

DRAINAGE STATEMENT

for

MPB Realty, LLC

Proposed Popeyes & IHOP Restaurant

470 Eagle Rock Avenue (CR 611)

Block 153, Lot 38

Township of West Orange

Essex County, NJ

Prepared by:



**DYNAMIC
ENGINEERING**

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A handwritten signature in dark ink, appearing to read 'MB', is positioned above a horizontal line. The signature is fluid and cursive.

Matthew J. Bersch, PE
NJ Professional Engineer License #54522

June 2024
DEC# 1021-99-025

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I. Introduction

This Drainage Statement has been prepared to define and analyze the stormwater drainage conditions that would occur as a result of the improvements to Block 153, Lot 38, as shown on the Township of West Orange Tax Map Sheet No. 84, located in the Township of West Orange, Essex County, New Jersey. In existing conditions, the subject site consists of 1.05 acres (45,713 SF) and is located at 470 Eagle Rock Avenue.

Under existing conditions, the site is developed as a restaurant with associated parking, landscaping, and lighting. The existing development has an impervious coverage of approximately 80.9% (36,974 SF) and is located in the B-2 – General Business Zone. The proposed development consists of retrofitting the existing building for the occupancy of a 2,391 SF Popeyes restaurant with a drive-thru and a 3,797 SF IHOP restaurant. Additional site improvements include parking, landscaping, lighting, and a trash enclosure. The proposed development will provide a total impervious coverage of approximately 76.3% (34,891 SF), resulting in an approximately 2,083 SF (4.6%) reduction. In addition, the project will result in a decrease in motor vehicle surface area of approximately 2,144 SF from 28,325 SF to 26,181 SF. Per the Natural Resources Conservation Service Web Soil Survey, a portion of the property is located within unclassified Urban Land soil. To be conservative, the analysis utilized HSG B in existing conditions and HSG D in proposed for disturbed areas within the Urban Land soil.

Based upon the fact that the proposed improvements will result in more than one (1) acre of land disturbance, this project is classified as a “major development” and is subject to compliance with the Stormwater Regulations set forth in NJAC 7:8. However, the project will result in a decrease in motor vehicle surface area and impervious coverage from existing to proposed conditions. As such, the project does not increase regulated motor vehicle surface by more than one-quarter acre and is therefore not required to meet the stormwater runoff quality standards under NJAC 7:8-5.5 and Township of West Orange Ordinance §25-29.4.q.

A hydrological evaluation is provided for the 2-, 10-, and 100-year storm events utilizing the Urban Hydrology for Small Watersheds TR55 Method to confirm compliance with the stormwater runoff quantity and groundwater recharge standards set forth by the Township of West Orange Land Development Ordinance and NJAC 7:8.

Based upon the Essex County Soil Survey, the soil types native to the site include:

Soil Type	Soil Type Name	Hydrologic Soil Group
BouC	Boonton – Urban Land	C
URBONB	Urban Land	--*

*Please note the NRCS Web Soil Survey did not have a hydrologic soil group rating for the Urban Land portion of the site. Therefore, per NJ BMP Manual Chapter 12 Subsection 1b – Table 12-1, hydrologic soil group B was assumed in the existing condition and hydrologic soil group D was assumed for the increase in pervious surface in the proposed condition. HSG B was maintained from the existing to proposed condition for all other onsite areas.

II. Existing Drainage Conditions

In existing conditions, a majority of the stormwater runoff from the area to be disturbed is conveyed via overland flow to the proposed onsite inlets which connect to the existing stormwater infrastructure within Rosney Terrace. Stormwater runoff from Rosney Terrace ultimately discharges into the existing stormwater infrastructure within Eagle Rock Avenue. The remaining stormwater runoff from the site discharges directly to the existing inlet along Eagle Rock Avenue via overland flow. As such, one point of analysis can be considered for the overall development.

III. Proposed Drainage Conditions

In proposed conditions, stormwater runoff from the project area has been designed to maintain existing drainage patterns. The project proposes to remove the existing onsite inlets and provide ten (10) new inlets within the site to assist in collecting stormwater runoff. The proposed inlets are connected via an underground conveyance system consisting of 12" and 15" reinforced concrete pipes discharging to the existing inlet within Rosney Terrace. Stormwater runoff from the building roof is collected and conveyed underground via 6" PVC roof leaders to the proposed inlets.

IV. Runoff Rate Reduction Performance

Due to the reduction in impervious coverage, the volume and peak discharge runoff rates for the 2-, 10- & 100-year design storms have been reduced. As such, there shall be no adverse impacts to the properties located upstream and downstream of the site.

Study Area Site		
Design Storm	Ex. Peak Flow (cfs)	Prop. Peak Flow (cfs)
2	3.08	2.98
10	4.89	4.79
100	8.48	8.37

Per NJAC 7:8-5.6(b).1, the stormwater runoff quantity requirements are met through demonstration that the post-construction runoff hydrographs for the 2, 10- and 100-year storm events do not exceed at any point in time, the pre-construction runoff hydrographs for the same storm events. Appended are the superimposed hydrographs for reference.

V. Groundwater Recharge

Per NJAC 7:8-5.4(b).2, the project is not subject to the groundwater recharge requirement as it is within the Metropolitan Planning Area (PA1) which is classified as an Urban Redevelopment Area.

VI. Water Quality

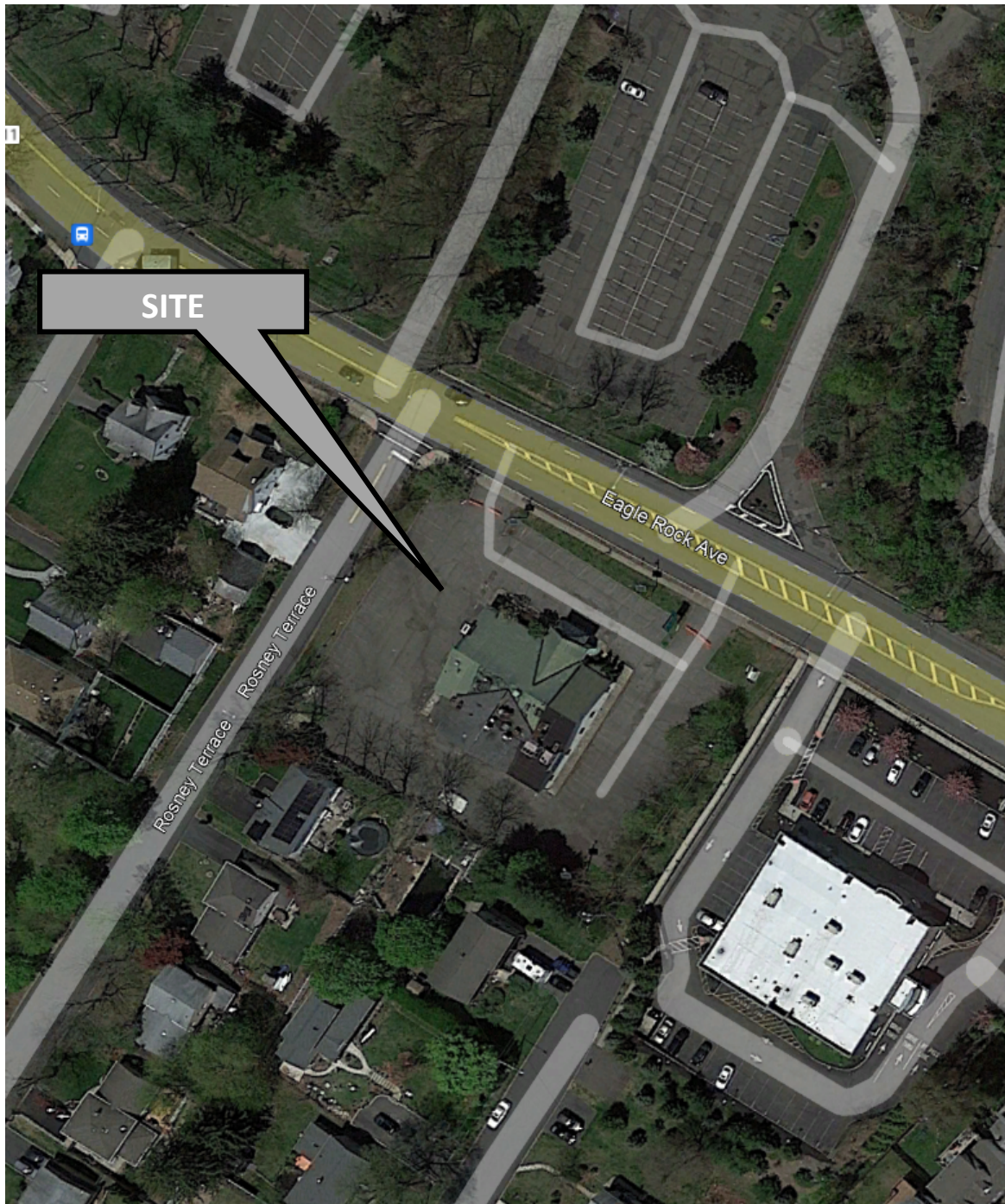
Per NJAC 7:8-5.5(a), the project is not required to meet the stormwater runoff quality standards as the project results in a decrease in motor vehicle surface area. This reduction provides a decrease in total suspended solid (TSS) generation for the site, improving the quality of stormwater runoff leaving the site.

