

# STORMWATER MANAGEMENT REPORT

for:

## 100 Prospect Street

**Block: 152**

**Lots: 51.01 & 51.02**

**Borough of Metuchen**

**Middlesex County, New Jersey**

### Prepared By:

Menlo Engineering Associates, Inc

261 Cleveland Avenue

Highland Park, New Jersey 08904

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F.: 732.846.9439

### Under the Immediate Supervision of:



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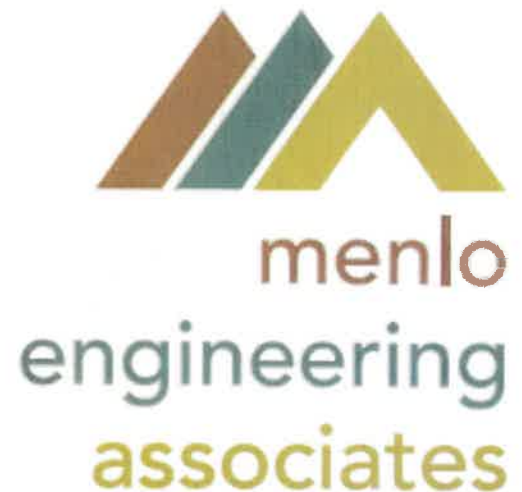
William A. Lane  
NJPE# 40262

WAL/je

MEA # 2022.004

Dated: 3/17/2023

Revised: May 23, 2023



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## **INTRODUCTION**

The following Stormwater Management Report details the design of the stormwater management plan for a proposed building addition located in the Borough of Metuchen, Middlesex County, New Jersey and has been prepared by Menlo Engineering Associates, Inc. in accordance with the standards of the Borough of Metuchen, the County of Middlesex, the New Jersey Soil Conservation Service, and the New Jersey Department of Environmental Protection. This report supplements, and should be reviewed in conjunction with, the project development plans prepared by Menlo Engineering Associates, Inc.

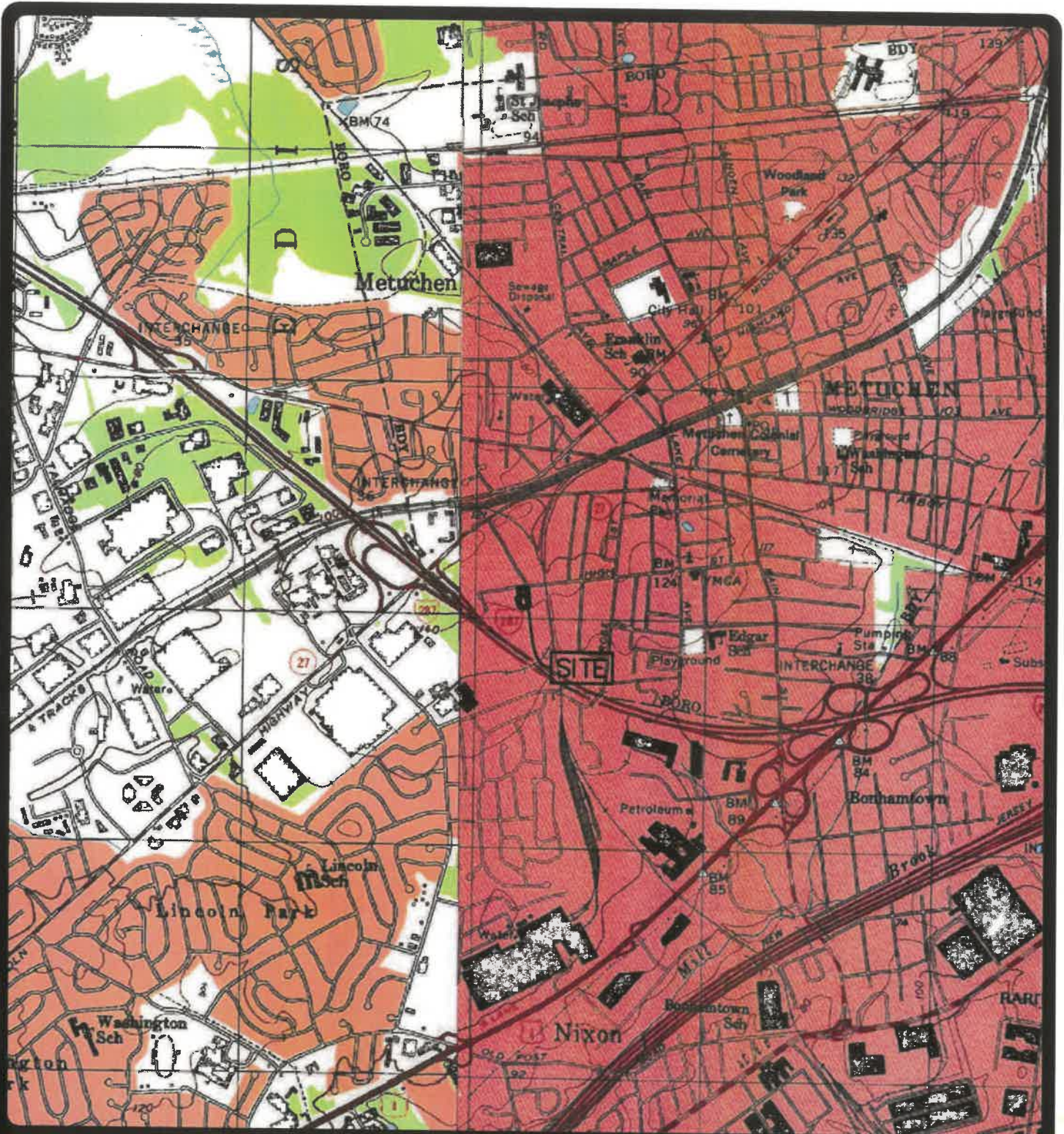
It is the intent of this report to aid and assist Engineers at the Municipal, County, and State levels in evaluating the drainage calculations and considerations incorporated in the design as shown on the plans submitted. This office will readily respond to questions and requests for additional calculations or verification of the proposed design by Municipal, County, or State Engineers, and will be responsive to their suggestions and modifications to the design in conformance to the applicable codes in the interest of land use control consistent with environmental protection.

## **CRITERIA**

In the hydraulic designs involved in this project, the drainage areas have been determined by electronic digitizer from the U.S.G.S. Quadrangle map, topographic survey prepared by Engineering & Land Planning Associates, Inc. and field observations to determine basin limits and off-site and on-site areas. The Soil Conservation Service Soil Survey maps are used for hydrological soil group classification. Existing and proposed conditions are calculated for the 2, 10, 25 and 100-year flows. On-site storm sewer collection systems were sized for the 25-year storm and employed the Rational Method for design calculations.

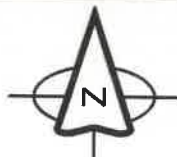
## **PROJECT LOCATION & DESCRIPTION**

This report examines the drainage characteristics and designs for a 0.76-acre tract of land situated in the Borough of Metuchen, Middlesex County, New Jersey. The applicant proposes an 8,972-sf building addition and associated parking lot. The site is located on the corner of Prospect Street and High Street. The property consists of a 10,000-sf building with a gravel parking lot. Access to the building will be provided on Prospect Street.



# U.S.G.S. MAP

Quad Name: Perth Amboy  
 Metuchen Township  
 Middlesex County

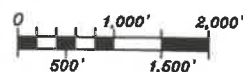


BLOCK  
 152

LOT  
 51.01  
 &  
 51.02

**MENLO ENGINEERING ASSOCIATES, INC.**  
 261 CLEVELAND AVENUE  
 HIGHLAND PARK, NJ 08904  
 (732) 846-8585

State Plane Coordinates:  
 N: 619,043.46 ft.  
 E: 527,751.51 ft.



Scale: 1"=2,000±ft Job # 2022.004

Soil Map—Middlesex County, New Jersey



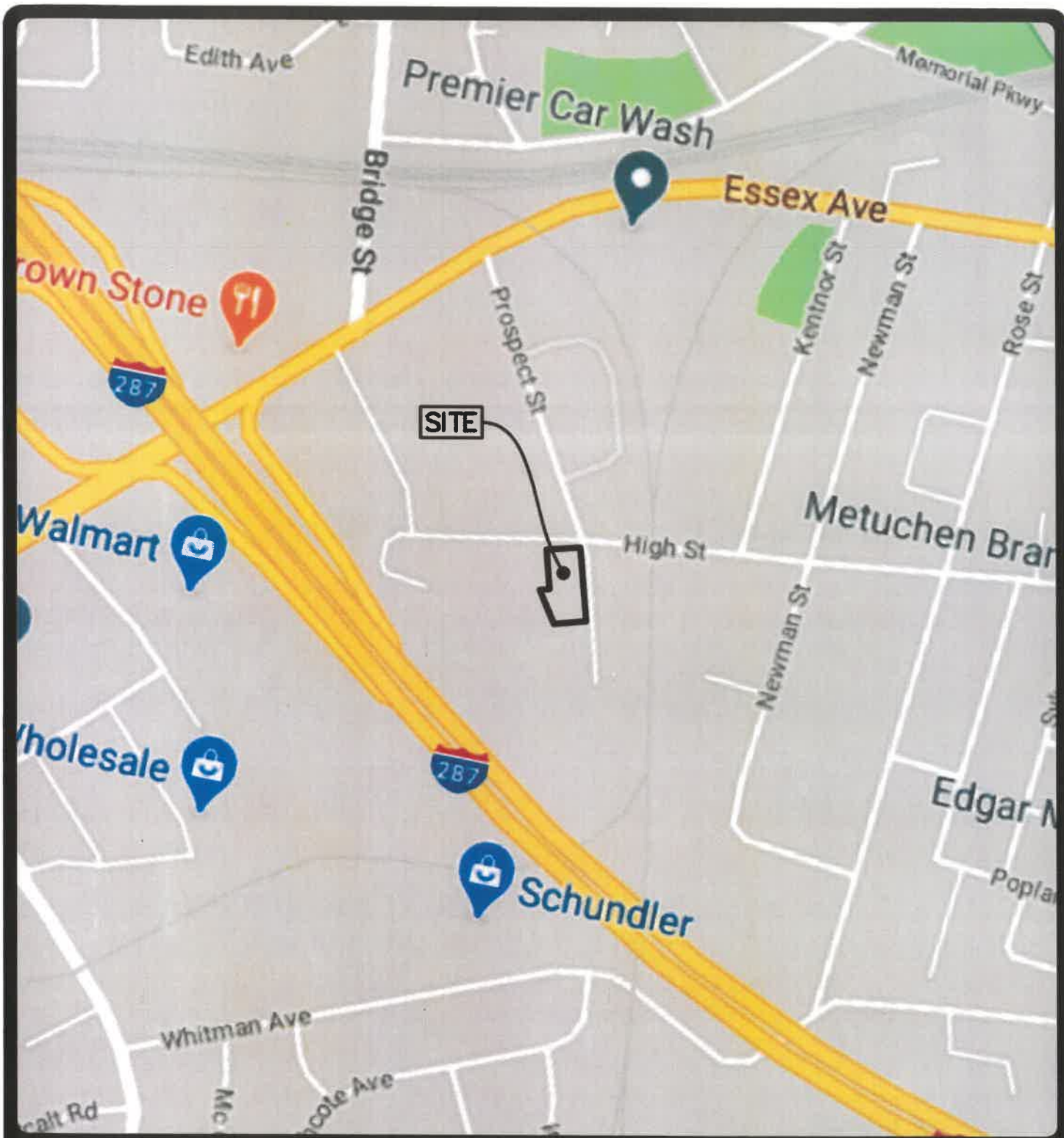
Map Scale: 1:542 if printed on A portrait (8.5" x 11") sheet.

0 5 10 20 30 Meters

0 25 50 100 150 Feet

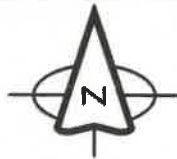
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84





# ROAD MAP

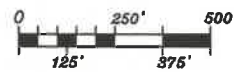
Metuchen Township  
Middlesex County



BLOCK  
152

LOT  
51.01  
&  
51.02

MENLO ENGINEERING ASSOCIATES, INC.  
261 CLEVELAND AVENUE  
HIGHLAND PARK, NJ 08904  
(732) 846-8585



Scale: 1" = 500± ft

Job # 2022.004

## **STORMWATER MANAGEMENT PLAN & DESIGN**

The guidelines for hydraulic design, as prepared by the Soil Conservation District, the Borough of Metuchen, Middlesex County and the New Jersey Department of Environmental Protection have been utilized for the drainage design of this project. The purpose of the drainage design is for the post-development peak drainage flow pattern to continue, as it exists today.

While the proposed development is not classified as a major development, the applicant proposes to incorporate water quantity and water quality through the use of pervious pavement.

### **Summary of the Runoff Analysis:**

The existing site generally drains into an existing stormwater system northeast of the site. The following area are shown in the Existing Drainage Area Map.

- The existing building has roof leaders on the eastern face, which will continue to drain the same.
- Existing Drainage Area A consists of existing motor vehicle gravel area.
- Existing Drainage Area B consists of existing motor vehicle pavement area.
- Existing Drainage Area C consists of the area south of the existing building, which drains towards the southern face of the building, which then drains west and east of the building, where they both ultimately drain into the existing stormwater system.

The proposed site will generally maintain the existing pattern. The follow areas are shown in the Proposed Drainage Area Map.

- Proposed Drainage Area A is proposed to change from motor vehicle gravel area to grass area.
- Proposed Drainage Area B is proposed to change from motor vehicle pavement area to grass area.
- Proposed Drainage Area C, consists of the western portion of the proposed building addition and the canopy over the loading area, will be collected and drain into the proposed pervious pavement.
- Proposed Drainage Area D, consists of the eastern portion of the building addition, will be collected with roof leaders and tie into the proposed stormwater conveyance located parallel to the east face of the building, which will tie into the existing storm system
- Proposed Drainage Area E, consists of an area to the east of the proposed building, which was previously motor vehicle surface and grass and will be converted to grass area and stairs. It will continue to flow overland.

In accordance with N.J.A.C. 7:8-5.4(a)3; the stormwater management system for the proposed development has been designed to control stormwater runoff quantity impacts. The post-construction peak runoff rates for the 100, 10 and 2-year storm events are 80, 75 and 50 percent, respectively, of the pre-construction peak runoff rates. 24-hour rainfall rates from NOAA have been used for analysis to calculate durations and intensities through NCRS Method.

**Summary Tables:**

The following tables summarize the reduction of runoff for the 2, 10, 25, and 100-year storm events:

**EXISTING & PROPOSED CONDITIONS**

STORM	EXISTING RUNOFF (CFS)	ALLOWED RUNOFF	TOTAL PROPOSED	PERCENT REDUCTION	CONDITION
100	3.18	2.48	2.14	25%	COMPLIES
25	2.27	-	0.96	39%	COMPLIES
10	1.77	1.33	0.70	46%	COMPLIES
2	1.05	0.53	0.42	50%	COMPLIES

**Summary of the Groundwater Recharge Analysis:**

The existing site and proposed development are located within the metropolitan planning area; therefore groundwater recharge requirement does not apply to this development.

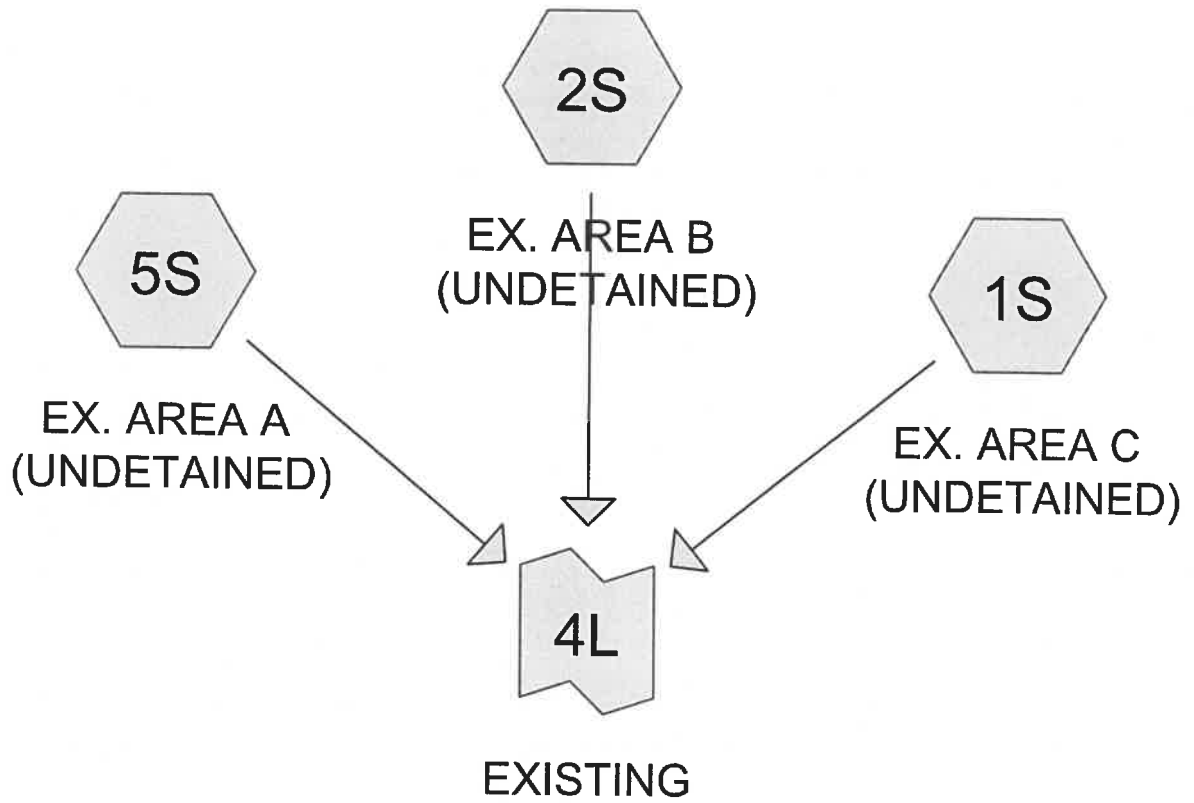
**Summary of the Water Quality Analysis:**

To merit the approved TSS removal rate of 80%, pervious paving systems must be designed to treat the WQDS and in accordance with the criteria provided in the New Jersey Stormwater Best Management Practices Manual Chapter 9.6. The porous pavement meets the requirements and provides water quality.

See Appendix D for Water Quality Map.



**APPENDIX A: EXISTING CONDITIONS**



**2022.004-EXISTING**

Prepared by Menlo Engineering Associates

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EXISTING

NOAA 24-hr D 2-Year Rainfall=3.35"

Printed 5/31/2023

**Summary for Subcatchment 1S: EX. AREA C (UNDETAINED)**

Runoff = 0.94 cfs @ 12.11 hrs, Volume= 0.062 af, Depth> 2.06"  
 Routed to Link 4L : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 2-Year Rainfall=3.35"

Area (ac)	CN	Description
0.240	96	Gravel surface, HSG C
0.120	74	>75% Grass cover, Good, HSG C
0.360	89	Weighted Average
0.360	89	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	47	0.0787	0.26		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.35"
0.5	94	0.0319	2.88		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.2	25	0.0256	2.40		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
0.3	4	0.0001	0.20		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.2	49	0.0643	3.80		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
0.2	57	0.0689	5.33		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.4	276	Total			

**2022.004-EXISTING**

Prepared by Menlo Engineering Associates

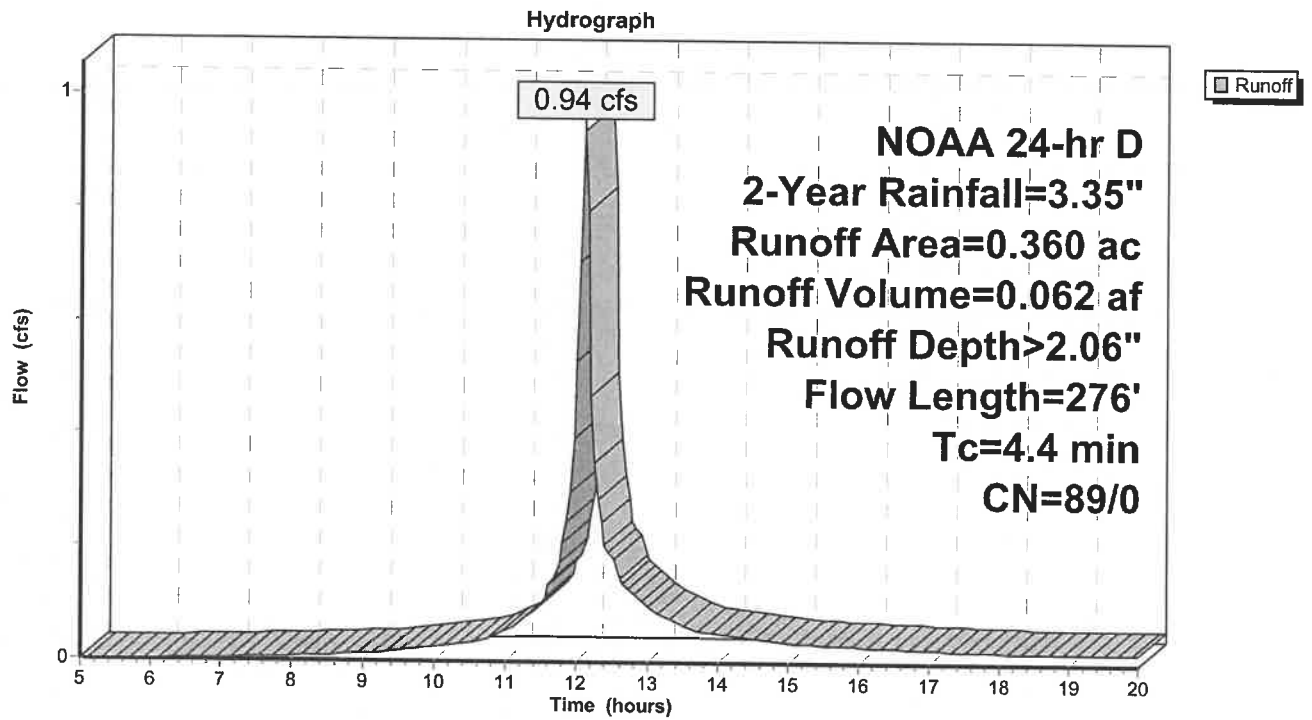
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EXISTING

NOAA 24-hr D 2-Year Rainfall=3.35"

Printed 5/31/2023

**Subcatchment 1S: EX. AREA C (UNDETAINED)**



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NOAA 24-hr D 2-Year Rainfall=3.35"

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**Summary for Subcatchment 2S: EX. AREA B (UNDETAINED)**

Runoff = 0.03 cfs @ 12.05 hrs, Volume= 0.002 af, Depth> 2.85"  
Routed to Link 4L : EXISTING

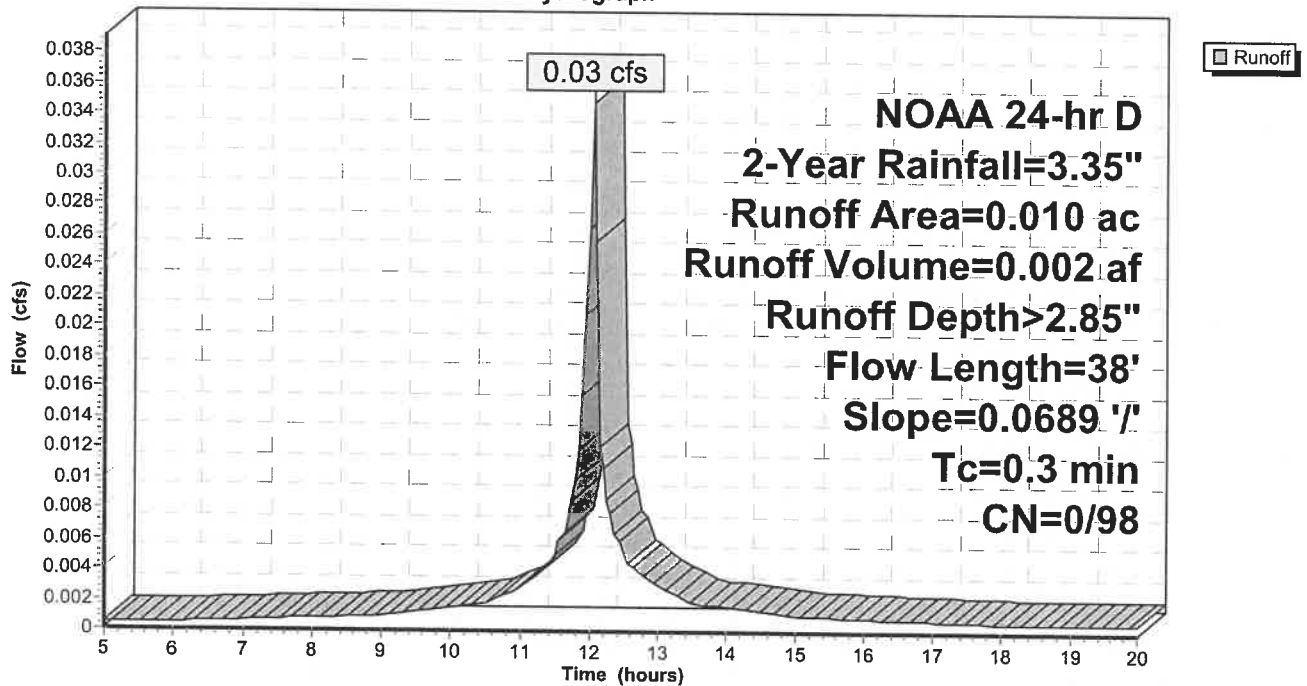
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 2-Year Rainfall=3.35"

