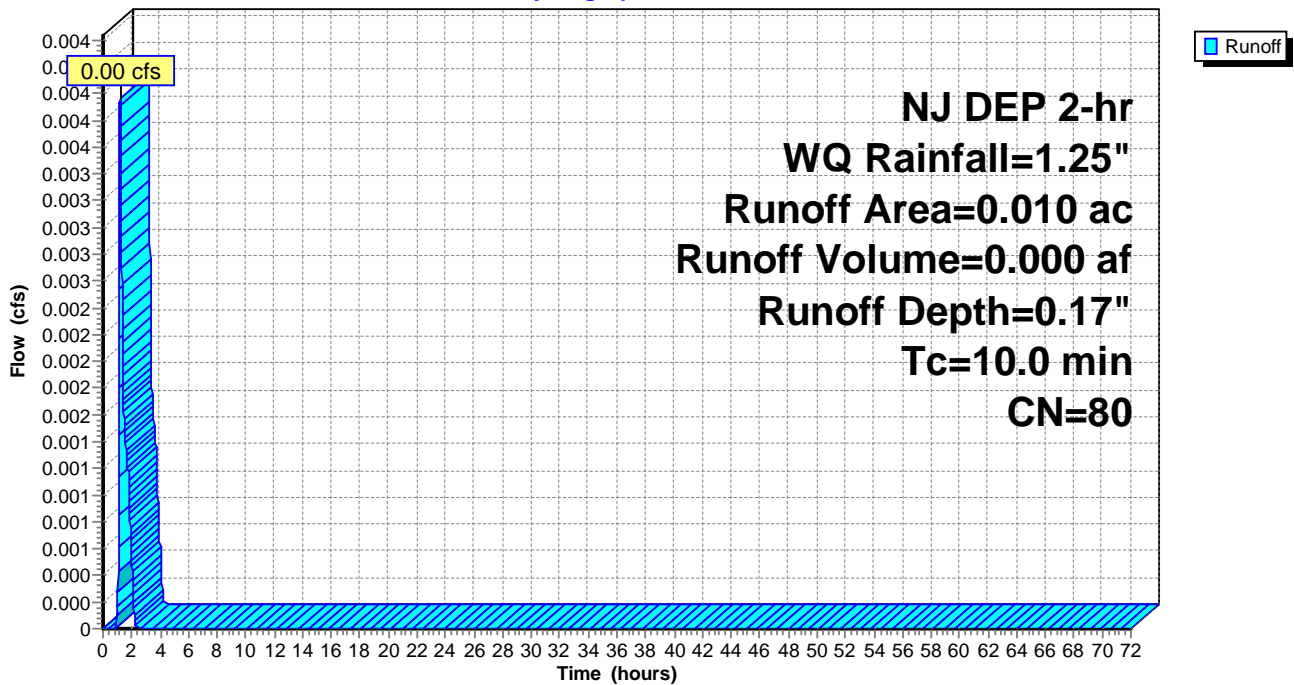
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.010	80	>75% Grass cover, Good, HSG D
0.010		100.00% Pervious Area

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

Subcatchment IA-2p: IA-2 Pervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA2: IA-2 Porous Pavement

Inflow Area = 0.110 ac, 90.91% Impervious, Inflow Depth = 0.96" for WQ event
Inflow = 0.26 cfs @ 1.15 hrs, Volume= 0.009 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= 11.20' @ 2.57 hrs Surf.Area= 0.074 ac Storage= 0.009 af

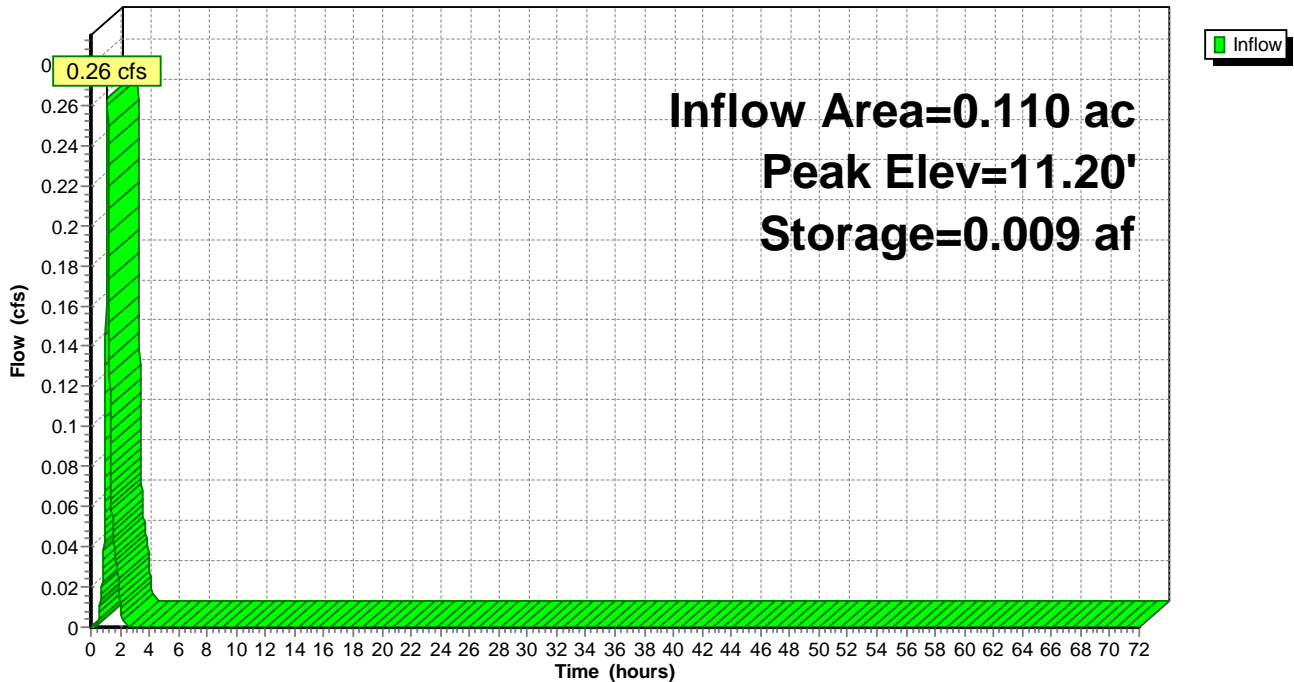
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.006 af	45.00'W x 18.00'L x 1.00'H Prisma-toid 0.019 af Overall x 33.3% Voids
#2	10.84'	0.005 af	18.00'W x 36.00'L x 1.00'H Prisma-toid 0.015 af Overall x 33.3% Voids
#3	10.84'	0.013 af	24.00'W x 73.00'L x 1.00'H Prisma-toid 0.040 af Overall x 33.3% Voids
			0.025 af Total Available Storage

Pond IA2: IA-2 Porous Pavement

Hydrograph



Porous Pavement (WQ Storage)

Prepared by {enter your company name here}

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NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-3i: IA-3 Impervious

Runoff = 0.31 cfs @ 1.15 hrs, Volume= 0.010 af, Depth= 1.03"

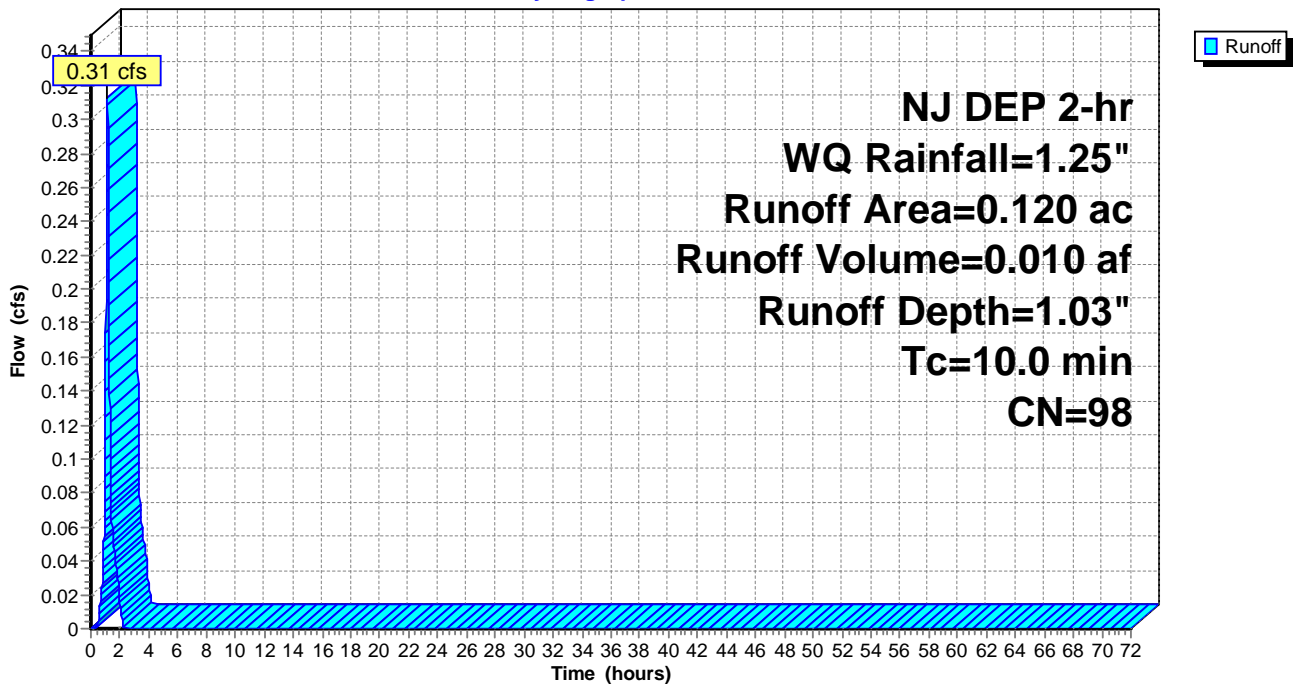
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.120	98	Impervious
0.120		100.00% Impervious Area

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

Subcatchment IA-3i: IA-3 Impervious

Hydrograph



Porous Pavement (Drain Time)

Prepared by {enter your company name here}

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NJ DEP 2-hr WQ Rainfall=1.25"

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Hydrograph for Pond IA1: IA-1 Porous Pavement

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	10.84	0.00
2.00	0.01	0.006	11.02	0.04
4.00	0.00	0.003	10.93	0.01
6.00	0.00	0.002	10.90	0.00
8.00	0.00	0.002	10.89	0.00
10.00	0.00	0.001	10.88	0.00
12.00	0.00	0.001	10.87	0.00
14.00	0.00	0.001	10.87	0.00
16.00	0.00	0.001	10.87	0.00
18.00	0.00	0.001	10.86	0.00
20.00	0.00	0.001	10.86	0.00
22.00	0.00	0.001	10.86	0.00
24.00	0.00	0.001	10.86	0.00
26.00	0.00	0.001	10.86	0.00
28.00	0.00	0.001	10.86	0.00
30.00	0.00	0.001	10.85	0.00
32.00	0.00	0.000	10.85	0.00
34.00	0.00	0.000	10.85	0.00
36.00	0.00	0.000	10.85	0.00
38.00	0.00	0.000	10.85	0.00
40.00	0.00	0.000	10.85	0.00
42.00	0.00	0.000	10.85	0.00
44.00	0.00	0.000	10.85	0.00
46.00	0.00	0.000	10.85	0.00
48.00	0.00	0.000	10.85	0.00
50.00	0.00	0.000	10.85	0.00
52.00	0.00	0.000	10.85	0.00
54.00	0.00	0.000	10.85	0.00
56.00	0.00	0.000	10.85	0.00
58.00	0.00	0.000	10.85	0.00
60.00	0.00	0.000	10.85	0.00
62.00	0.00	0.000	10.85	0.00
64.00	0.00	0.000	10.85	0.00
66.00	0.00	0.000	10.85	0.00
68.00	0.00	0.000	10.85	0.00
70.00	0.00	0.000	10.85	0.00
72.00	0.00	0.000	10.85	0.00

Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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

Runoff = 0.01 cfs @ 1.21 hrs, Volume= 0.000 af, Depth= 0.17"

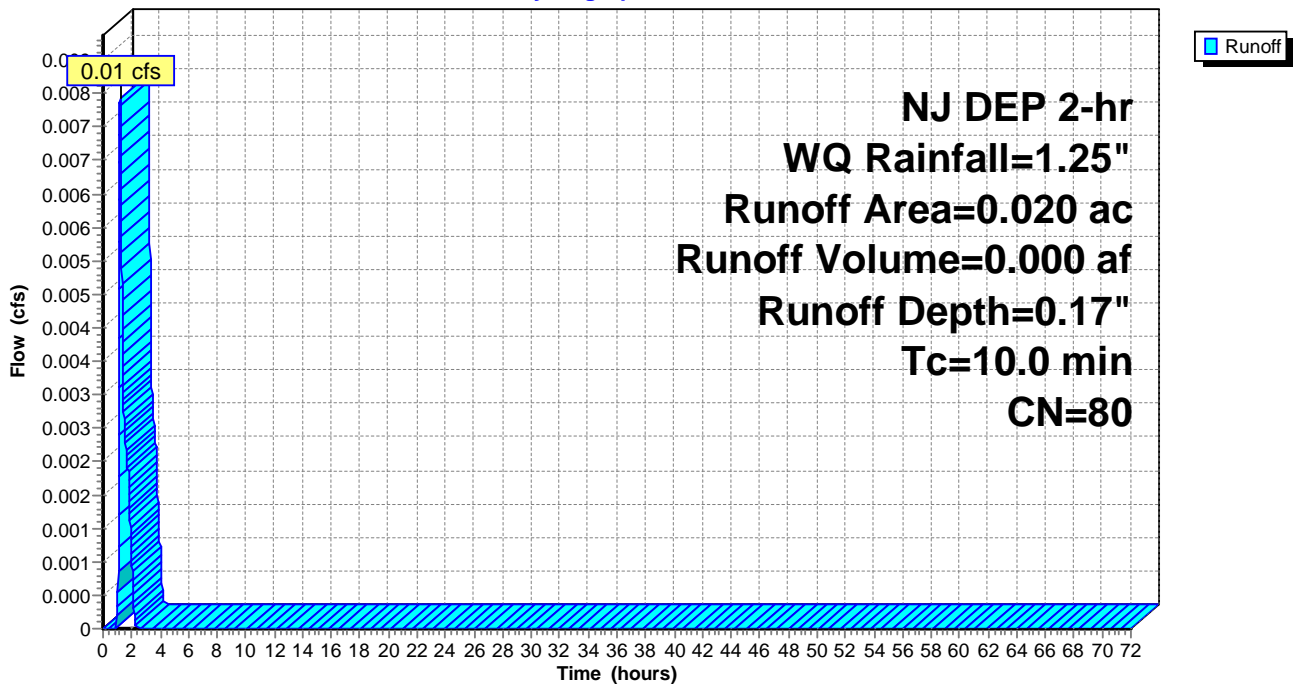
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.020	80	>75% Grass cover, Good, HSG D
0.020		100.00% Pervious Area

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

Subcatchment IA-3p: IA-3 Pervious

Hydrograph



Porous Pavement (WQ Storage)

Prepared by {enter your company name here}

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NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-6i: IA-6 Impervious

Runoff = 0.36 cfs @ 1.15 hrs, Volume= 0.012 af, Depth= 1.03"

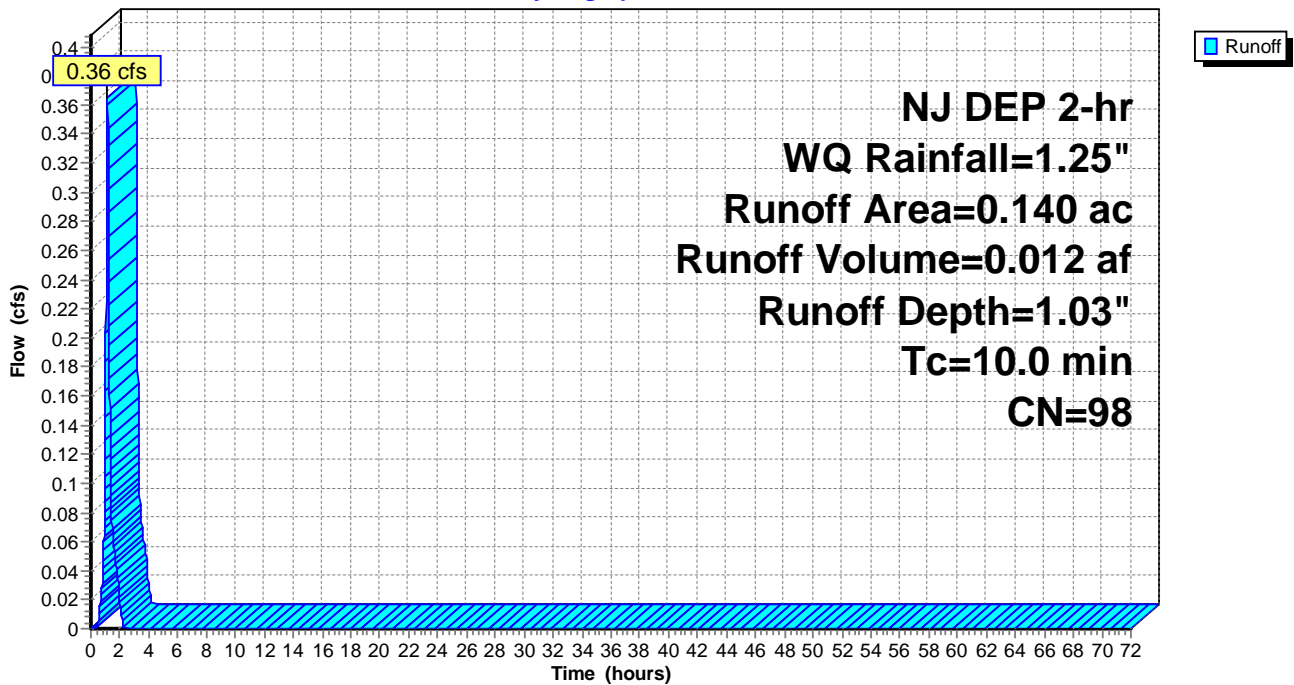
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.140	98	Impervious
0.140		100.00% Impervious Area

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

Subcatchment IA-6i: IA-6 Impervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-6p: IA-6 Pervious

Runoff = 0.01 cfs @ 1.21 hrs, Volume= 0.000 af, Depth= 0.17"

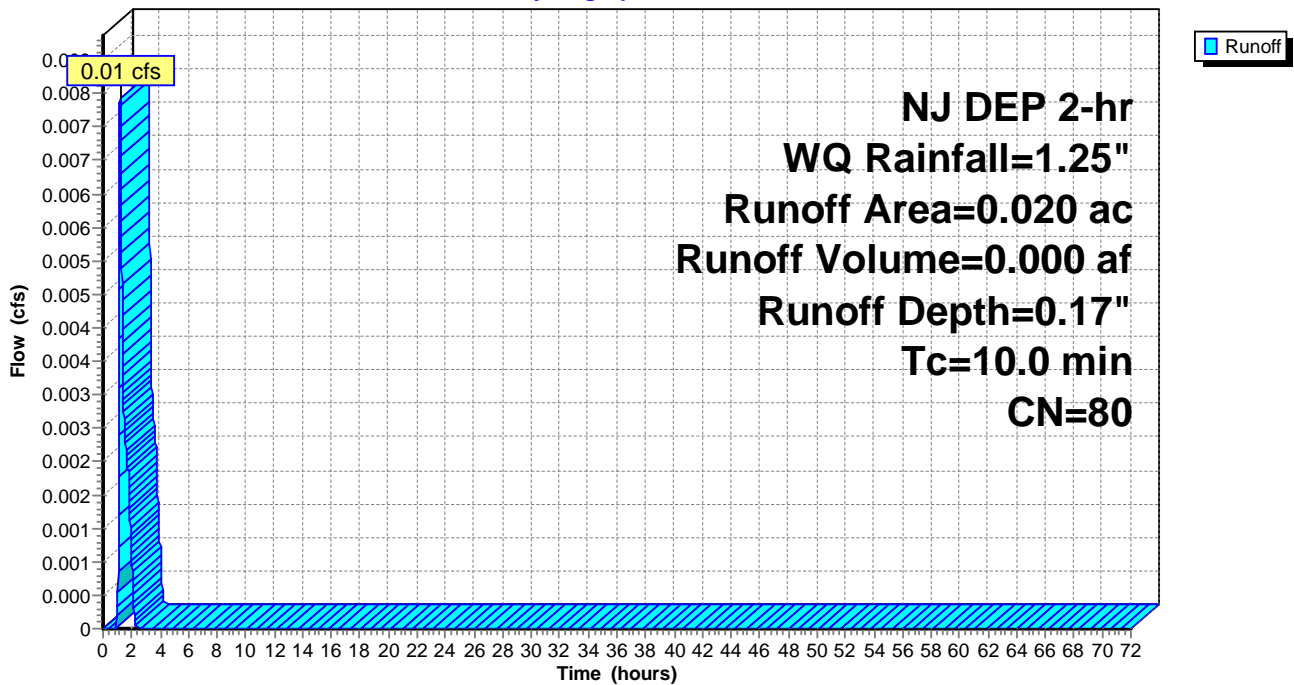
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.020	80	>75% Grass cover, Good, HSG D
0.020		100.00% Pervious Area