VII. Conclusion

In conclusion, the proposed project has been designed to ensure the safe and efficient control of stormwater runoff in a manner that will not adversely impact the existing drainage patterns or adjacent properties. The project is designed to comply with the stormwater runoff quantity and groundwater recharge requirements set forth under NJAC 7:8 and the Township of West Orange Land Use Ordinance. With this stated, it is evident that the proposed development will not have a negative impact on or within the vicinity of the site, and the increase in pervious coverage will benefit the area.

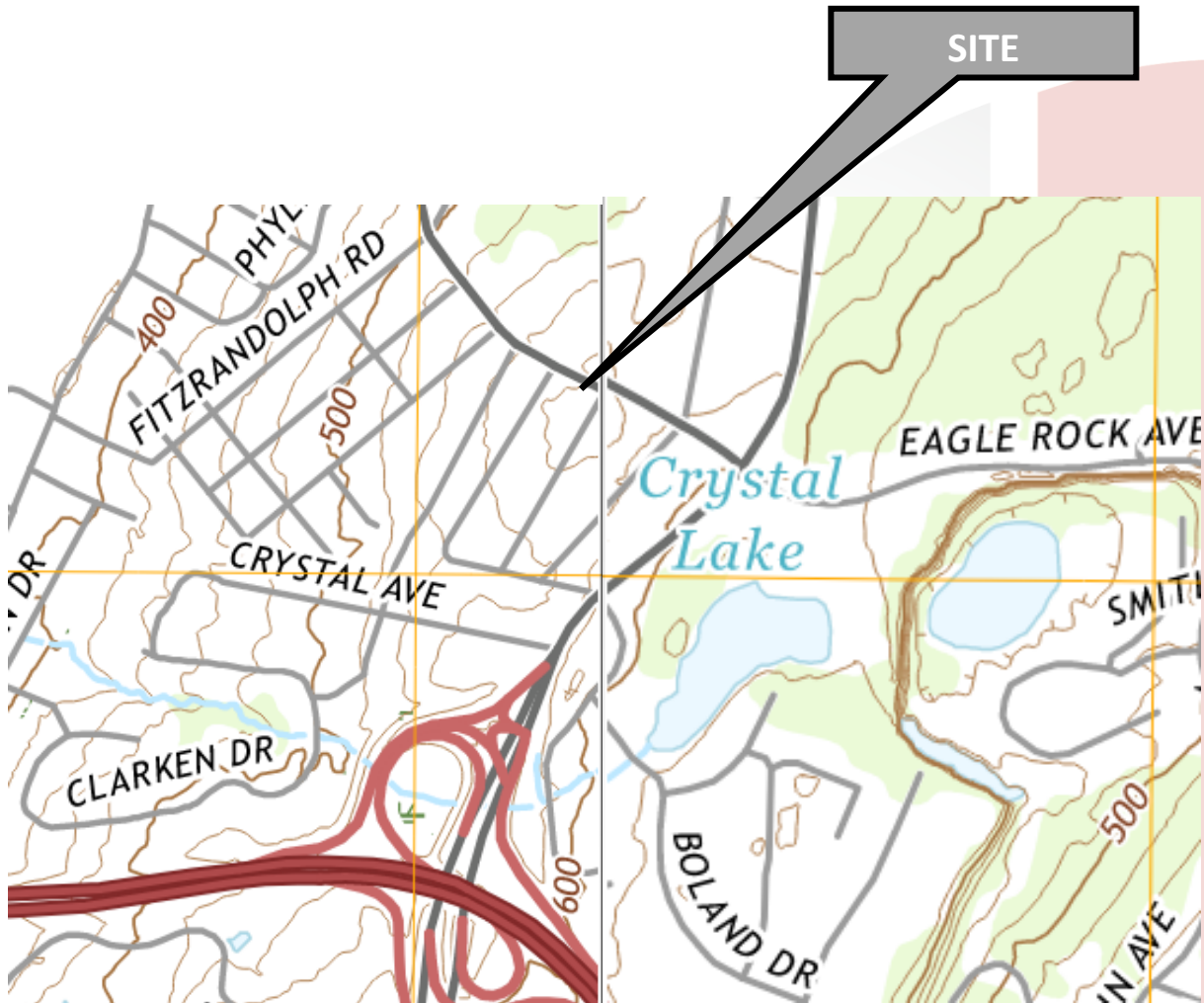
APPENDIX

LOCATION MAP



Location Map

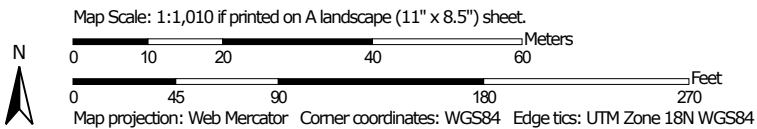
USGS MAP



USGS Map

NRCS WEB SOIL SURVEY

Hydrologic Soil Group—Essex County, New Jersey



MAP LEGEND**Area of Interest (AOI)**
 Area of Interest (AOI)
Soils**Soil Rating Polygons**

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available

Soil Rating Points

-  A
-  A/D
-  B
-  B/D

-  C
-  C/D
-  D
-  Not rated or not available

Water Features
 Streams and Canals
Transportation

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

Background
 Aerial Photography
MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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

Soil Survey Area: Essex County, New Jersey
Survey Area Data: Version 17, Aug 30, 2021

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

Date(s) aerial images were photographed: May 9, 2020—Oct 15, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BouC	Boonton - Urban land, Boonton substratum complex, 8 to 15 percent slopes	C	1.3	61.0%
URBONB	Urban land, Boonton substratum, 0 to 8 percent slopes		0.8	39.0%
Totals for Area of Interest			2.1	100.0%

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

**HYDROGRAPH SUMMARY REPORTS – EXISTING
AND PROPOSED CONDITIONS
2-, 10- & 100-YR.**

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2-Year Event

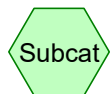
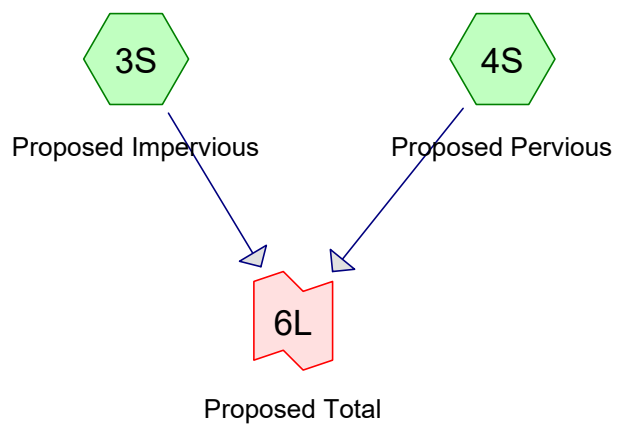
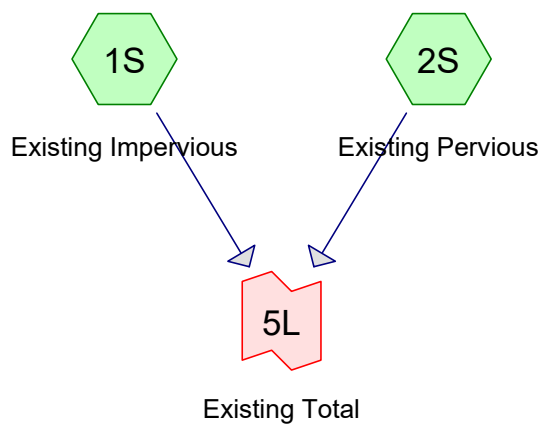
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- 28 Subcat 3S: Proposed Impervious
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- 33 Link 5L: Existing Total
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100-Year Event