Area (ac)	CN	Description
* 0.010	98	Impervious
0.010	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	38	0.0689	1.90		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.35"

**Subcatchment 2S: EX. AREA B (UNDETAINED)**

Hydrograph



**2022.004-EXISTING**

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NOAA 24-hr D 2-Year Rainfall=3.35"

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**Summary for Subcatchment 5S: EX. AREA A (UNDETAINED)**

Runoff = 0.10 cfs @ 12.06 hrs, Volume= 0.007 af, Depth> 2.69"  
Routed to Link 4L : EXISTING

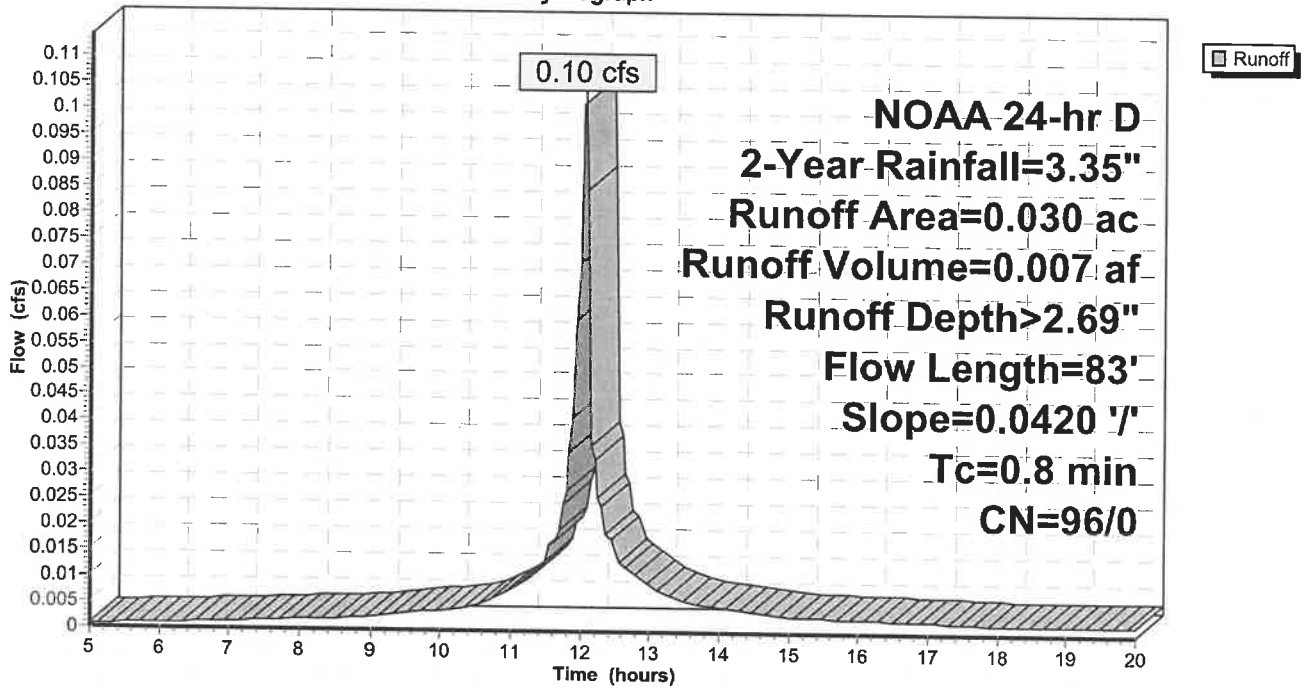
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 2-Year Rainfall=3.35"

Area (ac)	CN	Description
0.030	96	Gravel surface, HSG C
0.030	96	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	83	0.0420	1.82		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.35"

**Subcatchment 5S: EX. AREA A (UNDETAINED)**

Hydrograph



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NOAA 24-hr D 2-Year Rainfall=3.35"

Printed 5/31/2023

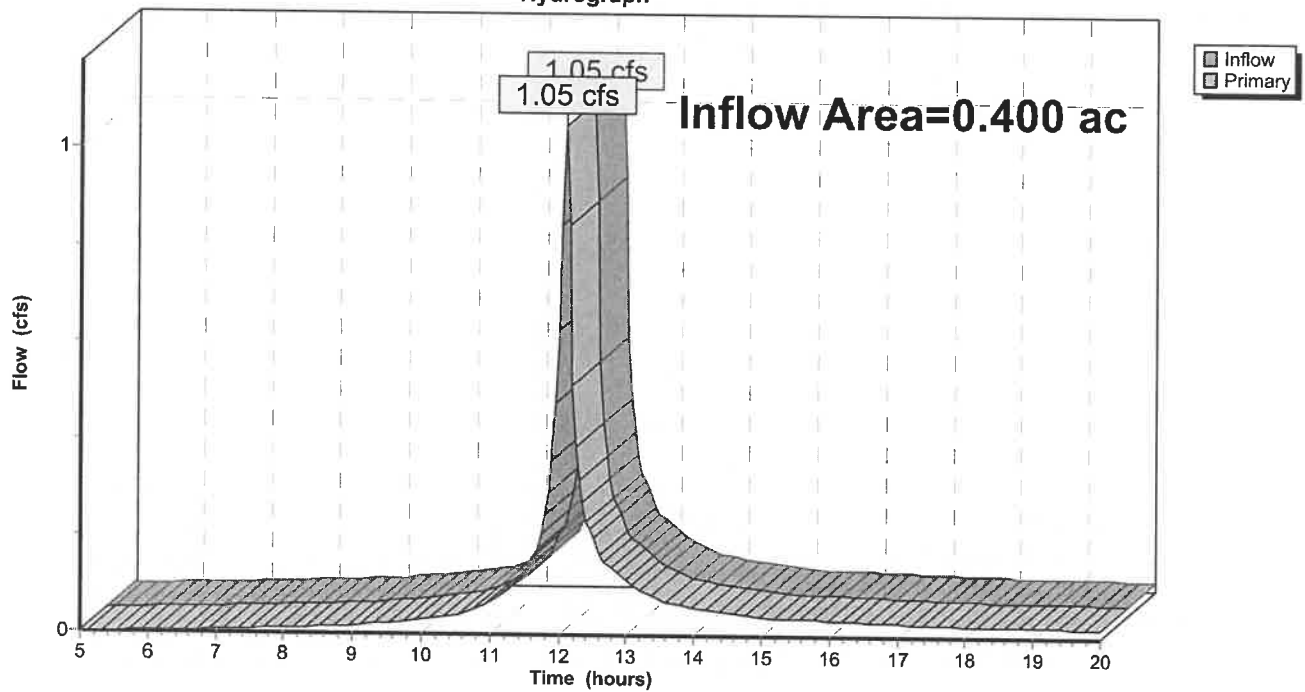
**Summary for Link 4L: EXISTING**

Inflow Area = 0.400 ac, 2.50% Impervious, Inflow Depth > 2.12" for 2-Year event  
Inflow = 1.05 cfs @ 12.10 hrs, Volume= 0.071 af  
Primary = 1.05 cfs @ 12.10 hrs, Volume= 0.071 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Link 4L: EXISTING**

Hydrograph



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EXISTING

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Summary for Subcatchment 1S: EX. AREA C (UNDETAINED)**

Runoff = 1.60 cfs @ 12.10 hrs, Volume= 0.109 af, Depth> 3.62"  
 Routed to Link 4L : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 10-Year Rainfall=5.12"

Area (ac)	CN	Description
0.240	96	Gravel surface, HSG C
0.120	74	>75% Grass cover, Good, HSG C
0.360	89	Weighted Average
0.360	89	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	47	0.0787	0.26		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.35"
0.5	94	0.0319	2.88		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.2	25	0.0256	2.40		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
0.3	4	0.0001	0.20		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.2	49	0.0643	3.80		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
0.2	57	0.0689	5.33		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.4	276	Total			



**2022.004-EXISTING**

Prepared by Menlo Engineering Associates

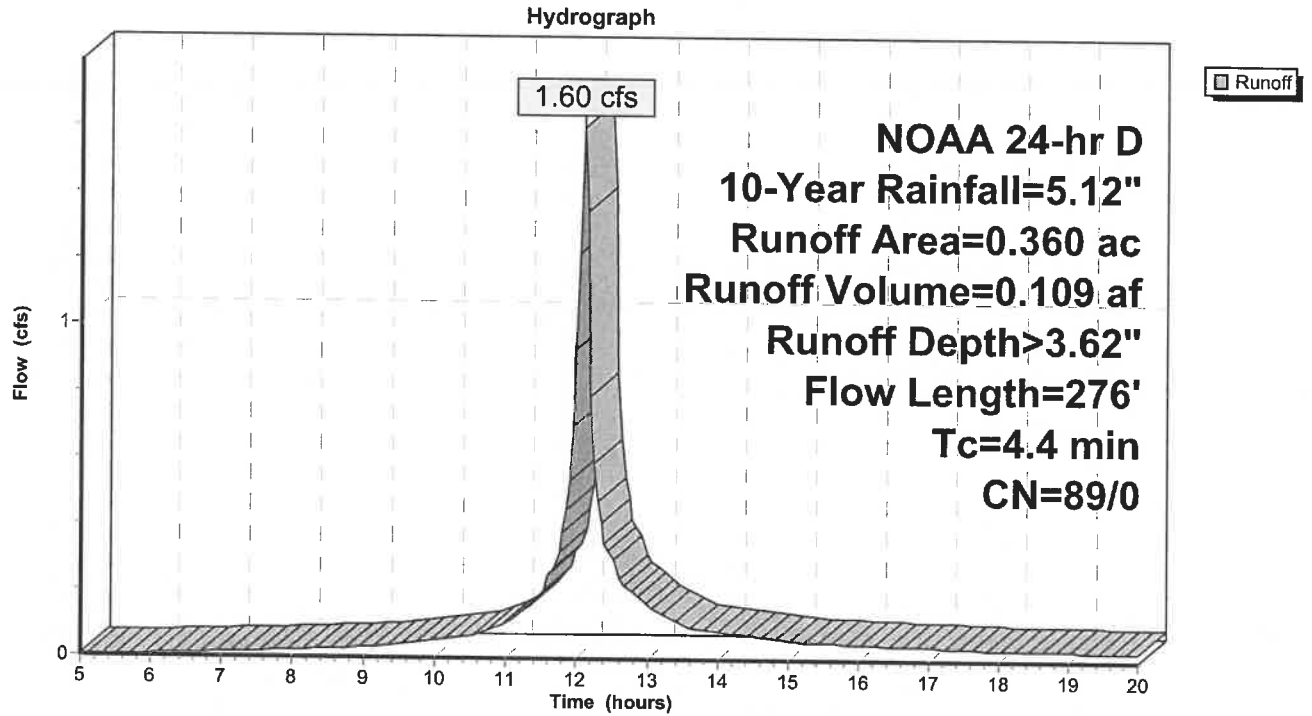
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EXISTING

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Subcatchment 1S: EX. AREA C (UNDETAINED)**



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EXISTING

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Summary for Subcatchment 2S: EX. AREA B (UNDETAINED)**

Runoff = 0.05 cfs @ 12.05 hrs, Volume= 0.004 af, Depth> 4.43"  
Routed to Link 4L : EXISTING

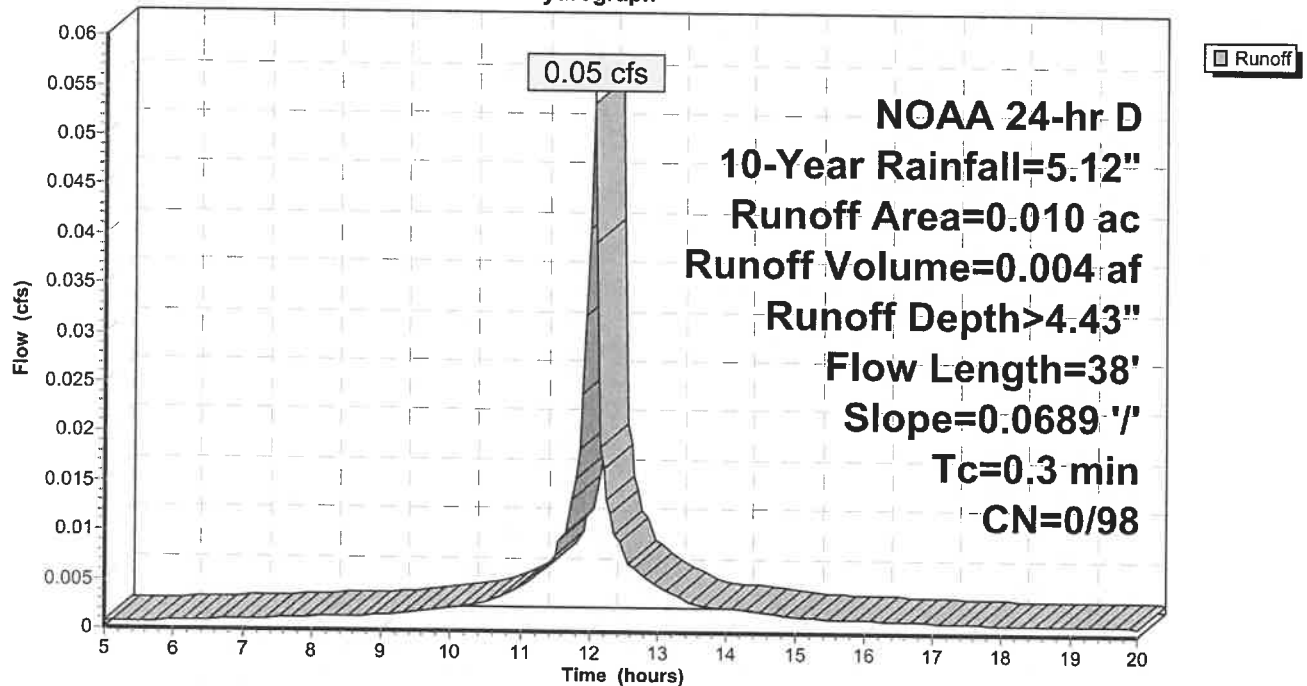
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 10-Year Rainfall=5.12"

Area (ac)	CN	Description
* 0.010	98	Impervious
0.010	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	38	0.0689	1.90		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.35"

**Subcatchment 2S: EX. AREA B (UNDETAINED)**

Hydrograph



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EXISTING

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Summary for Subcatchment 5S: EX. AREA A (UNDETAINED)**

Runoff = 0.16 cfs @ 12.06 hrs, Volume= 0.011 af, Depth> 4.28"  
Routed to Link 4L : EXISTING

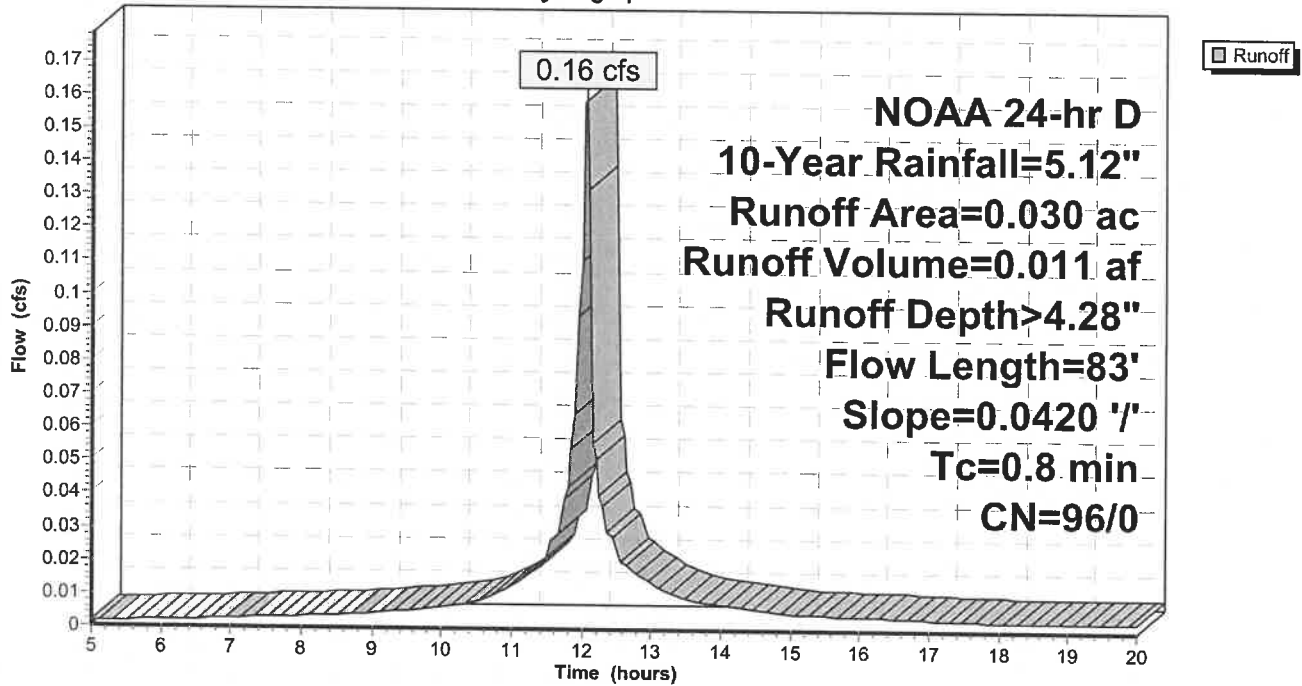
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 10-Year Rainfall=5.12"

Area (ac)	CN	Description
0.030	96	Gravel surface, HSG C
0.030	96	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	83	0.0420	1.82		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.35"

**Subcatchment 5S: EX. AREA A (UNDETAINED)**

Hydrograph



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EXISTING

NOAA 24-hr D 10-Year Rainfall=5.12"

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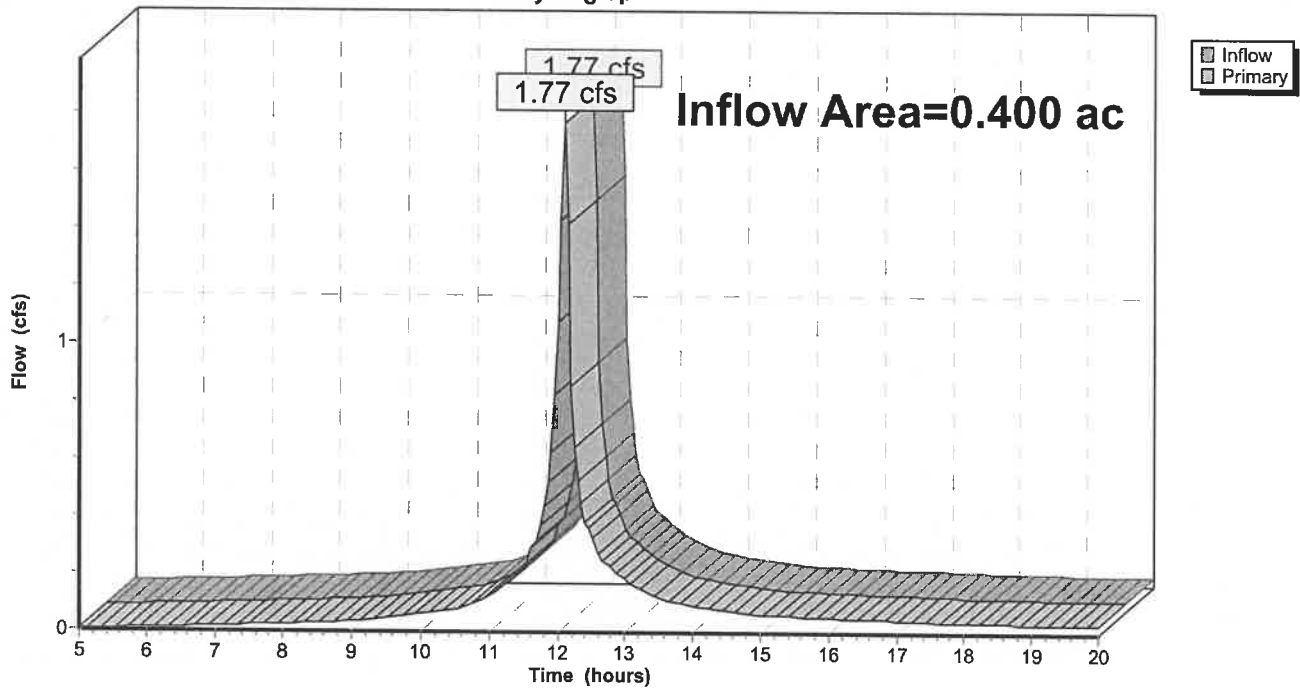
**Summary for Link 4L: EXISTING**

Inflow Area = 0.400 ac, 2.50% Impervious, Inflow Depth > 3.69" for 10-Year event  
Inflow = 1.77 cfs @ 12.10 hrs, Volume= 0.123 af  
Primary = 1.77 cfs @ 12.10 hrs, Volume= 0.123 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Link 4L: EXISTING**

Hydrograph



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EXISTING

NOAA 24-hr D 25-Year Rainfall=6.36"

Printed 5/31/2023

**Summary for Subcatchment 1S: EX. AREA C (UNDETAINED)**

Runoff = 2.06 cfs @ 12.10 hrs, Volume= 0.142 af, Depth> 4.73"  
 Routed to Link 4L : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 25-Year Rainfall=6.36"

Area (ac)	CN	Description
0.240	96	Gravel surface, HSG C
0.120	74	>75% Grass cover, Good, HSG C
0.360	89	Weighted Average
0.360	89	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
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0.5	94	0.0319	2.88		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.2	25	0.0256	2.40		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
0.3	4	0.0001	0.20		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.2	49	0.0643	3.80		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
0.2	57	0.0689	5.33		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.4	276	Total			

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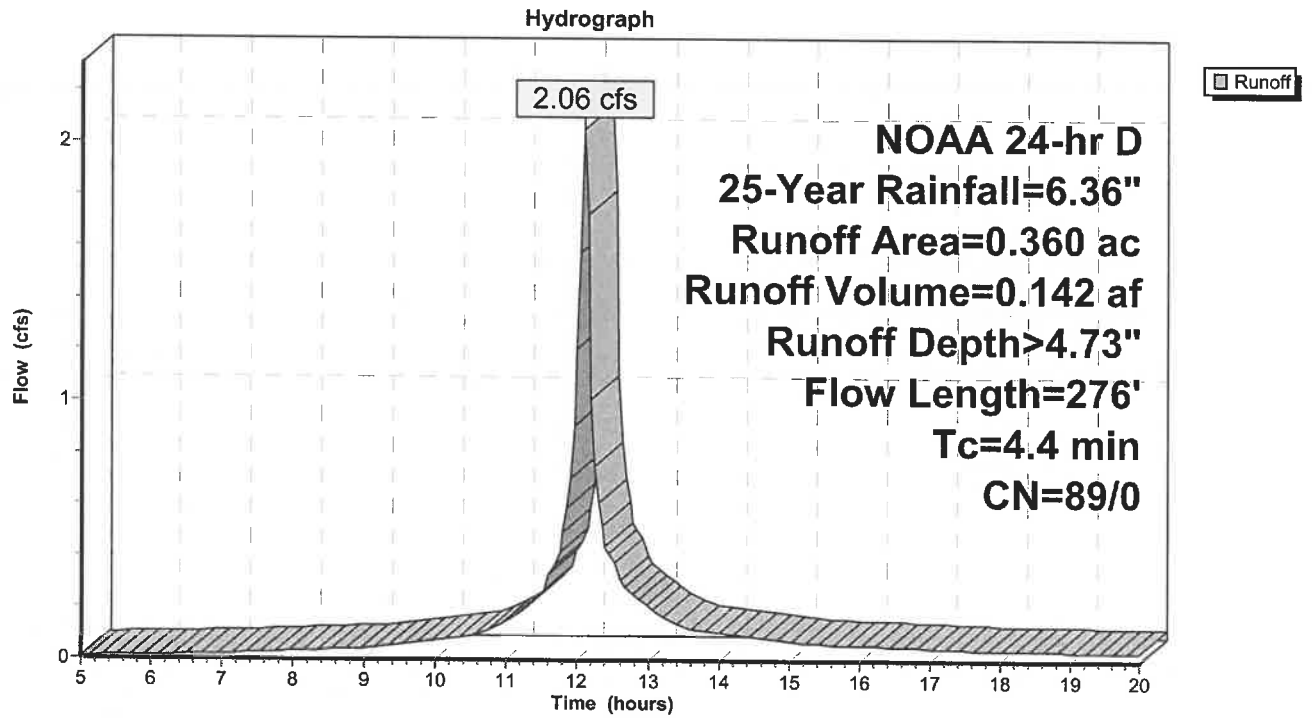
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NOAA 24-hr D 25-Year Rainfall=6.36"

Printed 5/31/2023

**Subcatchment 1S: EX. AREA C (UNDETAINED)**



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NOAA 24-hr D 25-Year Rainfall=6.36"

Printed 5/31/2023

**Summary for Subcatchment 2S: EX. AREA B (UNDETAINED)**

Runoff = 0.07 cfs @ 12.05 hrs, Volume= 0.005 af, Depth> 5.53"  
Routed to Link 4L : EXISTING