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

Subcatchment IA-6p: IA-6 Pervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA6: IA-6 Porous Pavement

Inflow Area = 0.160 ac, 87.50% Impervious, Inflow Depth = 0.93" for WQ event
 Inflow = 0.37 cfs @ 1.15 hrs, Volume= 0.012 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

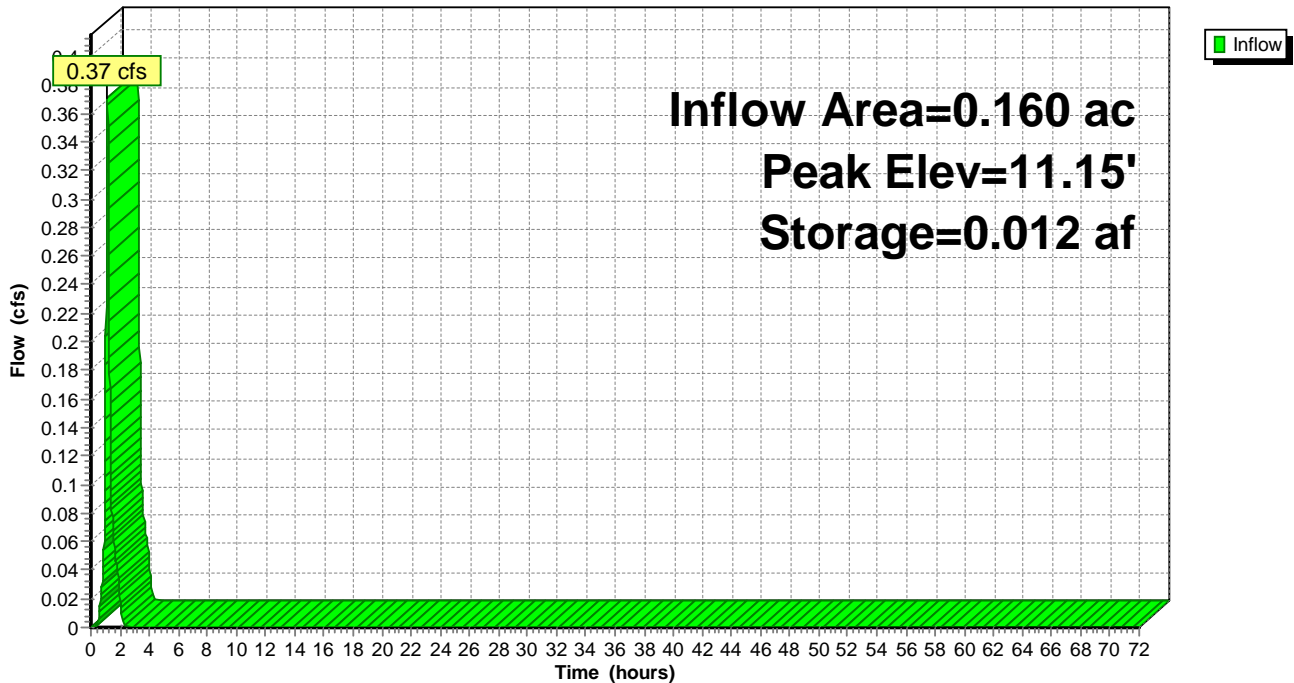
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.15' @ 2.57 hrs Surf.Area= 0.119 ac Storage= 0.012 af

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	10.84'	0.006 af	45.00'W x 18.00'L x 1.00'H Prismatic 0.019 af Overall x 33.3% Voids
#2	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prismatic 0.030 af Overall x 33.3% Voids
#3	10.84'	0.018 af	24.00'W x 100.00'L x 1.00'H Prismatic 0.055 af Overall x 33.3% Voids
#4	10.84'	0.005 af	24.00'W x 29.00'L x 1.00'H Prismatic 0.016 af Overall x 33.3% Voids
		0.040 af	Total Available Storage

Pond IA6: IA-6 Porous Pavement

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA3: IA-3 Porous Pavement

Inflow Area = 0.140 ac, 85.71% Impervious, Inflow Depth = 0.91" for WQ event
Inflow = 0.32 cfs @ 1.15 hrs, Volume= 0.011 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

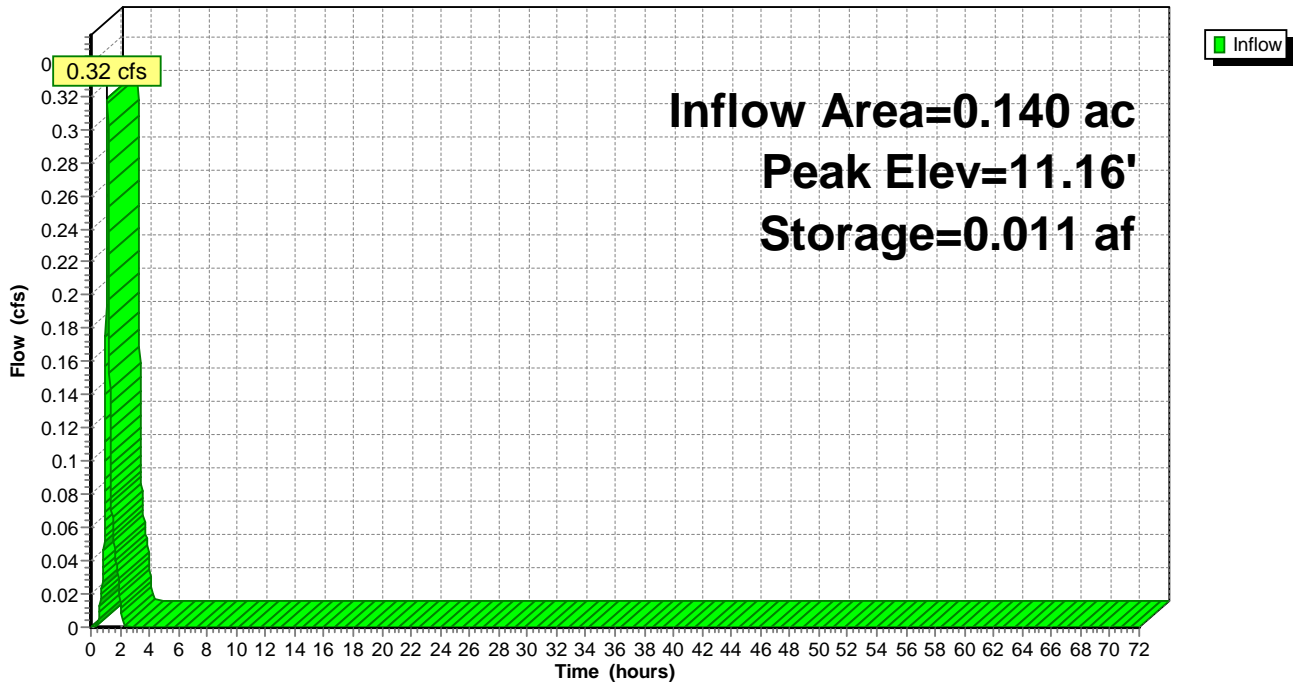
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.16' @ 2.57 hrs Surf.Area= 0.100 ac Storage= 0.011 af

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	10.84'	0.009 af	63.00'W x 18.00'L x 1.00'H Prisma-toid 0.026 af Overall x 33.3% Voids
#2	10.84'	0.009 af	18.00'W x 63.00'L x 1.00'H Prisma-toid 0.026 af Overall x 33.3% Voids
#3	10.84'	0.016 af	24.00'W x 87.00'L x 1.00'H Prisma-toid 0.048 af Overall x 33.3% Voids
			0.033 af Total Available Storage

Pond IA3: IA-3 Porous Pavement

Hydrograph



Porous Pavement (WQ Storage)

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NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-9i: IA-9 Impervious

Runoff = 0.31 cfs @ 1.15 hrs, Volume= 0.010 af, Depth= 1.03"

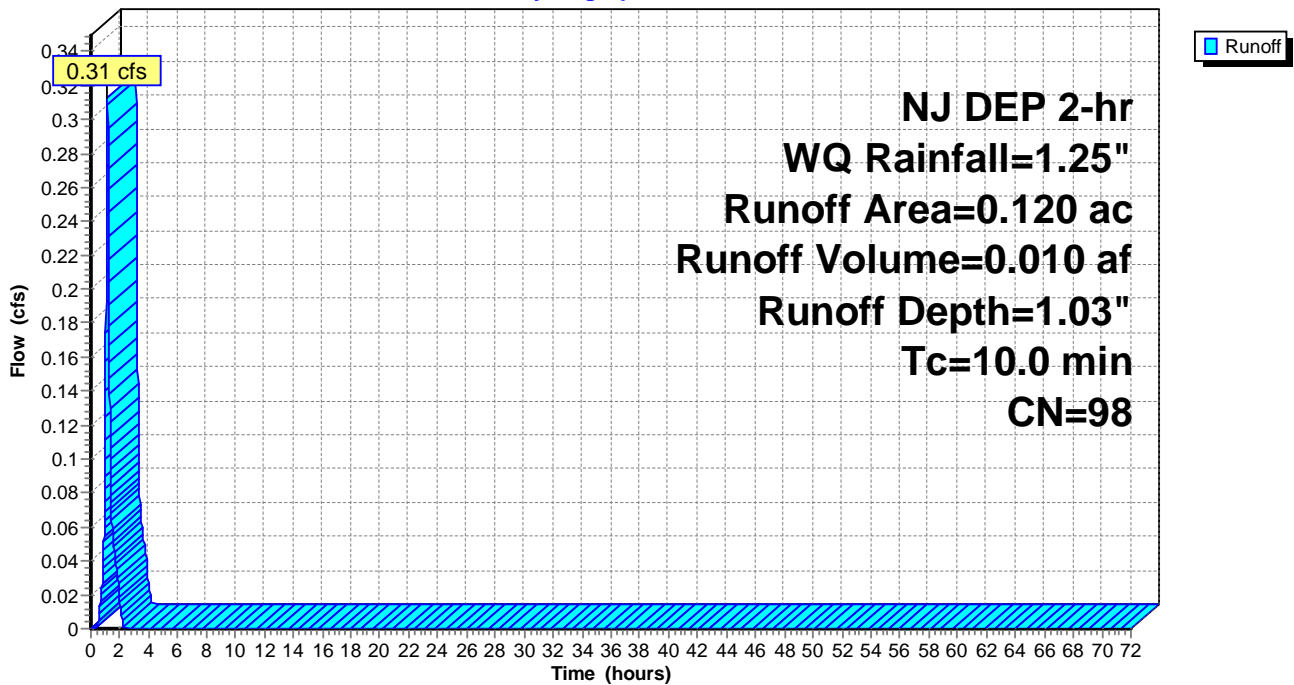
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.120	98	Impervious
0.120		100.00% Impervious Area

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

Subcatchment IA-9i: IA-9 Impervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-9p: IA-9 Pervious

Runoff = 0.00 cfs @ 1.21 hrs, Volume= 0.000 af, Depth= 0.17"

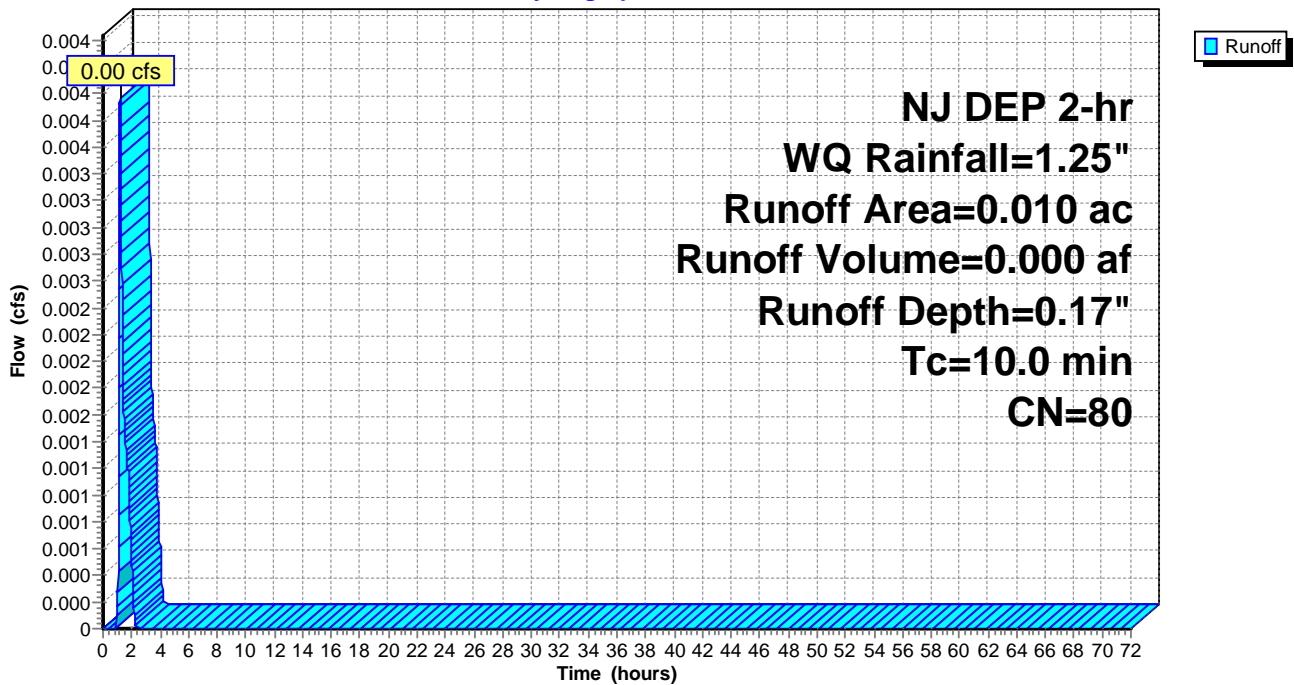
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.010	80	>75% Grass cover, Good, HSG D
0.010		100.00% Pervious Area

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

Subcatchment IA-9p: IA-9 Pervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA9: IA-9 Porous Pavement

Inflow Area = 0.130 ac, 92.31% Impervious, Inflow Depth = 0.97" for WQ event
 Inflow = 0.32 cfs @ 1.15 hrs, Volume= 0.010 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

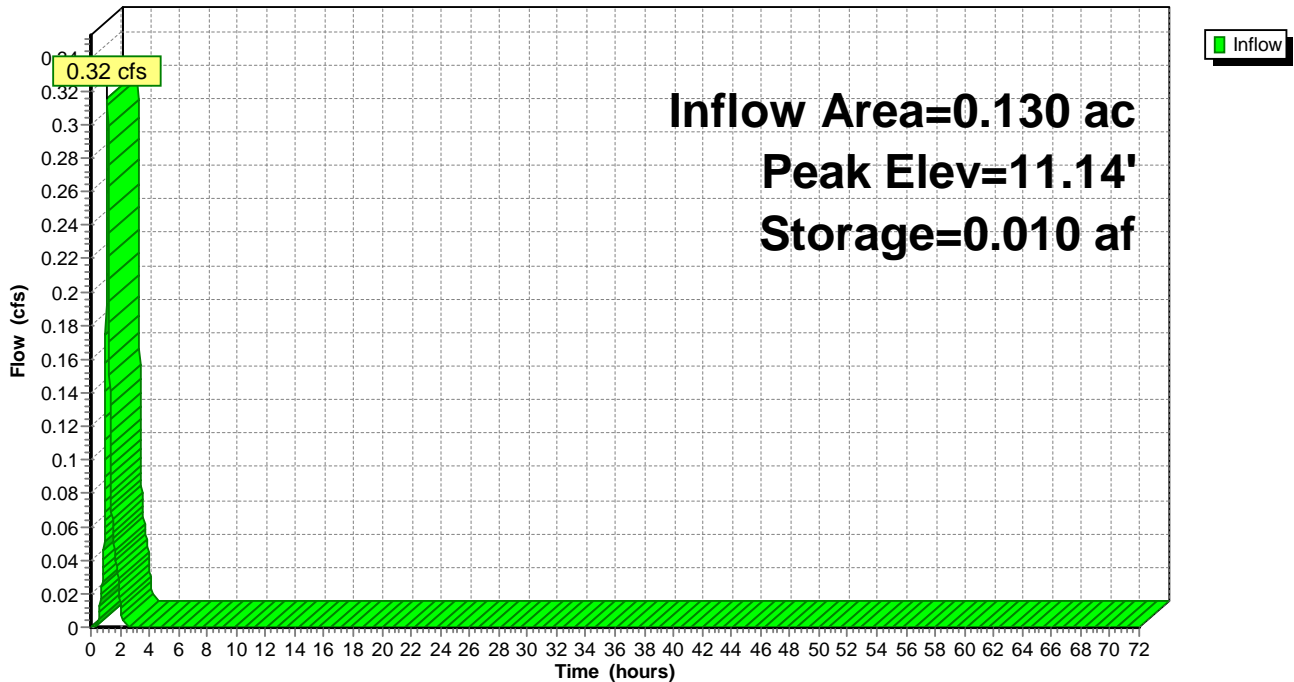
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.14' @ 2.57 hrs Surf.Area= 0.105 ac Storage= 0.010 af

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	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prisma 0.030 af Overall x 33.3% Voids
#2	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prisma 0.030 af Overall x 33.3% Voids
#3	10.84'	0.015 af	24.00'W x 82.00'L x 1.00'H Prisma 0.045 af Overall x 33.3% Voids
		0.035 af	Total Available Storage

Pond IA9: IA-9 Porous Pavement

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-10-11i: IA-10 & 11 Impervious

Runoff = 0.57 cfs @ 1.15 hrs, Volume= 0.019 af, Depth= 1.03"