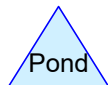
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Subcat



Reach



Pond



Link

Routing Diagram for 2024-04 HydroCAD

Prepared by Dynamic Engineering, Printed 6/5/2024

HydroCAD® 10.20-5a s/n 08640 © 2023 HydroCAD Software Solutions LLC

2024-04 HydroCAD

Prepared by Dynamic Engineering
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Rainfall Events Listing

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	NOAA 24-hr	D	Default	24.00	1	3.44	2
2	10-Year	NOAA 24-hr	D	Default	24.00	1	5.22	2
3	100-Year	NOAA 24-hr	D	Default	24.00	1	8.66	2

2024-04 HydroCAD

Prepared by Dynamic Engineering
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Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.118	61	>75% Grass cover, Good, HSG B (2S, 4S)
0.324	74	>75% Grass cover, Good, HSG C (2S, 4S)
0.019	80	>75% Grass cover, Good, HSG D (4S)
1.650	98	Unconnected pavement, HSG B (1S, 3S)
2.111	92	TOTAL AREA

2024-04 HydroCAD

Prepared by Dynamic Engineering
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Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
1.768	HSG B	1S, 2S, 3S, 4S
0.324	HSG C	2S, 4S
0.019	HSG D	4S
0.000	Other	
2.111	TOTAL AREA	

2024-04 HydroCAD

Prepared by Dynamic Engineering
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Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.118	0.324	0.019	0.000	0.461	>75% Grass cover, Good	2S, 4S
0.000	1.650	0.000	0.000	0.000	1.650	Unconnected pavement	1S, 3S
0.000	1.768	0.324	0.019	0.000	2.111	TOTAL AREA	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Width (inches)	Diam/Height (inches)	Inside-Fill (inches)	Node Name
1	1S	0.00	0.00	50.0	0.0370	0.010	0.0	4.0	0.0	
2	1S	0.00	0.00	21.0	0.1380	0.010	0.0	10.0	0.0	
3	3S	0.00	0.00	64.0	0.0300	0.011	0.0	12.0	0.0	
4	3S	0.00	0.00	81.0	0.0200	0.011	0.0	12.0	0.0	
5	3S	0.00	0.00	144.0	0.0200	0.011	0.0	12.0	0.0	
6	3S	0.00	0.00	27.0	0.0300	0.011	0.0	15.0	0.0	

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Existing Impervious Runoff Area=36,974 sf 100.00% Impervious Runoff Depth=3.21"
Flow Length=267' Tc=4.3 min CN=98 Runoff=2.85 cfs 0.227 af

Subcatchment2S: Existing Pervious Runoff Area=9,011 sf 0.00% Impervious Runoff Depth=0.97"
Tc=4.3 min CN=70 Runoff=0.23 cfs 0.017 af

Subcatchment3S: Proposed Impervious Runoff Area=34,891 sf 100.00% Impervious Runoff Depth=3.21"
Flow Length=410' Tc=4.5 min CN=98 Runoff=2.67 cfs 0.214 af

Subcatchment4S: Proposed Pervious Runoff Area=11,087 sf 0.00% Impervious Runoff Depth=1.08"
Tc=4.5 min CN=72 Runoff=0.32 cfs 0.023 af

Link 5L: Existing Total

Inflow=3.08 cfs 0.244 af
Primary=3.08 cfs 0.244 af

Link 6L: Proposed Total

Inflow=2.98 cfs 0.237 af
Primary=2.98 cfs 0.237 af

Total Runoff Area = 2.111 ac Runoff Volume = 0.481 af Average Runoff Depth = 2.73"
21.85% Pervious = 0.461 ac 78.15% Impervious = 1.650 ac

Summary for Subcatchment 1S: Existing Impervious

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 598% of capacity of segment #4

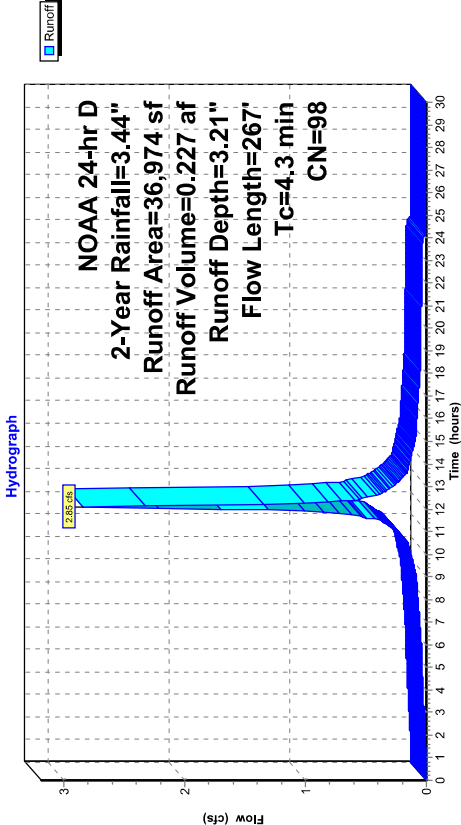
Runoff = 2.85 cfs @ 12.10 hrs, Volume= 0.227 af, Depth= 3.21"
Routed to Link 5L : Existing Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

Area (sf)	CN	Description
36,974	98	Unconnected pavement, HSG B
36,974	100.00%	Impervious Area
36,974	100.00%	Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	27	0.0700	0.15		Sheet Flow, Sheet Flow - AB Grass: Dense n= 0.240 P2= 3.35"
0.7	73	0.0410	1.76		Sheet Flow, Sheet Flow - BC Smooth surfaces n= 0.011 P2= 3.35"
0.4	96	0.0470	4.40		Shallow Concentrated Flow, SCF - CD Paved Kv= 20.3 fps
0.2	50	0.0370	5.45	0.48	Pipe Channel, Pipe Flow - DE 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08'
0.0	21	0.1380	19.40	10.58	Pipe Channel, Pipe Flow - EF 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21'
4.3	267	Total			n= 0.010 PVC, smooth interior

Subcatchment 1S: Existing Impervious



Hydrograph for Subcatchment 1S: Existing Impervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	3.44	3.21	0.00
0.50	0.02	0.00	0.00	26.50	3.44	3.21	0.00
1.00	0.04	0.00	0.00	27.00	3.44	3.21	0.00
1.50	0.06	0.00	0.01	27.50	3.44	3.21	0.00
2.00	0.08	0.01	0.01	28.00	3.44	3.21	0.00
2.50	0.11	0.02	0.02	28.50	3.44	3.21	0.00
3.00	0.13	0.03	0.02	29.00	3.44	3.21	0.00
3.50	0.15	0.04	0.03	29.50	3.44	3.21	0.00
4.00	0.18	0.06	0.03	30.00	3.44	3.21	0.00
4.50	0.21	0.07	0.03				
5.00	0.24	0.09	0.04				
5.50	0.26	0.12	0.04				
6.00	0.29	0.14	0.04				
6.50	0.33	0.17	0.05				
7.00	0.36	0.20	0.05				
7.50	0.40	0.23	0.06				
8.00	0.45	0.27	0.07				
8.50	0.49	0.31	0.08				
9.00	0.55	0.36	0.08				
9.50	0.61	0.42	0.11				
10.00	0.68	0.49	0.13				
10.50	0.77	0.57	0.15				
11.00	0.89	0.69	0.23				
11.50	1.09	0.88	0.38				
12.00	1.65	1.43	1.71				
12.50	2.35	2.12	0.53				
13.00	2.55	2.32	0.28				
13.50	2.67	2.44	0.18				
14.00	2.76	2.53	0.14				
14.50	2.83	2.60	0.12				
15.00	2.89	2.66	0.10				
15.50	2.95	2.71	0.09				
16.00	2.99	2.76	0.08				
16.50	3.04	2.81	0.07				
17.00	3.08	2.85	0.07				
17.50	3.11	2.88	0.06				
18.00	3.15	2.91	0.05				
18.50	3.18	2.94	0.05				
19.00	3.20	2.97	0.05				
19.50	3.23	3.00	0.05				
20.00	3.26	3.03	0.05				
20.50	3.29	3.05	0.04				
21.00	3.31	3.08	0.04				
21.50	3.33	3.10	0.04				
22.00	3.36	3.12	0.04				
22.50	3.38	3.15	0.04				
23.00	3.40	3.17	0.04				
23.50	3.42	3.19	0.03				
24.00	3.44	3.21	0.03				
24.50	3.44	3.21	0.00				
25.00	3.44	3.21	0.00				
25.50	3.44	3.21	0.00				