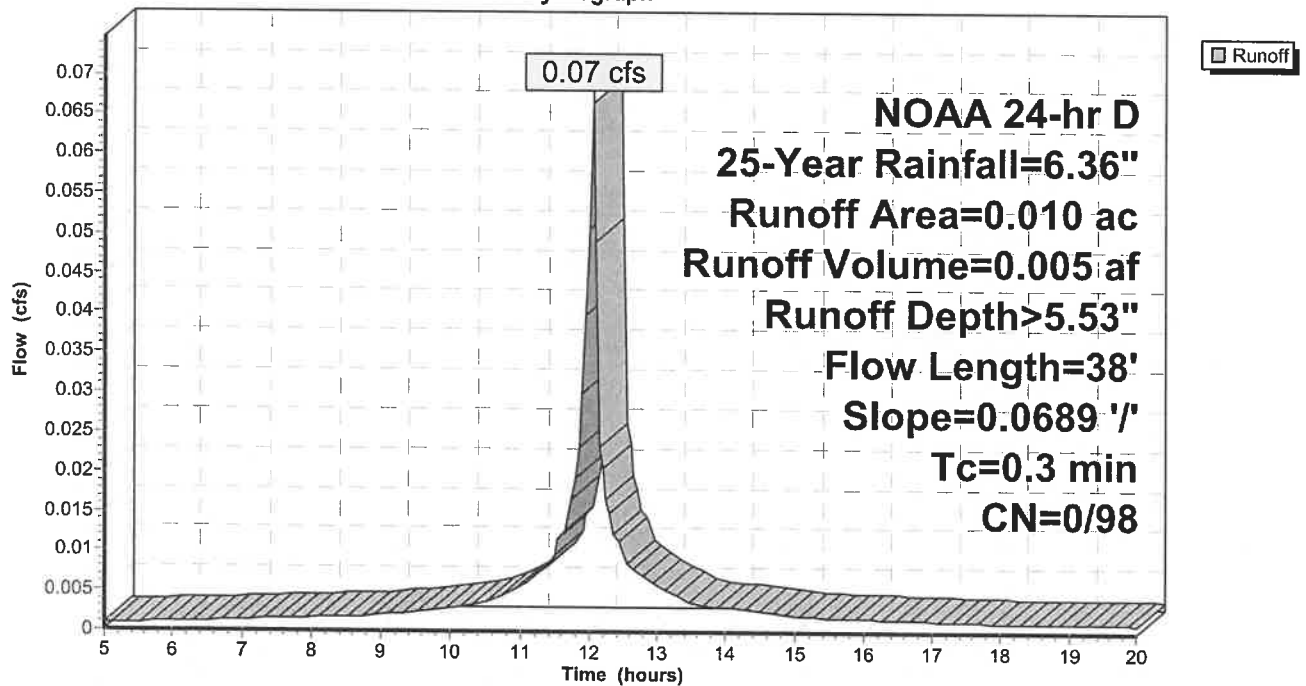
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 25-Year Rainfall=6.36"

Area (ac)	CN	Description
* 0.010	98	Impervious
0.010	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	38	0.0689	1.90		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.35"

**Subcatchment 2S: EX. AREA B (UNDETAINED)**

Hydrograph



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EXISTING  
NOAA 24-hr D 25-Year Rainfall=6.36"  
Printed 5/31/2023

**Summary for Subcatchment 5S: EX. AREA A (UNDETAINED)**

Runoff = 0.20 cfs @ 12.06 hrs, Volume= 0.013 af, Depth> 5.40"  
Routed to Link 4L : EXISTING

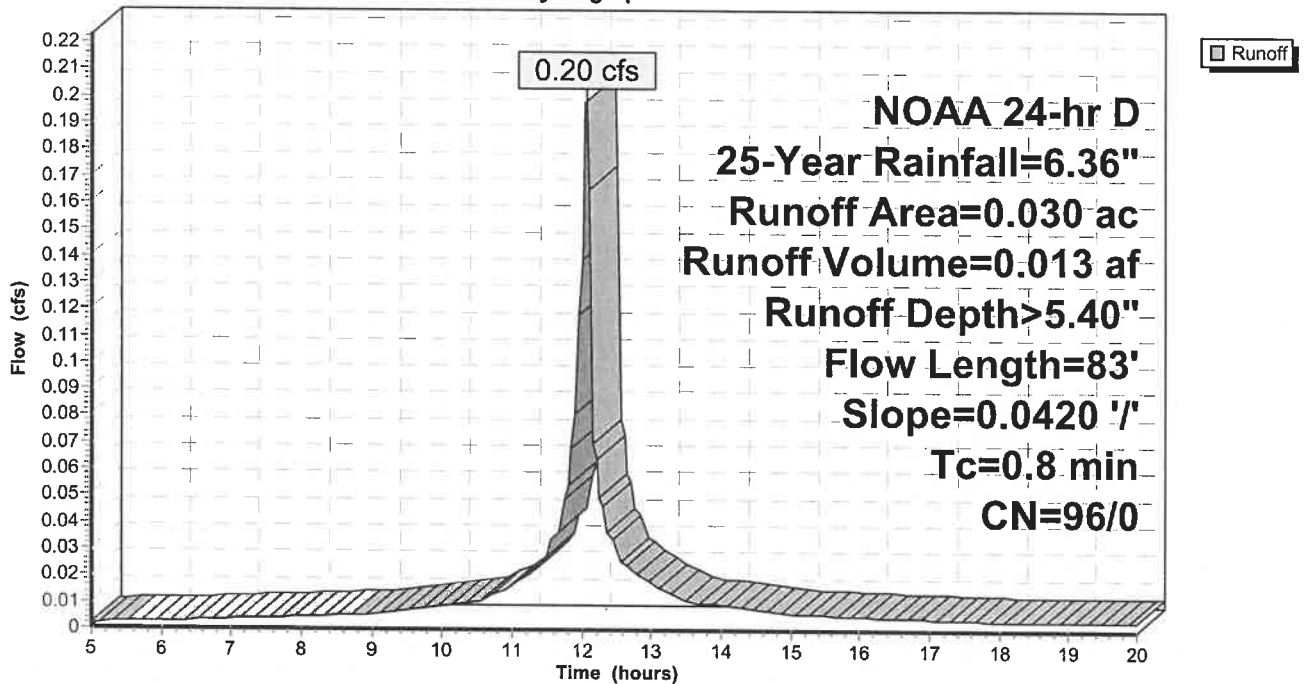
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 25-Year Rainfall=6.36"

Area (ac)	CN	Description
0.030	96	Gravel surface, HSG C
0.030	96	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	83	0.0420	1.82		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.35"

**Subcatchment 5S: EX. AREA A (UNDETAINED)**

Hydrograph





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EXISTING

NOAA 24-hr D 25-Year Rainfall=6.36"

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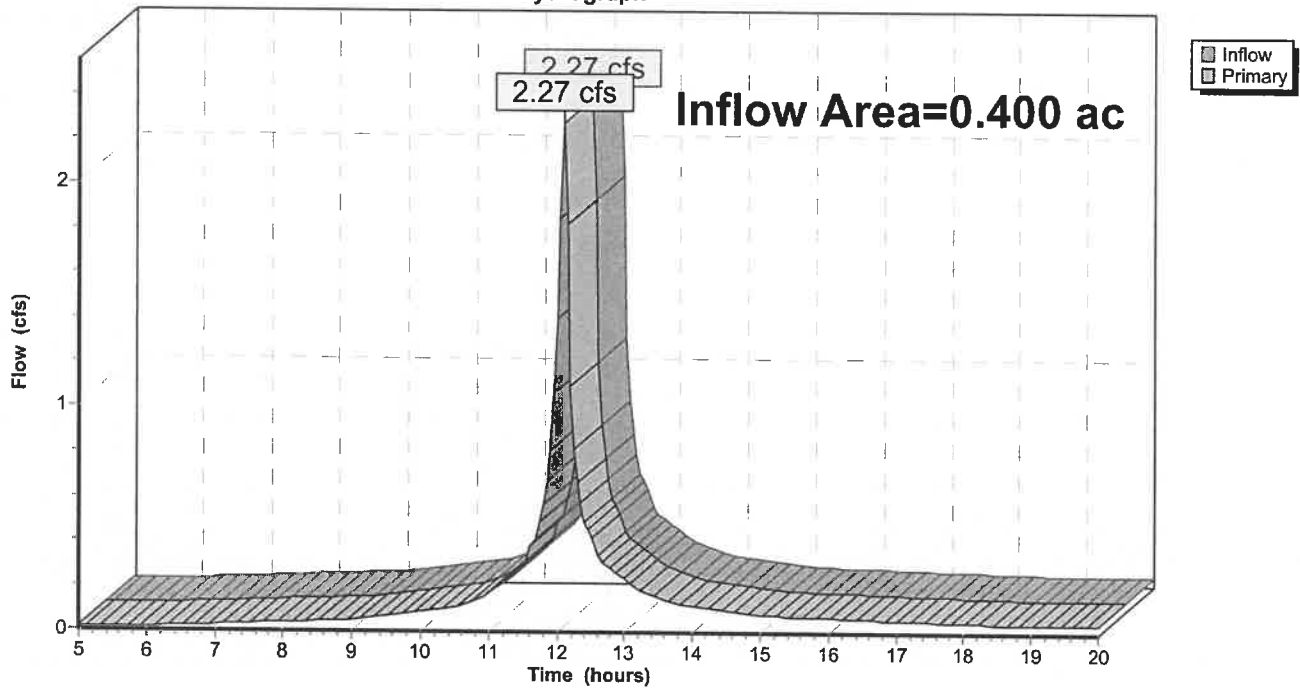
**Summary for Link 4L: EXISTING**

Inflow Area = 0.400 ac, 2.50% Impervious, Inflow Depth > 4.80" for 25-Year event  
Inflow = 2.27 cfs @ 12.10 hrs, Volume= 0.160 af  
Primary = 2.27 cfs @ 12.10 hrs, Volume= 0.160 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Link 4L: EXISTING**

Hydrograph



**2022.004-EXISTING**

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EXISTING

NOAA 24-hr D 100-Year Rainfall=8.63"

Printed 5/31/2023

**Summary for Subcatchment 1S: EX. AREA C (UNDETAINED)**

Runoff = 2.89 cfs @ 12.10 hrs, Volume= 0.204 af, Depth> 6.79"  
Routed to Link 4L : EXISTING

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 100-Year Rainfall=8.63"

Area (ac)	CN	Description
0.240	96	Gravel surface, HSG C
0.120	74	>75% Grass cover, Good, HSG C
0.360	89	Weighted Average
0.360	89	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	47	0.0787	0.26		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.35"
0.5	94	0.0319	2.88		<b>Shallow Concentrated Flow,</b> Unpaved Kv= 16.1 fps
0.2	25	0.0256	2.40		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
0.3	4	0.0001	0.20		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
0.2	49	0.0643	3.80		<b>Shallow Concentrated Flow,</b> Grassed Waterway Kv= 15.0 fps
0.2	57	0.0689	5.33		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.4	276	Total			

**2022.004-EXISTING**

Prepared by Menlo Engineering Associates

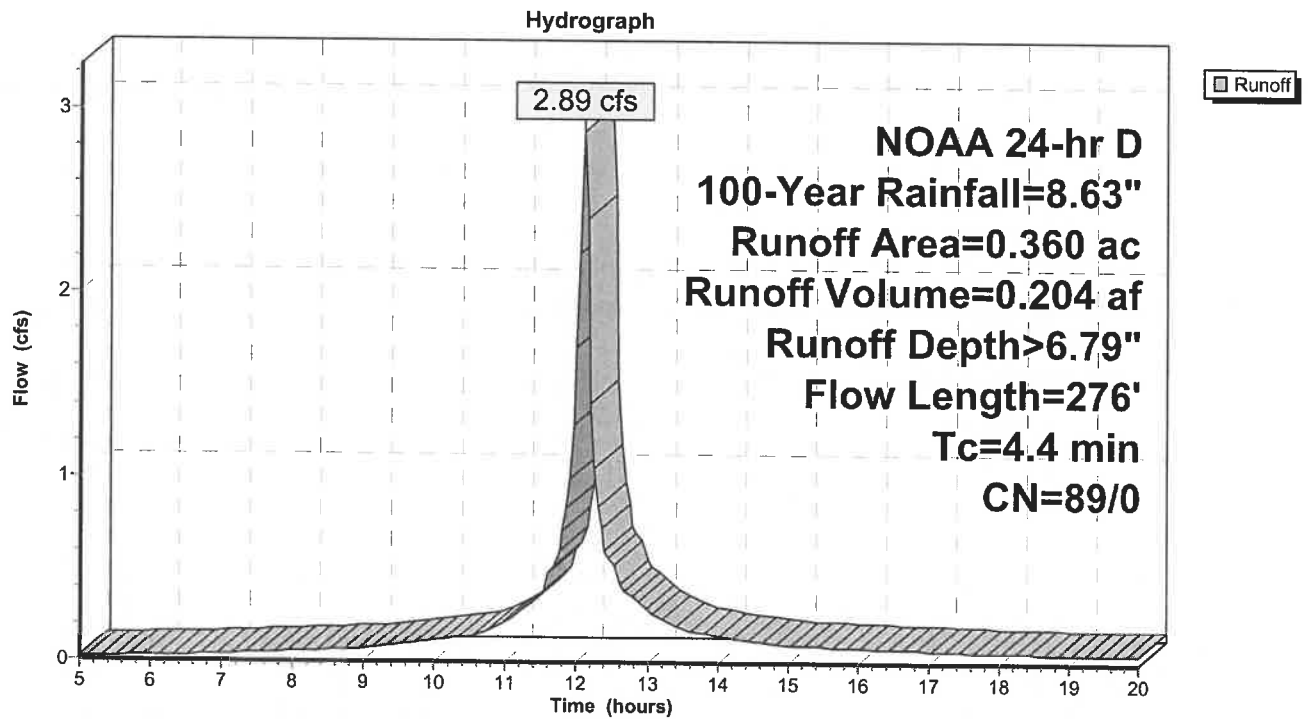
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EXISTING

NOAA 24-hr D 100-Year Rainfall=8.63"

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**Subcatchment 1S: EX. AREA C (UNDETAINED)**



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EXISTING

NOAA 24-hr D 100-Year Rainfall=8.63"

Printed 5/31/2023

**Summary for Subcatchment 2S: EX. AREA B (UNDETAINED)**

Runoff = 0.09 cfs @ 12.05 hrs, Volume= 0.006 af, Depth> 7.54"  
 Routed to Link 4L : EXISTING

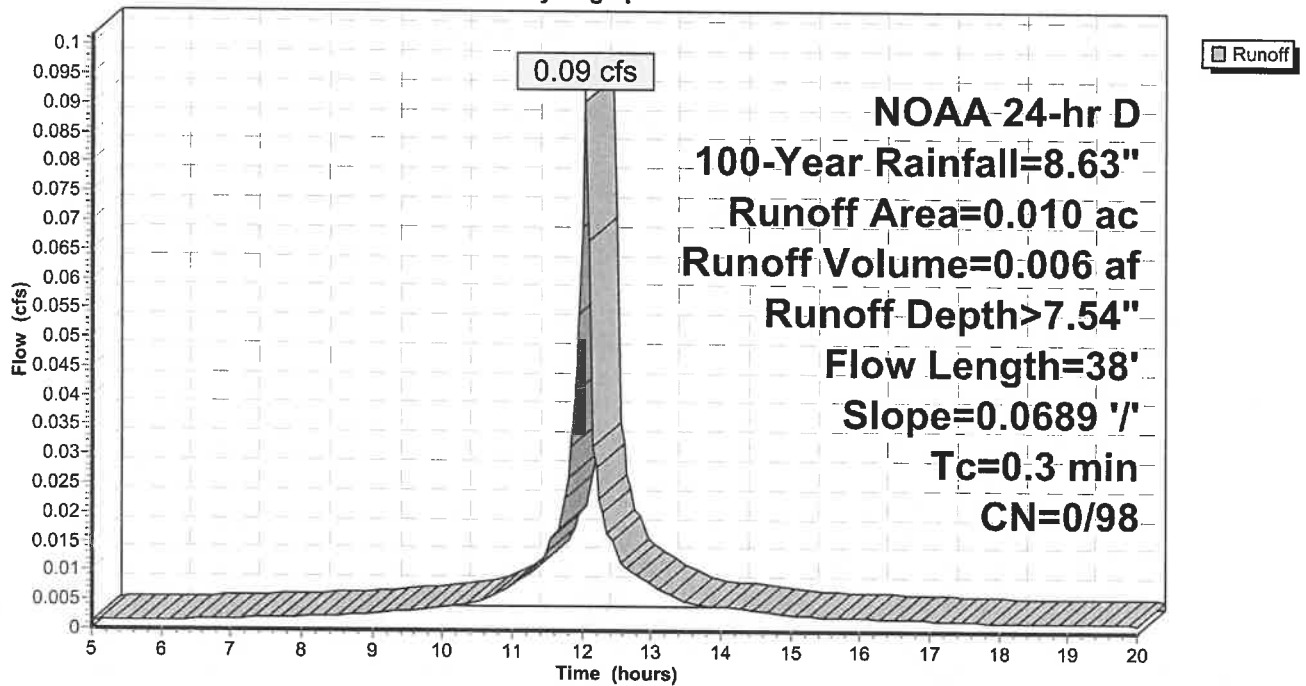
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 100-Year Rainfall=8.63"

Area (ac)	CN	Description
* 0.010	98	Impervious
0.010	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.3	38	0.0689	1.90		<b>Sheet Flow,</b> Smooth surfaces n= 0.011 P2= 3.35"

**Subcatchment 2S: EX. AREA B (UNDETAINED)**

Hydrograph



**2022.004-EXISTING**

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EXISTING

NOAA 24-hr D 100-Year Rainfall=8.63"

Printed 5/31/2023

**Summary for Subcatchment 5S: EX. AREA A (UNDETAINED)**

Runoff = 0.27 cfs @ 12.06 hrs, Volume= 0.019 af, Depth> 7.43"  
Routed to Link 4L : EXISTING

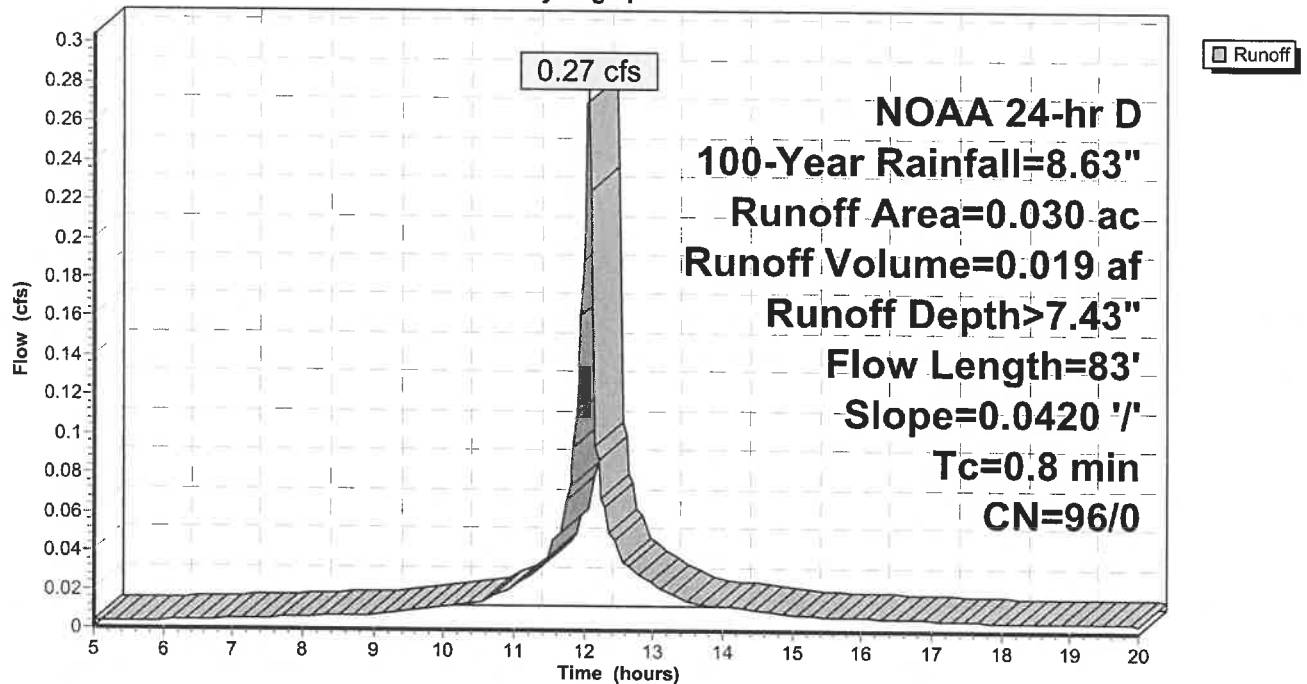
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 5.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 100-Year Rainfall=8.63"

Area (ac)	CN	Description
0.030	96	Gravel surface, HSG C
0.030	96	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	83	0.0420	1.82		Sheet Flow, Smooth surfaces n= 0.011 P2= 3.35"

**Subcatchment 5S: EX. AREA A (UNDETAINED)**

Hydrograph



**2022.004-EXISTING**

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EXISTING

NOAA 24-hr D 100-Year Rainfall=8.63"

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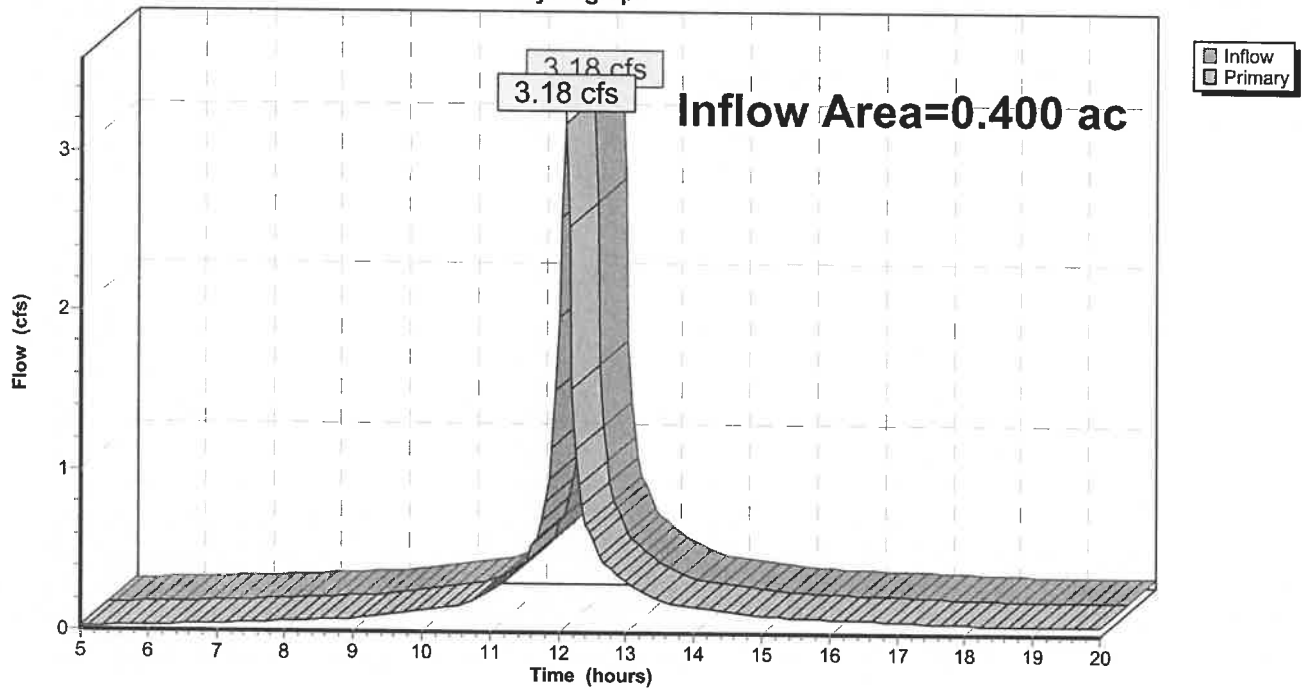
**Summary for Link 4L: EXISTING**

Inflow Area = 0.400 ac, 2.50% Impervious, Inflow Depth > 6.85" for 100-Year event  
Inflow = 3.18 cfs @ 12.10 hrs, Volume= 0.228 af  
Primary = 3.18 cfs @ 12.10 hrs, Volume= 0.228 af, Atten= 0%, Lag= 0.0 min

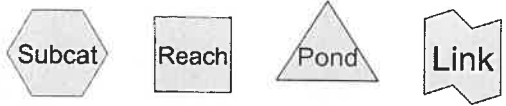
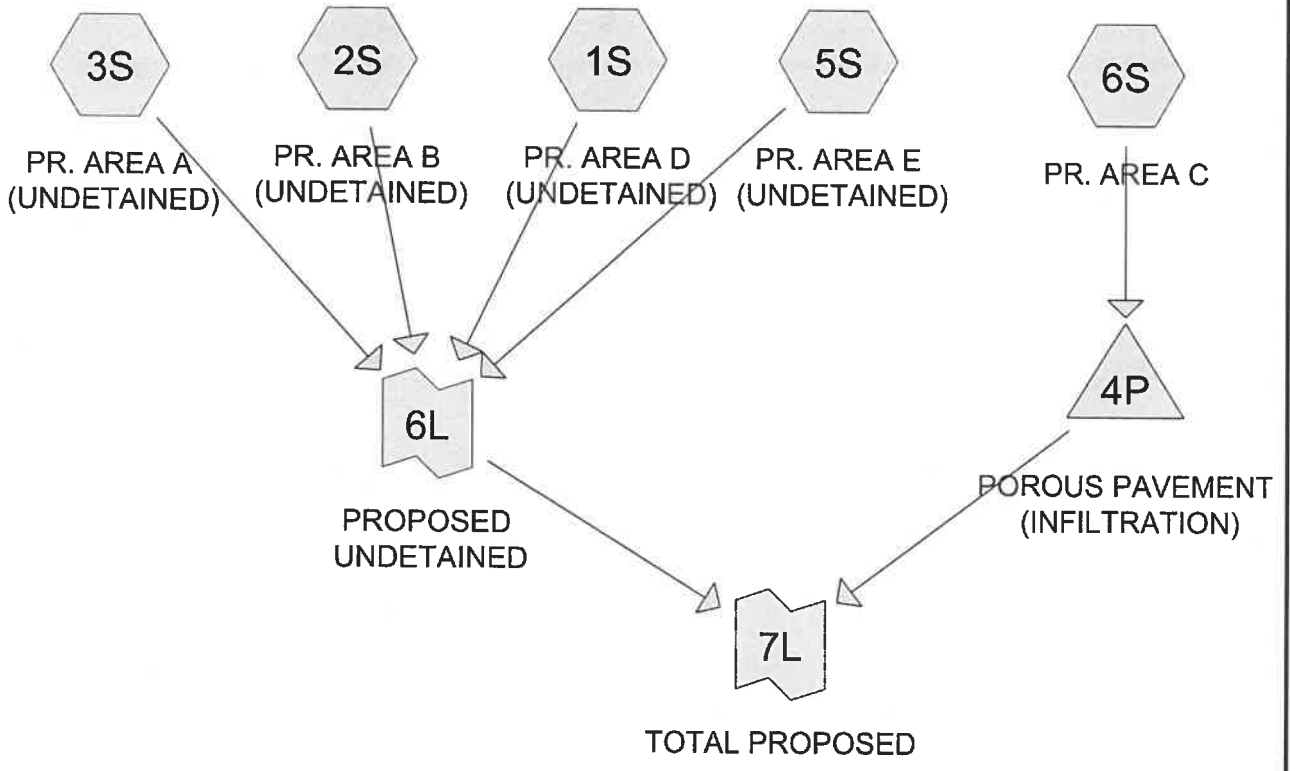
Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