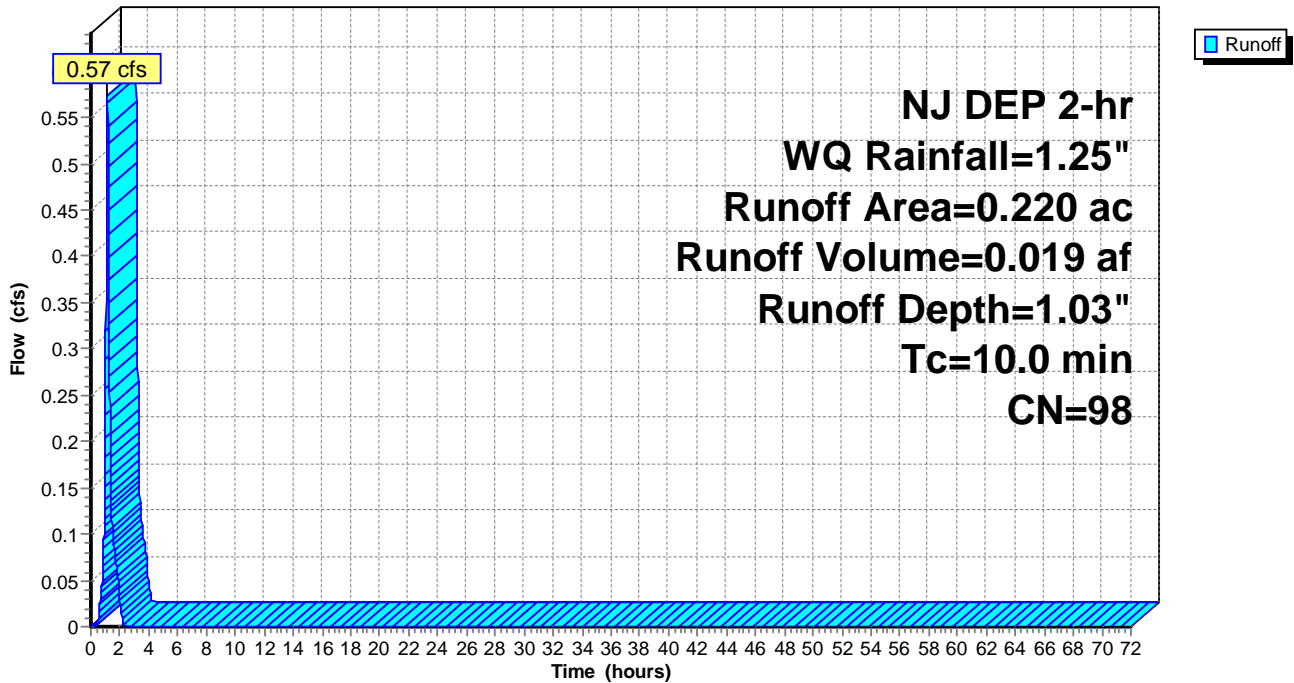
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.220	98	Impervious
0.220		100.00% Impervious Area

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

Subcatchment IA-10-11i: IA-10 & 11 Impervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-10-11p: IA-10 & 11 Pervious

Runoff = 0.01 cfs @ 1.21 hrs, Volume= 0.000 af, Depth= 0.17"

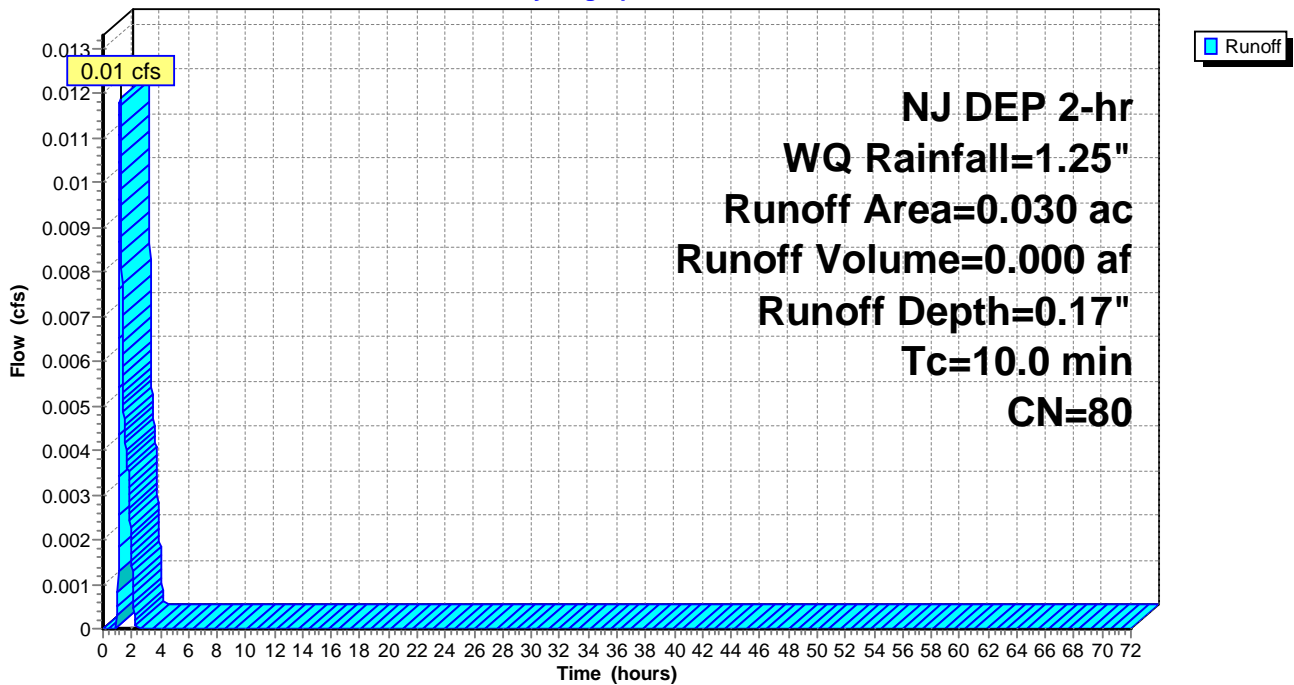
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.030	80	>75% Grass cover, Good, HSG D
0.030		100.00% Pervious Area

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

Subcatchment IA-10-11p: IA-10 & 11 Pervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA10-11: IA-10 & 11 Porous Pavement

Inflow Area = 0.250 ac, 88.00% Impervious, Inflow Depth = 0.93" for WQ event
 Inflow = 0.58 cfs @ 1.15 hrs, Volume= 0.019 af
 Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

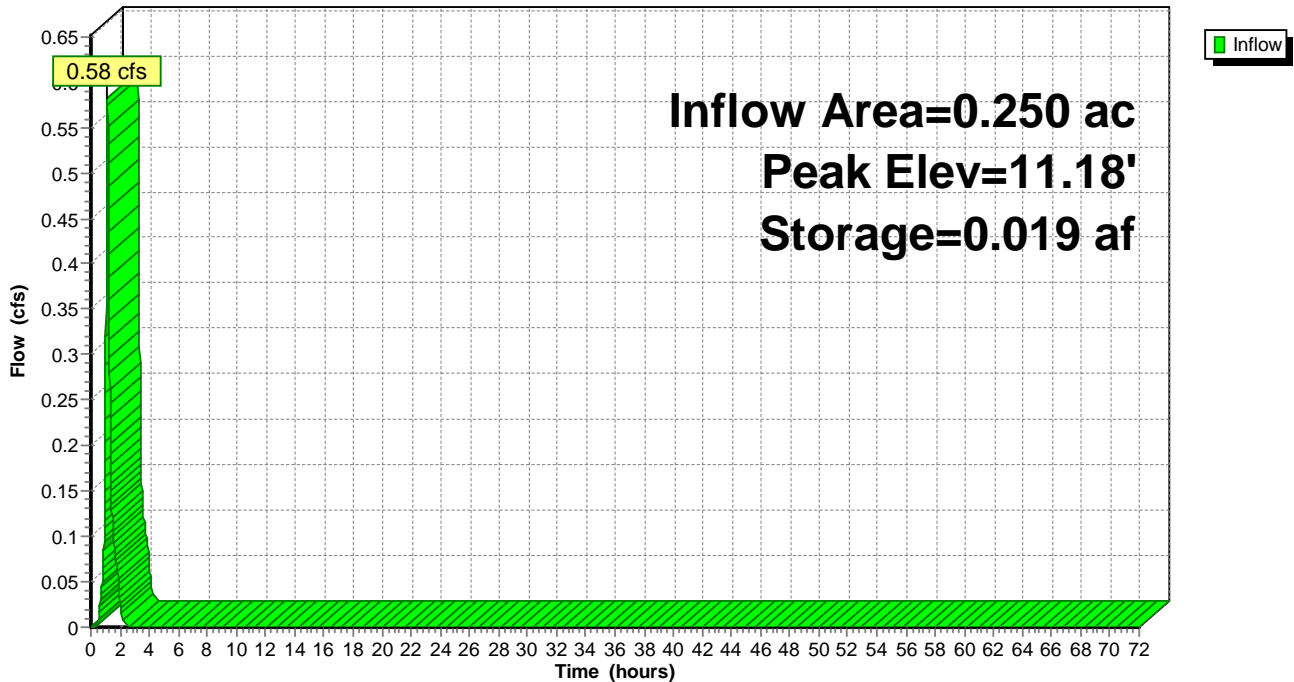
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.18' @ 2.57 hrs Surf.Area= 0.172 ac Storage= 0.019 af

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	10.84'	0.015 af	18.00'W x 108.00'L x 1.00'H Prismatic 0.045 af Overall x 33.3% Voids
#2	10.84'	0.014 af	18.00'W x 99.00'L x 1.00'H Prismatic 0.041 af Overall x 33.3% Voids
#3	10.84'	0.029 af	24.00'W x 157.00'L x 1.00'H Prismatic 0.087 af Overall x 33.3% Voids
		0.057 af	Total Available Storage

Pond IA10-11: IA-10 & 11 Porous Pavement

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-12i: IA-12 Impervious

Runoff = 0.44 cfs @ 1.15 hrs, Volume= 0.015 af, Depth= 1.03"

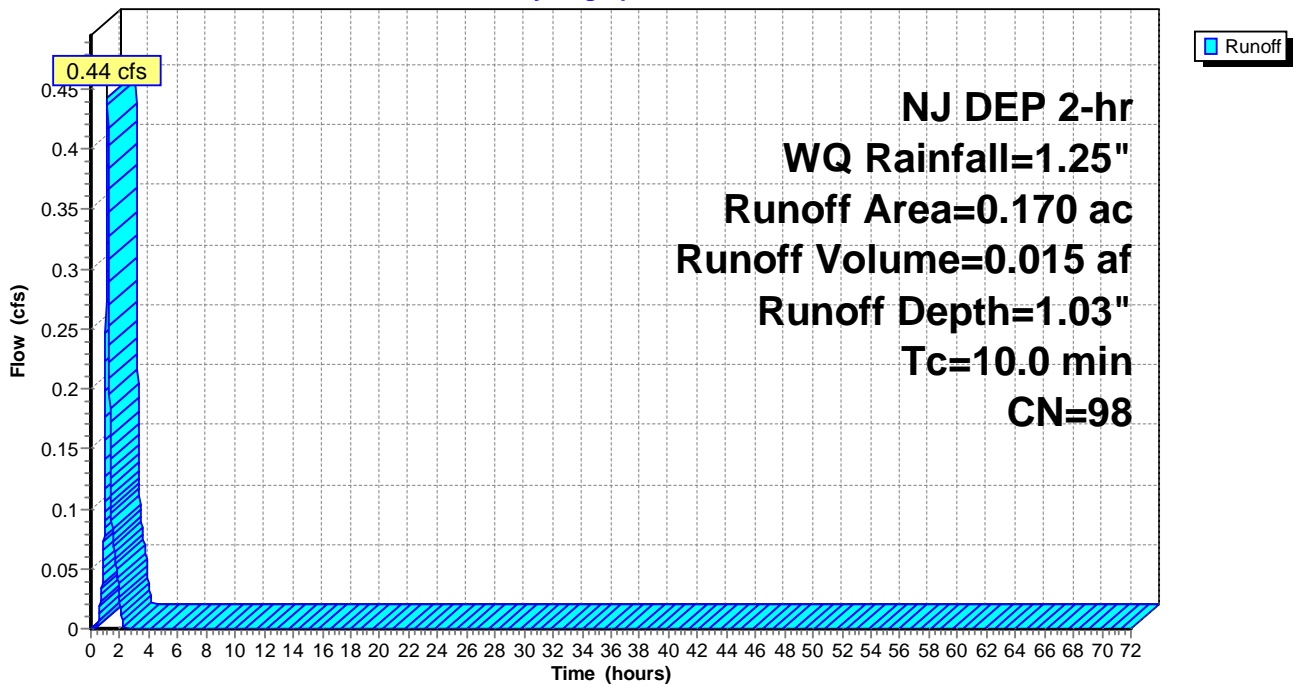
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.170	98	Impervious
0.170		100.00% Impervious Area

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

Subcatchment IA-12i: IA-12 Impervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-12p: IA-12 Pervious

Runoff = 0.01 cfs @ 1.21 hrs, Volume= 0.000 af, Depth= 0.17"

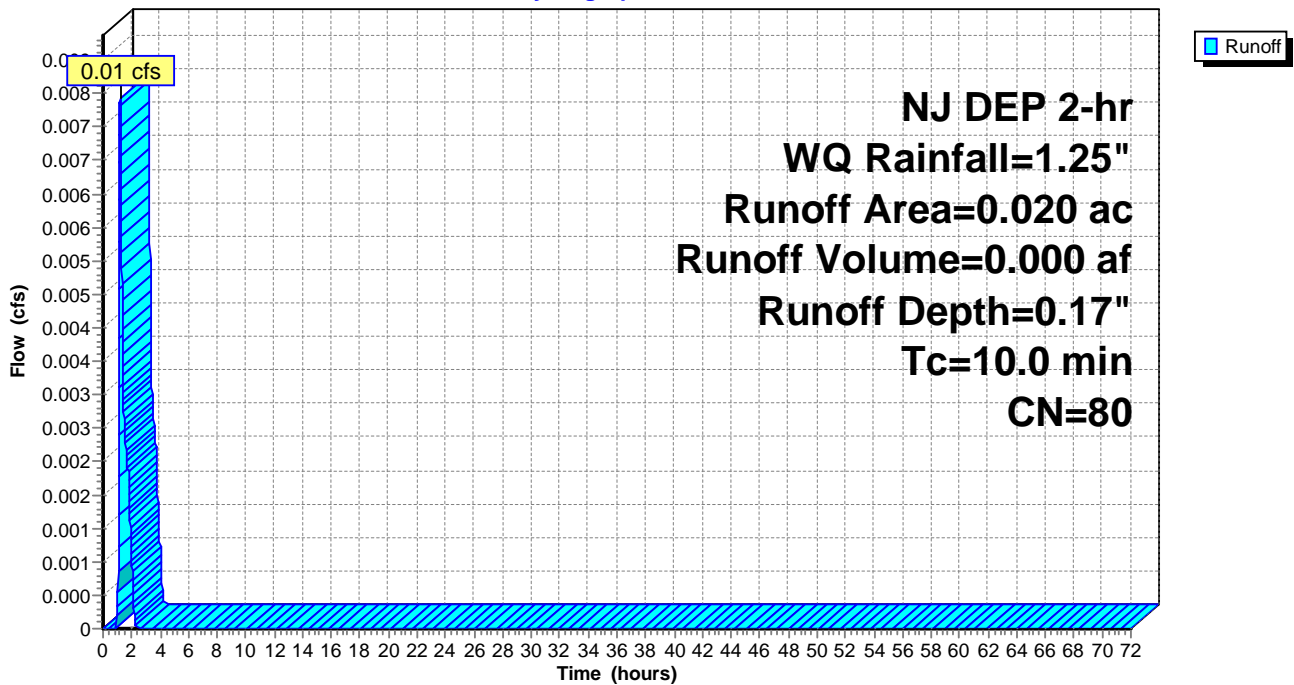
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.020	80	>75% Grass cover, Good, HSG D
0.020		100.00% Pervious Area

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

Subcatchment IA-12p: IA-12 Pervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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Summary for Pond IA12: IA-12 Porous Pavement

Inflow Area = 0.190 ac, 89.47% Impervious, Inflow Depth = 0.94" for WQ event
Inflow = 0.45 cfs @ 1.15 hrs, Volume= 0.015 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= 11.14' @ 2.57 hrs Surf.Area= 0.150 ac Storage= 0.015 af

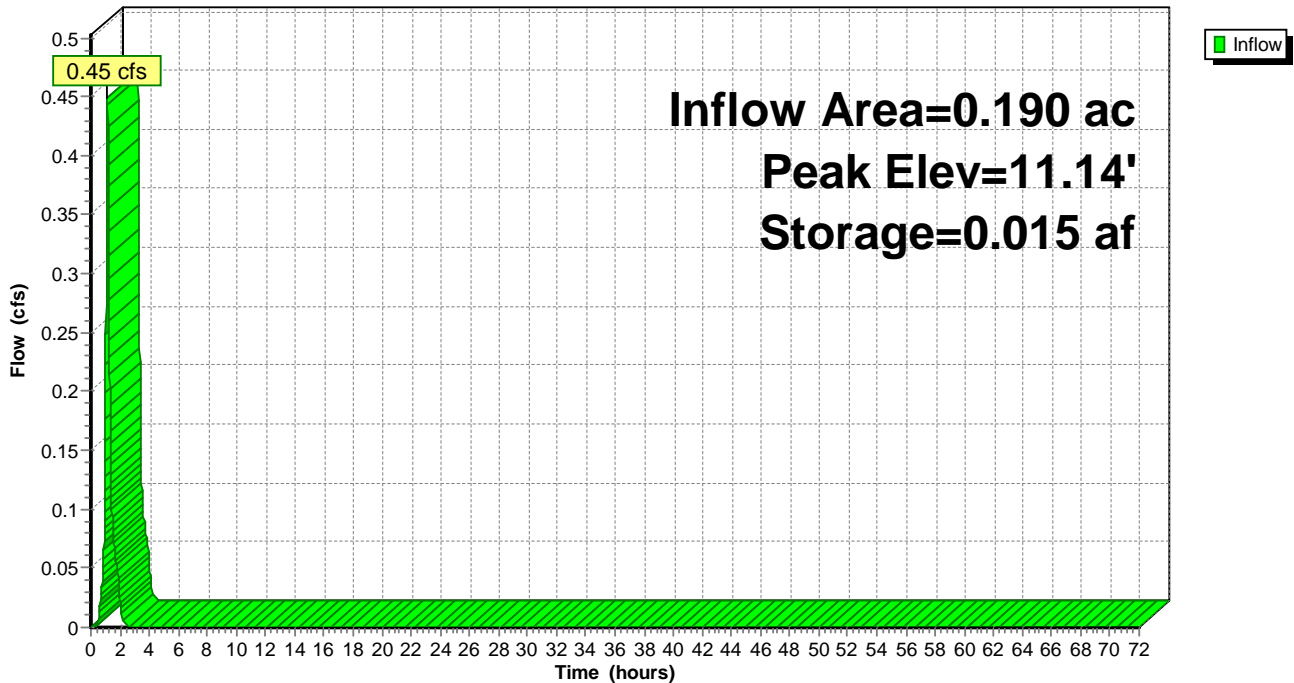
Plug-Flow detention time= (not calculated: initial storage exceeds outflow)

Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.010 af	72.00'W x 18.00'L x 1.00'H Prismaoid 0.030 af Overall x 33.3% Voids
#2	10.84'	0.012 af	18.00'W x 90.00'L x 1.00'H Prismaoid 0.037 af Overall x 33.3% Voids
#3	10.84'	0.005 af	24.00'W x 29.00'L x 1.00'H Prismaoid 0.016 af Overall x 33.3% Voids
#4	10.84'	0.022 af	24.00'W x 122.00'L x 1.00'H Prismaoid 0.067 af Overall x 33.3% Voids
			0.050 af Total Available Storage

Pond IA12: IA-12 Porous Pavement

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-13i: IA-13 Impervious

Runoff = 0.44 cfs @ 1.15 hrs, Volume= 0.015 af, Depth= 1.03"