Summary for Subcatchment 2S: Existing Pervious

[49] Hint: Tc<2dt may require smaller dt

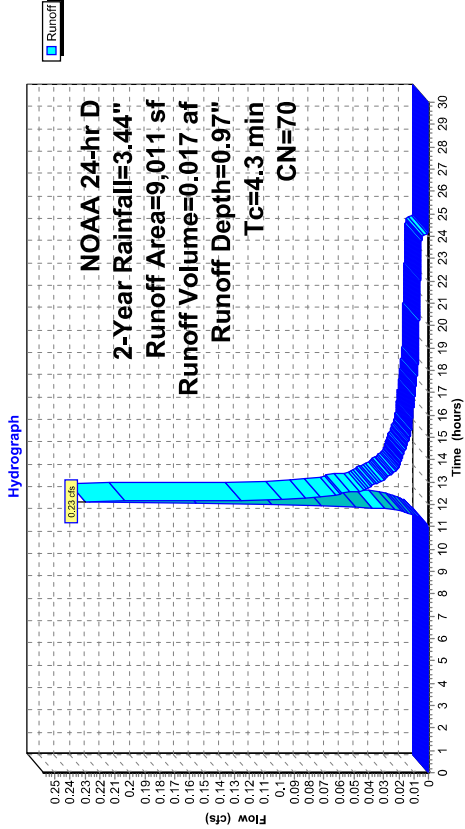
Runoff = 0.23 cfs @ 12.11 hrs, Volume= 0.017 af, Depth= 0.97"
Routed to Link 5L : Existing Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

Area (sf)	CN	Description
3,045	61	>75% Grass cover, Good, HSG B
5,966	74	>75% Grass cover, Good, HSG C
9,011	70	Weighted Average
9,011		100.00% Pervious Area

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

Subcatchment 2S: Existing Pervious



Hydrograph for Subcatchment 2S: Existing Pervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	3.44	0.97	0.00
0.50	0.02	0.00	0.00	26.50	3.44	0.97	0.00
1.00	0.04	0.00	0.00	27.00	3.44	0.97	0.00
1.50	0.06	0.00	0.00	27.50	3.44	0.97	0.00
2.00	0.08	0.00	0.00	28.00	3.44	0.97	0.00
2.50	0.11	0.00	0.00	28.50	3.44	0.97	0.00
3.00	0.13	0.00	0.00	29.00	3.44	0.97	0.00
3.50	0.15	0.00	0.00	29.50	3.44	0.97	0.00
4.00	0.18	0.00	0.00	30.00	3.44	0.97	0.00
4.50	0.21	0.00	0.00				
5.00	0.24	0.00	0.00				
5.50	0.26	0.00	0.00				
6.00	0.29	0.00	0.00				
6.50	0.33	0.00	0.00				
7.00	0.36	0.00	0.00				
7.50	0.40	0.00	0.00				
8.00	0.45	0.00	0.00				
8.50	0.49	0.00	0.00				
9.00	0.55	0.00	0.00				
9.50	0.61	0.00	0.00				
10.00	0.68	0.00	0.00				
10.50	0.77	0.00	0.00				
11.00	0.89	0.00	0.00				
11.50	1.09	0.01	0.01				
12.00	1.65	0.12	0.10				
12.50	2.35	0.39	0.06				
13.00	2.55	0.48	0.03				
13.50	2.67	0.54	0.02				
14.00	2.76	0.58	0.02				
14.50	2.83	0.62	0.02				
15.00	2.89	0.66	0.01				
15.50	2.95	0.68	0.01				
16.00	2.99	0.71	0.01				
16.50	3.04	0.74	0.01				
17.00	3.08	0.76	0.01				
17.50	3.11	0.78	0.01				
18.00	3.15	0.80	0.01				
18.50	3.18	0.81	0.01				
19.00	3.20	0.83	0.01				
19.50	3.23	0.85	0.01				
20.00	3.26	0.86	0.01				
20.50	3.29	0.88	0.01				
21.00	3.31	0.89	0.01				
21.50	3.33	0.91	0.01				
22.00	3.36	0.92	0.01				
22.50	3.38	0.93	0.01				
23.00	3.40	0.95	0.01				
23.50	3.42	0.96	0.01				
24.00	3.44	0.97	0.00				
24.50	3.44	0.97	0.00				
25.00	3.44	0.97	0.00				
25.50	3.44	0.97	0.00				

Summary for Subcatchment 3S: Proposed Impervious

[49] Hint: Tc<2dt may require smaller dt

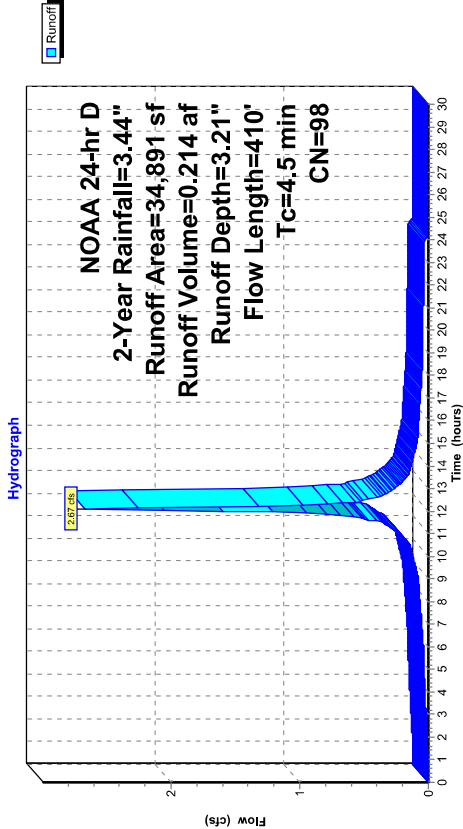
Runoff = 2.67 cfs @ 12.10 hrs, Volume= 0.214 af, Depth= 3.21"
Routed to Link 6L : Proposed Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 2-Year Rainfall=3.44"

Area (sf)	CN	Description
34,891	98	Unconnected pavement, HSG B
34,891		100.00% Impervious Area
34,891		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	21	0.1050	0.25		Sheet Flow, Sheet Flow - AB Grass: Short n= 0.150 P2= 3.35"
2.0	21	0.0450	0.18		Sheet Flow, Sheet Flow - BC Grass: Short n= 0.150 P2= 3.35"
0.5	52	0.0400	1.63		Sheet Flow, Sheet Flow - CD Smooth surfaces n= 0.011 P2= 3.35"
0.1	64	0.0300	9.29	7.29	Pipe Channel, Pipe Flow - DE 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.2	81	0.0200	7.58	5.95	Pipe Channel, Pipe Flow - EF 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	144	0.0200	7.58	5.95	Pipe Channel, Pipe Flow - FG 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.0	27	0.0300	10.78	13.22	Pipe Channel, Pipe Flow - GH 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
4.5	410	Total			