**Link 4L: EXISTING**

Hydrograph



## **APPENDIX B: PROPOSED CONDITIONS**



**Routing Diagram for 2022.004-PROPOSED**  
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**2022.004-PROPOSED**

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PROPOSED  
 NOAA 24-hr D 2-Year Rainfall=3.35"  
 Printed 5/31/2023

**Summary for Subcatchment 1S: PR. AREA D (UNDETAINED)**

Runoff = 0.35 cfs @ 12.08 hrs, Volume= 0.025 af, Depth> 2.94"  
 Routed to Link 6L : PROPOSED UNDETAINED

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 2-Year Rainfall=3.35"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG C
0.100	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		<b>Sheet Flow, Roof</b> Smooth surfaces n= 0.011 P2= 3.35"
0.2	60	0.0050	4.40	5.40	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.0	7	0.0052	4.49	5.51	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.3	201	0.0388	12.25	15.04	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.0	20	0.0491	13.78	16.92	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
2.1	388	Total			

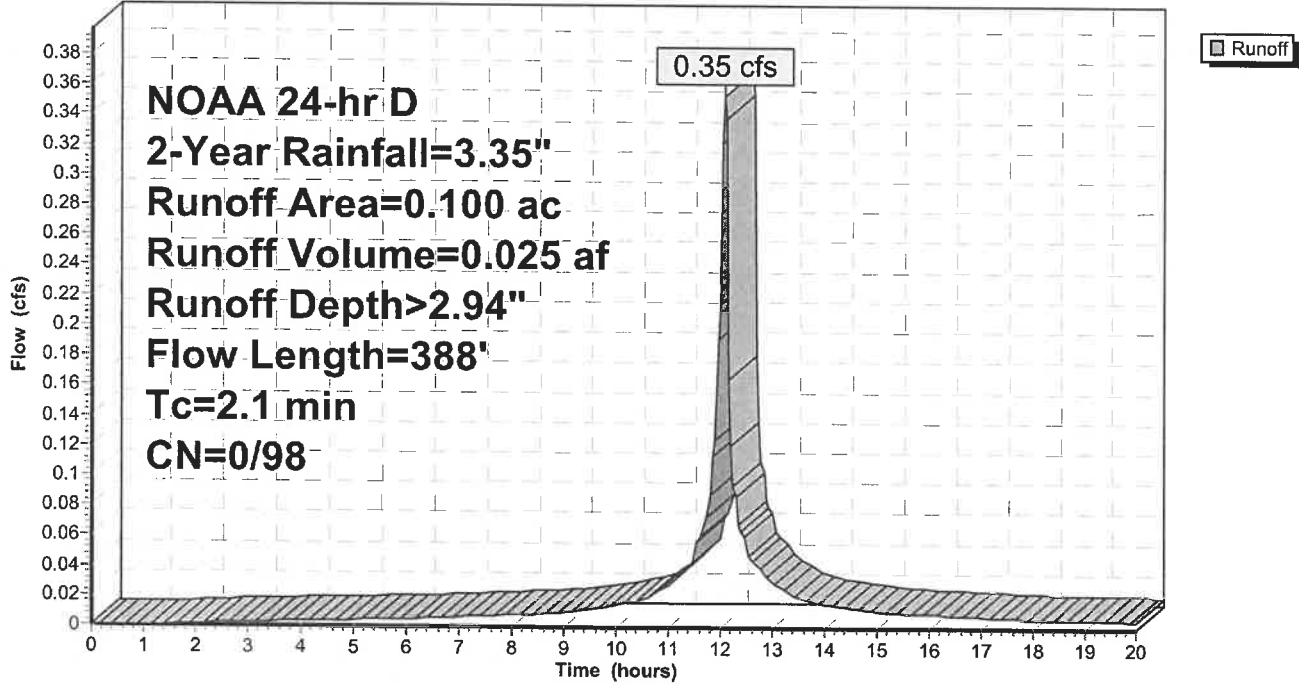
**2022.004-PROPOSED**

Prepared by Menlo Engineering Associates  
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PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.35"  
Printed 5/31/2023

**Subcatchment 1S: PR. AREA D (UNDETAINED)**

Hydrograph



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PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.35"

Printed 5/31/2023

**Summary for Subcatchment 2S: PR. AREA B (UNDETAINED)**

Runoff = 0.01 cfs @ 12.09 hrs, Volume= 0.001 af, Depth> 1.02"  
Routed to Link 6L : PROPOSED UNDETAINED

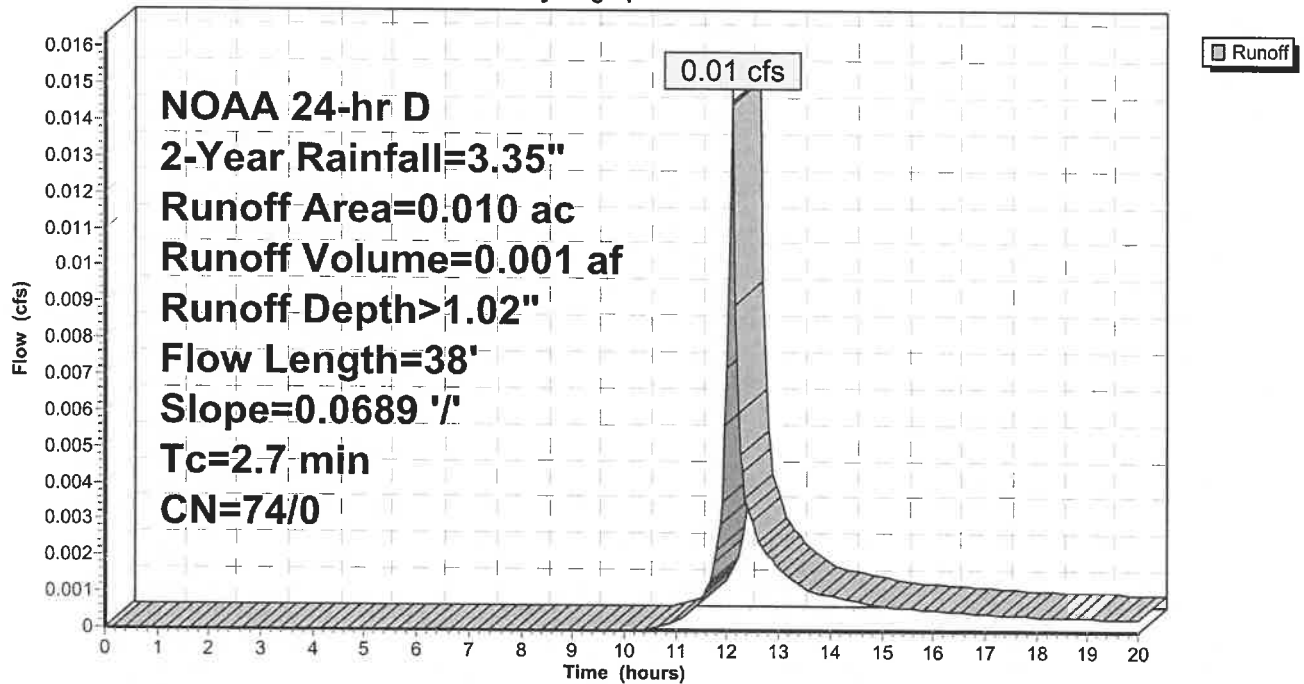
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 2-Year Rainfall=3.35"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
0.010	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	38	0.0689	0.24		Sheet Flow, Grass: Short n= 0.150 P2= 3.35"

**Subcatchment 2S: PR. AREA B (UNDETAINED)**

Hydrograph



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PROPOSED

NOAA 24-hr D 2-Year Rainfall=3.35"

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**Summary for Subcatchment 3S: PR. AREA A (UNDETAINED)**

Runoff = 0.04 cfs @ 12.14 hrs, Volume= 0.003 af, Depth> 1.02"  
Routed to Link 6L : PROPOSED UNDETAINED

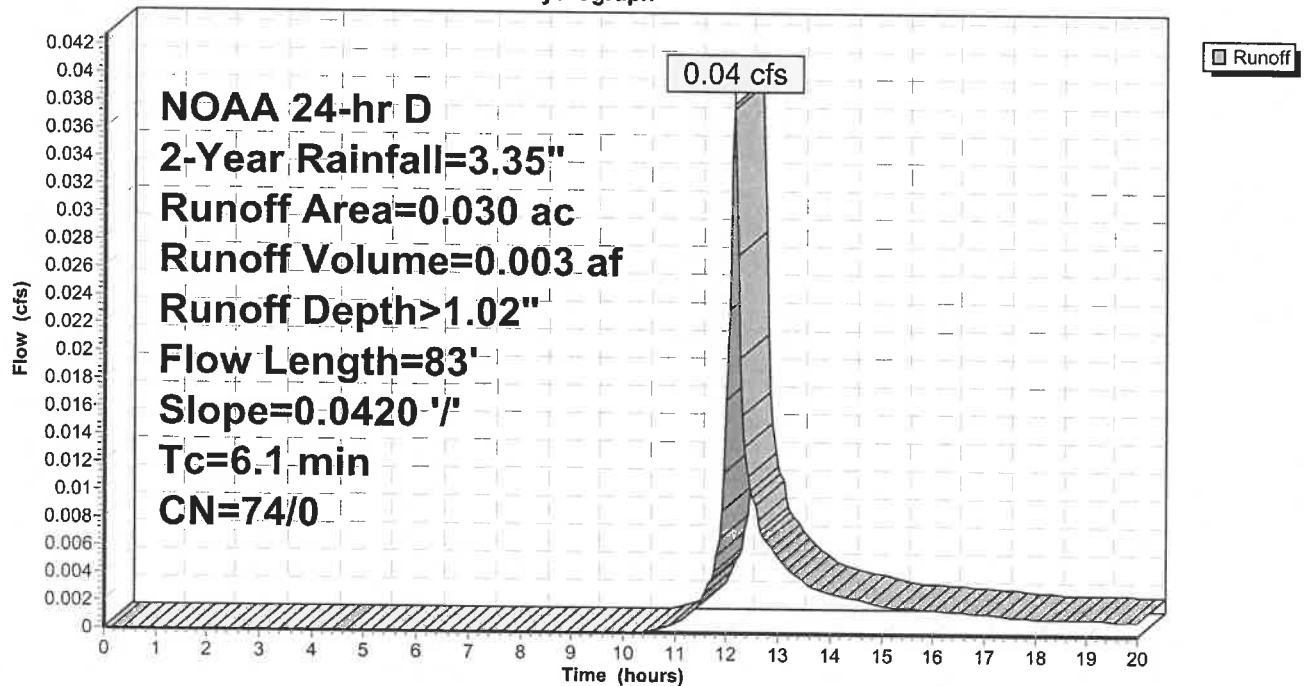
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 2-Year Rainfall=3.35"

Area (ac)	CN	Description
0.030	74	>75% Grass cover, Good, HSG C
0.030	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	83	0.0420	0.23		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.35"

**Subcatchment 3S: PR. AREA A (UNDETAINED)**

Hydrograph



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PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.35"  
Printed 5/31/2023

**Summary for Subcatchment 5S: PR. AREA E (UNDETAINED)**

Runoff = 0.03 cfs @ 12.11 hrs, Volume= 0.002 af, Depth> 1.02"  
Routed to Link 6L : PROPOSED UNDETAINED

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 2-Year Rainfall=3.35"

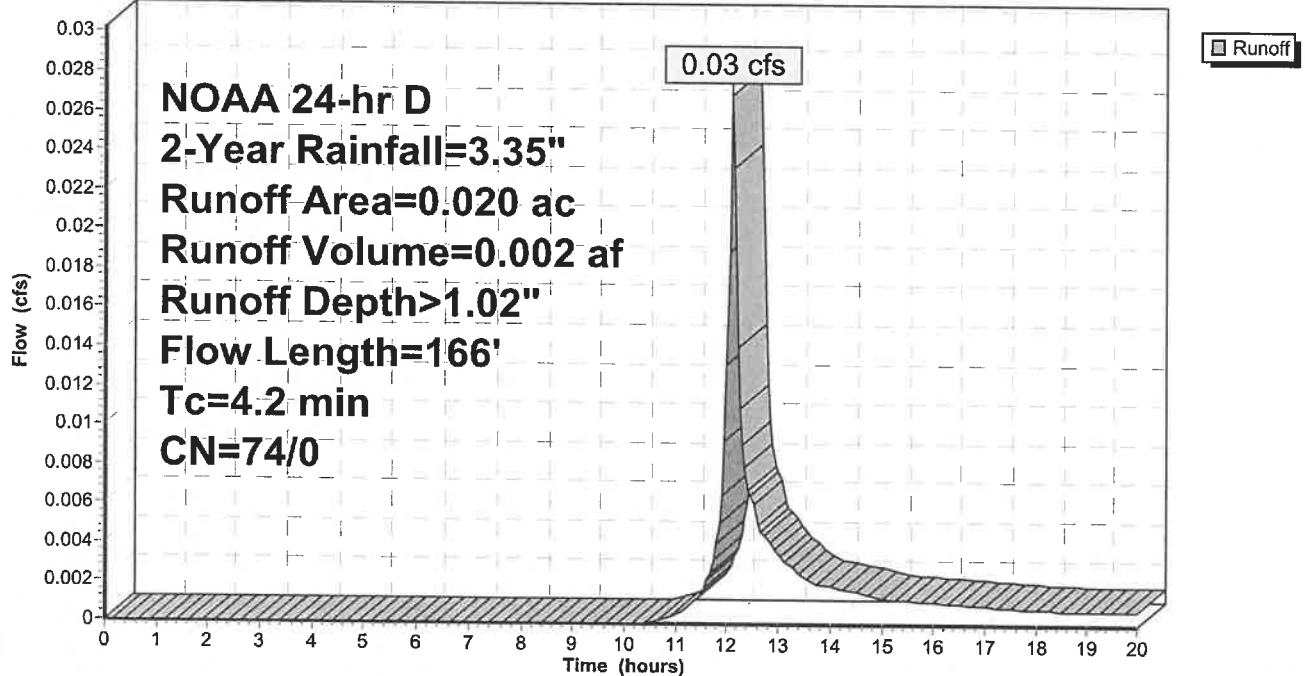
Area (ac)	CN	Description
0.020	74	>75% Grass cover, Good, HSG C
0.020	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	72	0.1000	0.31		Sheet Flow, Grass: Short n= 0.150 P2= 3.35"
0.3	94	0.0580	4.89		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.2	166	Total			

**Subcatchment 5S: PR. AREA E (UNDETAINED)**

Hydrograph



**2022.004-PROPOSED**

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PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.35"  
Printed 5/31/2023

**Summary for Subcatchment 6S: PR. AREA C**

Runoff = 0.85 cfs @ 12.07 hrs, Volume= 0.060 af, Depth> 2.87"  
Routed to Pond 4P : POROUS PAVEMENT (INFILTRATION)

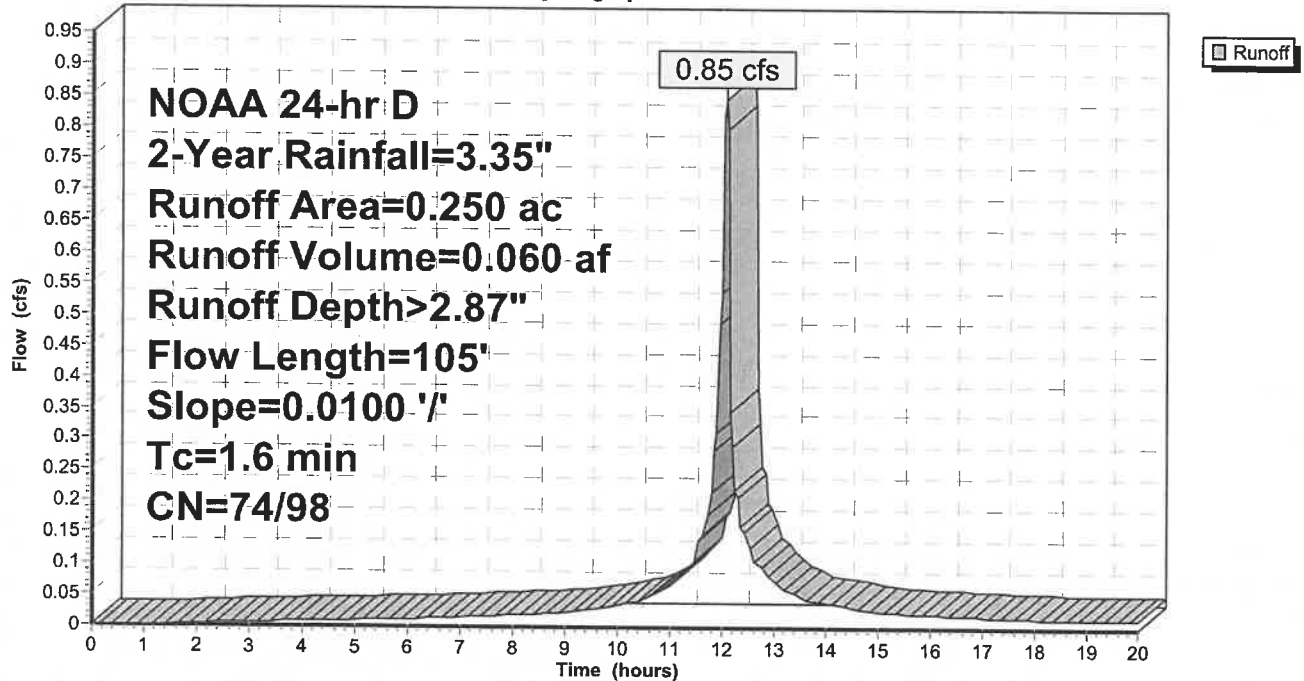
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 2-Year Rainfall=3.35"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG C
0.010	74	>75% Grass cover, Good, HSG C
* 0.040	98	
0.250	97	Weighted Average
0.010	74	4.00% Pervious Area
0.240	98	96.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		<b>Sheet Flow, Roof</b> Smooth surfaces n= 0.011 P2= 3.35"
0.0	5	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
1.6	105	Total			

**Subcatchment 6S: PR. AREA C**

Hydrograph



**2022.004-PROPOSED**

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PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.35"  
Printed 5/31/2023

**Summary for Pond 4P: POROUS PAVEMENT (INFILTRATION)**

Inflow Area = 0.250 ac, 96.00% Impervious, Inflow Depth > 2.87" for 2-Year event  
Inflow = 0.85 cfs @ 12.07 hrs, Volume= 0.060 af  
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min  
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af  
Routed to Link 7L : TOTAL PROPOSED

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
Peak Elev= 117.61' @ 20.00 hrs Surf.Area= 3,850 sf Storage= 2,599 cf

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

Volume	Invert	Avail.Storage	Storage Description
#1	115.56'	3,748 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 11,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.56	3,850	0	0
118.51	3,850	11,358	11,358

Device	Routing	Invert	Outlet Devices
#1	Primary	117.61'	<b>7.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.00 cfs @ 0.00 hrs HW=115.56' (Free Discharge)  
↑1=Orifice/Grate ( Controls 0.00 cfs)

**2022.004-PROPOSED**

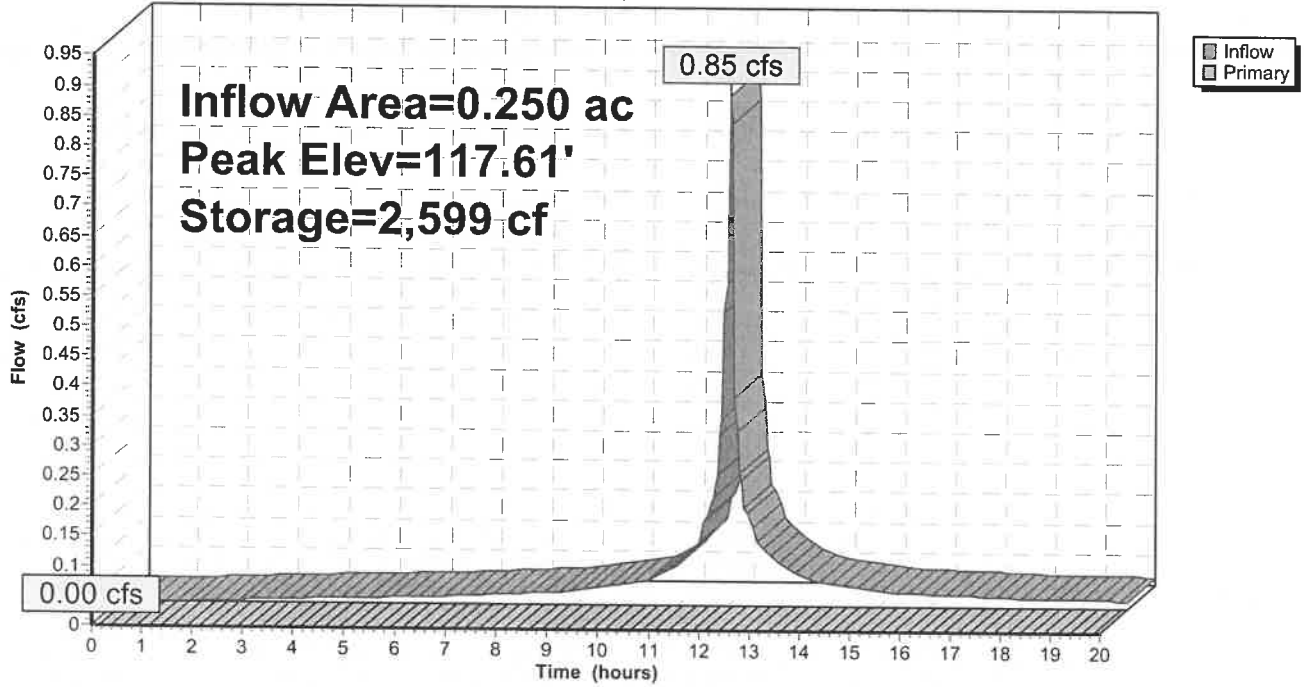
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PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.35"  
Printed 5/31/2023

**Pond 4P: POROUS PAVEMENT (INFILTRATION)**

Hydrograph





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PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.35"  
Printed 5/31/2023

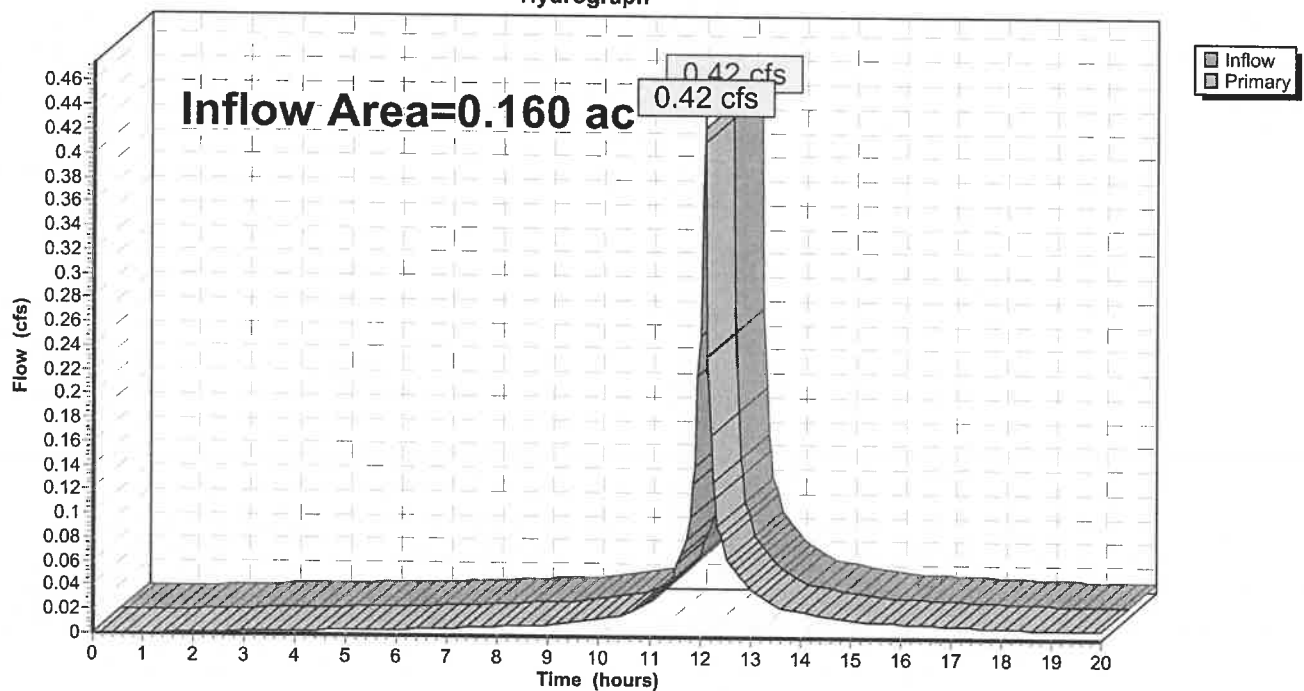
**Summary for Link 6L: PROPOSED UNDETAINED**