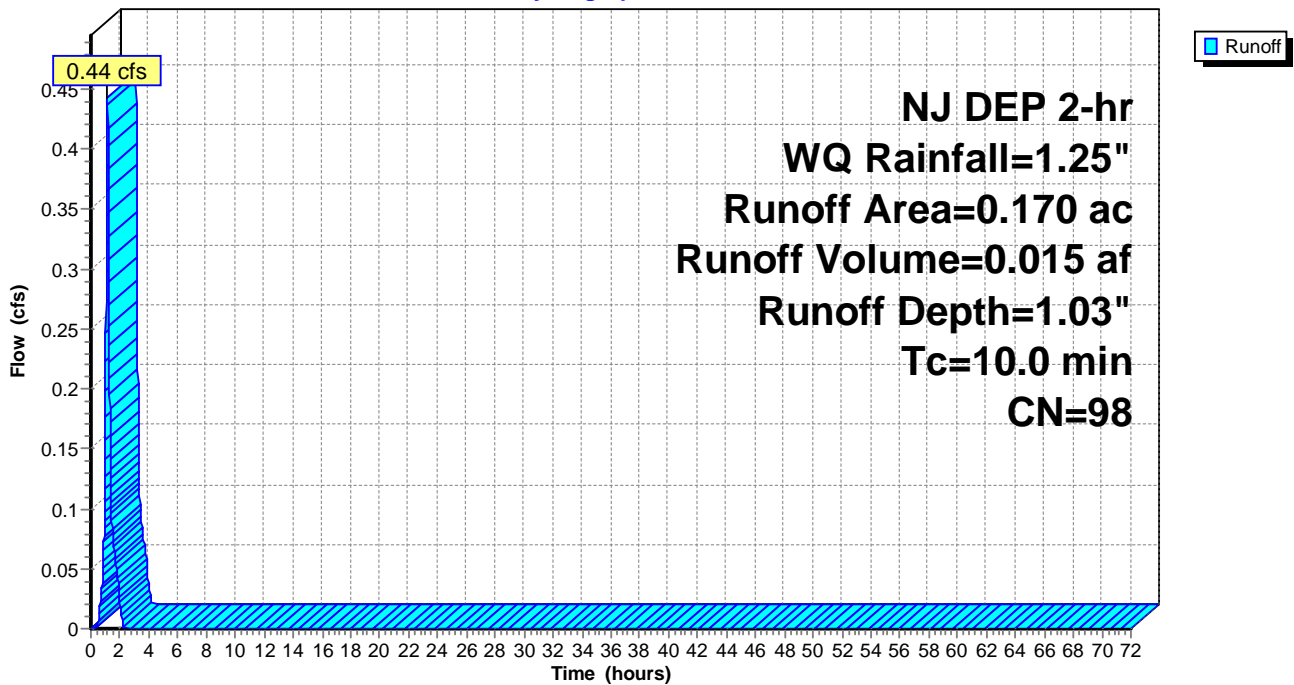
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
* 0.170	98	Impervious
0.170		100.00% Impervious Area

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

Subcatchment IA-13i: IA-13 Impervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Subcatchment IA-13p: IA-13 Pervious

Runoff = 0.01 cfs @ 1.21 hrs, Volume= 0.000 af, Depth= 0.17"

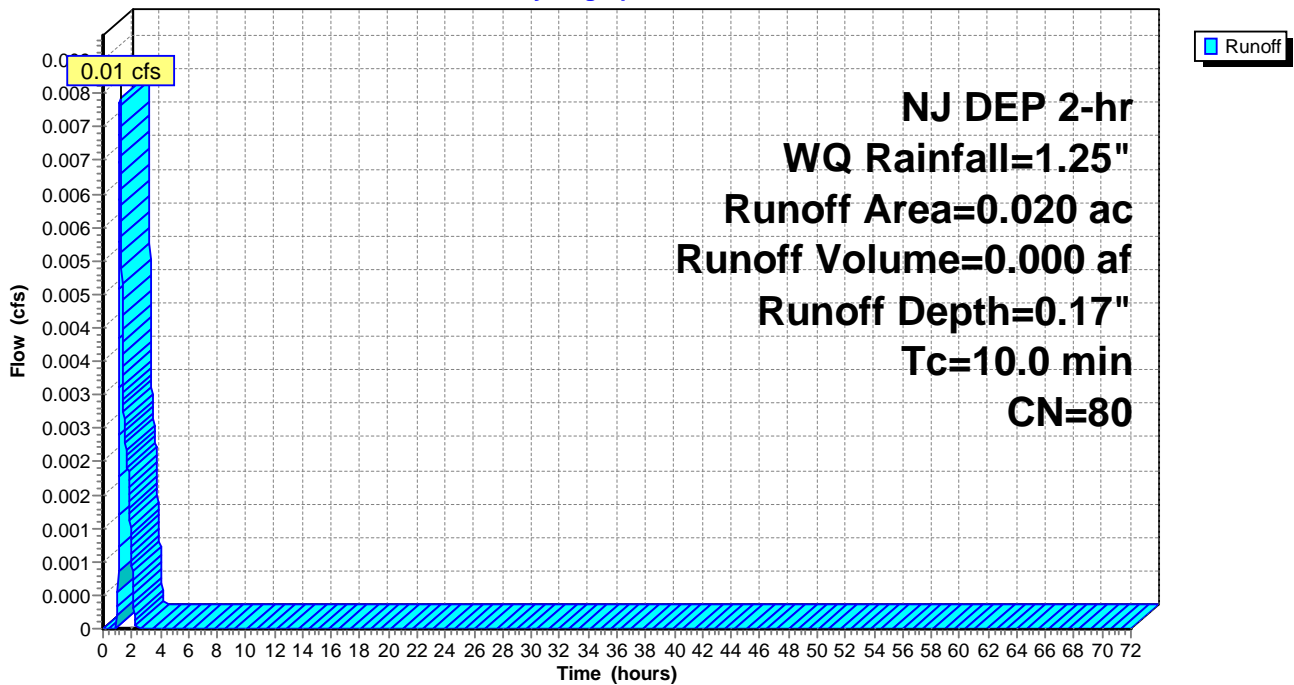
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
NJ DEP 2-hr WQ Rainfall=1.25"

Area (ac)	CN	Description
0.020	80	>75% Grass cover, Good, HSG D
0.020		100.00% Pervious Area

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

Subcatchment IA-13p: IA-13 Pervious

Hydrograph



Porous Pavement (WQ Storage)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA13: IA-13 Porous Pavement

Inflow Area = 0.190 ac, 89.47% Impervious, Inflow Depth = 0.94" for WQ event
Inflow = 0.45 cfs @ 1.15 hrs, Volume= 0.015 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

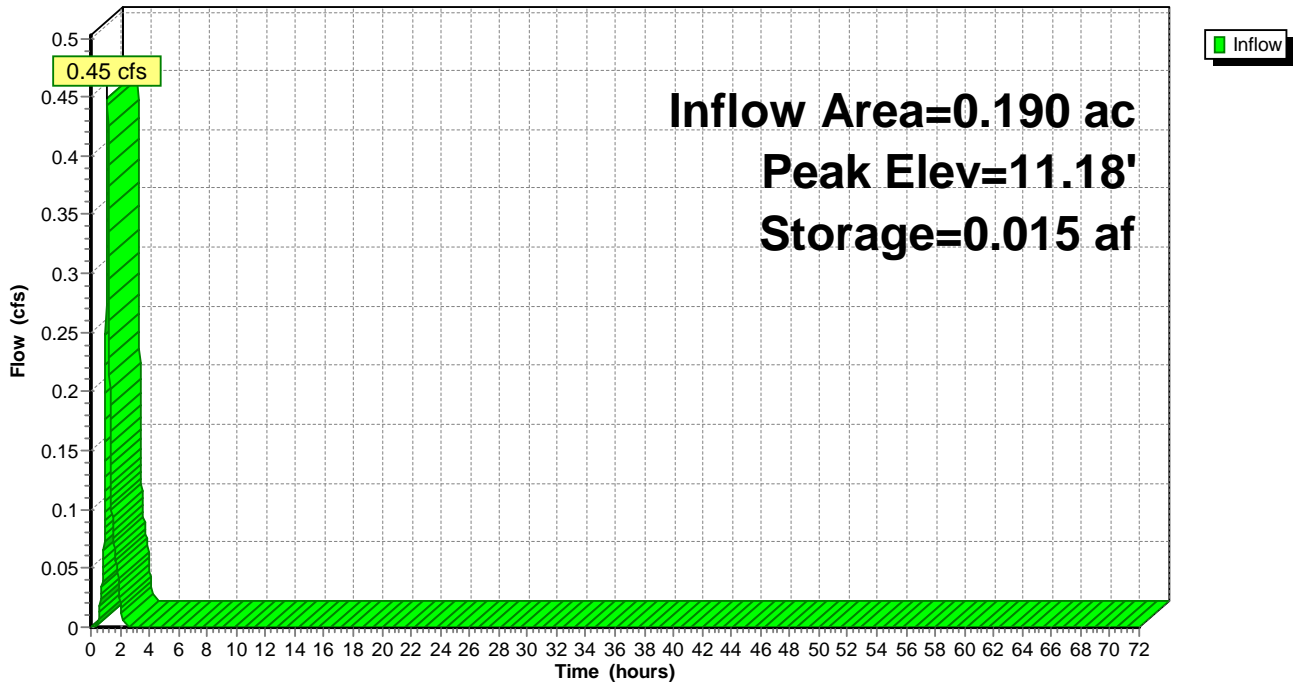
Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.18' @ 2.57 hrs Surf.Area= 0.133 ac Storage= 0.015 af

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	10.84'	0.012 af	90.00'W x 18.00'L x 1.00'H Prismatoid 0.037 af Overall x 33.3% Voids
#2	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prismatoid 0.030 af Overall x 33.3% Voids
#3	10.84'	0.022 af	24.00'W x 120.00'L x 1.00'H Prismatoid 0.066 af Overall x 33.3% Voids
			0.044 af Total Available Storage

Pond IA13: IA-13 Porous Pavement

Hydrograph



APPENDIX D

POROUS PAVEMENT DRAIN TIME ANALYSIS

Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA1: IA-1 Porous Pavement

Inflow Area = 0.120 ac, 91.67% Impervious, Inflow Depth = 0.96" for WQ event
 Inflow = 0.29 cfs @ 1.15 hrs, Volume= 0.010 af
 Outflow = 0.05 cfs @ 1.55 hrs, Volume= 0.009 af, Atten= 84%, Lag= 23.9 min
 Primary = 0.05 cfs @ 1.55 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 11.04' @ 1.55 hrs Surf.Area= 0.105 ac Storage= 0.007 af

Plug-Flow detention time= 266.6 min calculated for 0.009 af (98% of inflow)
 Center-of-Mass det. time= 266.0 min (340.2 - 74.2)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prismaoid 0.030 af Overall x 33.3% Voids
#2	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prismaoid 0.030 af Overall x 33.3% Voids
#3	10.84'	0.015 af	24.00'W x 82.00'L x 1.00'H Prismaoid 0.045 af Overall x 33.3% Voids
		0.035 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	10.84'	6.0" Round Culvert L= 72.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 10.84' / 10.77' S= 0.0010 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.05 cfs @ 1.55 hrs HW=11.04' (Free Discharge)
 ↑**1=Culvert** (Barrel Controls 0.05 cfs @ 0.96 fps)

Porous Pavement (Drain Time)

Prepared by {enter your company name here}

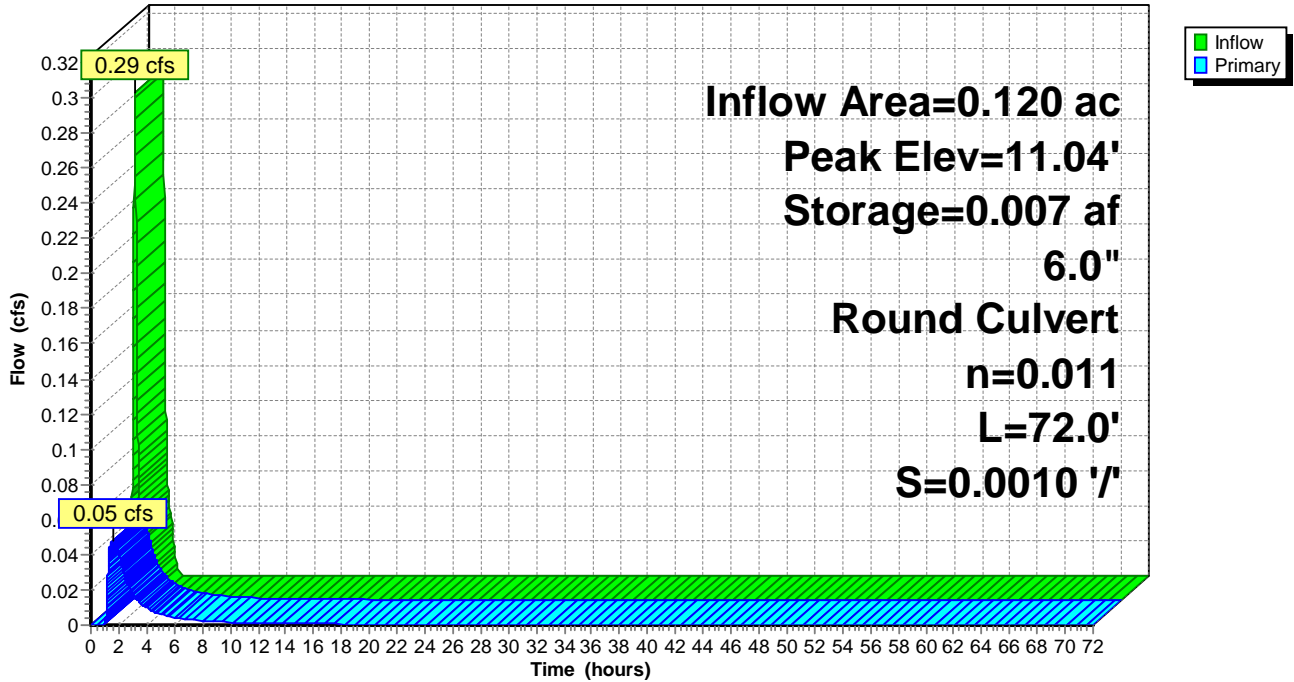
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NJ DEP 2-hr WQ Rainfall=1.25"

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Pond IA1: IA-1 Porous Pavement

Hydrograph



Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA10-11: IA-10 & 11 Porous Pavement

Inflow Area = 0.250 ac, 88.00% Impervious, Inflow Depth = 0.93" for WQ event
 Inflow = 0.58 cfs @ 1.15 hrs, Volume= 0.019 af
 Outflow = 0.07 cfs @ 1.70 hrs, Volume= 0.019 af, Atten= 87%, Lag= 33.1 min
 Primary = 0.07 cfs @ 1.70 hrs, Volume= 0.019 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 11.10' @ 1.70 hrs Surf.Area= 0.172 ac Storage= 0.015 af

Plug-Flow detention time= 322.0 min calculated for 0.019 af (97% of inflow)
 Center-of-Mass det. time= 321.0 min (395.3 - 74.3)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.015 af	18.00'W x 108.00'L x 1.00'H Prismatic 0.045 af Overall x 33.3% Voids
#2	10.84'	0.014 af	18.00'W x 99.00'L x 1.00'H Prismatic 0.041 af Overall x 33.3% Voids
#3	10.84'	0.029 af	24.00'W x 157.00'L x 1.00'H Prismatic 0.087 af Overall x 33.3% Voids
		0.057 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	10.84'	6.0" Round Culvert L= 206.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 10.84' / 10.63' S= 0.0010 '/ Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.07 cfs @ 1.70 hrs HW=11.10' (Free Discharge)

↑1=Culvert (Barrel Controls 0.07 cfs @ 1.04 fps)

Porous Pavement (Drain Time)

Prepared by {enter your company name here}

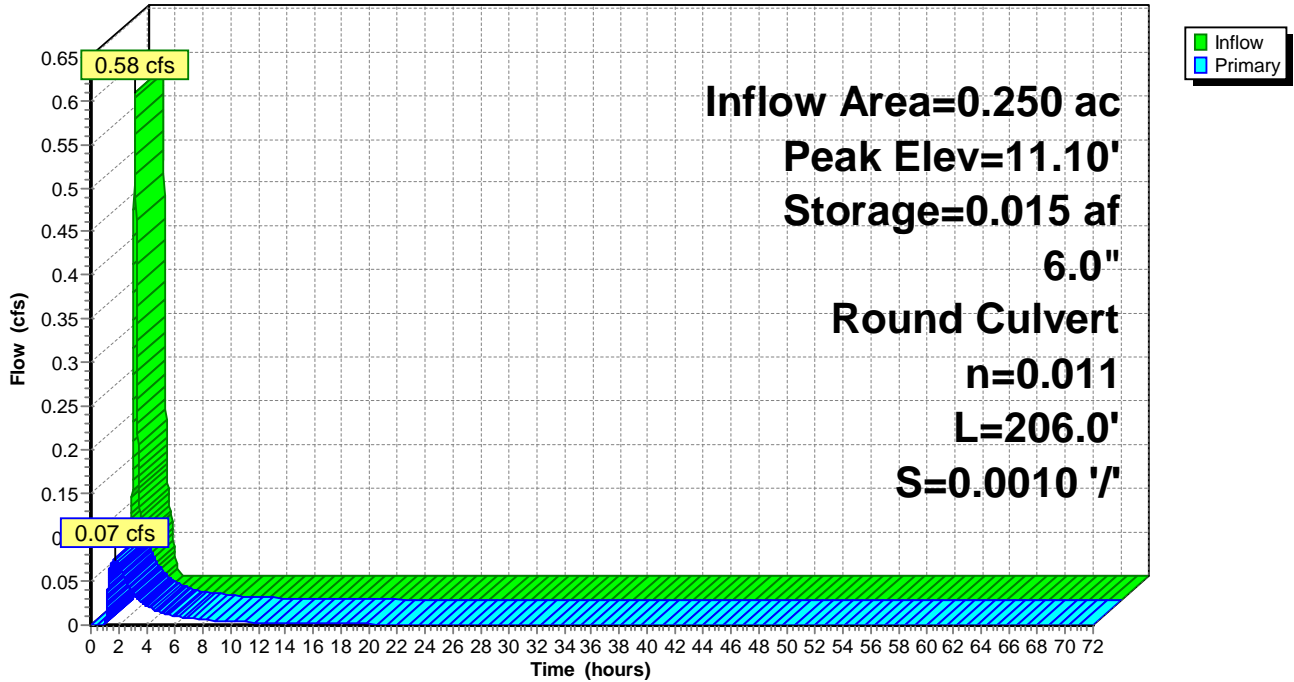
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NJ DEP 2-hr WQ Rainfall=1.25"

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Pond IA10-11: IA-10 & 11 Porous Pavement

Hydrograph



Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

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Hydrograph for Pond IA10-11: IA-10 & 11 Porous Pavement

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	10.84	0.00
2.00	0.03	0.014	11.09	0.07
4.00	0.00	0.008	10.98	0.02
6.00	0.00	0.006	10.94	0.01
8.00	0.00	0.004	10.92	0.01
10.00	0.00	0.004	10.90	0.00
12.00	0.00	0.003	10.89	0.00
14.00	0.00	0.003	10.89	0.00
16.00	0.00	0.002	10.88	0.00
18.00	0.00	0.002	10.88	0.00
20.00	0.00	0.002	10.87	0.00
22.00	0.00	0.002	10.87	0.00
24.00	0.00	0.002	10.87	0.00
26.00	0.00	0.001	10.87	0.00
28.00	0.00	0.001	10.86	0.00
30.00	0.00	0.001	10.86	0.00
32.00	0.00	0.001	10.86	0.00
34.00	0.00	0.001	10.86	0.00
36.00	0.00	0.001	10.86	0.00
38.00	0.00	0.001	10.86	0.00
40.00	0.00	0.001	10.86	0.00
42.00	0.00	0.001	10.86	0.00
44.00	0.00	0.001	10.86	0.00
46.00	0.00	0.001	10.86	0.00
48.00	0.00	0.001	10.85	0.00
50.00	0.00	0.001	10.85	0.00
52.00	0.00	0.001	10.85	0.00
54.00	0.00	0.001	10.85	0.00
56.00	0.00	0.001	10.85	0.00
58.00	0.00	0.001	10.85	0.00
60.00	0.00	0.001	10.85	0.00
62.00	0.00	0.001	10.85	0.00
64.00	0.00	0.001	10.85	0.00
66.00	0.00	0.001	10.85	0.00
68.00	0.00	0.001	10.85	0.00
70.00	0.00	0.001	10.85	0.00
72.00	0.00	0.001	10.85	0.00

Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA12: IA-12 Porous Pavement

Inflow Area = 0.190 ac, 89.47% Impervious, Inflow Depth = 0.94" for WQ event
Inflow = 0.45 cfs @ 1.15 hrs, Volume= 0.015 af
Outflow = 0.30 cfs @ 1.08 hrs, Volume= 0.015 af, Atten= 32%, Lag= 0.0 min
Discarded = 0.30 cfs @ 1.08 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 10.88' @ 1.25 hrs Surf.Area= 0.150 ac Storage= 0.002 af

Plug-Flow detention time= 2.3 min calculated for 0.015 af (100% of inflow)
Center-of-Mass det. time= 2.3 min (76.5 - 74.2)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.010 af	72.00'W x 18.00'L x 1.00'H Prismatic 0.030 af Overall x 33.3% Voids
#2	10.84'	0.012 af	18.00'W x 90.00'L x 1.00'H Prismatic 0.037 af Overall x 33.3% Voids
#3	10.84'	0.005 af	24.00'W x 29.00'L x 1.00'H Prismatic 0.016 af Overall x 33.3% Voids
#4	10.84'	0.022 af	24.00'W x 122.00'L x 1.00'H Prismatic 0.067 af Overall x 33.3% Voids
		0.050 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.84'	2.000 in/hr Exfiltration (Stone to 36" Perf. Pipe) over Surface area

Discarded OutFlow Max=0.30 cfs @ 1.08 hrs HW=10.85' (Free Discharge)
↑1=Exfiltration (Stone to 36" Perf. Pipe) (Exfiltration Controls 0.30 cfs)

Porous Pavement (Drain Time)

Prepared by {enter your company name here}

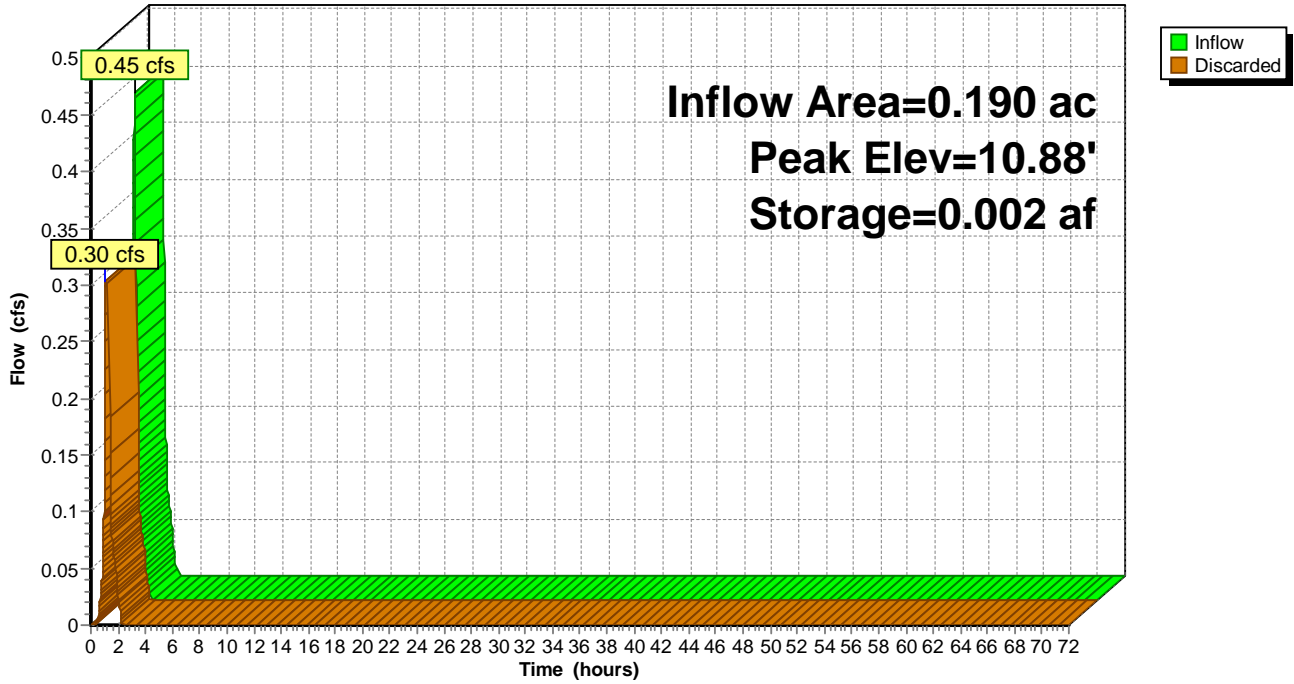
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NJ DEP 2-hr WQ Rainfall=1.25"

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Pond IA12: IA-12 Porous Pavement

Hydrograph



Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

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Hydrograph for Pond IA12: IA-12 Porous Pavement

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Discarded (cfs)
0.00	0.00	0.000	10.84	0.00
2.00	0.02	0.000	10.84	0.02
4.00	0.00	0.000	10.84	0.00
6.00	0.00	0.000	10.84	0.00
8.00	0.00	0.000	10.84	0.00
10.00	0.00	0.000	10.84	0.00
12.00	0.00	0.000	10.84	0.00
14.00	0.00	0.000	10.84	0.00
16.00	0.00	0.000	10.84	0.00
18.00	0.00	0.000	10.84	0.00
20.00	0.00	0.000	10.84	0.00
22.00	0.00	0.000	10.84	0.00
24.00	0.00	0.000	10.84	0.00
26.00	0.00	0.000	10.84	0.00
28.00	0.00	0.000	10.84	0.00
30.00	0.00	0.000	10.84	0.00
32.00	0.00	0.000	10.84	0.00
34.00	0.00	0.000	10.84	0.00
36.00	0.00	0.000	10.84	0.00
38.00	0.00	0.000	10.84	0.00
40.00	0.00	0.000	10.84	0.00
42.00	0.00	0.000	10.84	0.00
44.00	0.00	0.000	10.84	0.00
46.00	0.00	0.000	10.84	0.00
48.00	0.00	0.000	10.84	0.00
50.00	0.00	0.000	10.84	0.00
52.00	0.00	0.000	10.84	0.00
54.00	0.00	0.000	10.84	0.00
56.00	0.00	0.000	10.84	0.00
58.00	0.00	0.000	10.84	0.00
60.00	0.00	0.000	10.84	0.00
62.00	0.00	0.000	10.84	0.00
64.00	0.00	0.000	10.84	0.00
66.00	0.00	0.000	10.84	0.00
68.00	0.00	0.000	10.84	0.00
70.00	0.00	0.000	10.84	0.00
72.00	0.00	0.000	10.84	0.00

Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

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Summary for Pond IA13: IA-13 Porous Pavement

Inflow Area = 0.190 ac, 89.47% Impervious, Inflow Depth = 0.94" for WQ event
 Inflow = 0.45 cfs @ 1.15 hrs, Volume= 0.015 af
 Outflow = 0.27 cfs @ 1.06 hrs, Volume= 0.015 af, Atten= 40%, Lag= 0.0 min
 Discarded = 0.27 cfs @ 1.06 hrs, Volume= 0.015 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.90' @ 1.27 hrs Surf.Area= 0.133 ac Storage= 0.002 af

Plug-Flow detention time= 3.2 min calculated for 0.015 af (100% of inflow)
 Center-of-Mass det. time= 3.2 min (77.4 - 74.2)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.012 af	90.00'W x 18.00'L x 1.00'H Prismatic 0.037 af Overall x 33.3% Voids
#2	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prismatic 0.030 af Overall x 33.3% Voids
#3	10.84'	0.022 af	24.00'W x 120.00'L x 1.00'H Prismatic 0.066 af Overall x 33.3% Voids
		0.044 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.84'	2.000 in/hr Exfiltration (Stone to 36" Perf. Pipe) over Surface area

Discarded OutFlow Max=0.27 cfs @ 1.06 hrs HW=10.85' (Free Discharge)
 ↑1=Exfiltration (Stone to 36" Perf. Pipe) (Exfiltration Controls 0.27 cfs)

Porous Pavement (Drain Time)

Prepared by {enter your company name here}

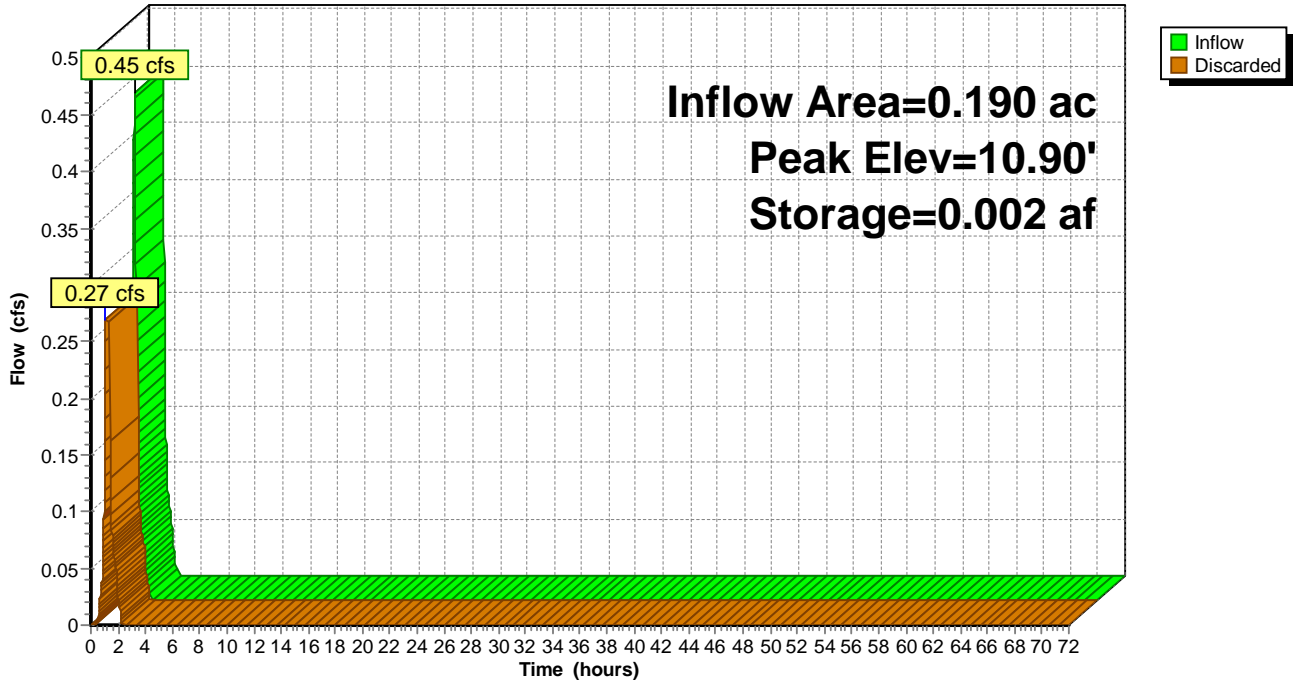
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NJ DEP 2-hr WQ Rainfall=1.25"

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Pond IA13: IA-13 Porous Pavement

Hydrograph



Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

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Hydrograph for Pond IA13: IA-13 Porous Pavement

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Discarded (cfs)
0.00	0.00	0.000	10.84	0.00
2.00	0.02	0.000	10.84	0.02
4.00	0.00	0.000	10.84	0.00
6.00	0.00	0.000	10.84	0.00
8.00	0.00	0.000	10.84	0.00
10.00	0.00	0.000	10.84	0.00
12.00	0.00	0.000	10.84	0.00
14.00	0.00	0.000	10.84	0.00
16.00	0.00	0.000	10.84	0.00
18.00	0.00	0.000	10.84	0.00
20.00	0.00	0.000	10.84	0.00
22.00	0.00	0.000	10.84	0.00
24.00	0.00	0.000	10.84	0.00
26.00	0.00	0.000	10.84	0.00
28.00	0.00	0.000	10.84	0.00
30.00	0.00	0.000	10.84	0.00
32.00	0.00	0.000	10.84	0.00
34.00	0.00	0.000	10.84	0.00
36.00	0.00	0.000	10.84	0.00
38.00	0.00	0.000	10.84	0.00
40.00	0.00	0.000	10.84	0.00
42.00	0.00	0.000	10.84	0.00
44.00	0.00	0.000	10.84	0.00
46.00	0.00	0.000	10.84	0.00
48.00	0.00	0.000	10.84	0.00
50.00	0.00	0.000	10.84	0.00
52.00	0.00	0.000	10.84	0.00
54.00	0.00	0.000	10.84	0.00
56.00	0.00	0.000	10.84	0.00
58.00	0.00	0.000	10.84	0.00
60.00	0.00	0.000	10.84	0.00
62.00	0.00	0.000	10.84	0.00
64.00	0.00	0.000	10.84	0.00
66.00	0.00	0.000	10.84	0.00
68.00	0.00	0.000	10.84	0.00
70.00	0.00	0.000	10.84	0.00
72.00	0.00	0.000	10.84	0.00

Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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Summary for Pond IA2: IA-2 Porous Pavement

Inflow Area = 0.110 ac, 90.91% Impervious, Inflow Depth = 0.96" for WQ event
Inflow = 0.26 cfs @ 1.15 hrs, Volume= 0.009 af
Outflow = 0.06 cfs @ 1.41 hrs, Volume= 0.009 af, Atten= 75%, Lag= 15.7 min
Primary = 0.06 cfs @ 1.41 hrs, Volume= 0.009 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.07' @ 1.41 hrs Surf.Area= 0.074 ac Storage= 0.006 af

Plug-Flow detention time= 184.5 min calculated for 0.009 af (99% of inflow)
Center-of-Mass det. time= 184.0 min (258.2 - 74.2)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.006 af	45.00'W x 18.00'L x 1.00'H Prismatic 0.019 af Overall x 33.3% Voids
#2	10.84'	0.005 af	18.00'W x 36.00'L x 1.00'H Prismatic 0.015 af Overall x 33.3% Voids
#3	10.84'	0.013 af	24.00'W x 73.00'L x 1.00'H Prismatic 0.040 af Overall x 33.3% Voids
		0.025 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	10.84'	6.0" Round Culvert L= 82.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 10.84' / 10.76' S= 0.0010 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.06 cfs @ 1.41 hrs HW=11.07' (Free Discharge)
↑1=Culvert (Barrel Controls 0.06 cfs @ 1.05 fps)

Porous Pavement (Drain Time)

Prepared by {enter your company name here}

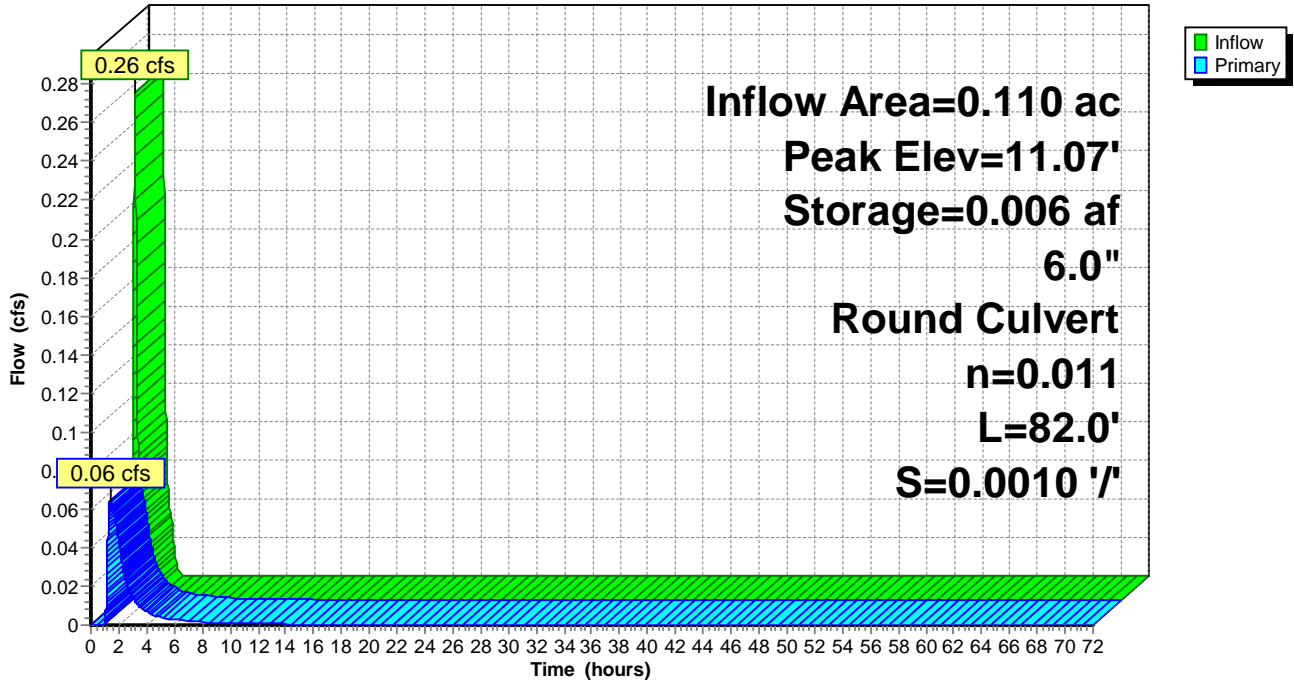
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 9/13/2023

Pond IA2: IA-2 Porous Pavement

Hydrograph



Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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Hydrograph for Pond IA2: IA-2 Porous Pavement

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	10.84	0.00
2.00	0.01	0.005	11.03	0.04
4.00	0.00	0.002	10.92	0.01
6.00	0.00	0.001	10.89	0.00
8.00	0.00	0.001	10.88	0.00
10.00	0.00	0.001	10.87	0.00
12.00	0.00	0.001	10.87	0.00
14.00	0.00	0.001	10.86	0.00
16.00	0.00	0.000	10.86	0.00
18.00	0.00	0.000	10.86	0.00
20.00	0.00	0.000	10.86	0.00
22.00	0.00	0.000	10.85	0.00
24.00	0.00	0.000	10.85	0.00
26.00	0.00	0.000	10.85	0.00
28.00	0.00	0.000	10.85	0.00
30.00	0.00	0.000	10.85	0.00
32.00	0.00	0.000	10.85	0.00
34.00	0.00	0.000	10.85	0.00
36.00	0.00	0.000	10.85	0.00
38.00	0.00	0.000	10.85	0.00
40.00	0.00	0.000	10.85	0.00
42.00	0.00	0.000	10.85	0.00
44.00	0.00	0.000	10.85	0.00
46.00	0.00	0.000	10.85	0.00
48.00	0.00	0.000	10.85	0.00
50.00	0.00	0.000	10.85	0.00
52.00	0.00	0.000	10.85	0.00
54.00	0.00	0.000	10.85	0.00
56.00	0.00	0.000	10.85	0.00
58.00	0.00	0.000	10.85	0.00
60.00	0.00	0.000	10.84	0.00
62.00	0.00	0.000	10.84	0.00
64.00	0.00	0.000	10.84	0.00
66.00	0.00	0.000	10.84	0.00
68.00	0.00	0.000	10.84	0.00
70.00	0.00	0.000	10.84	0.00
72.00	0.00	0.000	10.84	0.00

Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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Summary for Pond IA3: IA-3 Porous Pavement

Inflow Area = 0.140 ac, 85.71% Impervious, Inflow Depth = 0.91" for WQ event
 Inflow = 0.32 cfs @ 1.15 hrs, Volume= 0.011 af
 Outflow = 0.20 cfs @ 1.07 hrs, Volume= 0.011 af, Atten= 37%, Lag= 0.0 min
 Discarded = 0.20 cfs @ 1.07 hrs, Volume= 0.011 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.89' @ 1.26 hrs Surf.Area= 0.100 ac Storage= 0.002 af

Plug-Flow detention time= 2.7 min calculated for 0.011 af (100% of inflow)
 Center-of-Mass det. time= 2.7 min (77.1 - 74.3)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.009 af	63.00'W x 18.00'L x 1.00'H Prismatic 0.026 af Overall x 33.3% Voids
#2	10.84'	0.009 af	18.00'W x 63.00'L x 1.00'H Prismatic 0.026 af Overall x 33.3% Voids
#3	10.84'	0.016 af	24.00'W x 87.00'L x 1.00'H Prismatic 0.048 af Overall x 33.3% Voids
		0.033 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.84'	2.000 in/hr Exfiltration (Stone to 36" Perf. Pipe) over Surface area