Subcatchment 3S: Proposed Impervious



Hydrograph for Subcatchment 3S: Proposed Impervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	3.44	3.21	0.00
0.50	0.02	0.00	0.00	26.50	3.44	3.21	0.00
1.00	0.04	0.00	0.00	27.00	3.44	3.21	0.00
1.50	0.06	0.00	0.01	27.50	3.44	3.21	0.00
2.00	0.08	0.01	0.01	28.00	3.44	3.21	0.00
2.50	0.11	0.02	0.02	28.50	3.44	3.21	0.00
3.00	0.13	0.03	0.02	29.00	3.44	3.21	0.00
3.50	0.15	0.04	0.02	29.50	3.44	3.21	0.00
4.00	0.18	0.06	0.03	30.00	3.44	3.21	0.00
4.50	0.21	0.07	0.03				
5.00	0.24	0.09	0.03				
5.50	0.26	0.12	0.04				
6.00	0.29	0.14	0.04				
6.50	0.33	0.17	0.04				
7.00	0.36	0.20	0.05				
7.50	0.40	0.23	0.06				
8.00	0.45	0.27	0.06				
8.50	0.49	0.31	0.07				
9.00	0.55	0.36	0.08				
9.50	0.61	0.42	0.10				
10.00	0.68	0.49	0.12				
10.50	0.77	0.57	0.14				
11.00	0.89	0.69	0.22				
11.50	1.09	0.88	0.36				
12.00	1.65	1.43	1.59				
12.50	2.35	2.12	0.50				
13.00	2.55	2.32	0.26				
13.50	2.67	2.44	0.17				
14.00	2.76	2.53	0.13				
14.50	2.83	2.60	0.11				
15.00	2.89	2.66	0.09				
15.50	2.95	2.71	0.08				
16.00	2.99	2.76	0.07				
16.50	3.04	2.81	0.07				
17.00	3.08	2.85	0.06				
17.50	3.11	2.88	0.06				
18.00	3.15	2.91	0.05				
18.50	3.18	2.94	0.05				
19.00	3.20	2.97	0.05				
19.50	3.23	3.00	0.04				
20.00	3.26	3.03	0.04				
20.50	3.29	3.05	0.04				
21.00	3.31	3.08	0.04				
21.50	3.33	3.10	0.04				
22.00	3.36	3.12	0.04				
22.50	3.38	3.15	0.03				
23.00	3.40	3.17	0.03				
23.50	3.42	3.19	0.03				
24.00	3.44	3.21	0.03				
24.50	3.44	3.21	0.00				
25.00	3.44	3.21	0.00				
25.50	3.44	3.21	0.00				

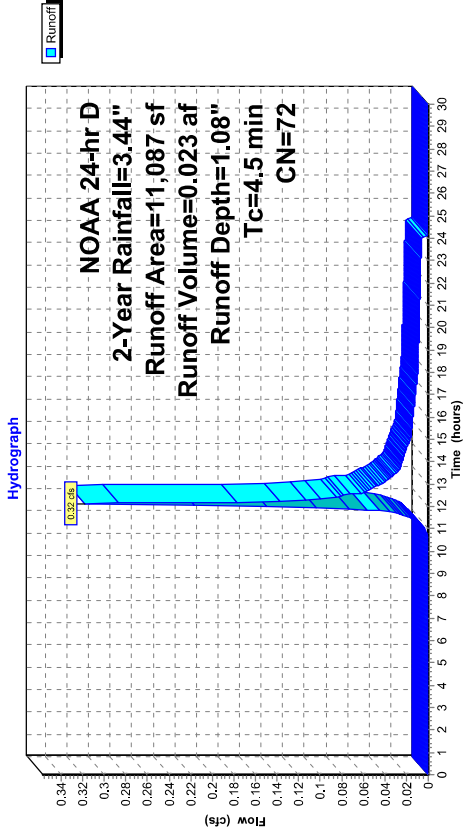
Summary for Subcatchment 4S: Proposed Pervious

[49] Hint: Tc<2dt may require smaller dt

Runoff	=	0.32 cfs @ 12.11 hrs,	Volume=	0.023 af, Depth= 1.08"
Routed to Link 6L : Proposed Total				
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs				
NOAA 24-hr D 2-Year Rainfall=3.44"				
Area (sf)	CN	Description		
2,096	61	>75% Grass cover, Good, HSG B		
8,158	74	>75% Grass cover, Good, HSG C		
833	80	>75% Grass cover, Good, HSG D		
11,087	72	Weighted Average		
11,087		100.00% Pervious Area		

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

Subcatchment 4S: Proposed Pervious



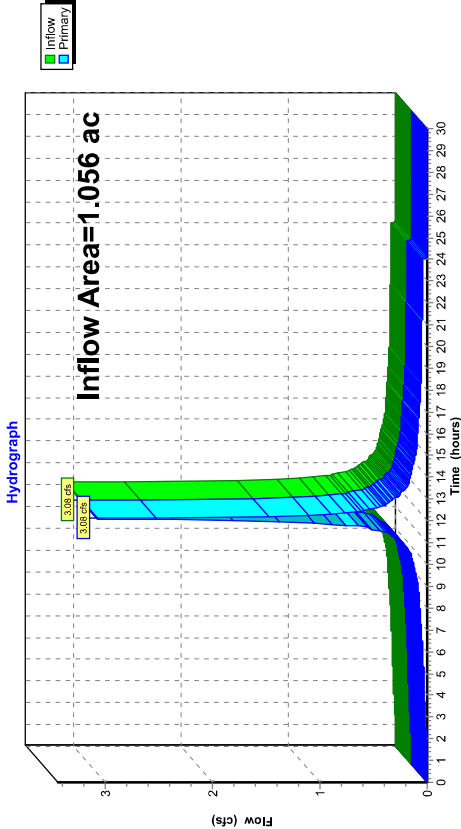
Hydrograph for Subcatchment 4S: Proposed Pervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	3.44	1.08	0.00
0.50	0.02	0.00	0.00	26.50	3.44	1.08	0.00
1.00	0.04	0.00	0.00	27.00	3.44	1.08	0.00
1.50	0.06	0.00	0.00	27.50	3.44	1.08	0.00
2.00	0.08	0.00	0.00	28.00	3.44	1.08	0.00
2.50	0.11	0.00	0.00	28.50	3.44	1.08	0.00
3.00	0.13	0.00	0.00	29.00	3.44	1.08	0.00
3.50	0.15	0.00	0.00	29.50	3.44	1.08	0.00
4.00	0.18	0.00	0.00	30.00	3.44	1.08	0.00
4.50	0.21	0.00	0.00				
5.00	0.24	0.00	0.00				
5.50	0.26	0.00	0.00				
6.00	0.29	0.00	0.00				
6.50	0.33	0.00	0.00				
7.00	0.36	0.00	0.00				
7.50	0.40	0.00	0.00				
8.00	0.45	0.00	0.00				
8.50	0.49	0.00	0.00				
9.00	0.55	0.00	0.00				
9.50	0.61	0.00	0.00				
10.00	0.68	0.00	0.00				
10.50	0.77	0.00	0.00				
11.00	0.89	0.00	0.00				
11.50	1.09	0.02	0.02				
12.00	1.65	0.16	0.15				
12.50	2.35	0.45	0.08				
13.00	2.55	0.55	0.04				
13.50	2.67	0.62	0.03				
14.00	2.76	0.67	0.02				
14.50	2.83	0.71	0.02				
15.00	2.89	0.75	0.02				
15.50	2.95	0.78	0.02				
16.00	2.99	0.80	0.01				
16.50	3.04	0.83	0.01				
17.00	3.08	0.85	0.01				
17.50	3.11	0.88	0.01				
18.00	3.15	0.90	0.01				
18.50	3.18	0.91	0.01				
19.00	3.20	0.93	0.01				
19.50	3.23	0.95	0.01				
20.00	3.26	0.97	0.01				
20.50	3.29	0.98	0.01				
21.00	3.31	1.00	0.01				
21.50	3.33	1.01	0.01				
22.00	3.36	1.03	0.01				
22.50	3.38	1.04	0.01				
23.00	3.40	1.06	0.01				
23.50	3.42	1.07	0.01				
24.00	3.44	1.08	0.01				
24.50	3.44	1.08	0.00				
25.00	3.44	1.08	0.00				
25.50	3.44	1.08	0.00				