Inflow Area = 0.160 ac, 62.50% Impervious, Inflow Depth > 2.22" for 2-Year event  
Inflow = 0.42 cfs @ 12.08 hrs, Volume= 0.030 af  
Primary = 0.42 cfs @ 12.08 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 7L : TOTAL PROPOSED

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

**Link 6L: PROPOSED UNDETAINED**

Hydrograph



**2022.004-PROPOSED**

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PROPOSED  
NOAA 24-hr D 2-Year Rainfall=3.35"  
Printed 5/31/2023

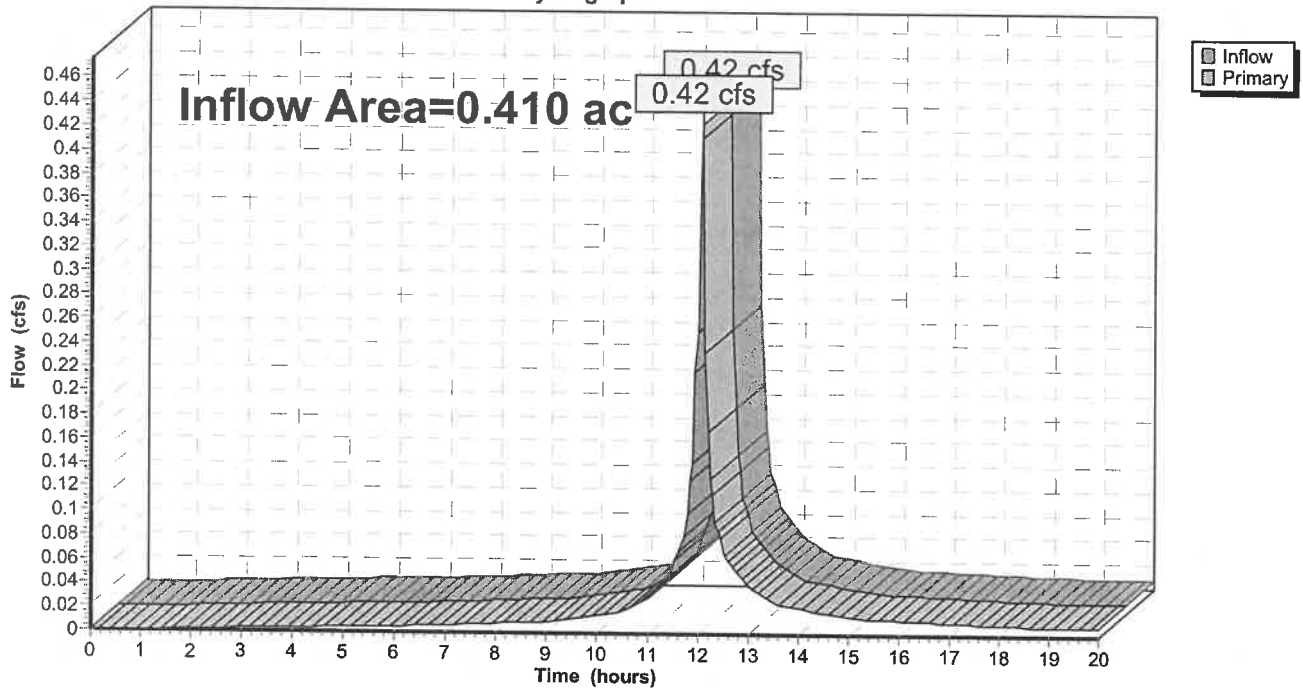
**Summary for Link 7L: TOTAL PROPOSED**

Inflow Area = 0.410 ac, 82.93% Impervious, Inflow Depth > 0.87" for 2-Year event  
Inflow = 0.42 cfs @ 12.08 hrs, Volume= 0.030 af  
Primary = 0.42 cfs @ 12.08 hrs, Volume= 0.030 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

**Link 7L: TOTAL PROPOSED**

Hydrograph



**2022.004-PROPOSED**

Prepared by Menlo Engineering Associates

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PROPOSED

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Summary for Subcatchment 1S: PR. AREA D (UNDETAINED)**

Runoff = 0.54 cfs @ 12.08 hrs, Volume= 0.038 af, Depth> 4.61"  
Routed to Link 6L : PROPOSED UNDETAINED

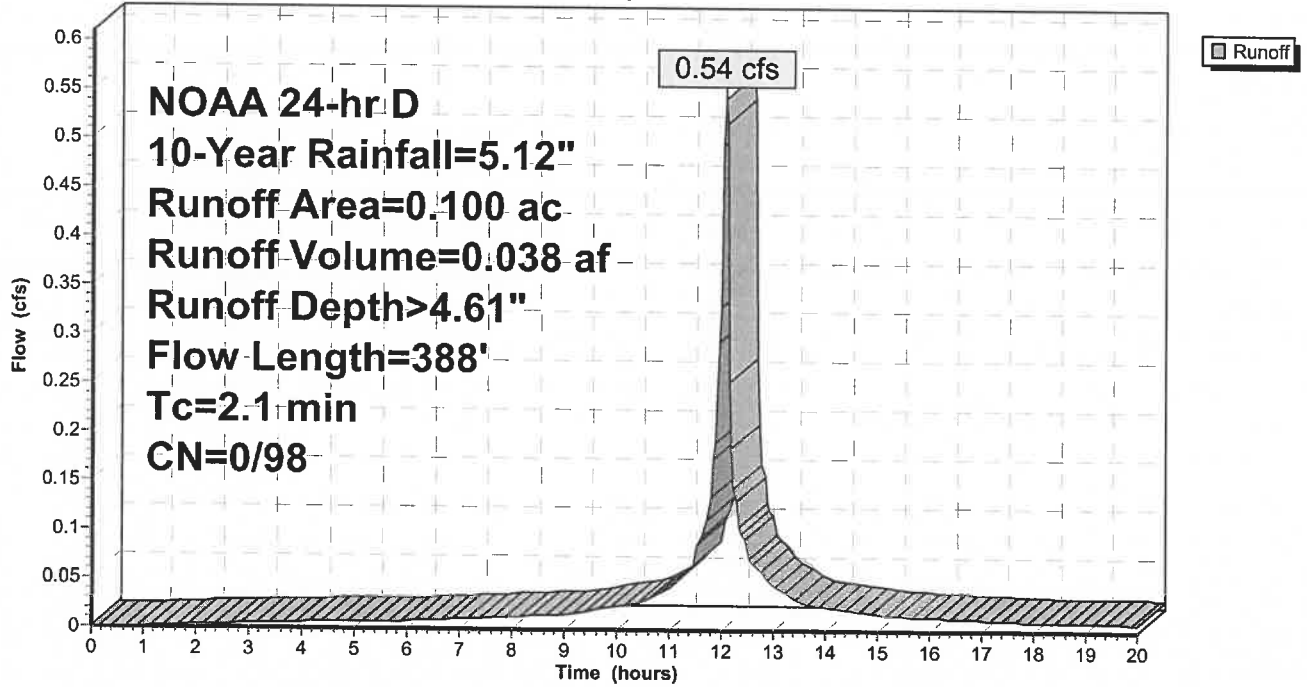
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 10-Year Rainfall=5.12"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG C
0.100	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		<b>Sheet Flow, Roof</b> Smooth surfaces n= 0.011 P2= 3.35"
0.2	60	0.0050	4.40	5.40	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.0	7	0.0052	4.49	5.51	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.3	201	0.0388	12.25	15.04	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.0	20	0.0491	13.78	16.92	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
2.1	388	Total			

### Subcatchment 1S: PR. AREA D (UNDETAINED)

Hydrograph



**2022.004-PROPOSED**

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PROPOSED

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Summary for Subcatchment 2S: PR. AREA B (UNDETAINED)**

Runoff = 0.03 cfs @ 12.09 hrs, Volume= 0.002 af, Depth> 2.25"  
Routed to Link 6L : PROPOSED UNDETAINED

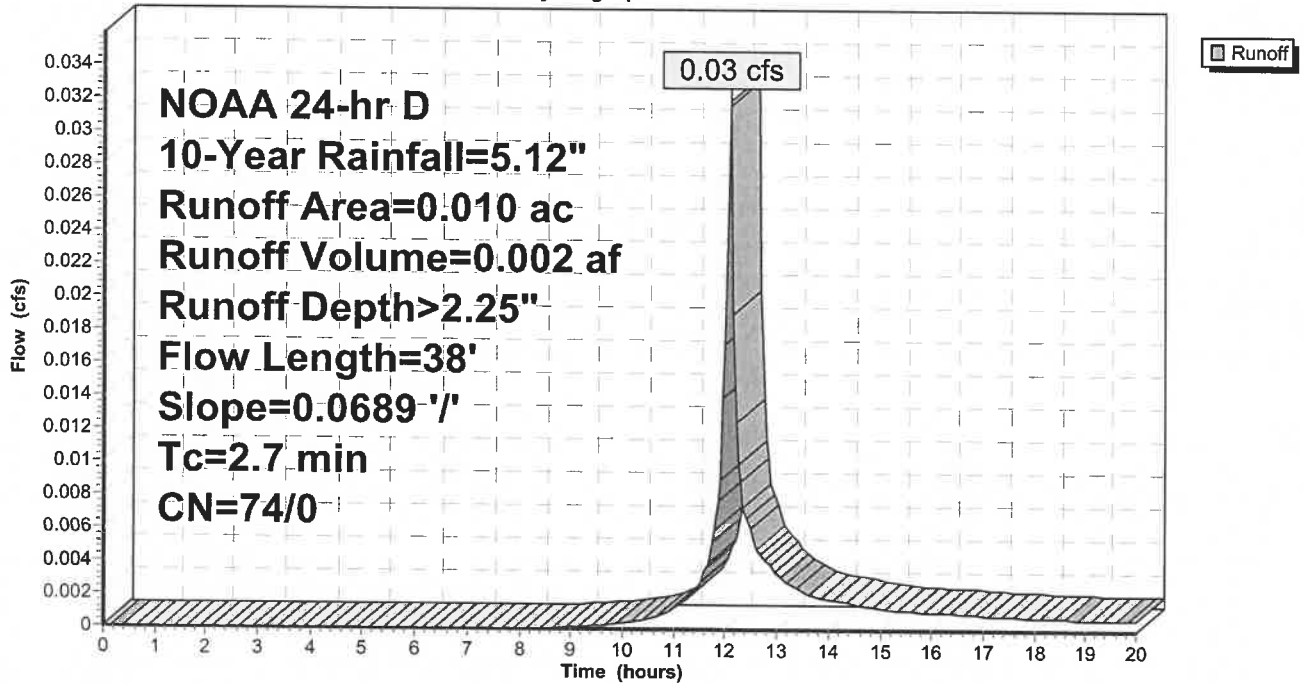
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 10-Year Rainfall=5.12"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
0.010	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	38	0.0689	0.24		Sheet Flow, Grass: Short n= 0.150 P2= 3.35"

**Subcatchment 2S: PR. AREA B (UNDETAINED)**

Hydrograph



**2022.004-PROPOSED**

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PROPOSED

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Summary for Subcatchment 3S: PR. AREA A (UNDETAINED)**

Runoff = 0.08 cfs @ 12.13 hrs, Volume= 0.006 af, Depth> 2.24"  
Routed to Link 6L : PROPOSED UNDETAINED

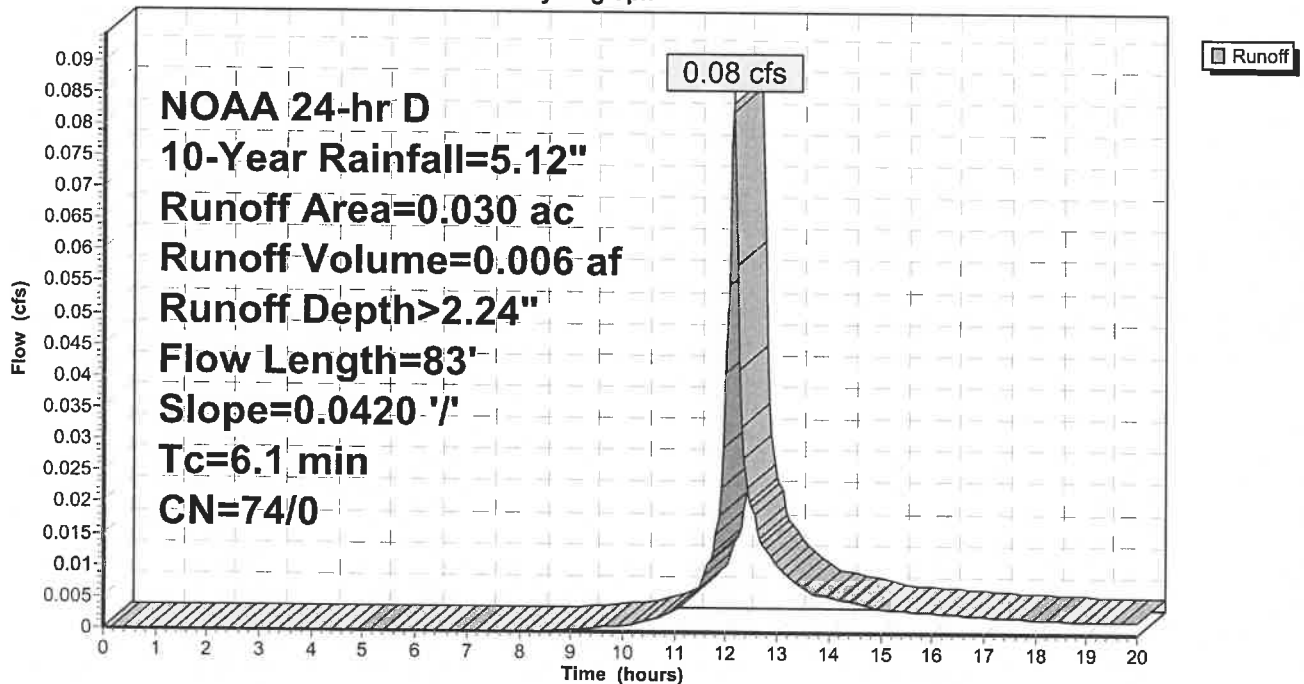
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 10-Year Rainfall=5.12"

Area (ac)	CN	Description
0.030	74	>75% Grass cover, Good, HSG C
0.030	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	83	0.0420	0.23		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.35"

**Subcatchment 3S: PR. AREA A (UNDETAINED)**

Hydrograph



**2022.004-PROPOSED**

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NOAA 24-hr D 10-Year Rainfall=5.12"

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**Summary for Subcatchment 5S: PR. AREA E (UNDETAINED)**

Runoff = 0.06 cfs @ 12.11 hrs, Volume= 0.004 af, Depth> 2.24"  
Routed to Link 6L : PROPOSED UNDETAINED

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 10-Year Rainfall=5.12"

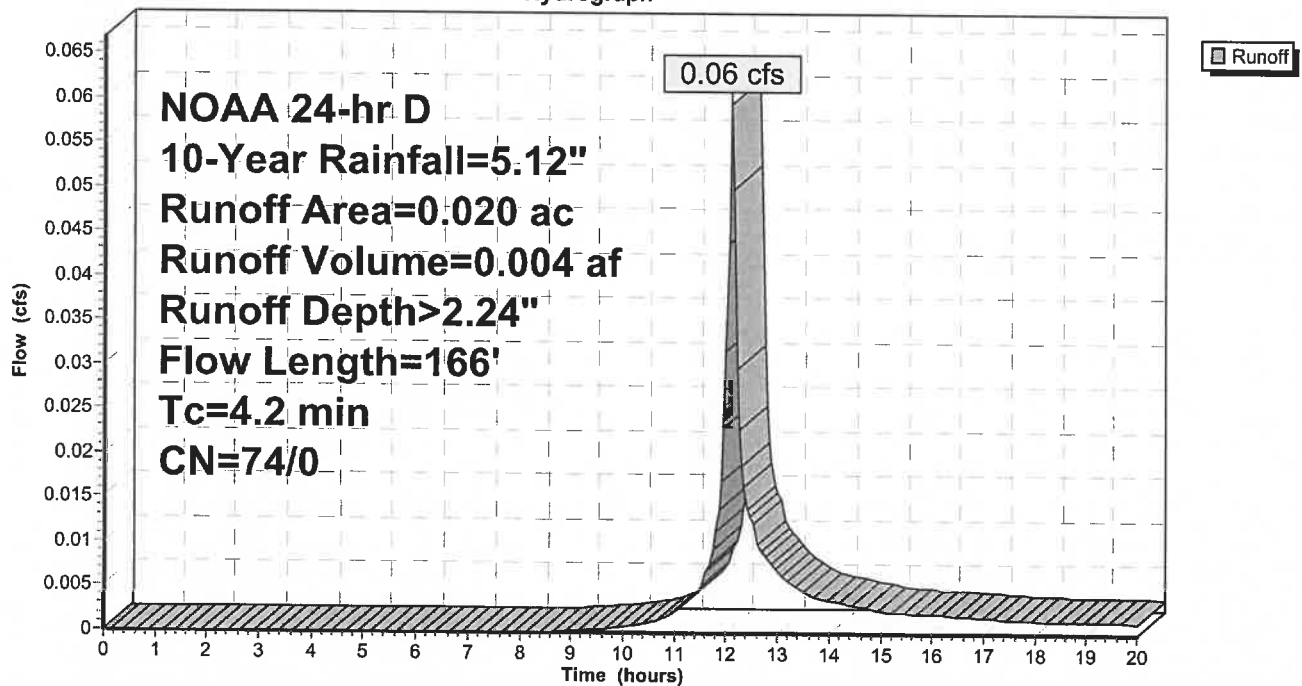
Area (ac)	CN	Description
0.020	74	>75% Grass cover, Good, HSG C
0.020	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	72	0.1000	0.31		Sheet Flow, Grass: Short n= 0.150 P2= 3.35"
0.3	94	0.0580	4.89		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.2	166	Total			

**Subcatchment 5S: PR. AREA E (UNDETAINED)**

Hydrograph



**2022.004-PROPOSED**

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NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Summary for Subcatchment 6S: PR. AREA C**

Runoff = 1.32 cfs @ 12.07 hrs, Volume= 0.094 af, Depth> 4.52"  
 Routed to Pond 4P : POROUS PAVEMENT (INFILTRATION)

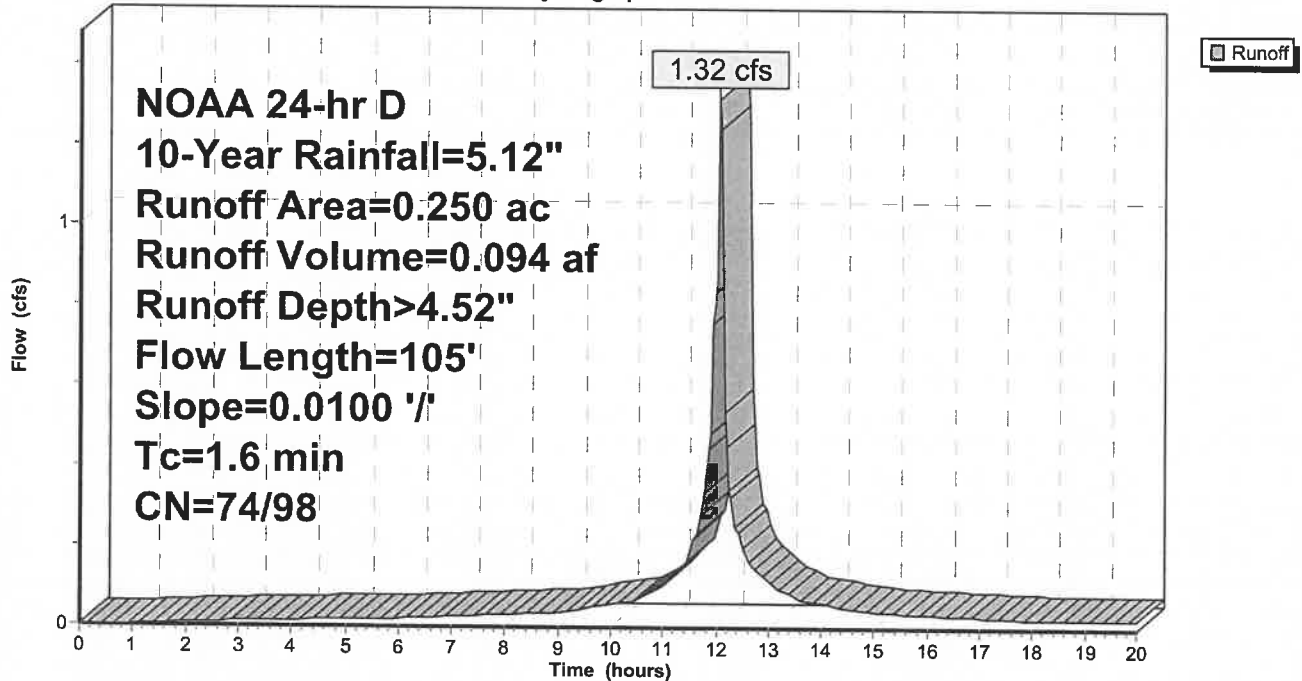
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 10-Year Rainfall=5.12"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG C
0.010	74	>75% Grass cover, Good, HSG C
* 0.040	98	
0.250	97	Weighted Average
0.010	74	4.00% Pervious Area
0.240	98	96.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		<b>Sheet Flow, Roof</b> Smooth surfaces n= 0.011 P2= 3.35"
0.0	5	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
1.6	105	Total			

**Subcatchment 6S: PR. AREA C**

Hydrograph





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PROPOSED

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Summary for Pond 4P: POROUS PAVEMENT (INFILTRATION)**

Inflow Area = 0.250 ac, 96.00% Impervious, Inflow Depth > 4.52" for 10-Year event  
 Inflow = 1.32 cfs @ 12.07 hrs, Volume= 0.094 af  
 Outflow = 0.14 cfs @ 12.84 hrs, Volume= 0.032 af, Atten= 90%, Lag= 46.3 min  
 Primary = 0.14 cfs @ 12.84 hrs, Volume= 0.032 af  
 Routed to Link 7L : TOTAL PROPOSED

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 117.82' @ 12.84 hrs Surf.Area= 3,850 sf Storage= 2,872 cf

Plug-Flow detention time= 353.3 min calculated for 0.032 af (34% of inflow)  
 Center-of-Mass det. time= 181.7 min ( 895.1 - 713.4 )

Volume	Invert	Avail.Storage	Storage Description
#1	115.56'	3,748 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 11,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.56	3,850	0	0
118.51	3,850	11,358	11,358

Device	Routing	Invert	Outlet Devices
#1	Primary	117.61'	<b>7.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.14 cfs @ 12.84 hrs HW=117.82' (Free Discharge)  
 ←1=Orifice/Grate (Orifice Controls 0.14 cfs @ 1.56 fps)

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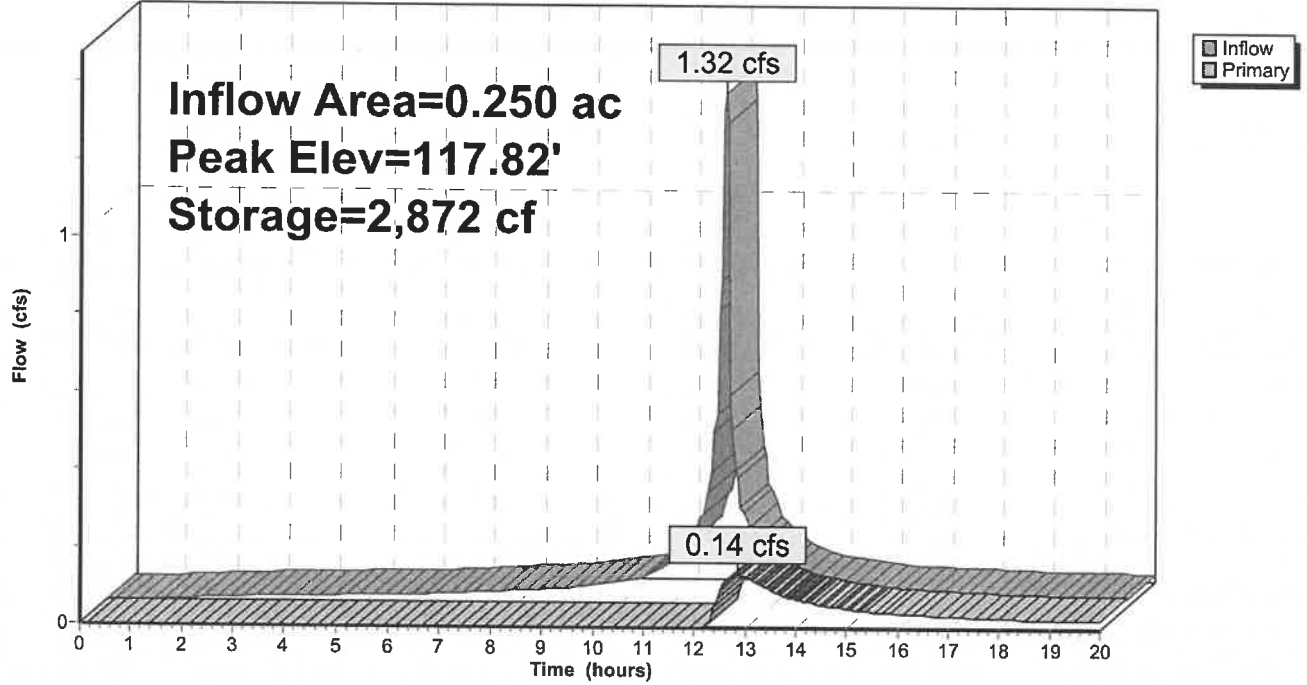
PROPOSED