Discarded OutFlow Max=0.20 cfs @ 1.07 hrs HW=10.85' (Free Discharge)
 ↑1=Exfiltration (Stone to 36" Perf. Pipe) (Exfiltration Controls 0.20 cfs)

Porous Pavement (Drain Time)

Prepared by {enter your company name here}

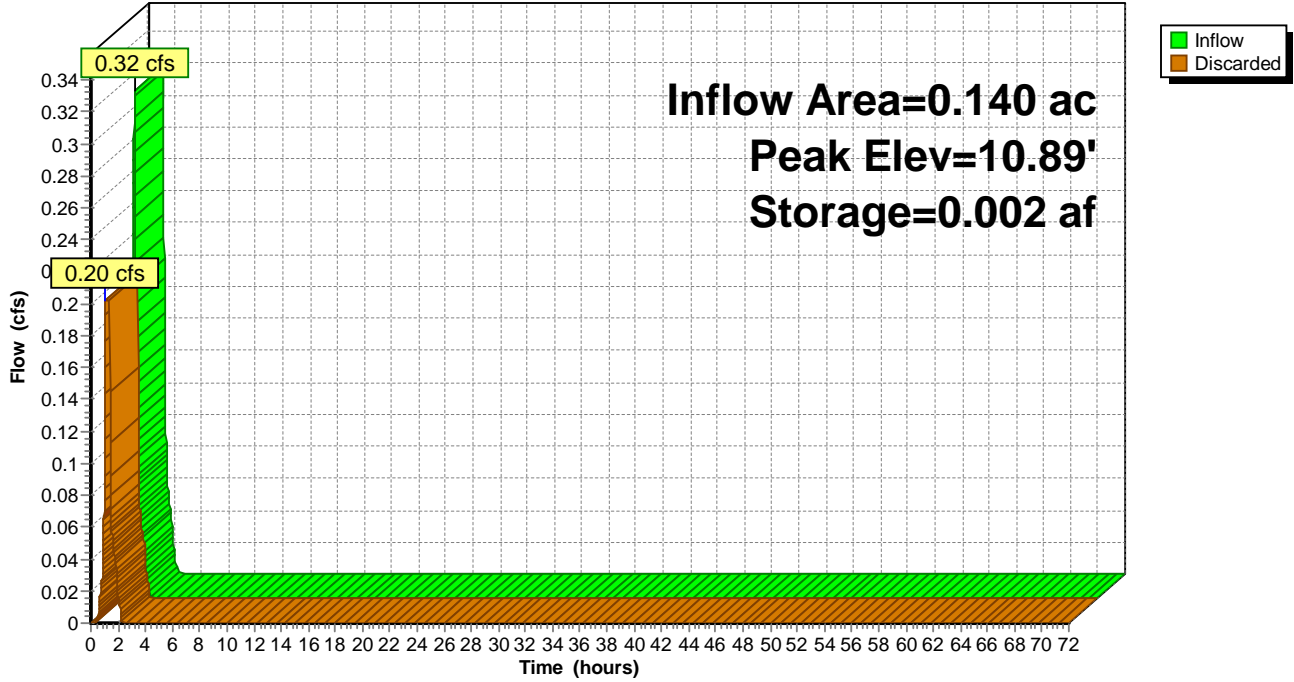
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 9/13/2023

Pond IA3: IA-3 Porous Pavement

Hydrograph



Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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Hydrograph for Pond IA3: IA-3 Porous Pavement

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Discarded (cfs)
0.00	0.00	0.000	10.84	0.00
2.00	0.02	0.000	10.84	0.02
4.00	0.00	0.000	10.84	0.00
6.00	0.00	0.000	10.84	0.00
8.00	0.00	0.000	10.84	0.00
10.00	0.00	0.000	10.84	0.00
12.00	0.00	0.000	10.84	0.00
14.00	0.00	0.000	10.84	0.00
16.00	0.00	0.000	10.84	0.00
18.00	0.00	0.000	10.84	0.00
20.00	0.00	0.000	10.84	0.00
22.00	0.00	0.000	10.84	0.00
24.00	0.00	0.000	10.84	0.00
26.00	0.00	0.000	10.84	0.00
28.00	0.00	0.000	10.84	0.00
30.00	0.00	0.000	10.84	0.00
32.00	0.00	0.000	10.84	0.00
34.00	0.00	0.000	10.84	0.00
36.00	0.00	0.000	10.84	0.00
38.00	0.00	0.000	10.84	0.00
40.00	0.00	0.000	10.84	0.00
42.00	0.00	0.000	10.84	0.00
44.00	0.00	0.000	10.84	0.00
46.00	0.00	0.000	10.84	0.00
48.00	0.00	0.000	10.84	0.00
50.00	0.00	0.000	10.84	0.00
52.00	0.00	0.000	10.84	0.00
54.00	0.00	0.000	10.84	0.00
56.00	0.00	0.000	10.84	0.00
58.00	0.00	0.000	10.84	0.00
60.00	0.00	0.000	10.84	0.00
62.00	0.00	0.000	10.84	0.00
64.00	0.00	0.000	10.84	0.00
66.00	0.00	0.000	10.84	0.00
68.00	0.00	0.000	10.84	0.00
70.00	0.00	0.000	10.84	0.00
72.00	0.00	0.000	10.84	0.00

Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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Summary for Pond IA6: IA-6 Porous Pavement

Inflow Area = 0.160 ac, 87.50% Impervious, Inflow Depth = 0.93" for WQ event
 Inflow = 0.37 cfs @ 1.15 hrs, Volume= 0.012 af
 Outflow = 0.24 cfs @ 1.07 hrs, Volume= 0.012 af, Atten= 35%, Lag= 0.0 min
 Discarded = 0.24 cfs @ 1.07 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
 Peak Elev= 10.88' @ 1.25 hrs Surf.Area= 0.119 ac Storage= 0.002 af

Plug-Flow detention time= 2.6 min calculated for 0.012 af (100% of inflow)
 Center-of-Mass det. time= 2.6 min (76.8 - 74.3)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.006 af	45.00'W x 18.00'L x 1.00'H Prismatic 0.019 af Overall x 33.3% Voids
#2	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prismatic 0.030 af Overall x 33.3% Voids
#3	10.84'	0.018 af	24.00'W x 100.00'L x 1.00'H Prismatic 0.055 af Overall x 33.3% Voids
#4	10.84'	0.005 af	24.00'W x 29.00'L x 1.00'H Prismatic 0.016 af Overall x 33.3% Voids
		0.040 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	10.84'	2.000 in/hr Exfiltration (Stone to 36" Perf. Pipe) over Surface area

Discarded OutFlow Max=0.24 cfs @ 1.07 hrs HW=10.85' (Free Discharge)
 ↑1=Exfiltration (Stone to 36" Perf. Pipe) (Exfiltration Controls 0.24 cfs)

Porous Pavement (Drain Time)

Prepared by {enter your company name here}

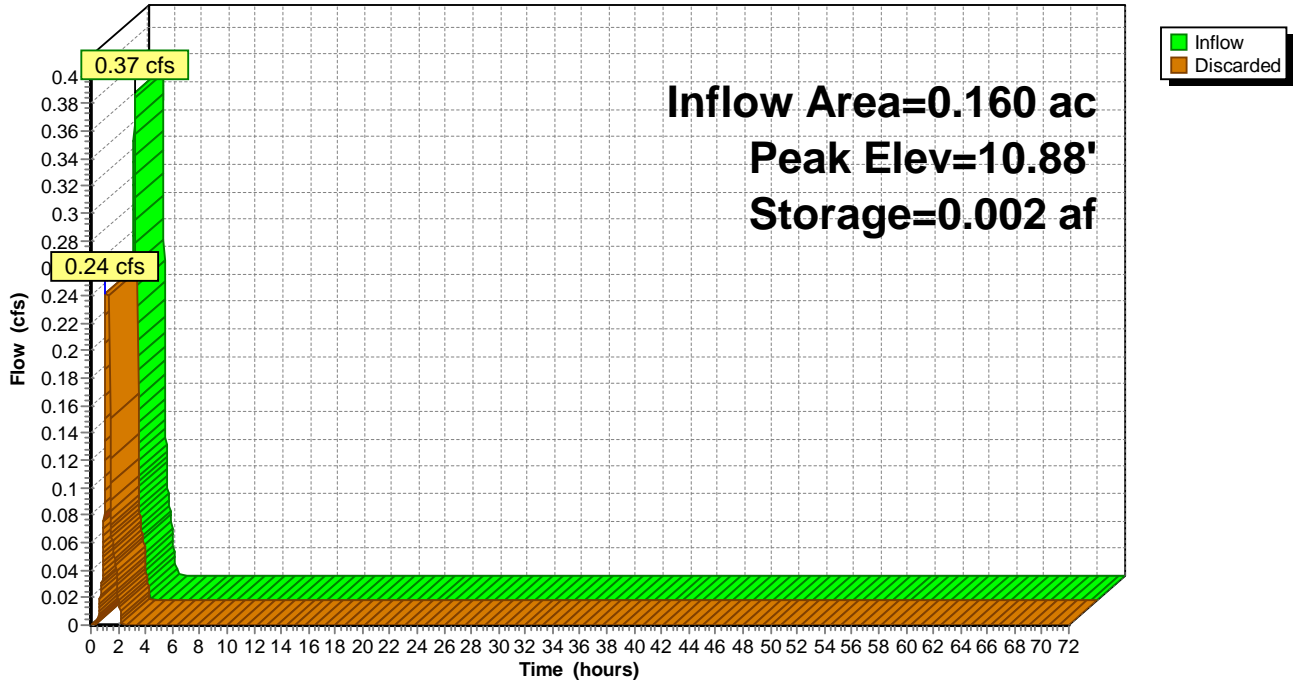
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NJ DEP 2-hr WQ Rainfall=1.25"

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Pond IA6: IA-6 Porous Pavement

Hydrograph



Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

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Hydrograph for Pond IA6: IA-6 Porous Pavement

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Discarded (cfs)
0.00	0.00	0.000	10.84	0.00
2.00	0.02	0.000	10.84	0.02
4.00	0.00	0.000	10.84	0.00
6.00	0.00	0.000	10.84	0.00
8.00	0.00	0.000	10.84	0.00
10.00	0.00	0.000	10.84	0.00
12.00	0.00	0.000	10.84	0.00
14.00	0.00	0.000	10.84	0.00
16.00	0.00	0.000	10.84	0.00
18.00	0.00	0.000	10.84	0.00
20.00	0.00	0.000	10.84	0.00
22.00	0.00	0.000	10.84	0.00
24.00	0.00	0.000	10.84	0.00
26.00	0.00	0.000	10.84	0.00
28.00	0.00	0.000	10.84	0.00
30.00	0.00	0.000	10.84	0.00
32.00	0.00	0.000	10.84	0.00
34.00	0.00	0.000	10.84	0.00
36.00	0.00	0.000	10.84	0.00
38.00	0.00	0.000	10.84	0.00
40.00	0.00	0.000	10.84	0.00
42.00	0.00	0.000	10.84	0.00
44.00	0.00	0.000	10.84	0.00
46.00	0.00	0.000	10.84	0.00
48.00	0.00	0.000	10.84	0.00
50.00	0.00	0.000	10.84	0.00
52.00	0.00	0.000	10.84	0.00
54.00	0.00	0.000	10.84	0.00
56.00	0.00	0.000	10.84	0.00
58.00	0.00	0.000	10.84	0.00
60.00	0.00	0.000	10.84	0.00
62.00	0.00	0.000	10.84	0.00
64.00	0.00	0.000	10.84	0.00
66.00	0.00	0.000	10.84	0.00
68.00	0.00	0.000	10.84	0.00
70.00	0.00	0.000	10.84	0.00
72.00	0.00	0.000	10.84	0.00

Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

Prepared by {enter your company name here}

Printed 9/13/2023

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Summary for Pond IA9: IA-9 Porous Pavement

Inflow Area = 0.130 ac, 92.31% Impervious, Inflow Depth = 0.97" for WQ event
Inflow = 0.32 cfs @ 1.15 hrs, Volume= 0.010 af
Outflow = 0.05 cfs @ 1.51 hrs, Volume= 0.010 af, Atten= 83%, Lag= 21.6 min
Primary = 0.05 cfs @ 1.51 hrs, Volume= 0.010 af

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.01 hrs
Peak Elev= 11.05' @ 1.51 hrs Surf.Area= 0.105 ac Storage= 0.007 af

Plug-Flow detention time= 250.7 min calculated for 0.010 af (98% of inflow)
Center-of-Mass det. time= 250.2 min (324.3 - 74.2)

Volume	Invert	Avail.Storage	Storage Description
#1	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prismatoid 0.030 af Overall x 33.3% Voids
#2	10.84'	0.010 af	18.00'W x 72.00'L x 1.00'H Prismatoid 0.030 af Overall x 33.3% Voids
#3	10.84'	0.015 af	24.00'W x 82.00'L x 1.00'H Prismatoid 0.045 af Overall x 33.3% Voids
		0.035 af	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Primary	10.84'	6.0" Round Culvert L= 72.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 10.84' / 10.77' S= 0.0010 '/' Cc= 0.900 n= 0.011, Flow Area= 0.20 sf

Primary OutFlow Max=0.05 cfs @ 1.51 hrs HW=11.05' (Free Discharge)
↑1=Culvert (Barrel Controls 0.05 cfs @ 1.01 fps)

Porous Pavement (Drain Time)

Prepared by {enter your company name here}

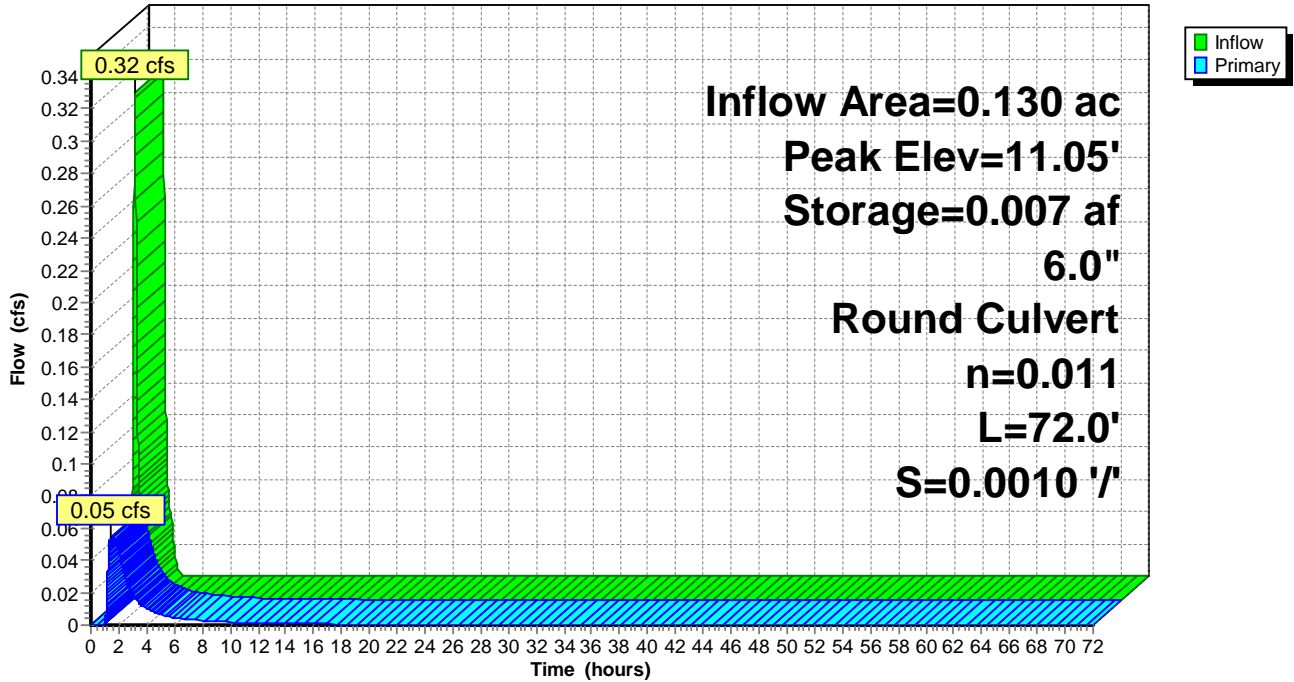
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NJ DEP 2-hr WQ Rainfall=1.25"

Printed 9/13/2023

Pond IA9: IA-9 Porous Pavement

Hydrograph



Porous Pavement (Drain Time)

NJ DEP 2-hr WQ Rainfall=1.25"

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Hydrograph for Pond IA9: IA-9 Porous Pavement

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	10.84	0.00
2.00	0.01	0.007	11.04	0.05
4.00	0.00	0.003	10.94	0.01
6.00	0.00	0.002	10.90	0.00
8.00	0.00	0.002	10.89	0.00
10.00	0.00	0.001	10.88	0.00
12.00	0.00	0.001	10.87	0.00
14.00	0.00	0.001	10.87	0.00
16.00	0.00	0.001	10.87	0.00
18.00	0.00	0.001	10.86	0.00
20.00	0.00	0.001	10.86	0.00
22.00	0.00	0.001	10.86	0.00
24.00	0.00	0.001	10.86	0.00
26.00	0.00	0.001	10.86	0.00
28.00	0.00	0.001	10.86	0.00
30.00	0.00	0.001	10.85	0.00
32.00	0.00	0.000	10.85	0.00
34.00	0.00	0.000	10.85	0.00
36.00	0.00	0.000	10.85	0.00
38.00	0.00	0.000	10.85	0.00
40.00	0.00	0.000	10.85	0.00
42.00	0.00	0.000	10.85	0.00
44.00	0.00	0.000	10.85	0.00
46.00	0.00	0.000	10.85	0.00
48.00	0.00	0.000	10.85	0.00
50.00	0.00	0.000	10.85	0.00
52.00	0.00	0.000	10.85	0.00
54.00	0.00	0.000	10.85	0.00
56.00	0.00	0.000	10.85	0.00
58.00	0.00	0.000	10.85	0.00
60.00	0.00	0.000	10.85	0.00
62.00	0.00	0.000	10.85	0.00
64.00	0.00	0.000	10.85	0.00
66.00	0.00	0.000	10.85	0.00
68.00	0.00	0.000	10.85	0.00
70.00	0.00	0.000	10.85	0.00
72.00	0.00	0.000	10.85	0.00

APPENDIX E

STORM SEWER CHARTS

Line No.	Inlet ID	DnStm Ln No	Drng Area (ac)	Total Area (ac)	Runoff Coeff (C)	Line Size (in)	Line Length (ft)	Invert Up (ft)	Invert Dn (ft)	Line Slope (%)	Flow Rate (cfs)	Capac Full (cfs)	Vel Ave (ft/s)	Vel Up (ft/s)	Vel Dn (ft/s)	Gnd/Rim El Up (ft)	Gnd/Rim El Dn (ft)	HGL Up (ft)	HGL Dn (ft)	n-val Pipe	Tc (min)
6	CB-10 'B'	5	0.11	0.11	0.96	15	24,545	8.38	8.32	0.24	0.67	3.19	0.94	0.99	0.90	11.05	11.27	9.06	9.06	0.013	10.0
5	CB-11 'B'	Outfall	0.14	0.25	0.94	15	127,907	8.32	8.00	0.25	1.47	3.23	2.73	2.07	3.40	11.27	13.00	9.02	8.48	0.013	10.7
4	CB-2 'B'	3	0.11	0.11	0.96	15	24,756	8.61	8.49	0.48	0.67	4.50	1.90	2.23	1.57	11.41	11.30	8.98	8.97	0.013	10.0
3	CB-3 'B'	Outfall	0.14	0.25	0.91	15	8,942	8.49	8.44	0.56	1.45	4.83	3.36	3.38	3.34	11.30	12.25	8.97 j	8.92	0.013	10.8
2	CB-1 'E'	Outfall	0.12	0.12	0.94	15	83,500	10.00	9.58	0.50	0.72	4.58	2.71	2.67	2.76	13.00	13.23	10.34	9.91	0.013	10.0
1	CB-9 'E'	Outfall	0.13	0.13	0.95	15	84,453	8.36	8.15	0.25	0.79	3.22	2.29	1.77	2.81	13.00	13.22	8.85	8.50	0.013	10.0

Project File: 2023-09-13 Pipe Calculations.stm
 Number of lines: 6
 Date: 9/13/2023

NOTES: ** Critical depth

APPENDIX F

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: Beachway Avenue Realty, LLC.