Summary for Link 5L: Existing Total

Inflow Area = 1.056 ac, 80.40% Impervious, Inflow Depth = 2.77" for 2-Year event
Inflow = 3.08 cfs @ 12.10 hrs, Volume= 0.244 af
Primary = 3.08 cfs @ 12.10 hrs, Volume= 0.244 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link 5L: Existing Total



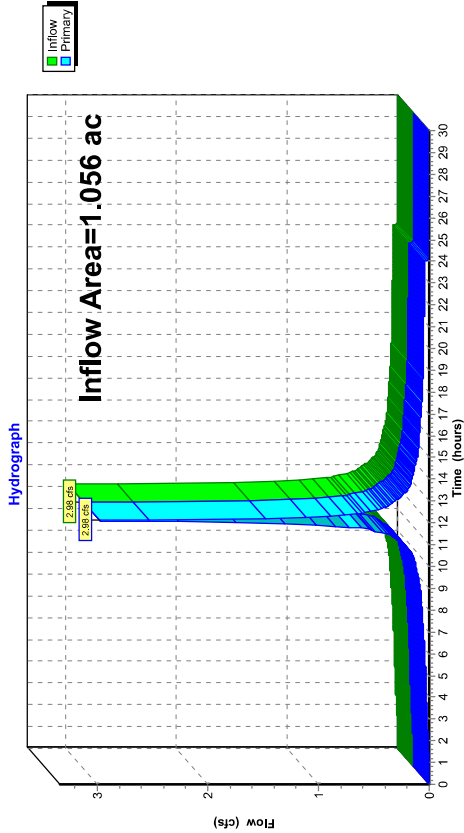
Hydrograph for Link 5L: Existing Total

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00	26.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00	26.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.50	0.01	0.00	0.01	27.50	0.00	0.00	0.00
2.00	0.01	0.00	0.01	28.00	0.00	0.00	0.00
2.50	0.02	0.00	0.02	28.50	0.00	0.00	0.00
3.00	0.02	0.00	0.02	29.00	0.00	0.00	0.00
3.50	0.03	0.00	0.03	29.50	0.00	0.00	0.00
4.00	0.03	0.00	0.03	30.00	0.00	0.00	0.00
4.50	0.03	0.00	0.03				
5.00	0.04	0.00	0.04				
5.50	0.04	0.00	0.04				
6.00	0.04	0.00	0.04				
6.50	0.05	0.00	0.05				
7.00	0.05	0.00	0.05				
7.50	0.06	0.00	0.06				
8.00	0.07	0.00	0.07				
8.50	0.08	0.00	0.08				
9.00	0.08	0.00	0.08				
9.50	0.11	0.00	0.11				
10.00	0.13	0.00	0.13				
10.50	0.15	0.00	0.15				
11.00	0.23	0.00	0.23				
11.50	0.39	0.00	0.39				
12.00	1.81	0.00	1.81				
12.50	0.59	0.00	0.59				
13.00	0.31	0.00	0.31				
13.50	0.20	0.00	0.20				
14.00	0.16	0.00	0.16				
14.50	0.13	0.00	0.13				
15.00	0.11	0.00	0.11				
15.50	0.10	0.00	0.10				
16.00	0.09	0.00	0.09				
16.50	0.08	0.00	0.08				
17.00	0.08	0.00	0.08				
17.50	0.07	0.00	0.07				
18.00	0.06	0.00	0.06				
18.50	0.06	0.00	0.06				
19.00	0.06	0.00	0.06				
19.50	0.05	0.00	0.05				
20.00	0.05	0.00	0.05				
20.50	0.05	0.00	0.05				
21.00	0.05	0.00	0.05				
21.50	0.05	0.00	0.05				
22.00	0.04	0.00	0.04				
22.50	0.04	0.00	0.04				
23.00	0.04	0.00	0.04				
23.50	0.04	0.00	0.04				
24.00	0.04	0.00	0.04				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				

Summary for Link 6L: Proposed Total

Inflow Area = 1.056 ac, 75.89% Impervious, Inflow Depth = 2.69" for 2-Year event
Inflow = 2.98 cfs @ 12.11 hrs, Volume= 0.237 af
Primary = 2.98 cfs @ 12.11 hrs, Volume= 0.237 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link 6L: Proposed Total



Hydrograph for Link 6L: Proposed Total

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00	26.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00	26.50	0.00	0.00	0.00
1.00	0.00	0.00	0.00	27.00	0.00	0.00	0.00
1.50	0.01	0.00	0.01	27.50	0.00	0.00	0.00
2.00	0.01	0.00	0.01	28.00	0.00	0.00	0.00
2.50	0.02	0.00	0.02	28.50	0.00	0.00	0.00
3.00	0.02	0.00	0.02	29.00	0.00	0.00	0.00
3.50	0.02	0.00	0.02	29.50	0.00	0.00	0.00
4.00	0.03	0.00	0.03	30.00	0.00	0.00	0.00
4.50	0.03	0.00	0.03				
5.00	0.03	0.00	0.03				
5.50	0.04	0.00	0.04				
6.00	0.04	0.00	0.04				
6.50	0.04	0.00	0.04				
7.00	0.05	0.00	0.05				
7.50	0.06	0.00	0.06				
8.00	0.06	0.00	0.06				
8.50	0.07	0.00	0.07				
9.00	0.08	0.00	0.08				
9.50	0.10	0.00	0.10				
10.00	0.12	0.00	0.12				
10.50	0.14	0.00	0.14				
11.00	0.22	0.00	0.22				
11.50	0.37	0.00	0.37				
12.00	1.74	0.00	1.74				
12.50	0.58	0.00	0.58				
13.00	0.31	0.00	0.31				
13.50	0.20	0.00	0.20				
14.00	0.16	0.00	0.16				
14.50	0.13	0.00	0.13				
15.00	0.11	0.00	0.11				
15.50	0.10	0.00	0.10				
16.00	0.09	0.00	0.09				
16.50	0.08	0.00	0.08				
17.00	0.07	0.00	0.07				
17.50	0.07	0.00	0.07				
18.00	0.06	0.00	0.06				
18.50	0.06	0.00	0.06				
19.00	0.05	0.00	0.05				
19.50	0.05	0.00	0.05				
20.00	0.05	0.00	0.05				
20.50	0.05	0.00	0.05				
21.00	0.05	0.00	0.05				
21.50	0.05	0.00	0.05				
22.00	0.04	0.00	0.04				
22.50	0.04	0.00	0.04				
23.00	0.04	0.00	0.04				
23.50	0.04	0.00	0.04				
24.00	0.04	0.00	0.04				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Existing Impervious Runoff Area=36,974 sf 100.00% Impervious Runoff Depth=4.98"
Flow Length=267' Tc=4.3 min CN=98 Runoff=4.35 cfs 0.352 af

Subcatchment2S: Existing Pervious Runoff Area=9,011 sf 0.00% Impervious Runoff Depth=2.20"
Tc=4.3 min CN=70 Runoff=0.55 cfs 0.038 af

Subcatchment3S: Proposed Impervious Runoff Area=34,891 sf 100.00% Impervious Runoff Depth=4.98"
Flow Length=410' Tc=4.5 min CN=98 Runoff=4.07 cfs 0.333 af

Subcatchment4S: Proposed Pervious Runoff Area=11,087 sf 0.00% Impervious Runoff Depth=2.37"
Tc=4.5 min CN=72 Runoff=0.72 cfs 0.050 af

Link 5L: Existing Total Inflow=4.89 cfs 0.390 af
Primary=4.89 cfs 0.390 af

Link 6L: Proposed Total Inflow=4.79 cfs 0.383 af
Primary=4.79 cfs 0.383 af

Total Runoff Area = 2.111 ac Runoff Volume = 0.773 af Average Runoff Depth = 4.40"
21.85% Pervious = 0.461 ac 78.15% Impervious = 1.650 ac