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

**Pond 4P: POROUS PAVEMENT (INFILTRATION)**

Hydrograph



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PROPOSED

NOAA 24-hr D 10-Year Rainfall=5.12"

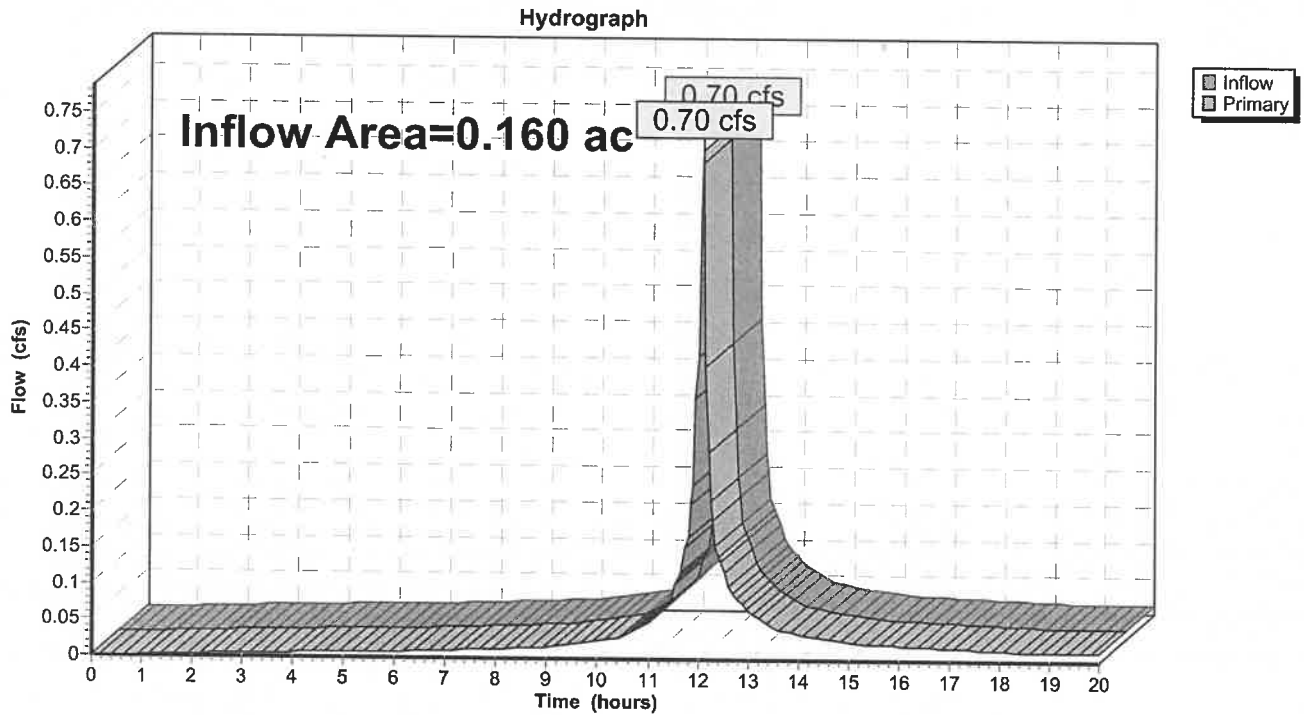
Printed 5/31/2023

**Summary for Link 6L: PROPOSED UNDETAINED**

Inflow Area = 0.160 ac, 62.50% Impervious, Inflow Depth > 3.73" for 10-Year event  
Inflow = 0.70 cfs @ 12.08 hrs, Volume= 0.050 af  
Primary = 0.70 cfs @ 12.08 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 7L : TOTAL PROPOSED

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

**Link 6L: PROPOSED UNDETAINED**



**2022.004-PROPOSED**

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PROPOSED

NOAA 24-hr D 10-Year Rainfall=5.12"

Printed 5/31/2023

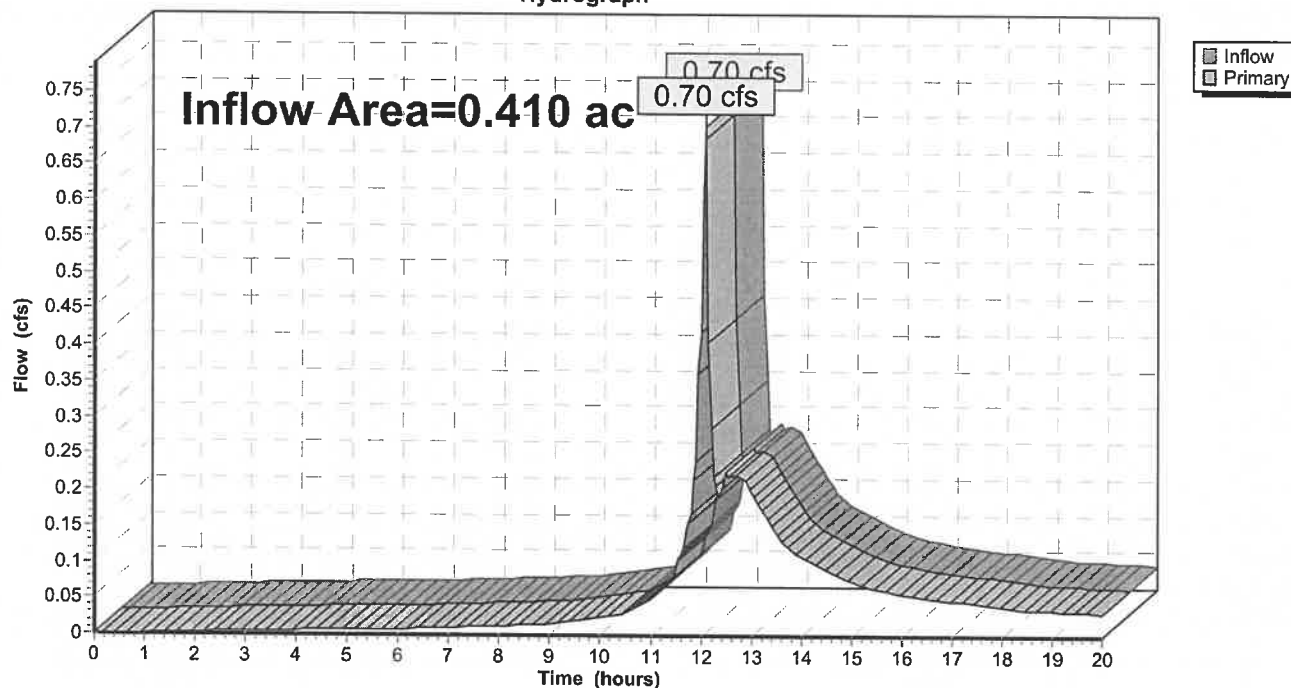
**Summary for Link 7L: TOTAL PROPOSED**

Inflow Area = 0.410 ac, 82.93% Impervious, Inflow Depth > 2.39" for 10-Year event  
Inflow = 0.70 cfs @ 12.08 hrs, Volume= 0.082 af  
Primary = 0.70 cfs @ 12.08 hrs, Volume= 0.082 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

**Link 7L: TOTAL PROPOSED**

Hydrograph



**2022.004-PROPOSED**

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PROPOSED

NOAA 24-hr D 25-Year Rainfall=6.36"

Printed 5/31/2023

**Summary for Subcatchment 1S: PR. AREA D (UNDETAINED)**

Runoff = 0.68 cfs @ 12.08 hrs, Volume= 0.048 af, Depth> 5.79"  
 Routed to Link 6L : PROPOSED UNDETAINED

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 25-Year Rainfall=6.36"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG C
0.100	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		<b>Sheet Flow, Roof</b> Smooth surfaces n= 0.011 P2= 3.35"
0.2	60	0.0050	4.40	5.40	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.0	7	0.0052	4.49	5.51	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.3	201	0.0388	12.25	15.04	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.0	20	0.0491	13.78	16.92	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
2.1	388	Total			

**2022.004-PROPOSED**

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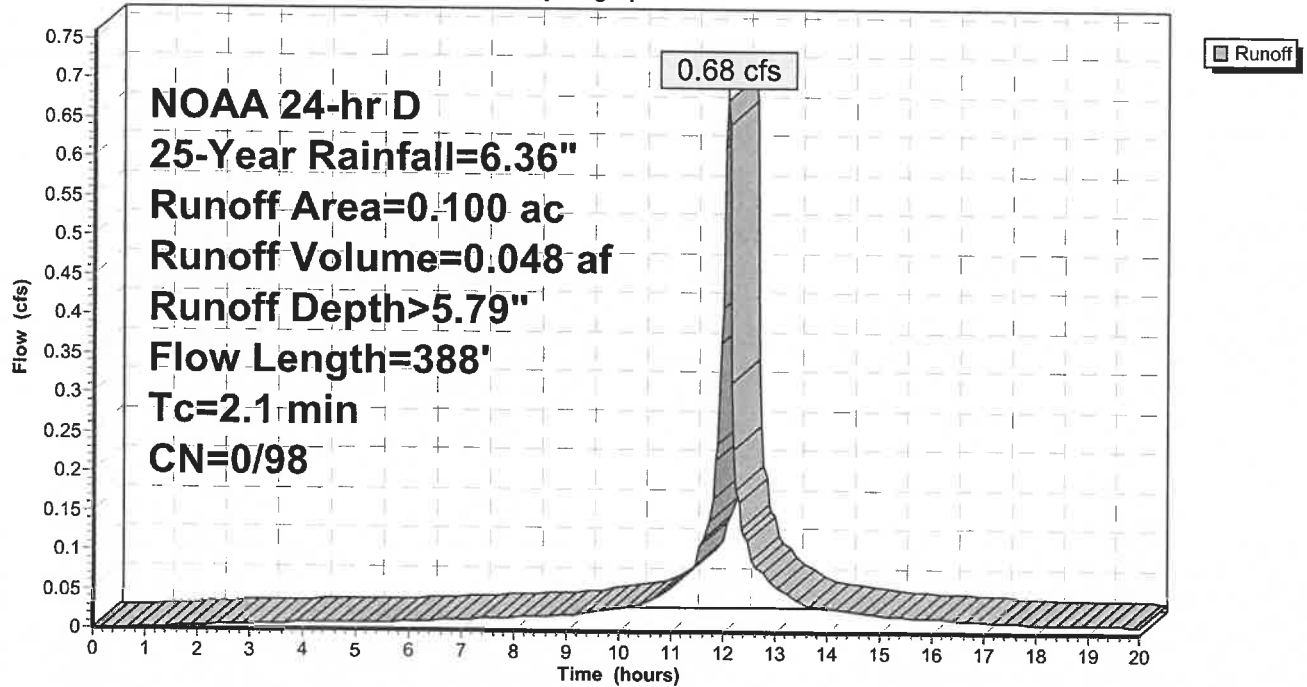
PROPOSED

NOAA 24-hr D 25-Year Rainfall=6.36"

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**Subcatchment 1S: PR. AREA D (UNDETAINED)**

Hydrograph



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PROPOSED

NOAA 24-hr D 25-Year Rainfall=6.36"

Printed 5/31/2023

**Summary for Subcatchment 2S: PR. AREA B (UNDETAINED)**

Runoff = 0.05 cfs @ 12.09 hrs, Volume= 0.003 af, Depth> 3.21"  
 Routed to Link 6L : PROPOSED UNDETAINED

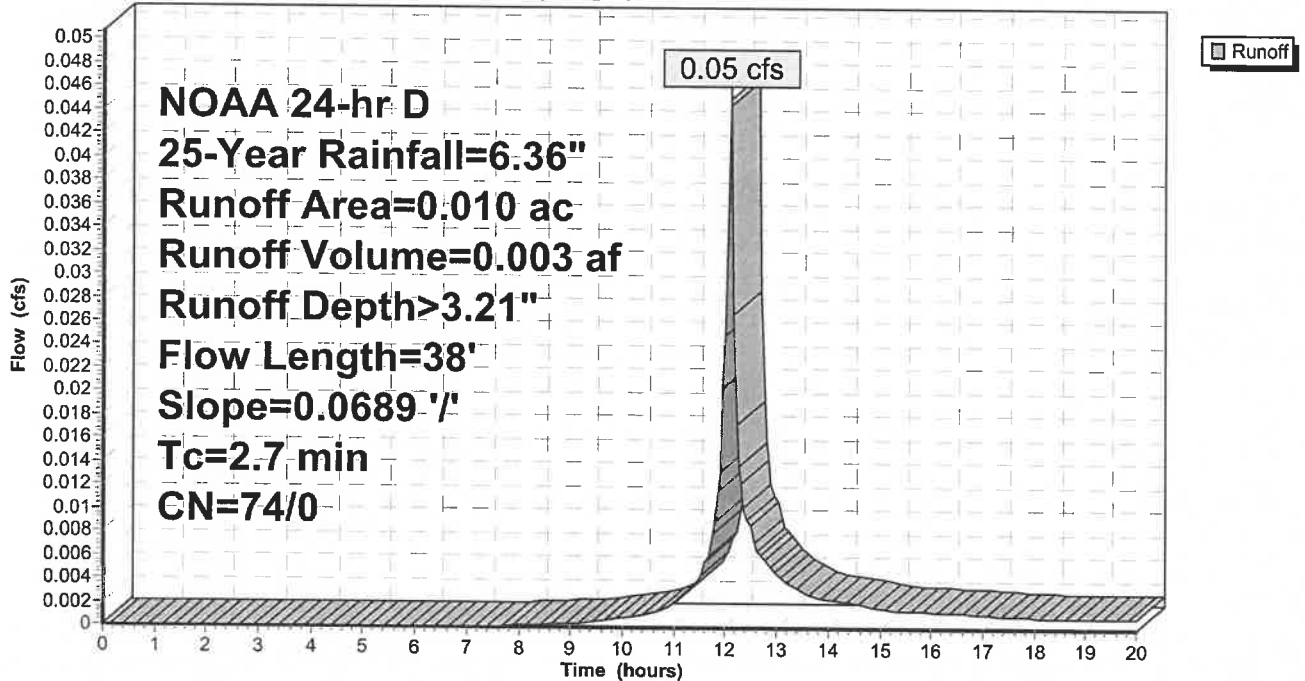
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 25-Year Rainfall=6.36"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
0.010	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	38	0.0689	0.24		Sheet Flow, Grass: Short n= 0.150 P2= 3.35"

**Subcatchment 2S: PR. AREA B (UNDETAINED)**

Hydrograph



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NOAA 24-hr D 25-Year Rainfall=6.36"

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**Summary for Subcatchment 3S: PR. AREA A (UNDETAINED)**

Runoff = 0.12 cfs @ 12.13 hrs, Volume= 0.008 af, Depth> 3.20"  
Routed to Link 6L : PROPOSED UNDETAINED

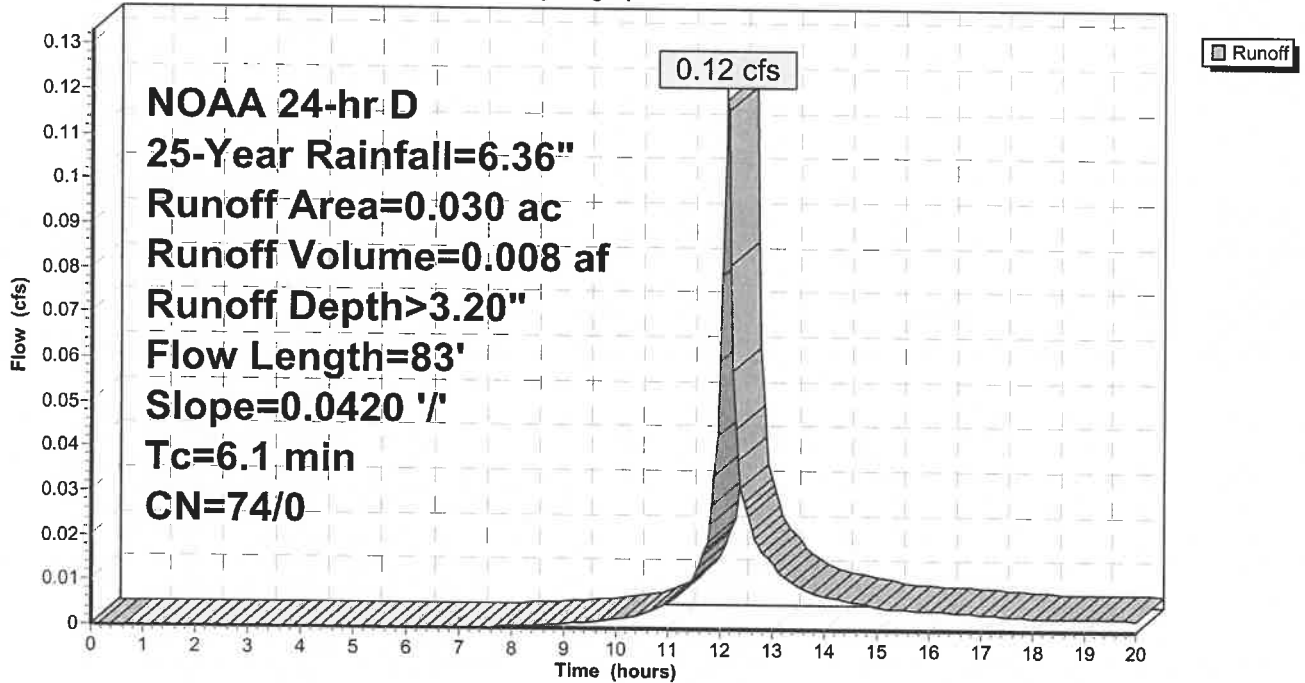
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 25-Year Rainfall=6.36"

Area (ac)	CN	Description
0.030	74	>75% Grass cover, Good, HSG C
0.030	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	83	0.0420	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.35"

**Subcatchment 3S: PR. AREA A (UNDETAINED)**

Hydrograph





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PROPOSED  
 NOAA 24-hr D 25-Year Rainfall=6.36"  
 Printed 5/31/2023

**Summary for Subcatchment 5S: PR. AREA E (UNDETAINED)**

Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.005 af, Depth> 3.20"  
 Routed to Link 6L : PROPOSED UNDETAINED

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 25-Year Rainfall=6.36"

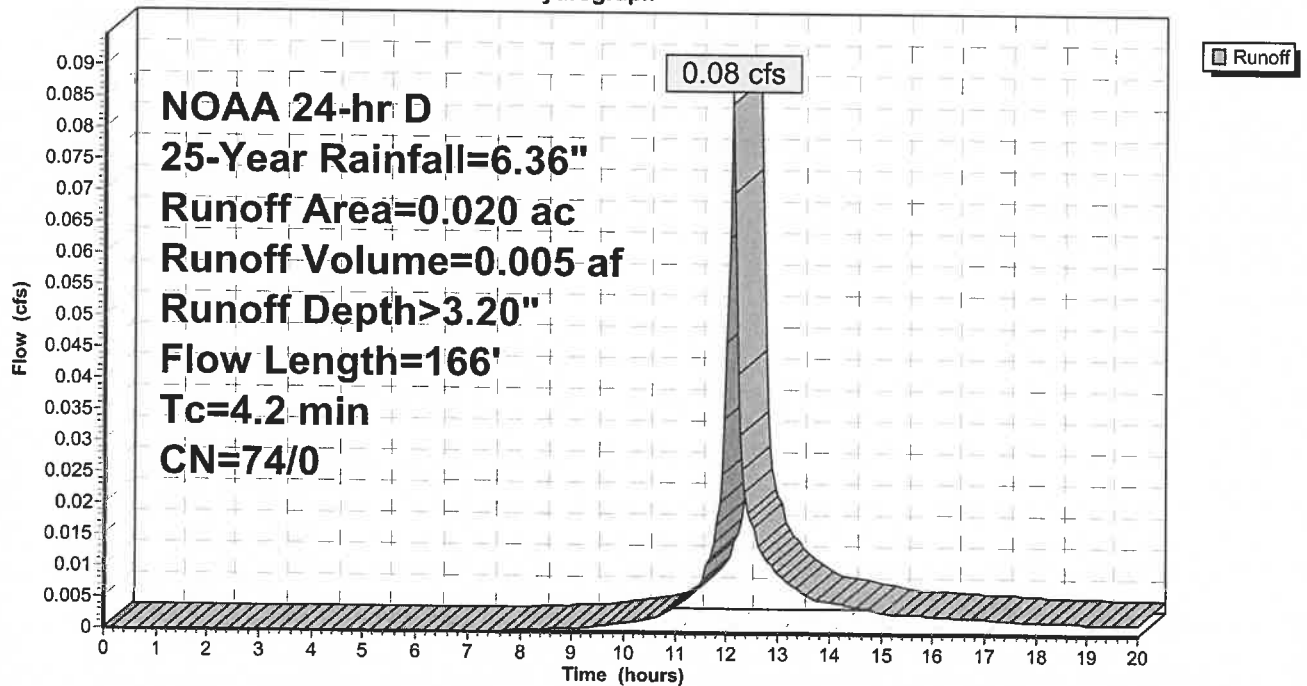
Area (ac)	CN	Description
0.020	74	>75% Grass cover, Good, HSG C
0.020	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	72	0.1000	0.31		Sheet Flow, Grass: Short n= 0.150 P2= 3.35"
0.3	94	0.0580	4.89		Shallow Concentrated Flow, Paved Kv= 20.3 fps
4.2	166	Total			

**Subcatchment 5S: PR. AREA E (UNDETAINED)**

Hydrograph



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NOAA 24-hr D 25-Year Rainfall=6.36"

Printed 5/31/2023

**Summary for Subcatchment 6S: PR. AREA C**

Runoff = 1.64 cfs @ 12.07 hrs, Volume= 0.118 af, Depth> 5.68"  
 Routed to Pond 4P : POROUS PAVEMENT (INFILTRATION)

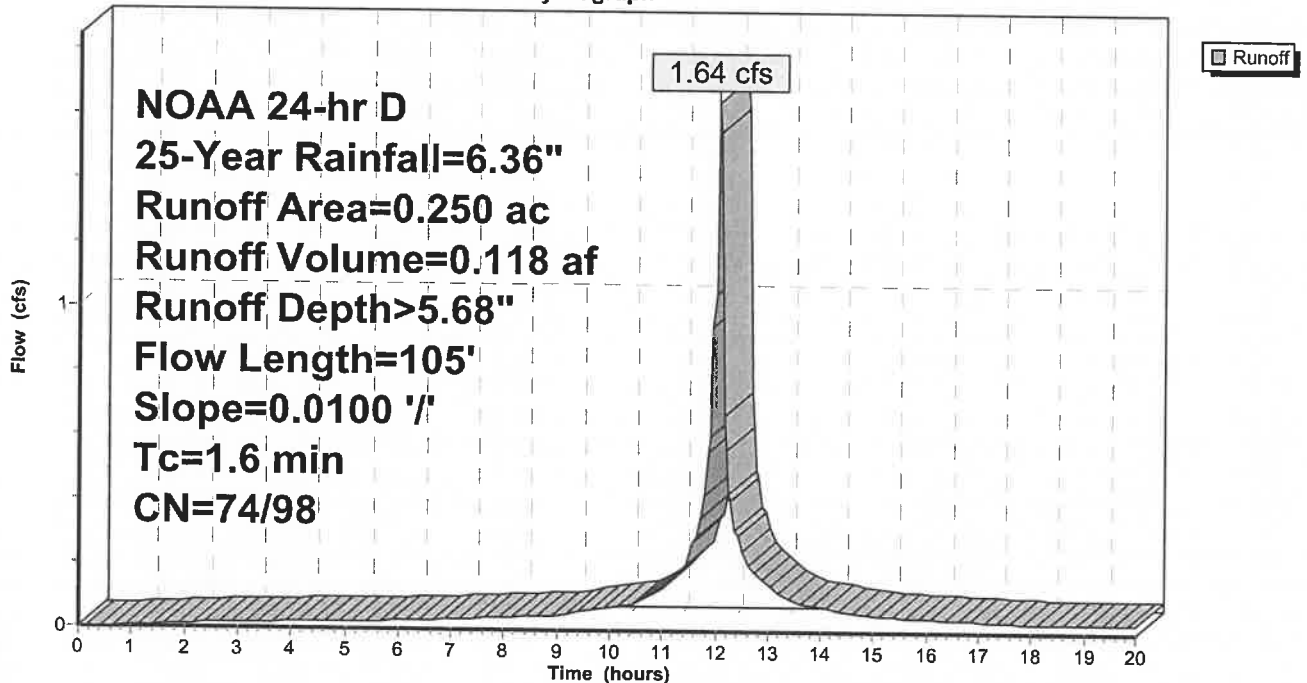
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 25-Year Rainfall=6.36"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG C
0.010	74	>75% Grass cover, Good, HSG C
* 0.040	98	
0.250	97	Weighted Average
0.010	74	4.00% Pervious Area
0.240	98	96.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		<b>Sheet Flow, Roof</b> Smooth surfaces n= 0.011 P2= 3.35"
0.0	5	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
1.6	105	Total			