Address: 7 Heyward Hills Drive, Holmdel, NJ 07733

Phone: 732-888-3736

Email: tcritelli@danitom.com

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	2.16	96	93.5%	10

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	7.5"W	7.25	0.60	$Q=CA(2gh)^{0.5 2)}$
Orifice	6"H x 15.5"W	8.96	0.60	$Q=CA(2gh)^{0.5 2)}$
Orifice	6"H x 17"W	9.96	0.60	$Q=CA(2gh)^{0.5 2)}$

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)
7.25	0.000	0.00
8.00	0.065	0.98
8.56	0.123	1.48
9.06	0.176	1.93
9.56	0.227	3.87
9.97	0.265	5.00
10.58	0.305	8.21
11.00	0.329	9.92
11.15	0.337	10.44

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	41,923	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 G

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: 09/21/23

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: Beachway Avenue Realty. LLC

Applicant's address: 7 Heyward Hills Drive

Holmdel, NJ 07733

Telephone: 732-888-3736 Fax: _____

Email address: _____

Designer's name: Jason M. Fogler, P.E., MidAtlantic Engineering Partners LLC

Designer's address: 2026B Briggs Road, Suite 300

Mount Laurel, NJ 08054

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 Udorthents-Urban Land Complex (UdauB) which is categorized as Hydrologic Soil Group 'D'.

To accomplish these tasks, runoff from 2.16 acres of the 2.71 acre developed area is sent to one (1) subsurface stormwater management systems, while the remaining 0.55 acres of disturbed area is directed overland toward the existing collection system in Beachway Avenue. The system consists of three (3) proposed 36" perforated HDPE pipes each 360 LF 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:

3.2 Minimize Land Disturbance

Minimizing land disturbance is a nonstructural LID-BMP that can be applied during both the development's construction and post-construction phases. This section of the checklist helps identify those land disturbance strategies and nonstructural LID-BMPs that have been incorporated into the proposed development's design to minimize land disturbance and the resultant change in the site's hydrologic character.

A. Have inventories of existing site soils and slopes been performed? Yes: X No: _____

If yes, were these inventories factors in the site's layout and design? Yes: X No: _____

B. Does the development's design utilize any of the following nonstructural LID-BMPs?

Restrict permanent site disturbance by land owners? Yes: X No: _____

If yes, how: _____

Existing sand dunes are restricted from future disturbance.

Restrict temporary site disturbance during construction? Yes: X No: _____

If yes, how: _____

sand dunes will be preserved across 1%* of the site

Consider soils and slopes in selecting disturbance limits? N/A Yes: _____ No: _____

If yes, how: _____

C. Specify percentage of site to be cleared: 97.8% Regraded: 97.8%

D. Specify percentage of cleared areas done so for buildings: 33%

For driveways and parking: 43.4% For roadways: 0%

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 and a go kart track. 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: 22.5% HSG B: _____ HSG C: _____ HSG D: 77%

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?

77% of the project area is located within a HSG D.

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: 32%* Proposed: 79%*

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: 75 – Residential Regulations: RSIS – 192
124 – Public

*** Percentages based on 8.50 Ac. project area.**

F. Specify percentage of total site impervious cover created by buildings: 40%
By driveways and parking: 51.6% 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: 51.6% Buildings: _____ Driveways and parking: 100% Roads: _____

J. Specify percentage of total building roof area that will be vegetated: 0%

K. Specify percentage of total parking area located beneath buildings: 29%

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):

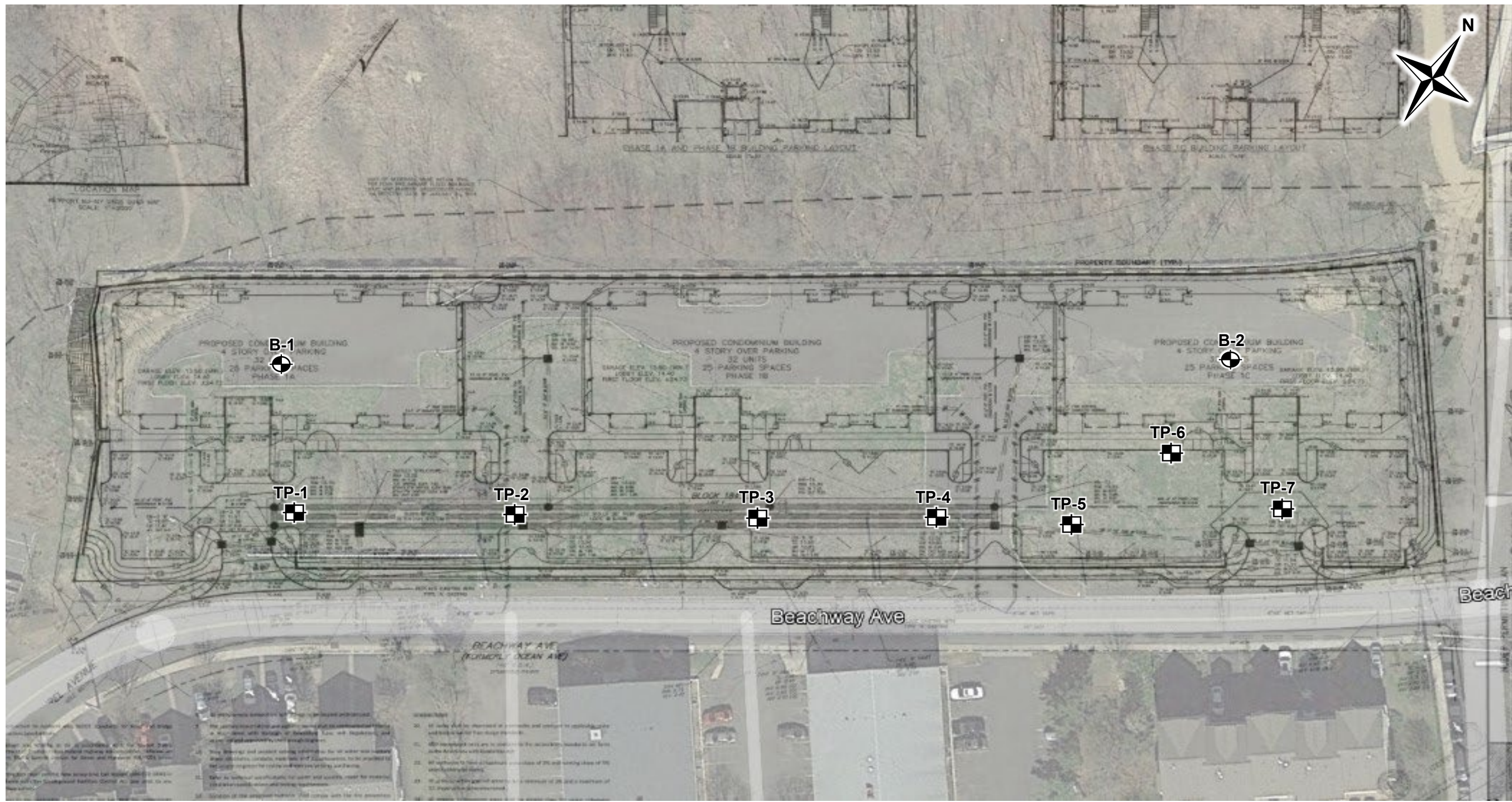
No.	Nonstructural Strategy	Yes	No
1.	Protect areas that provide water quality benefits or areas particularly susceptible to erosion and sediment loss.		X
2.	Minimize impervious surfaces and break up or disconnect the flow of runoff over impervious surfaces.	X	
3.	Maximize the protection of natural drainage 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 0.03 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. Parking areas 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 H

SOIL LOGS



*Base plan prepared by MidAtlantic Engineering Partners, LLC titled "Grading & Utility Plan" dated February 15, 2018 with a latest revision date of July 19, 2018.

LEGEND:

- B-X**  Indicates the numbers and approximate locations of borings performed by GTA for this study.
- TP-X**  Indicates the numbers and approximate locations of test pits performed by GTA for this study.

EXPLORATION LOCATION PLAN



14 Worlds Fair Drive, Suite A
Somerset, New Jersey 08873
(732) 271-9301
fax (732) 271-9306

GEO-TECHNOLOGY ASSOCIATES, INC.

**PROPOSED BEACHWAY AVENUE
WATERFRONT DEVELOPMENT**

Borough of Keansburg,
Monmouth County, New Jersey

Prepared For: Beachway Avenue Realty, LLC

DESIGN BY: *	DRAWN BY: AFS	REVIEWED BY: KTP
SCALE: NTS	DATE: MAY 2023	PROJECT #: 31230924

Figure 2

NOTES FOR EXPLORATION LOGS

KEY TO USCS TERMINOLOGY AND GRAPHIC SYMBOLS

MAJOR DIVISIONS (BASED UPON ASTM D 2488)			SYMBOLS		
			GRAPHIC	LETTER	
COARSE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LESS THAN 15% PASSING THE NO. 200 SIEVE)		GW	
		GRAVELS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)		GP	
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LESS THAN 15% PASSING THE NO. 200 SIEVE)		GM	
				GC	
		SANDS WITH FINES (MORE THAN 15% PASSING THE NO. 200 SIEVE)		SW	
				SP	
FINE-GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILT OR CLAY (<15% RETAINED ON THE NO. 200 SIEVE) SILT OR CLAY WITH SAND OR GRAVEL (15% TO 30% RETAINED ON THE NO. 200 SIEVE)	SILTS AND LEAN CLAYS LIQUID LIMIT LESS THAN 50		SM	
				SC	
		SANDY OR GRAVELLY SILT OR CLAY (>30% RETAINED ON THE NO. 200 SIEVE)	ELASTIC SILTS AND FAT CLAYS LIQUID LIMIT GREATER THAN 50		ML
					CL
			OL		
			MH		
		CH			
		OH			
HIGHLY ORGANIC SOILS				PT	

COARSE-GRAINED SOILS (GRAVEL AND SAND)

DESIGNATION	BLOWS PER FOOT (BPF) "N"
VERY LOOSE	0 - 4
LOOSE	5 - 10
MEDIUM DENSE	11 - 30
DENSE	31 - 50
VERY DENSE	>50

NOTE: "N" VALUE DETERMINED AS PER ASTM D 1586

FINE-GRAINED SOILS (SILT AND CLAY)

CONSISTENCY	BPF "N"
VERY SOFT	<2
SOFT	2 - 4
MEDIUM STIFF	5 - 8
STIFF	9 - 15
VERY STIFF	16 - 30
HARD	>30

NOTE: ADDITIONAL DESIGNATIONS TO ADVANCE SAMPLER INDICATED IN BLOW COUNT COLUMN:
 WOH = WEIGHT OF HAMMER
 WOR = WEIGHT OF ROD(S)

SAMPLE TYPE

DESIGNATION	SYMBOL
SOIL SAMPLE	S-
SHELBY TUBE	U-
ROCK CORE	R-

NOTE: DUAL SYMBOLS ARE USED TO INDICATE COARSE-GRAINED SOILS WHICH CONTAIN AN ESTIMATED 5 TO 15% FINES BASED ON VISUAL CLASSIFICATION OR BETWEEN 5 AND 12% FINES BASED ON LABORATORY TESTING; AND FINE-GRAINED SOILS WHEN THE PLOT OF LIQUID LIMIT & PLASTICITY INDEX VALUES FALLS IN THE PLASTICITY CHART'S CROSS-HATCHED AREA. FINE-GRAINED SOILS ARE CLASSIFIED AS ORGANIC (OL OR OH) WHEN ENOUGH ORGANIC PARTICLES ARE PRESENT TO INFLUENCE ITS PROPERTIES. LABORATORY TEST RESULTS ARE USED TO SUPPLEMENT SOIL CLASSIFICATION BY THE VISUAL-MANUAL PROCEDURES OF ASTM D 2488.

ADDITIONAL TERMINOLOGY AND GRAPHIC SYMBOLS

ADDITIONAL DESIGNATIONS	DESCRIPTION		GRAPHIC SYMBOLS
	TOPSOIL		
	MAN MADE FILL		
	GLACIAL TILL		
	COBBLES AND BOULDERS		
RESIDUAL SOIL DESIGNATIONS	DESCRIPTION	"N" VALUE	GRAPHIC SYMBOLS
	HIGHLY WEATHERED ROCK	50 TO 50/1"	
	PARTIALLY WEATHERED ROCK	MORE THAN 50 BLOWS FOR 1" OF PENETRATION OR LESS, AUGER PENETRABLE	

WATER DESIGNATION

DESCRIPTION	SYMBOL
ENCOUNTERED DURING DRILLING	
UPON COMPLETION OF DRILLING	
24 HOURS AFTER COMPLETION	

NOTE: WATER OBSERVATIONS WERE MADE AT THE TIME INDICATED. POROSITY OF SOIL STRATA, WEATHER CONDITIONS, SITE TOPOGRAPHY, ETC. MAY CAUSE WATER LEVEL CHANGES.

LOG OF BORING NO. B-1

Sheet 1 of 1

PROJECT: **Proposed Beachway Avenue Waterfront Development**
 PROJECT NO.: **31230924**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, NJ**
 DATE STARTED: **5/5/2023**
 DATE COMPLETED: **5/5/2023**
 DRILLING CONTRACTOR: **Environmental Technical Drilling, Inc.**
 DRILLER: **Scott P.**
 DRILLING METHOD: **Mud Rotary**
 SAMPLING METHOD: **Split-Spoon**

WATER LEVEL (ft): ∇ **6 Ft.** ∇ **N/A** ∇ **N/A**
 DATE: **5/5/2023** **5/5/2023** **-**
 CAVED (ft): **In casing** **8 Ft.** **BOC**

GROUND SURFACE ELEVATION: **11 Ft.**
 DATUM: **Google Earth**
 EQUIPMENT: **CME 45**
 HAMMER TYPE: **Automatic**
 LOGGED BY: **AFS**
 CHECKED BY: **KTP**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
					11.0	0			4 In. of Pavement		
1	0.0	21	11-23-39-24	62	10.7				FILL - Dark brown, moist, very dense, silty sand with gravel and with wood, concrete fragments		
2	2.0	10	10-23-15-15	38					- dense at 2 Ft.		
3	4.0	20	8-8-7-6	15					- medium dense, gravel grades out at 4 Ft.		∇
4	6.0	13	4-4-4-4	8	5.0		SP-SM		Dark yellow-brown, wet, loose, Poorly-graded SAND with silt		
5	8.0	24	3-3-3-3	6					- medium dense at 10 Ft.		
6	10.0	24	7-11-11-9	22					- Gray brown at 15 Ft.		
7	15.0	10	4-5-6-7	11							
8	20.0	8	2-2-2-2	4	-9.0	20	SP		Gray brown, wet, very loose, Poorly-graded SAND with gravel		- NMC = 20.4%
9	25.0	10	2-3-3-4	6	-14.0		CL		Gray-brown, moist, medium stiff, Lean CLAY with sand		
10	30.0	24	3-6-7-10	13					- stiff, with gravel at 30 Ft.		
11	35.0	18	3-5-8-12	13					- dark gray to black, gravel grades out at 35 Ft.		
12	40.0	24	4-7-10-13	17					- very stiff at 40 Ft.		
13	45.0	18	5-10-12-16	22							
14	47.0	24	15-22-18-29	40					- hard at 47 Ft.		
					-38.0	50			Boring complete at 49 Ft.		
						60					

NOTES: **Location and elevation are approximate.**
BOC: Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF BORING NO. B-1

Sheet 1 of 1

LOG OF BORING NO. B-2

PROJECT: **Proposed Beachway Avenue Waterfront Development**
 PROJECT NO.: **31230924**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, NJ**
 DATE STARTED: **5/5/2023**
 DATE COMPLETED: **5/5/2023**
 DRILLING CONTRACTOR: **Environmental Technical Drilling, Inc.**
 DRILLER: **Scott P.**
 DRILLING METHOD: **Mud Rotary**
 SAMPLING METHOD: **Split-Spoon**

WATER LEVEL (ft): ∇ **7 Ft.** ∇ **N/A** ∇ **N/A**
 DATE: **5/5/2023** **5/5/2023** **-**
 CAVED (ft): **In casing** **10 Ft.** **BOC**
 GROUND SURFACE ELEVATION: **11 Ft.**
 DATUM: **Google Earth**
 EQUIPMENT: **CME 45**
 HAMMER TYPE: **Automatic**
 LOGGED BY: **AFS**
 CHECKED BY: **KTP**

SAMPLE NUMBER	SAMPLE DEPTH (ft.)	SAMPLE RECOVERY (in.)	SAMPLE BLOWS/6 inches	N (blows/ft.)	ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION		REMARKS
									DESCRIPTION		
					11.0	0			4 In. of Asphalt		
1	0.0	19	8-11-18-21	29	10.7				FILL - Dark yellow-brown, moist, medium dense, silty sand with gravel and with brick, concrete fragments		- NMC = 11.3%
2	2.0	9	12-5-3-3	8				- loose at 2 Ft.			
3	4.0	15	3-3-6-5	9					- Dark yellow-brown and dark brown, moist, loose, poorly-graded sand with silt and roots		∇
4	6.0	12	3-11-8-8	19	5.0		SP-SM	Dark yellow-brown, moist, medium dense, Poorly-graded SAND with silt			
5	8.0	20	5-5-6-5	11					- wet at 7 Ft.		- NMC = 24.6%
6	10.0	18	3-3-3-5	6				- loose at 10 Ft.			
7	15.0	16	5-8-9-9	17					- medium dense at 15 Ft.		
8	20.0	10	4-4-6-10	10					- loose at 20 Ft.		
9	25.0	12	11-15-10-4	25							
					-16.5			CL	Gray-brown, moist, medium stiff, Lean CLAY with sand		
10	30.0	24	3-5-10-11	15					- dark gray to black, stiff at 30 Ft.		
11	35.0	18	2-5-7-8	12							
12	40.0	24	4-8-11-14	19					- very stiff at 40 Ft.		
13	45.0	24	4-8-11-18	19							
14	47.0	24	7-11-13-13	24							
					-38.0	50			Boring complete at 49 Ft.		
						60					

NOTES: **Location and elevation are approximate.**
BOC: Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF BORING NO. B-2





LOG OF TEST PIT NO. TP-1

PROJECT: **Proposed Beachway Avenue Waterfront Development**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **Beachway Avenue Realty, LLC**

PROJECT NO.: **31230924**

DATE STARTED: **5/11/2023**
 DATE COMPLETED: **5/11/2023**
 CONTRACTOR: **J.A. Neary Excavating**
 EQUIPMENT: **Case 580 Super N**

GROUNDWATER ENCOUNTERED: **9 Ft.**
 GROUND SURFACE ELEVATION: **12 Ft.**
 DATUM: **Google Earth**
 LOGGED BY: **SR**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
11.6	0			5 In. of Topsoil	
	2			FILL - Brown (10YR 4/3) and gray (10YR 6/1), moist, silty sand with gravel and brick fragments [Sandy Loam per USDA] - Dark yellow-brown (10YR 4/6) and gray (10YR 6/1), gravel grades out at 3-1/2 Ft. - Dark brown (10YR 3/3) at 5 Ft.	
5.0	8	SP-SM		Yellow-brown (10YR 5/6), moist, Poorly-graded SAND with silt [Sand per USDA] - wet at 9 Ft.	- Infiltration rate = 72 in/hr at 7 Ft. 
2.5	10			Test pit complete at 9-1/2 Ft.	
	12				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



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LOG OF TEST PIT NO. TP-1



LOG OF TEST PIT NO. TP-2

PROJECT: **Proposed Beachway Avenue Waterfront Development**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **Beachway Avenue Realty, LLC**