Summary for Subcatchment 1S: Existing Impervious

[49] Hint: Tc<2dt may require smaller dt

[47] Hint: Peak is 913% of capacity of segment #4

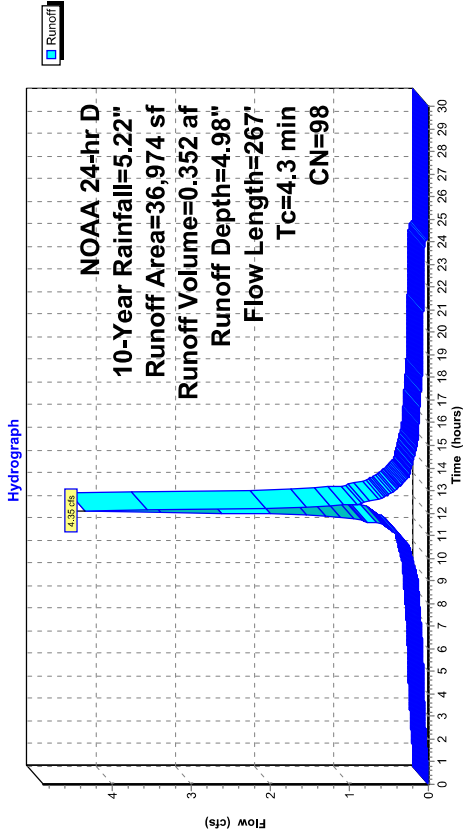
Runoff = 4.35 cfs @ 12.10 hrs, Volume= 0.352 af, Depth= 4.98"
Routed to Link 5L : Existing Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

Area (sf)	CN	Description
36,974	98	Unconnected pavement, HSG B
36,974		100.00% Impervious Area
36,974		100.00% Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	27	0.0700	0.15		Sheet Flow, Sheet Flow - AB Grass: Dense n= 0.240 P2= 3.35"
0.7	73	0.0410	1.76		Sheet Flow, Sheet Flow - BC Smooth surfaces n= 0.011 P2= 3.35"
0.4	96	0.0470	4.40		Shallow Concentrated Flow, SCF - CD Paved Kv= 20.3 fps
0.2	50	0.0370	5.45	0.48	Pipe Channel, Pipe Flow - DE 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08'
0.0	21	0.1380	19.40	10.58	Pipe Channel, Pipe Flow - EF 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21'
4.3	267	Total			n= 0.010 PVC, smooth interior

Subcatchment 1S: Existing Impervious



Hydrograph for Subcatchment 1S: Existing Impervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	5.22	4.98	0.00
0.50	0.03	0.00	0.00	26.50	5.22	4.98	0.00
1.00	0.06	0.00	0.01	27.00	5.22	4.98	0.00
1.50	0.09	0.01	0.02	27.50	5.22	4.98	0.00
2.00	0.13	0.02	0.03	28.00	5.22	4.98	0.00
2.50	0.16	0.04	0.04	28.50	5.22	4.98	0.00
3.00	0.20	0.07	0.04	29.00	5.22	4.98	0.00
3.50	0.23	0.09	0.05	29.50	5.22	4.98	0.00
4.00	0.27	0.12	0.05	30.00	5.22	4.98	0.00
4.50	0.31	0.16	0.06				
5.00	0.36	0.19	0.06				
5.50	0.40	0.23	0.07				
6.00	0.45	0.27	0.07				
6.50	0.49	0.31	0.08				
7.00	0.55	0.36	0.09				
7.50	0.61	0.42	0.10				
8.00	0.68	0.48	0.11				
8.50	0.75	0.55	0.12				
9.00	0.83	0.63	0.13				
9.50	0.92	0.71	0.17				
10.00	1.03	0.82	0.20				
10.50	1.17	0.96	0.24				
11.00	1.36	1.14	0.36				
11.50	1.65	1.43	0.59				
12.00	2.50	2.27	2.61				
12.50	3.57	3.33	0.81				
13.00	3.86	3.63	0.42				
13.50	4.05	3.82	0.27				
14.00	4.19	3.95	0.22				
14.50	4.30	4.06	0.18				
15.00	4.39	4.16	0.15				
15.50	4.47	4.23	0.13				
16.00	4.54	4.31	0.12				
16.50	4.61	4.37	0.11				
17.00	4.67	4.43	0.10				
17.50	4.73	4.49	0.09				
18.00	4.77	4.54	0.08				
18.50	4.82	4.58	0.08				
19.00	4.86	4.63	0.07				
19.50	4.91	4.67	0.07				
20.00	4.95	4.71	0.07				
20.50	4.99	4.75	0.07				
21.00	5.02	4.79	0.06				
21.50	5.06	4.82	0.06				
22.00	5.09	4.86	0.06				
22.50	5.13	4.89	0.06				
23.00	5.16	4.92	0.05				
23.50	5.19	4.95	0.05				
24.00	5.22	4.98	0.05				
24.50	5.22	4.98	0.00				
25.00	5.22	4.98	0.00				
25.50	5.22	4.98	0.00				

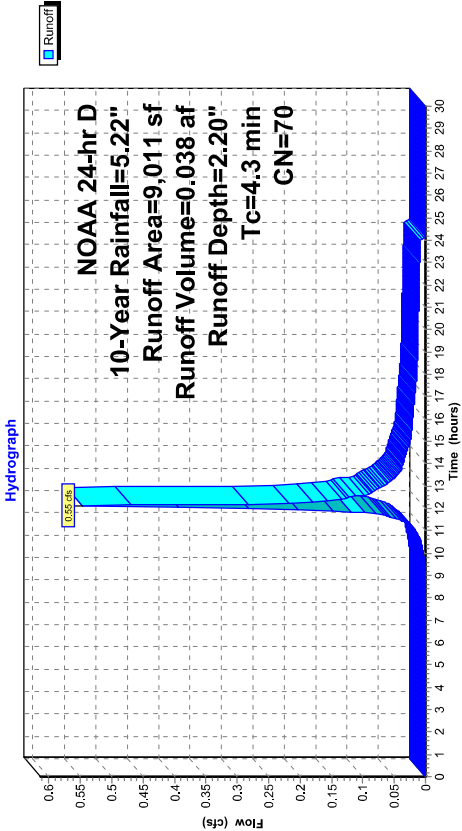
Summary for Subcatchment 2S: Existing Pervious

[49] Hint: Tc<2dt may require smaller dt

Runoff	=	0.55 cfs @ 12.11 hrs,	Volume=	0.038 af, Depth=	2.20"
Routed to Link 5L : Existing Total					
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs					
NOAA 24-hr D 10-Year Rainfall=5.22"					
Area (sf)	CN	Description			
3,045	61	>75% Grass cover, Good, HSG B			
5,966	74	>75% Grass cover, Good, HSG C			
9,011	70	Weighted Average			
9,011		100.00% Pervious Area			

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

Subcatchment 2S: Existing Pervious



Hydrograph for Subcatchment 2S: Existing Pervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	5.22	2.20	0.00
0.50	0.03	0.00	0.00	26.50	5.22	2.20	0.00
1.00	0.06	0.00	0.00	27.00	5.22	2.20	0.00
1.50	0.09	0.00	0.00	27.50	5.22	2.20	0.00
2.00	0.13	0.00	0.00	28.00	5.22	2.20	0.00
2.50	0.16	0.00	0.00	28.50	5.22	2.20	0.00
3.00	0.20	0.00	0.00	29.00	5.22	2.20	0.00
3.50	0.23	0.00	0.00	29.50	5.22	2.20	0.00
4.00	0.27	0.00	0.00	30.00	5.22	2.20	0.00
4.50	0.31	0.00	0.00				
5.00	0.36	0.00	0.00				
5.50	0.40	0.00	0.00				
6.00	0.45	0.00	0.00				
6.50	0.49	0.00	0.00				
7.00	0.55	0.00	0.00				
7.50	0.61	0.00	0.00				
8.00	0.68	0.00	0.00				
8.50	0.75	0.00	0.00				
9.00	0.83	0.00	0.00				
9.50	0.92	0.00	0.00				
10.00	1.03	0.01	0.00				
10.50	1.17	0.02	0.01				
11.00	1.36	0.05	0.02				
11.50	1.65	0.13	0.04				
12.00	2.50	0.46	0.28				
12.50	3.57	1.05	0.12				
13.00	3.86	1.24	0.07				
13.50	4.05	1.36	0.04				
14.00	4.19	1.45	0.04				
14.50	4.30	1.53	0.03				
15.00	4.39	1.60	0.02				
15.50	4.47	1.65	0.02				
16.00	4.54	1.70	0.02				
16.50	4.61	1.75	0.02				
17.00	4.67	1.80	0.02				
17.50	4.73	1.83	0.02				
18.00	4.77	1.87	0.01				
18.50	4.82	1.90	0.01				
19.00	4.86	1.94	0.01				
19.50	4.91	1.97	0.01				
20.00	4.95	2.00	0.01				
20.50	4.99	2.03	0.01				
21.00	5.02	2.05	0.01				
21.50	5.06	2.08	0.01				
22.00	5.09	2.11	0.01				
22.50	5.13	2.13	0.01				
23.00	5.16	2.16	0.01				
23.50	5.19	2.18	0.01				
24.00	5.22	2.20	0.01				
24.50	5.22	2.20	0.00				
25.00	5.22	2.20	0.00				
25.50	5.22	2.20	0.00				