**Subcatchment 6S: PR. AREA C**

Hydrograph



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PROPOSED

NOAA 24-hr D 25-Year Rainfall=6.36"

Printed 5/31/2023

**Summary for Pond 4P: POROUS PAVEMENT (INFILTRATION)**

Inflow Area = 0.250 ac, 96.00% Impervious, Inflow Depth > 5.68" for 25-Year event  
 Inflow = 1.64 cfs @ 12.07 hrs, Volume= 0.118 af  
 Outflow = 0.43 cfs @ 12.27 hrs, Volume= 0.056 af, Atten= 74%, Lag= 11.9 min  
 Primary = 0.43 cfs @ 12.27 hrs, Volume= 0.056 af  
 Routed to Link 7L : TOTAL PROPOSED

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 118.01' @ 12.27 hrs Surf.Area= 3,850 sf Storage= 3,117 cf

Plug-Flow detention time= 266.0 min calculated for 0.056 af (47% of inflow)  
 Center-of-Mass det. time= 140.8 min ( 850.9 - 710.0 )

Volume	Invert	Avail.Storage	Storage Description
#1	115.56'	3,748 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 11,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.56	3,850	0	0
118.51	3,850	11,358	11,358

Device	Routing	Invert	Outlet Devices
#1	Primary	117.61'	<b>7.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.42 cfs @ 12.27 hrs HW=118.01' (Free Discharge)  
 ←1=Orifice/Grate (Orifice Controls 0.42 cfs @ 2.16 fps)

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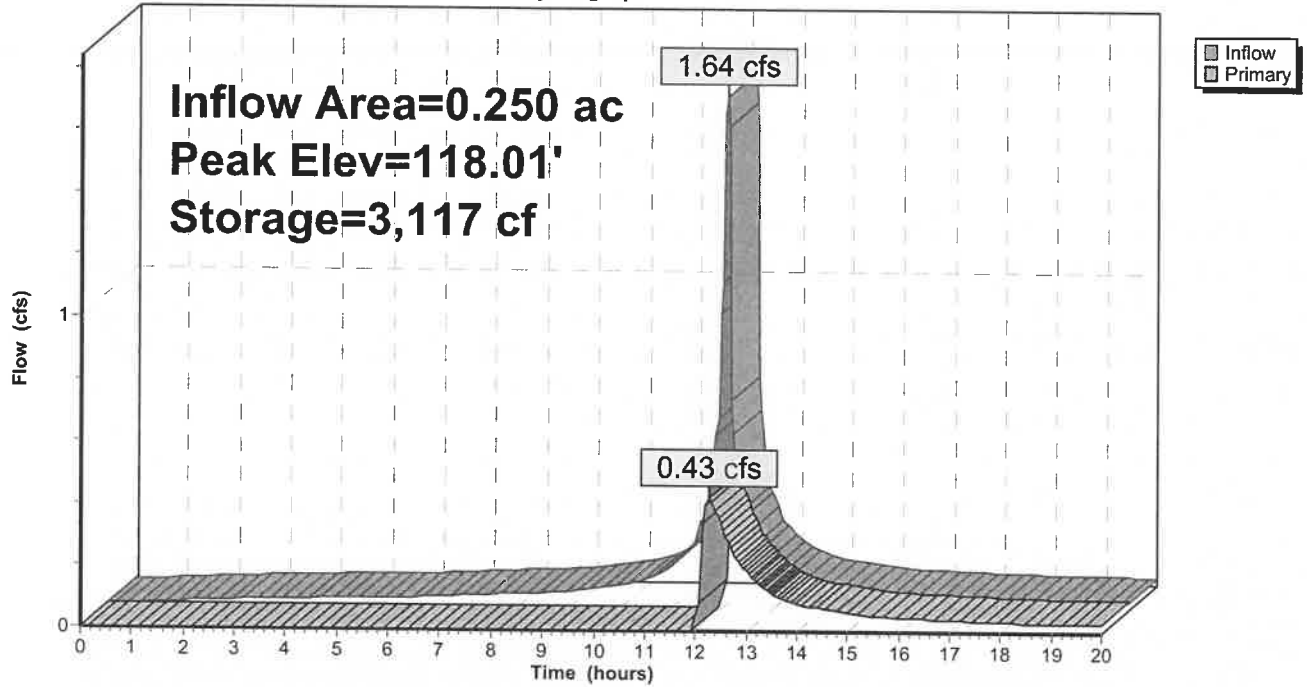
PROPOSED

NOAA 24-hr D 25-Year Rainfall=6.36"

Printed 5/31/2023

**Pond 4P: POROUS PAVEMENT (INFILTRATION)**

Hydrograph



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PROPOSED

NOAA 24-hr D 25-Year Rainfall=6.36"

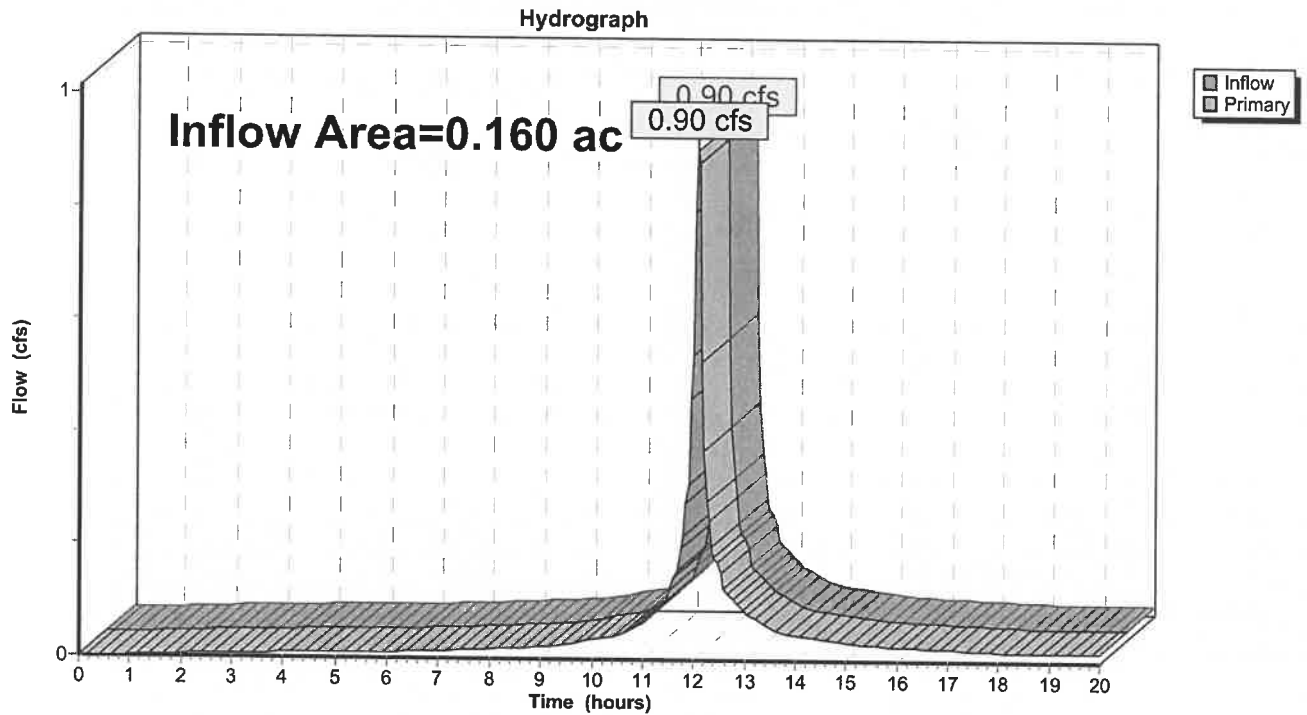
Printed 5/31/2023

**Summary for Link 6L: PROPOSED UNDETAINED**

Inflow Area = 0.160 ac, 62.50% Impervious, Inflow Depth > 4.82" for 25-Year event  
Inflow = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af  
Primary = 0.90 cfs @ 12.09 hrs, Volume= 0.064 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 7L : TOTAL PROPOSED

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

**Link 6L: PROPOSED UNDETAINED**



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NOAA 24-hr D 25-Year Rainfall=6.36"

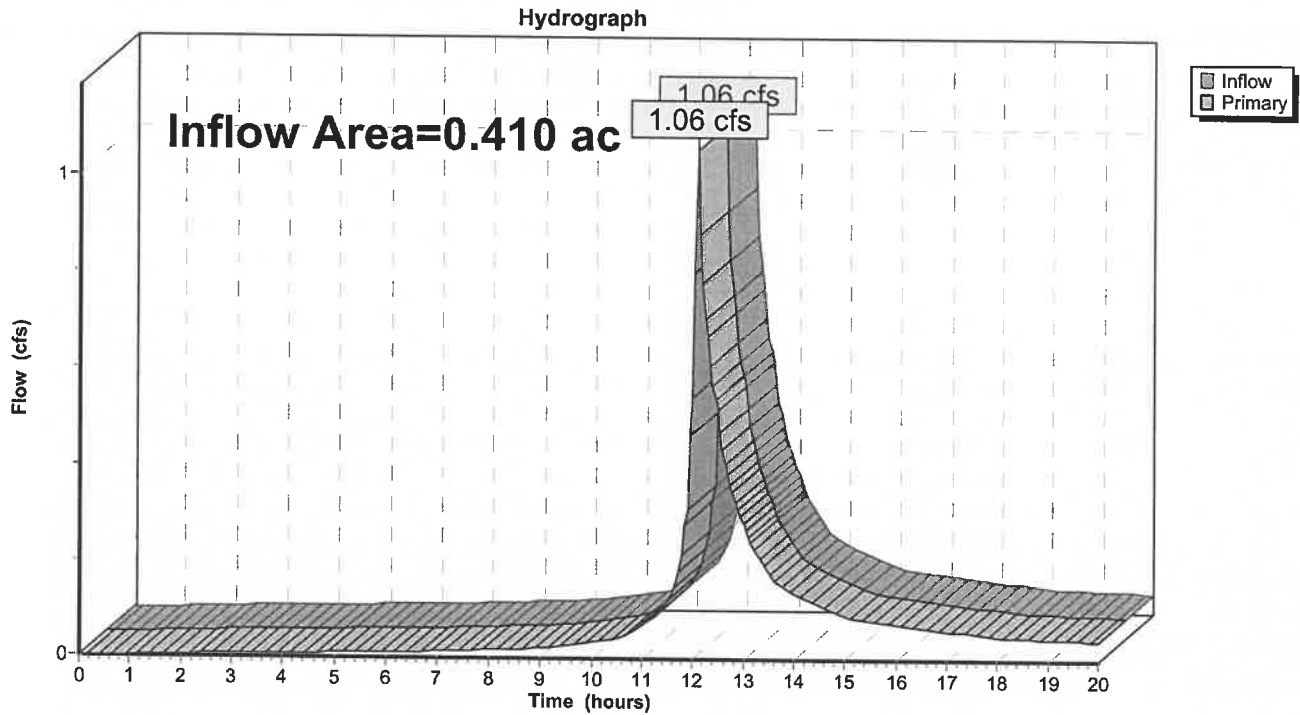
Printed 5/31/2023

**Summary for Link 7L: TOTAL PROPOSED**

Inflow Area = 0.410 ac, 82.93% Impervious, Inflow Depth > 3.52" for 25-Year event  
Inflow = 1.06 cfs @ 12.10 hrs, Volume= 0.120 af  
Primary = 1.06 cfs @ 12.10 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

**Link 7L: TOTAL PROPOSED**



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NOAA 24-hr D 100-Year Rainfall=8.63"

Printed 5/31/2023

**Summary for Subcatchment 1S: PR. AREA D (UNDETAINED)**

Runoff = 0.92 cfs @ 12.08 hrs, Volume= 0.066 af, Depth> 7.94"  
 Routed to Link 6L : PROPOSED UNDETAINED

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 100-Year Rainfall=8.63"

Area (ac)	CN	Description
0.100	98	Paved parking, HSG C
0.100	98	100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		<b>Sheet Flow, Roof</b> Smooth surfaces n= 0.011 P2= 3.35"
0.2	60	0.0050	4.40	5.40	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.0	7	0.0052	4.49	5.51	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.3	201	0.0388	12.25	15.04	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
0.0	20	0.0491	13.78	16.92	<b>Pipe Channel, RCP_Round 15"</b> 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011
2.1	388	Total			

2022.004-PROPOSED

Prepared by Menlo Engineering Associates

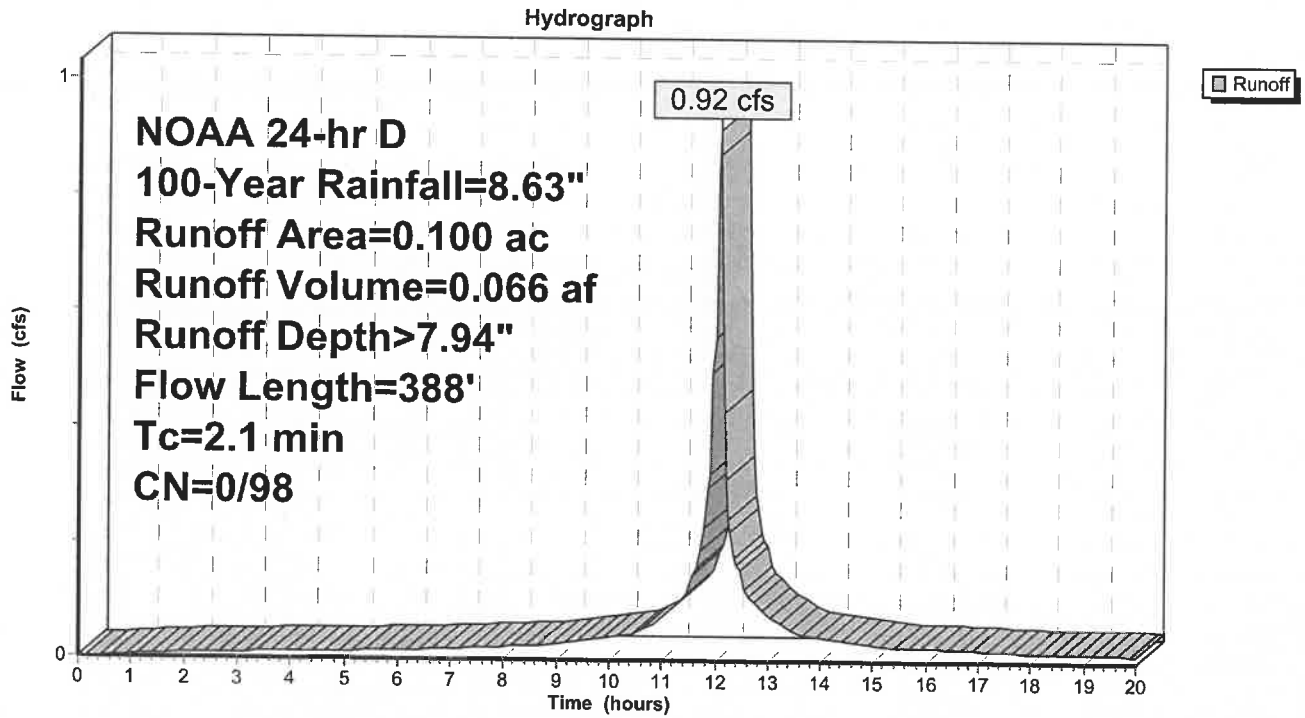
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PROPOSED

NOAA 24-hr D 100-Year Rainfall=8.63"

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### Subcatchment 1S: PR. AREA D (UNDETAINED)





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PROPOSED  
NOAA 24-hr D 100-Year Rainfall=8.63"

Printed 5/31/2023

**Summary for Subcatchment 2S: PR. AREA B (UNDETAINED)**

Runoff = 0.07 cfs @ 12.09 hrs, Volume= 0.004 af, Depth> 5.08"  
Routed to Link 6L : PROPOSED UNDETAINED

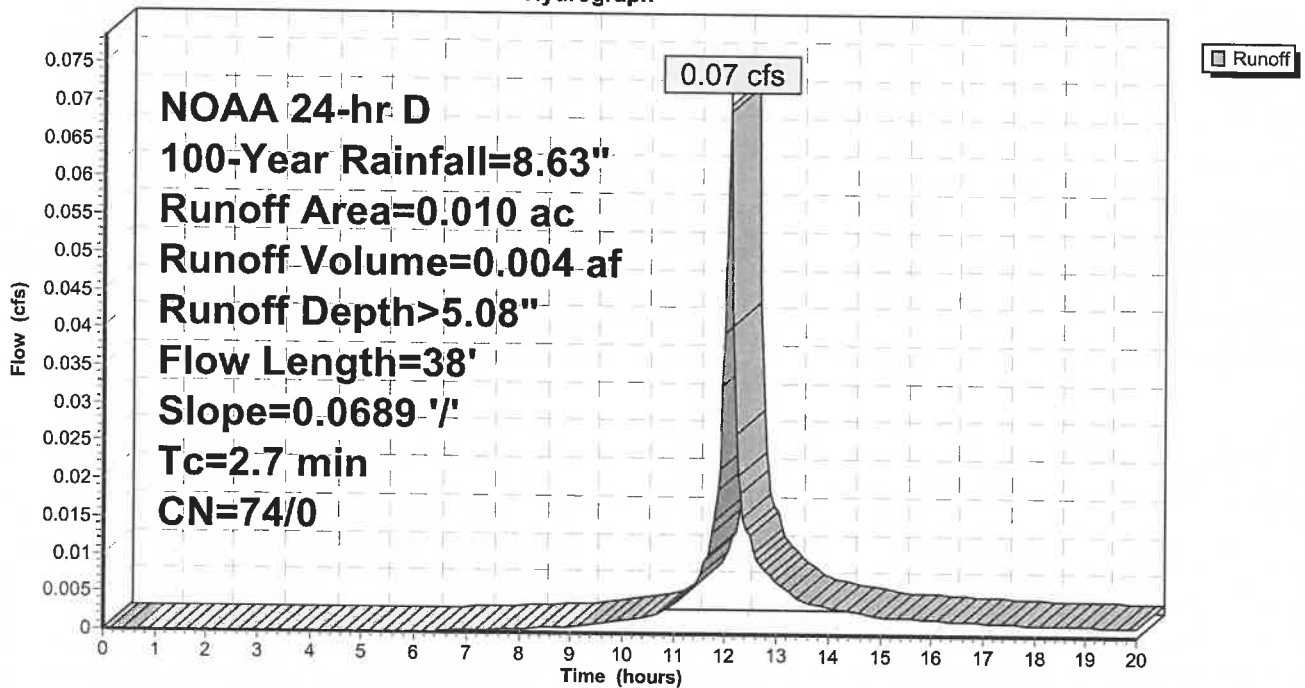
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 100-Year Rainfall=8.63"

Area (ac)	CN	Description
0.010	74	>75% Grass cover, Good, HSG C
0.010	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	38	0.0689	0.24		Sheet Flow, Grass: Short n= 0.150 P2= 3.35"

**Subcatchment 2S: PR. AREA B (UNDETAINED)**

Hydrograph



**2022.004-PROPOSED**

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PROPOSED

NOAA 24-hr D 100-Year Rainfall=8.63"

Printed 5/31/2023

**Summary for Subcatchment 3S: PR. AREA A (UNDETAINED)**

Runoff = 0.18 cfs @ 12.13 hrs, Volume= 0.013 af, Depth> 5.08"  
 Routed to Link 6L : PROPOSED UNDETAINED

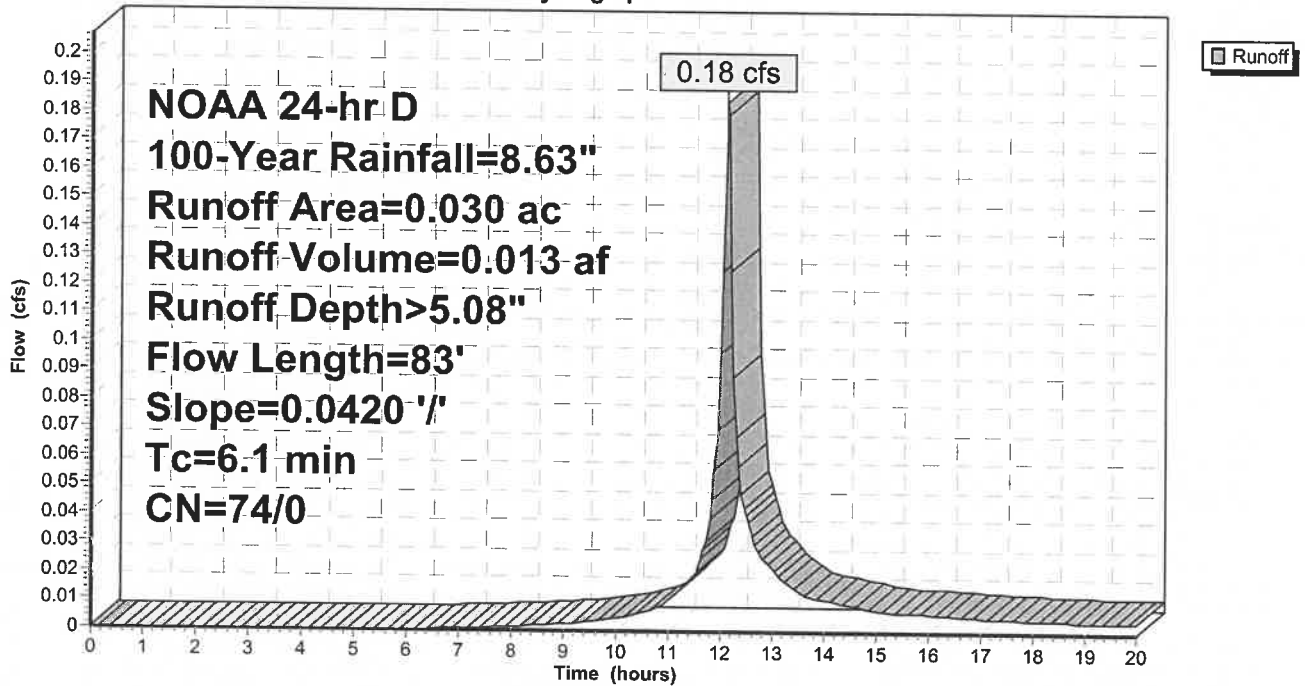
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 100-Year Rainfall=8.63"

Area (ac)	CN	Description
0.030	74	>75% Grass cover, Good, HSG C
0.030	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	83	0.0420	0.23		Sheet Flow, Grass: Short n= 0.150 P2= 3.35"

**Subcatchment 3S: PR. AREA A (UNDETAINED)**

Hydrograph



**2022.004-PROPOSED**

Prepared by Menlo Engineering Associates

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PROPOSED  
NOAA 24-hr D 100-Year Rainfall=8.63"

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**Summary for Subcatchment 5S: PR. AREA E (UNDETAINED)**

Runoff = 0.13 cfs @ 12.10 hrs, Volume= 0.008 af, Depth> 5.08"  
Routed to Link 6L : PROPOSED UNDETAINED

Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
NOAA 24-hr D 100-Year Rainfall=8.63"

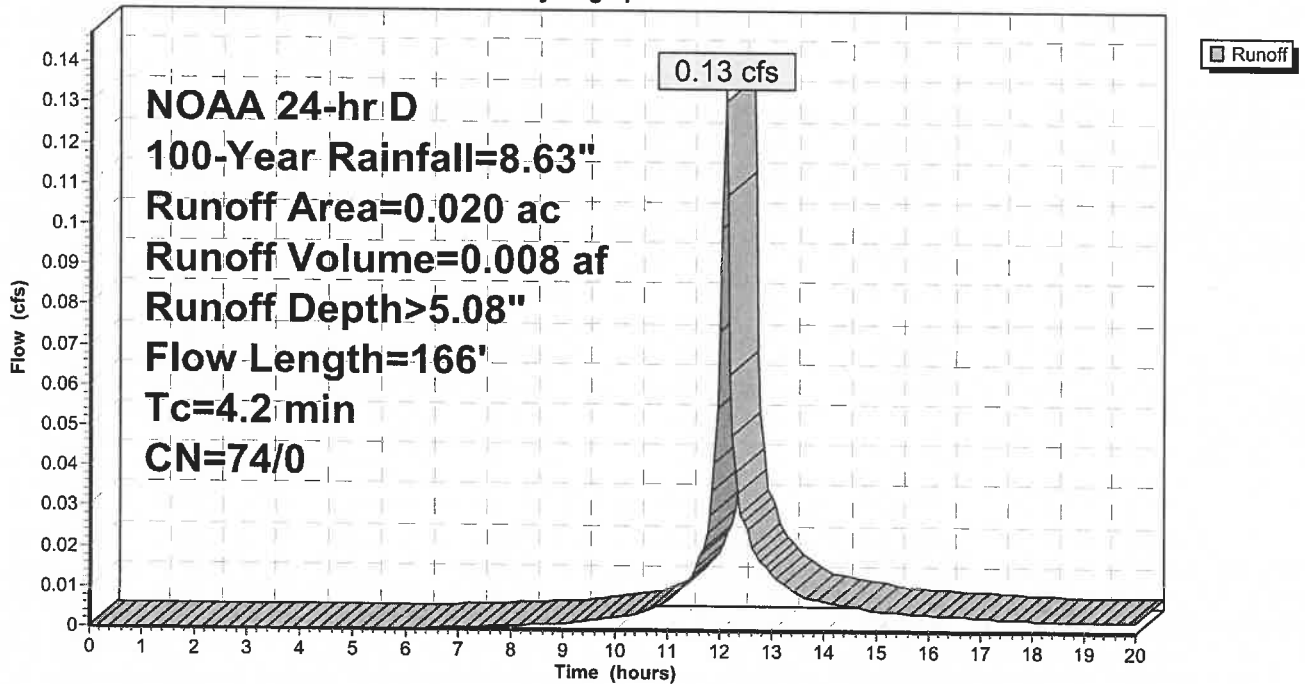
Area (ac)	CN	Description
0.020	74	>75% Grass cover, Good, HSG C
0.020	74	100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.9	72	0.1000	0.31		<b>Sheet Flow,</b> Grass: Short n= 0.150 P2= 3.35"
0.3	94	0.0580	4.89		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
4.2	166	Total			