PROJECT NO.: **31230924**

DATE STARTED: **5/11/2023**
 DATE COMPLETED: **5/11/2023**
 CONTRACTOR: **J.A. Neary Excavating**
 EQUIPMENT: **Case 580 Super N**

GROUNDWATER ENCOUNTERED: **8 Ft.**
 GROUND SURFACE ELEVATION: **12 Ft.**
 DATUM: **Google Earth**
 LOGGED BY: **SR**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
11.7	0			4 In. of Topsoil	
	2			FILL - Dark brown (10YR 3/3) and gray (10YR 6/1), moist, silty sand with gravel [Sandy Loam per USDA]	
	4				- Hard excavating at 3-1/2 Ft.
	6			- Dark brown (10YR 3/3) at 5-1/2 Ft.	- Infiltration rate = 0.5 in/hr at 6 Ft.
	8			- with pipe and concrete slab, gravel grades out at 7 Ft. - Very dark gray (10YR 3/1) at 7-1/2 Ft.	▼ Rapid water seepage at 8 Ft.
3.5				Test pit complete at 8-1/2 Ft. due to rapid water water seepage.	
	10				
	12				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.
 14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-2

LOG OF TEST PIT NO. TP-3

Sheet 1 of 1

PROJECT: **Proposed Beachway Avenue Waterfront Development**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **Beachway Avenue Realty, LLC**

PROJECT NO.: **31230924**

DATE STARTED: **5/11/2023**
 DATE COMPLETED: **5/11/2023**
 CONTRACTOR: **J.A. Neary Excavating**
 EQUIPMENT: **Case 580 Super N**

GROUNDWATER ENCOUNTERED: **7 Ft.**
 GROUND SURFACE ELEVATION: **12 Ft.**
 DATUM: **Google Earth**
 LOGGED BY: **SR**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
11.8	0			3 In. of Topsoil	
	2			FILL - Dark brown (10YR 3/3) and gray (10YR 6/1), moist, silty sand with gravel [Sandy Loam per USDA]	
	4			- Dark yellow-brown (10YR 4/6) at 4-1/2 Ft.	
	6			- with wood and concrete at 5-1/2 Ft.	- Infiltration rate = 24 in/hr at 5 Ft.
5.0		SP-SM		Yellow-brown (10YR 5/6) and gray-brown (10YR 5/2), wet, Poorly-graded SAND with silt [Sand per USDA]	▼ Rapid water seepage at 7 Ft.
4.5	8			Test pit complete at 7-1/2 Ft. due to rapid water seepage.	
	10				
	12				

NOTES: **Location and elevation 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

Sheet 1 of 1



LOG OF TEST PIT NO. TP-4

PROJECT: **Proposed Beachway Avenue Waterfront Development**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **Beachway Avenue Realty, LLC**

PROJECT NO.: **31230924**

DATE STARTED: **5/11/2023**
 DATE COMPLETED: **5/11/2023**
 CONTRACTOR: **J.A. Neary Excavating**
 EQUIPMENT: **Case 580 Super N**

GROUNDWATER ENCOUNTERED: **7 Ft.**
 GROUND SURFACE ELEVATION: **10 Ft.**
 DATUM: **Google Earth**
 LOGGED BY: **SR**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
9.7	0			4 In. of Topsoil	
	2			FILL - Dark brown (10YR 3/3) and gray (10YR 6/1), moist, silty sand with concrete and brick fragments [Sandy Loam per USDA]	
	4			- Dark brown (10YR 3/3) and yellow (10YR 7/6) at 3-1/2 Ft.	
	6			- Yellow-brown (10YR 5/6) and gray (10YR 6/1), with roots at 5 Ft.	- Infiltration rate = 18 in/hr at 5 Ft.
2.5	8			Test pit complete at 7-1/2 Ft. due to rapid water seepage and sidewall collapse.	▼ Sidewall collapse at 7 Ft. - Rapid water seepage at 7 Ft.
	10				
	12				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



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 14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-4

LOG OF TEST PIT NO. TP-5

Sheet 1 of 1

PROJECT: **Proposed Beachway Avenue Waterfront Development**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **Beachway Avenue Realty, LLC**

PROJECT NO.: **31230924**

DATE STARTED: **5/11/2023**
 DATE COMPLETED: **5/11/2023**
 CONTRACTOR: **J.A. Neary Excavating**
 EQUIPMENT: **Case 580 Super N**

GROUNDWATER ENCOUNTERED: **6 Ft.**
 GROUND SURFACE ELEVATION: **11 Ft.**
 DATUM: **Google Earth**
 LOGGED BY: **SR**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
10.8	0		[Cross-hatch symbol]	3 In. of Topsoil FILL - Dark brown, moist, silty sand with gravel and plastic fragments	
	2		[Cross-hatch symbol]	- Dark orange brown at 3 Ft.	
7.5	4	SP-SM	[Dotted symbol]	Yellow and gray, moist, Poorly-graded SAND with silt	
4.5	6			Test pit complete at 6-1/2 Ft. due to rapid water seepage.	▼ Rapid water seepage at 6 Ft.
	8				
	10				
	12				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



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14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-5

Sheet 1 of 1

LOG OF TEST PIT NO. TP-6

Sheet 1 of 1

PROJECT: **Proposed Beachway Avenue Waterfront Development**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **Beachway Avenue Realty, LLC**

PROJECT NO.: **31230924**

DATE STARTED: **5/11/2023**
 DATE COMPLETED: **5/11/2023**
 CONTRACTOR: **J.A. Neary Excavating**
 EQUIPMENT: **Case 580 Super N**

GROUNDWATER ENCOUNTERED: **9 Ft.**
 GROUND SURFACE ELEVATION: **12 Ft.**
 DATUM: **Google Earth**
 LOGGED BY: **SR**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
11.8	0		[Cross-hatch symbol]	3 In. of Topsoil FILL - Dark brown, moist, silty sand with gravel	
	2		[Cross-hatch symbol]	- Dark orange-brown at 3-1/2 Ft.	
8.0	4	SP-SM	[Dotted symbol]	Yellow-brown and gray, moist, Poorly-graded SAND with silt	
	6		[Dotted symbol]		
	8		[Dotted symbol]		
2.5	10		[Dotted symbol]	Test pit complete at 9-1/2 Ft. due to rapid water seepage and sidewall collapse.	▼ Rapid water seepage at 9 Ft.
	12				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



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14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-6

Sheet 1 of 1

LOG OF TEST PIT NO. TP-7

Sheet 1 of 1

PROJECT: **Proposed Beachway Avenue Waterfront Development**
 PROJECT LOCATION: **Borough of Keansburg, Monmouth County, New Jersey**
 CLIENT: **Beachway Avenue Realty, LLC**

PROJECT NO.: **31230924**

DATE STARTED: **5/11/2023**
 DATE COMPLETED: **5/11/2023**
 CONTRACTOR: **J.A. Neary Excavating**
 EQUIPMENT: **Case 580 Super N**

GROUNDWATER ENCOUNTERED: **8 Ft.**
 GROUND SURFACE ELEVATION: **12 Ft.**
 DATUM: **Google Earth**
 LOGGED BY: **SR**
 CHECKED BY: **KTP**

ELEVATION (ft.)	DEPTH (ft.)	USCS	GRAPHIC SYMBOL	DESCRIPTION	REMARKS
11.7	0		[Cross-hatch symbol]	4 In. of Topsoil	
	2		[Cross-hatch symbol]	FILL - Dark brown, moist, silty sand with gravel	
	3		[Cross-hatch symbol]	- Dark orange-brown at 3 Ft.	
8.5	4	SP-SM	[Dotted symbol]	Yellow-brown and gray, moist, Poorly-graded SAND with silt	
4.0	8			Test pit complete at 8 Ft. due to sidewall collapse.	▼ Rapid water seepage at 8 Ft.
	10				
	12				

NOTES: **Location and elevation are approximate.**
Backfilled on completion.



GEO-TECHNOLOGY ASSOCIATES, INC.

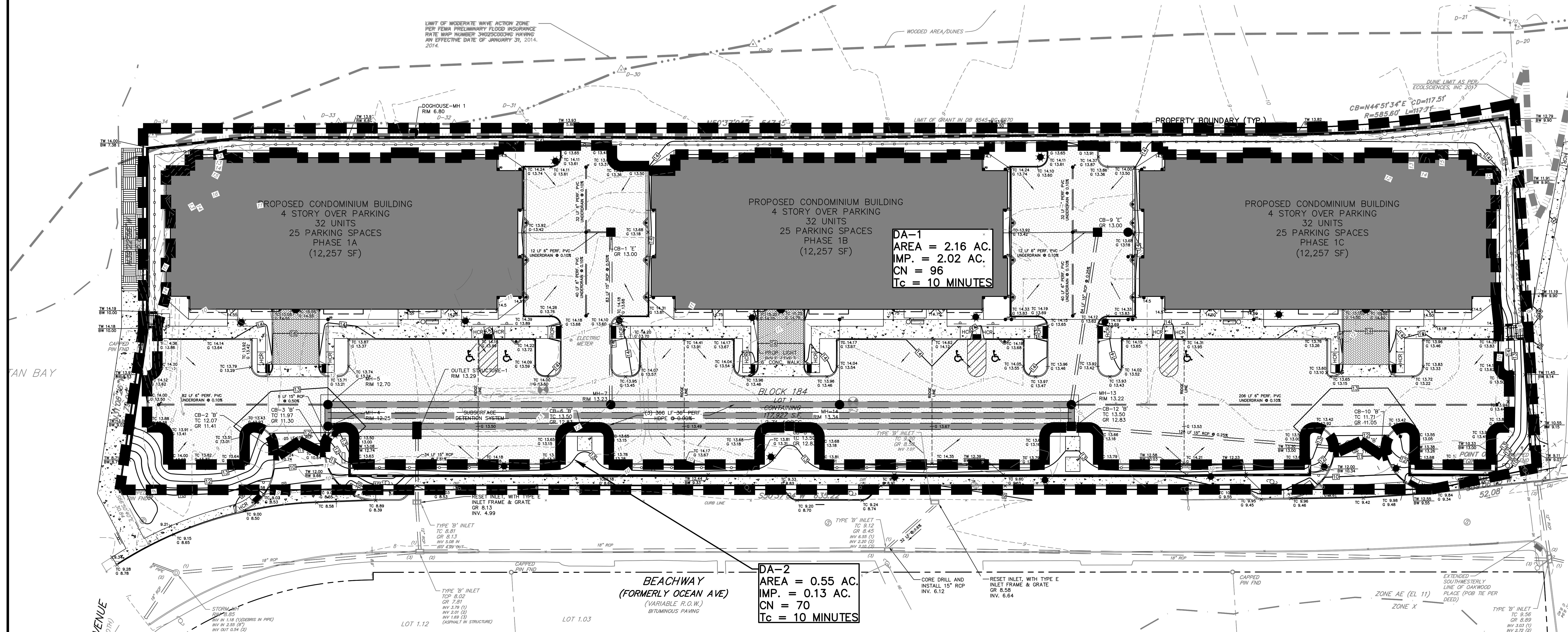
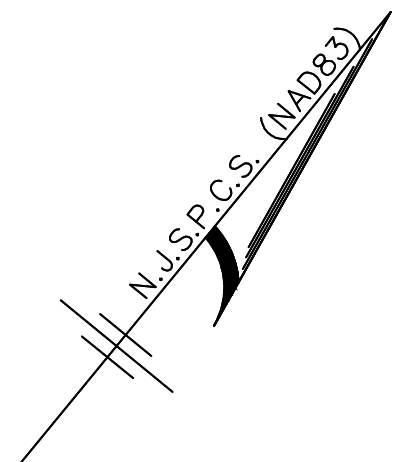
14 Worlds Fair Drive, Suite A
 Somerset, NJ 08873

LOG OF TEST PIT NO. TP-7

Sheet 1 of 1

APPENDIX I

DRAINAGE AREA MAPS



AN BAY

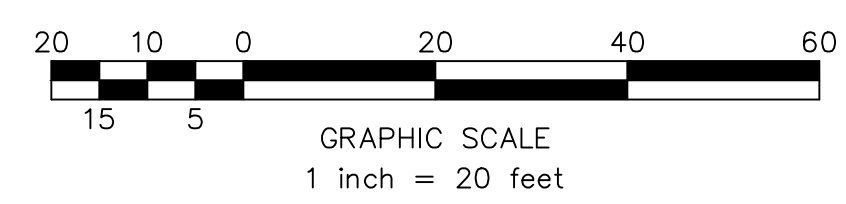
VENUE
(17th)

DA-2
 AREA = 0.55 AC.
 IMP. = 0.13 AC.
 CN = 70
 Tc = 10 MINUTES

DA-1
 AREA = 2.16 AC.
 IMP. = 2.02 AC.
 CN = 96
 Tc = 10 MINUTES

LEGEND

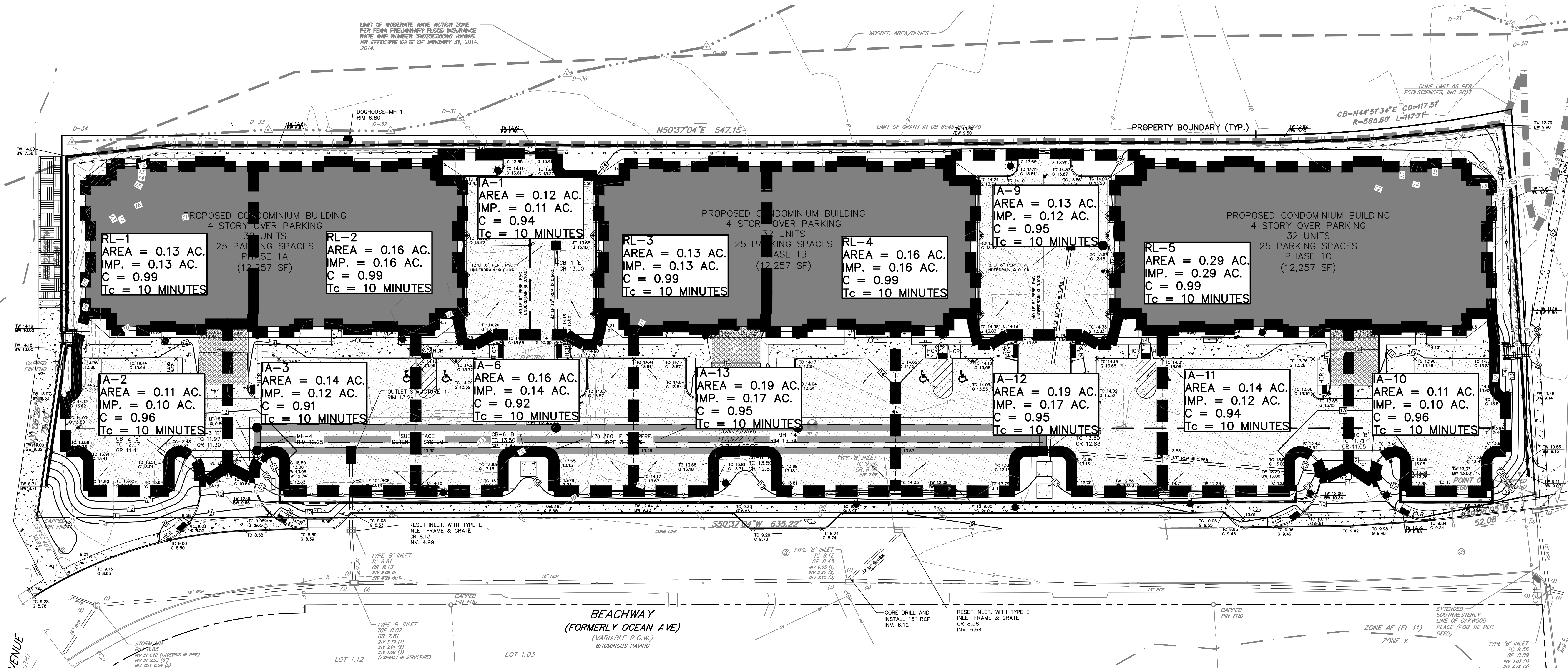
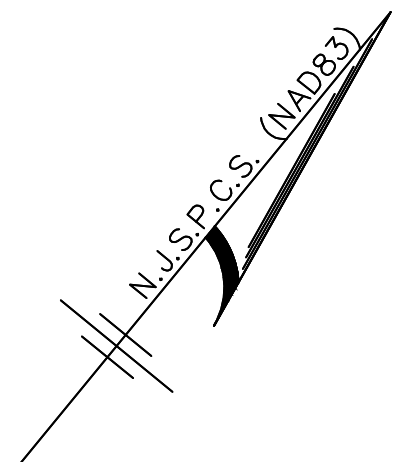
- EXISTING CONTOUR
- PROPOSED CONTOUR
- EXISTING SPOT ELEVATION
- PROPOSED SPOT ELEVATION
- EXISTING SANITARY SEWER LINE
- PROPOSED SANITARY SEWER LINE
- EXISTING STORM SEWER LINE
- PROPOSED STORM SEWER LINE
- EXISTING INLET
- PROPOSED INLET
- PROPOSED MANHOLE
- EXISTING SANITARY MANHOLE
- PROPOSED SANITARY MANHOLE
- 100-YR WATER SURFACE ELEV.
- PROPOSED STORM CLEANOUT
- PROPOSED INSPECTION PORT
- FLOW ARROW



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

MidAtlantic
Engineering Partners
 977 Highway 4, Suite 301
 Marlton, NJ 08053
 610-985-0200
 609-910-4400
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 973-715-8602

DRAWN BY:	PFB
CHECKED BY:	MJB
HORIZONTAL SCALE:	1" = 20'
VERTICAL SCALE:	N/A
PROJECT No.:	BAR-2301
DATE:	03/12/24
REVISIONS:	
DATE:	
DRAWN BY CHECKED BY:	

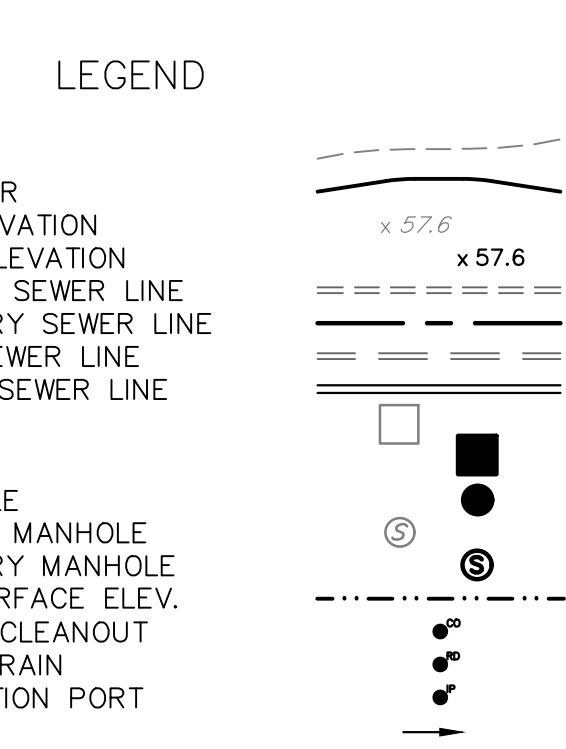


AN BAY

VENUE
(17th)

BEACHWAY
(FORMERLY OCEAN AVE)
(VARIABLE R.O.W.)
BITUMINOUS PAVING

LOT 1.12
LOT 1.03



DATE	03/12/24
REVISIONS	
DRAWN BY	MJB
CHECKED BY	MJB
HORIZONTAL SCALE:	1" = 20'
VERTICAL SCALE:	N/A
PROJECT No.:	BAR-2301
DATE:	03/12/24

PRELIMINARY/FINAL MAJOR SITE PLAN
 BEACHWAY AVENUE WATERFRONT REDEVELOPMENT
 BLOCK 184; LOT 1
 POST-DEVELOPMENT INLET AREA MAP
 SITUATED IN
 BOROUGH OF KEANSBURG, MONMOUTH COUNTY, NEW JERSEY

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