**Subcatchment 5S: PR. AREA E (UNDETAINED)**

Hydrograph



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NOAA 24-hr D 100-Year Rainfall=8.63"

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**Summary for Subcatchment 6S: PR. AREA C**

Runoff = 2.24 cfs @ 12.07 hrs, Volume= 0.163 af, Depth> 7.82"  
 Routed to Pond 4P : POROUS PAVEMENT (INFILTRATION)

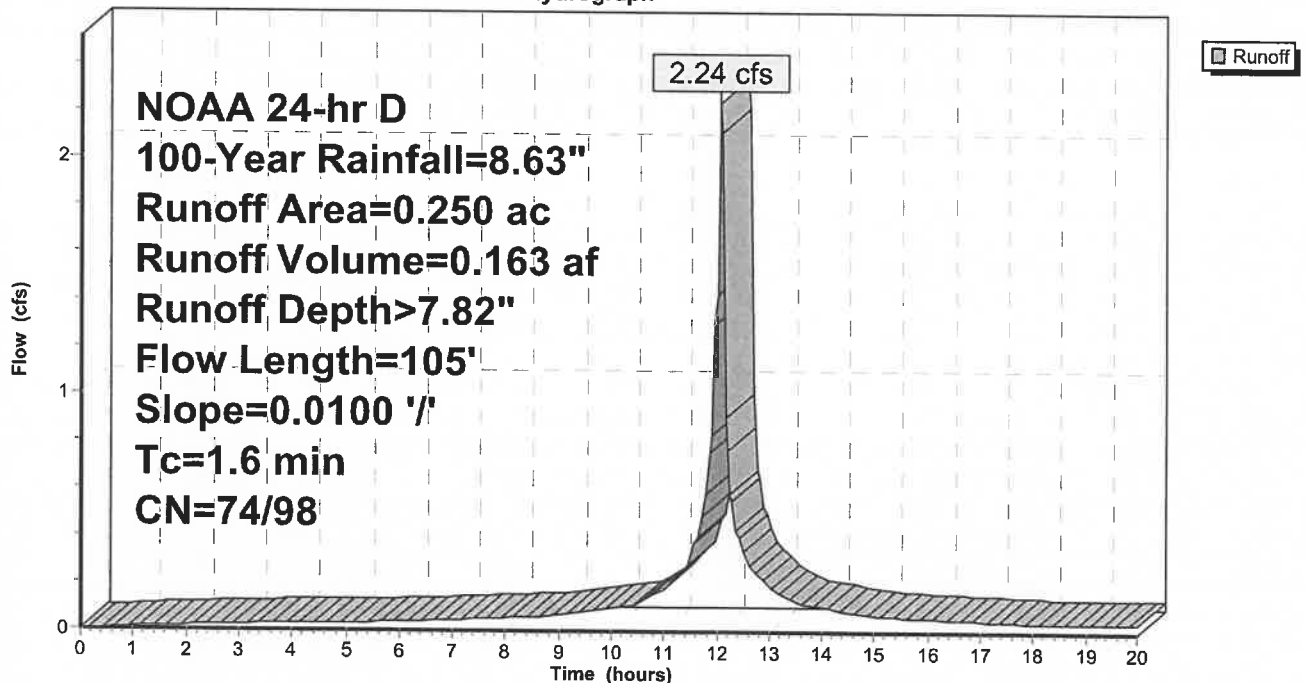
Runoff by SCS TR-20 method, UH=SCS, Split Pervious/Imperv., Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 NOAA 24-hr D 100-Year Rainfall=8.63"

Area (ac)	CN	Description
0.200	98	Paved parking, HSG C
0.010	74	>75% Grass cover, Good, HSG C
* 0.040	98	
0.250	97	Weighted Average
0.010	74	4.00% Pervious Area
0.240	98	96.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.6	100	0.0100	1.07		<b>Sheet Flow, Roof</b> Smooth surfaces n= 0.011 P2= 3.35"
0.0	5	0.0100	2.03		<b>Shallow Concentrated Flow,</b> Paved Kv= 20.3 fps
1.6	105	Total			

**Subcatchment 6S: PR. AREA C**

Hydrograph



**2022.004-PROPOSED**

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PROPOSED

NOAA 24-hr D 100-Year Rainfall=8.63"

Printed 5/31/2023

**Summary for Pond 4P: POROUS PAVEMENT (INFILTRATION)**

Inflow Area = 0.250 ac, 96.00% Impervious, Inflow Depth > 7.82" for 100-Year event  
 Inflow = 2.24 cfs @ 12.07 hrs, Volume= 0.163 af  
 Outflow = 1.00 cfs @ 12.16 hrs, Volume= 0.100 af, Atten= 55%, Lag= 5.6 min  
 Primary = 1.00 cfs @ 12.16 hrs, Volume= 0.100 af  
 Routed to Link 7L : TOTAL PROPOSED

Routing by Stor-Ind method, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs  
 Peak Elev= 118.51' @ 12.16 hrs Surf.Area= 3,850 sf Storage= 3,746 cf

Plug-Flow detention time= 210.0 min calculated for 0.100 af (61% of inflow)  
 Center-of-Mass det. time= 115.8 min ( 821.7 - 705.9 )

Volume	Invert	Avail.Storage	Storage Description
#1	115.56'	3,748 cf	<b>Custom Stage Data (Prismatic)</b> Listed below (Recalc) 11,358 cf Overall x 33.0% Voids

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
115.56	3,850	0	0
118.51	3,850	11,358	11,358

Device	Routing	Invert	Outlet Devices
#1	Primary	117.61'	<b>7.0" Vert. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.99 cfs @ 12.16 hrs HW=118.50' (Free Discharge)  
 ↳1=Orifice/Grate (Orifice Controls 0.99 cfs @ 3.72 fps)

**2022.004-PROPOSED**

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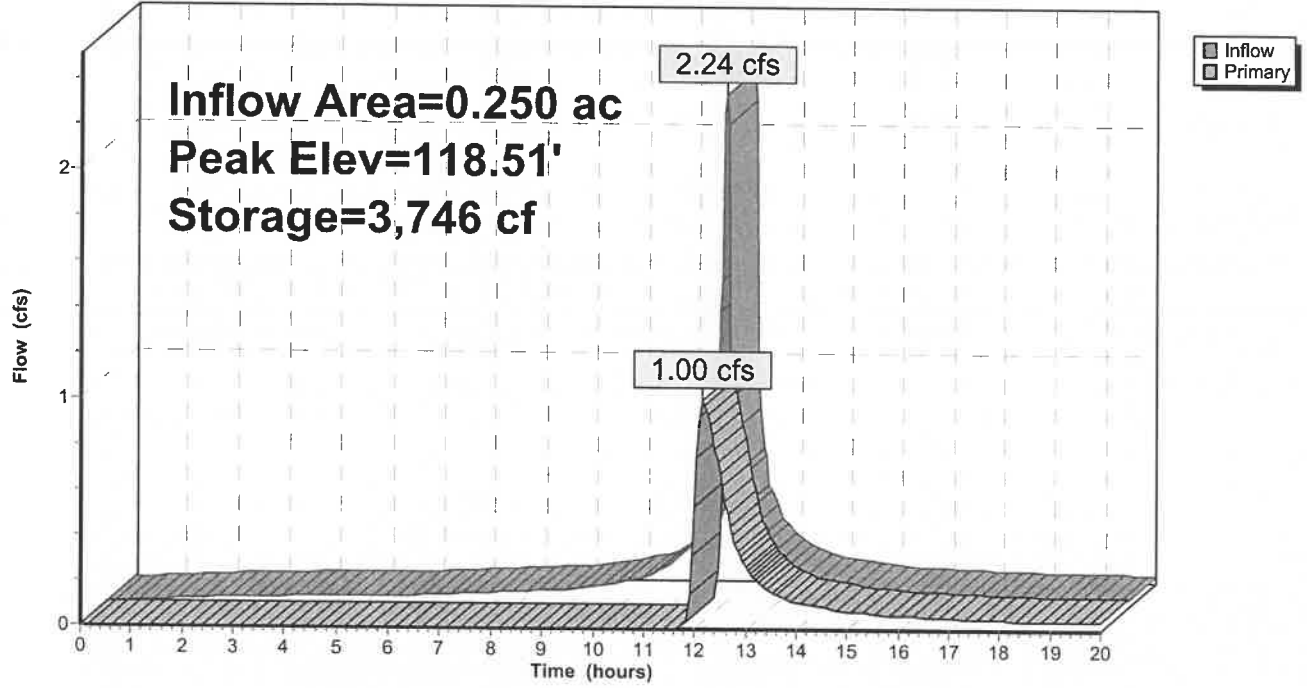
PROPOSED

NOAA 24-hr D 100-Year Rainfall=8.63"

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**Pond 4P: POROUS PAVEMENT (INFILTRATION)**

Hydrograph



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PROPOSED

NOAA 24-hr D 100-Year Rainfall=8.63"

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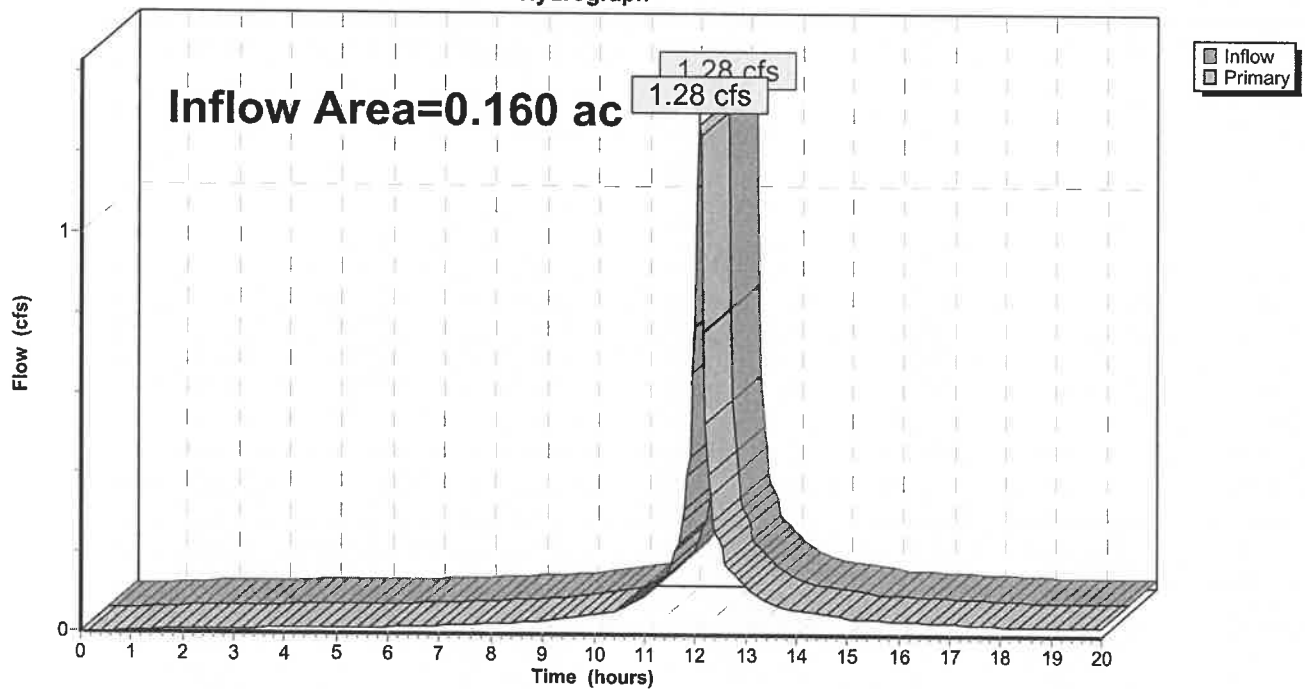
**Summary for Link 6L: PROPOSED UNDETAINED**

Inflow Area = 0.160 ac, 62.50% Impervious, Inflow Depth > 6.86" for 100-Year event  
Inflow = 1.28 cfs @ 12.09 hrs, Volume= 0.092 af  
Primary = 1.28 cfs @ 12.09 hrs, Volume= 0.092 af, Atten= 0%, Lag= 0.0 min  
Routed to Link 7L : TOTAL PROPOSED

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

**Link 6L: PROPOSED UNDETAINED**

Hydrograph



**2022.004-PROPOSED**

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PROPOSED

NOAA 24-hr D 100-Year Rainfall=8.63"

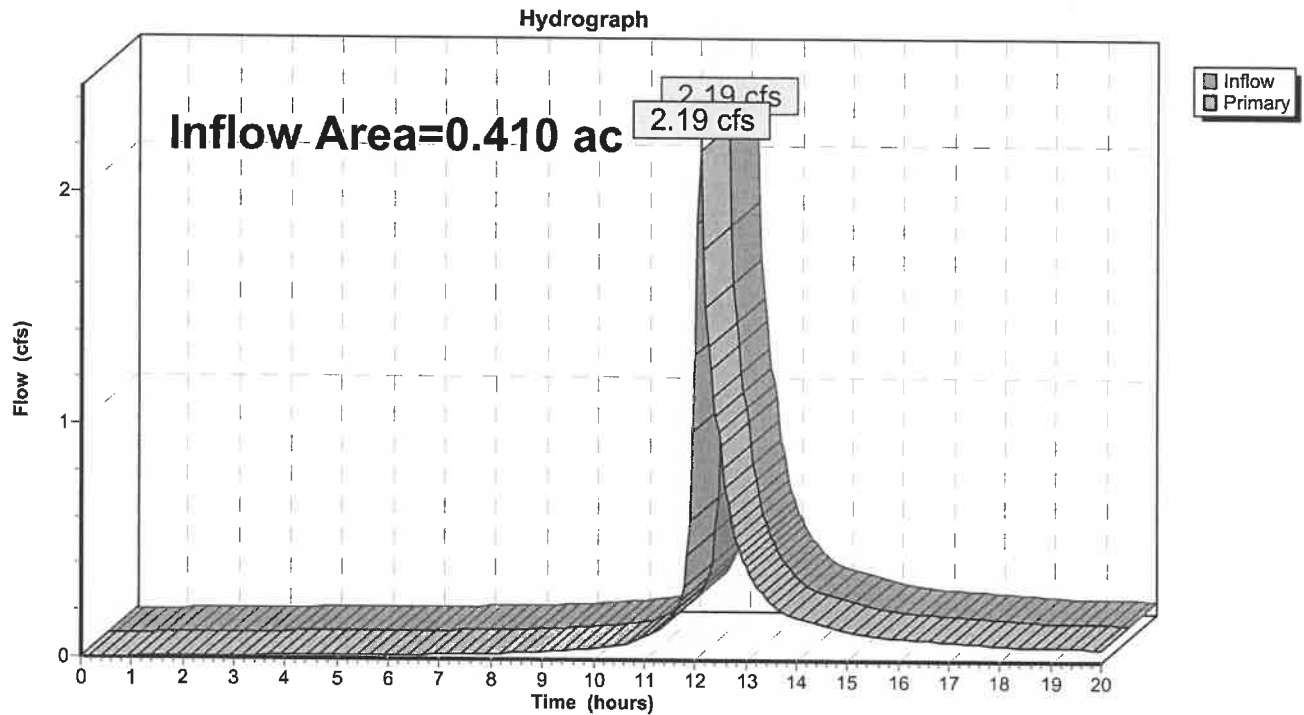
Printed 5/31/2023

**Summary for Link 7L: TOTAL PROPOSED**

Inflow Area = 0.410 ac, 82.93% Impervious, Inflow Depth > 5.61" for 100-Year event  
Inflow = 2.19 cfs @ 12.10 hrs, Volume= 0.192 af  
Primary = 2.19 cfs @ 12.10 hrs, Volume= 0.192 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-20.00 hrs, dt= 0.05 hrs

**Link 7L: TOTAL PROPOSED**





## APPENDIX C: PIPE CALCULATIONS

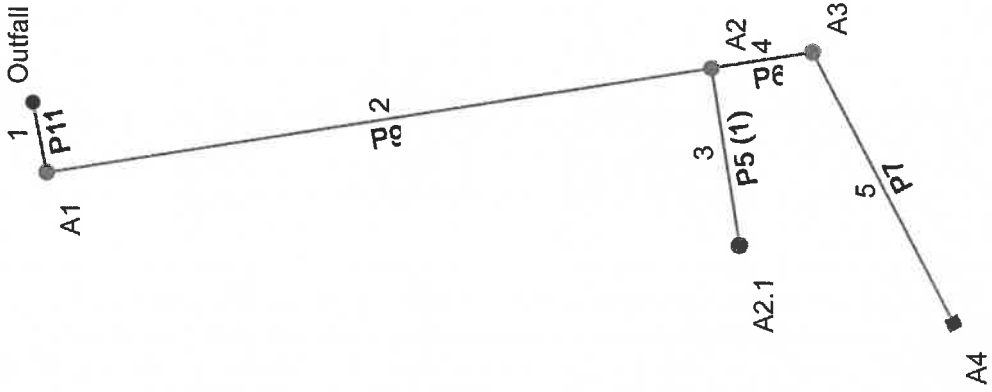
# JOB NAME - WEIGHTED 'C' VALUES

SOIL TYPES : (C) LbtB - Sassafras sandy loam, 2 to 5 percent slopes  
 (C) NkrA - Sassafras gravelly sandy loam, 10 to 15 percent slopes

## TYPE 'C' SOILS

STRUCTURE	TOTAL AREA (acres)	TOTAL WEIGHTED 'C'	IMPERVIOUS		'C' =	GRASS		'C' =	WOODS		'C' =
			AREA (acres)	%		AREA (acres)	%		AREA (acres)	%	
A4	0.25	0.97	0.24	96%	0.99	0.01	4%	0.51	0.00	0%	0.45
A2.1	0.11	0.99	0.11	100%	0.99	0.00	0%	0.51	0.00	0%	0.45
<b>TOTALS</b>	<b>0.36</b>	<b>0.98</b>	<b>0.35</b>	<b>97%</b>	<b>0.99</b>	<b>0.01</b>	<b>3%</b>	<b>0.51</b>	<b>0.01</b>	<b>0%</b>	<b>0.45</b>

# Hydraflow Storm Sewers Extension for Autodesk® Civil 3D® Plan



# Pipe Calc

Line No.	Inlet ID	Line ID	Gnd/Rim EI Up (ft)	Line Length (ft)	Dmg Area (ac)	Runoff Coeff (C)	Inlet Time (min)	i Inlet (in/hr)	Incr Q (cfs)	Total Area (ac)	Tc (min)	i Sys (in/hr)	Total Runoff (cfs)	Known Q (cfs)	Flow Rate (cfs)	Capac Full (cfs)	Line Size (in)	Line Slope (%)	Vel Ave (ft/s)	Invert Up (ft)	Invert Dn (ft)	n-val Pipe
1	A1	P11	110.14	20.364	0.00	0.00	0.0	0.00	0.00	0.36	13.2	5.92	2.08	0.00	2.08	15.50	15	4.91	3.78	104.00	103.00	0.012
2	A2	P9	117.14	191.229	0.00	0.00	0.0	0.00	0.00	0.36	11.5	6.32	2.22	0.00	2.22	13.90	15	3.95	6.07	112.55	105.00	0.012
3	A2.1	P5(1)	117.39	51.344	0.11	0.99	10.0	6.73	0.73	0.11	10.0	6.73	0.73	0.00	0.73	5.11	15	0.45	2.87	113.23	113.00	0.011
4	A3	P6	119.25	28.981	0.00	0.00	0.0	0.00	0.00	0.25	11.1	6.42	1.56	0.00	1.56	5.03	15	0.52	3.45	112.80	112.65	0.012
5	A4	P7	118.85	86.922	0.25	0.97	10.0	6.73	1.63	0.25	10.0	6.73	1.63	0.00	1.63	5.18	15	0.46	3.62	113.30	112.90	0.011

Project File: LINE-A.stm

Number of lines: 5




Date: 5/31/2023

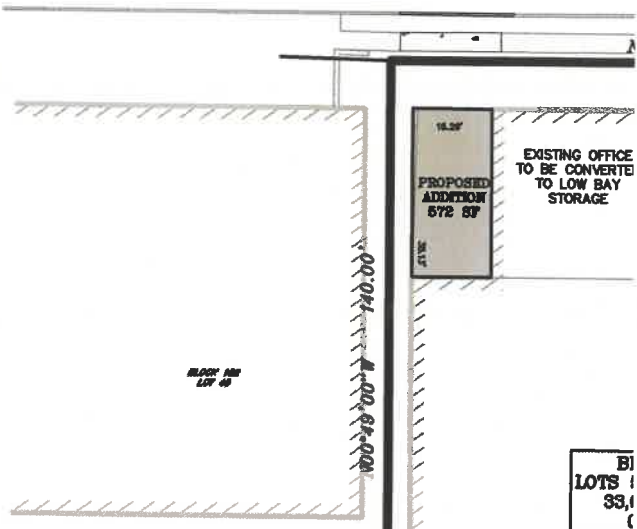
NOTES: Intensity = 42.39 / (Inlet time + 5.10) ^ 0.68 -- Return period = 25 Yrs. ; \*\* Critical depth

## APPENDIX D: WATER QUALITY CALCULATIONS

**HIGH STREET**  
(50' RIGHT-OF-WAY)

**KEY**

-  EXISTING MOTOR VEHICLE SURFACE
-  PROPOSED MOTOR VEHICLE SURFACE
-  PROPOSED MOTOR VEHICLE SURFACE TO BMP

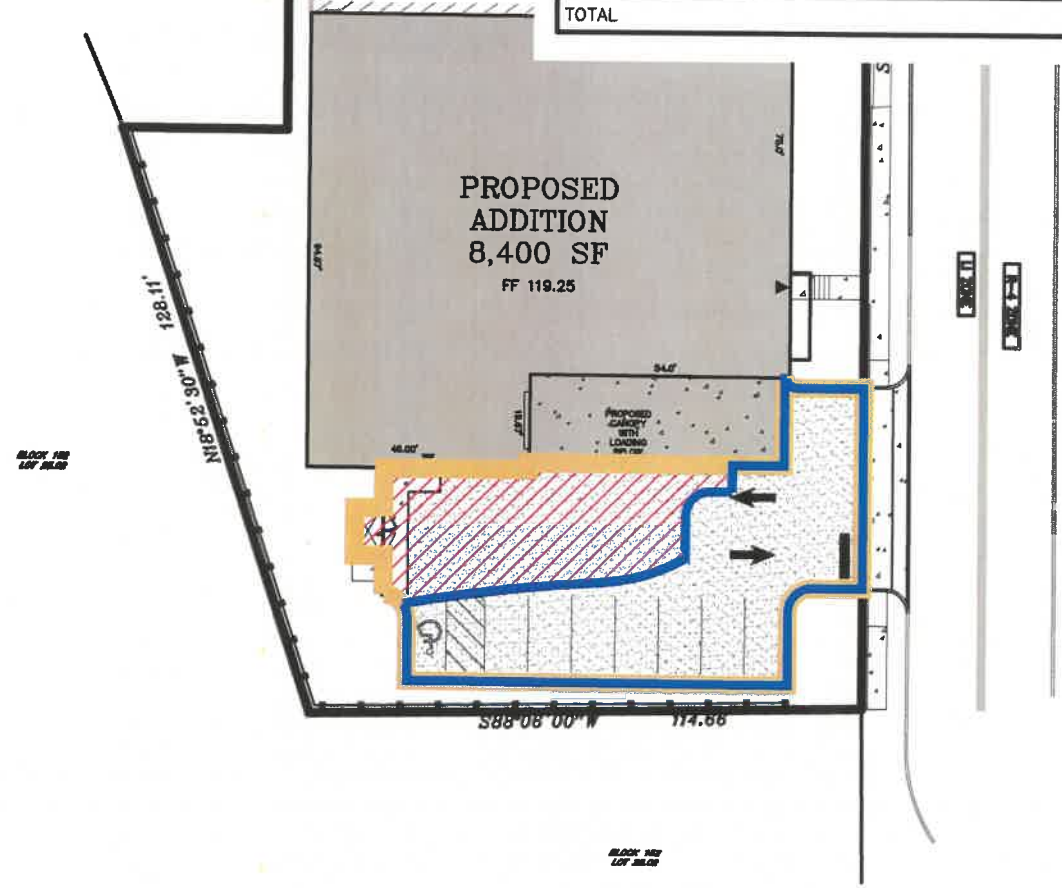


**REQUIRED TSS REMOVAL**

	AREA	REQUIRED REMOVAL	
EXISTING MOTOR VEHICLE SURFACE	1,696 SF	50%	848
PROPOSED MOTOR VEHICLE SURFACE	2,755 SF	80%	2,204
<b>TOTAL</b>			<b>3,052</b>

**PROPOSED TSS REMOVAL**

	AREA	PROPOSED REMOVAL	
MOTOR VEHICLE SURFACE TO PVIOUS PAVEMENT	4,452 SF	80%	3,562
<b>TOTAL</b>			<b>3,562</b>



**WATER QUALITY MAP**  
SCALE 1"=40'

**DRAINAGE AREA MAPS**