Summary for Subcatchment 3S: Proposed Impervious

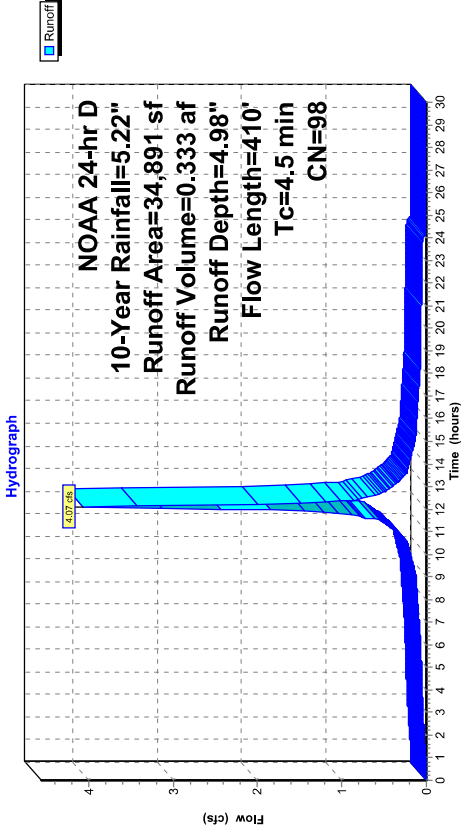
[49] Hint: Tc<2dt may require smaller dt

Runoff = 4.07 cfs @ 12.10 hrs, Volume= 0.333 af, Depth= 4.98"
Routed to Link 6L : Proposed Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

Area (sf)		CN	Description		
34,891	98		Unconnected pavement, HSG B		
34,891			100.00% Impervious Area		
34,891			100.00% Unconnected		
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	21	0.1050	0.25		Sheet Flow, Sheet Flow - AB Grass: Short n= 0.150 P2= 3.35"
2.0	21	0.0450	0.18		Sheet Flow, Sheet Flow - BC Grass: Short n= 0.150 P2= 3.35"
0.5	52	0.0400	1.63		Sheet Flow, Sheet Flow - CD Smooth surfaces n= 0.011 P2= 3.35"
0.1	64	0.0300	9.29	7.29	Pipe Channel, Pipe Flow - DE 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.2	81	0.0200	7.58	5.95	Pipe Channel, Pipe Flow - EF 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	144	0.0200	7.58	5.95	Pipe Channel, Pipe Flow - FG 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.0	27	0.0300	10.78	13.22	Pipe Channel, Pipe Flow - GH 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
4.5	410	Total			

Subcatchment 3S: Proposed Impervious



Hydrograph for Subcatchment 3S: Proposed Impervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	5.22	4.98	0.00
0.50	0.03	0.00	0.00	26.50	5.22	4.98	0.00
1.00	0.06	0.00	0.01	27.00	5.22	4.98	0.00
1.50	0.09	0.01	0.02	27.50	5.22	4.98	0.00
2.00	0.13	0.02	0.03	28.00	5.22	4.98	0.00
2.50	0.16	0.04	0.03	28.50	5.22	4.98	0.00
3.00	0.20	0.07	0.04	29.00	5.22	4.98	0.00
3.50	0.23	0.09	0.05	29.50	5.22	4.98	0.00
4.00	0.27	0.12	0.05	30.00	5.22	4.98	0.00
4.50	0.31	0.16	0.05				
5.00	0.36	0.19	0.06				
5.50	0.40	0.23	0.06				
6.00	0.45	0.27	0.07				
6.50	0.49	0.31	0.07				
7.00	0.55	0.36	0.08				
7.50	0.61	0.42	0.09				
8.00	0.68	0.48	0.10				
8.50	0.75	0.55	0.11				
9.00	0.83	0.63	0.12				
9.50	0.92	0.71	0.16				
10.00	1.03	0.82	0.19				
10.50	1.17	0.96	0.22				
11.00	1.36	1.14	0.34				
11.50	1.65	1.43	0.55				
12.00	2.50	2.27	2.44				
12.50	3.57	3.33	0.77				
13.00	3.86	3.63	0.40				
13.50	4.05	3.82	0.26				
14.00	4.19	3.95	0.20				
14.50	4.30	4.06	0.17				
15.00	4.39	4.16	0.14				
15.50	4.47	4.23	0.12				
16.00	4.54	4.31	0.11				
16.50	4.61	4.37	0.10				
17.00	4.67	4.43	0.09				
17.50	4.73	4.49	0.09				
18.00	4.77	4.54	0.08				
18.50	4.82	4.58	0.07				
19.00	4.86	4.63	0.07				
19.50	4.91	4.67	0.07				
20.00	4.95	4.71	0.06				
20.50	4.99	4.75	0.06				
21.00	5.02	4.79	0.06				
21.50	5.06	4.82	0.06				
22.00	5.09	4.86	0.06				
22.50	5.13	4.89	0.05				
23.00	5.16	4.92	0.05				
23.50	5.19	4.95	0.05				
24.00	5.22	4.98	0.05				
24.50	5.22	4.98	0.00				
25.00	5.22	4.98	0.00				
25.50	5.22	4.98	0.00				

Summary for Subcatchment 4S: Proposed Pervious

[49] Hint: Tc<2dt may require smaller dt

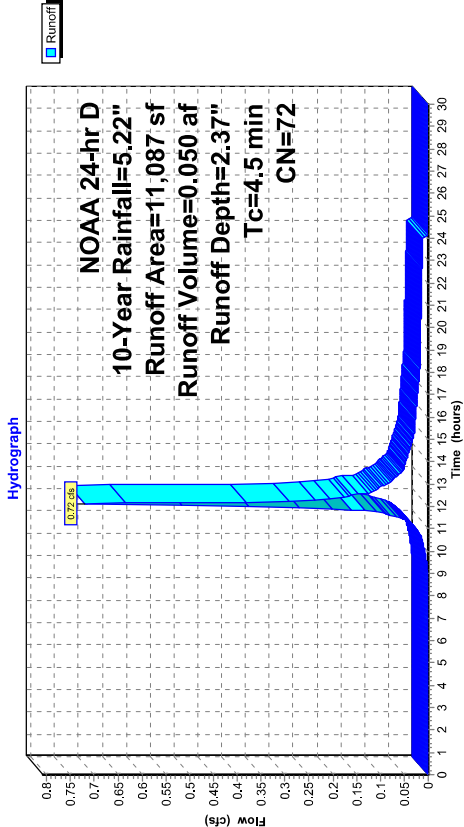
Runoff = 0.72 cfs @ 12.11 hrs, Volume= 0.050 af, Depth= 2.37"
Routed to Link 6L : Proposed Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 10-Year Rainfall=5.22"

Area (sf)	CN	Description
2,096	61	>75% Grass cover, Good, HSG B
8,158	74	>75% Grass cover, Good, HSG C
833	80	>75% Grass cover, Good, HSG D
11,087	72	Weighted Average
11,087		100.00% Pervious Area

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

Subcatchment 4S: Proposed Pervious



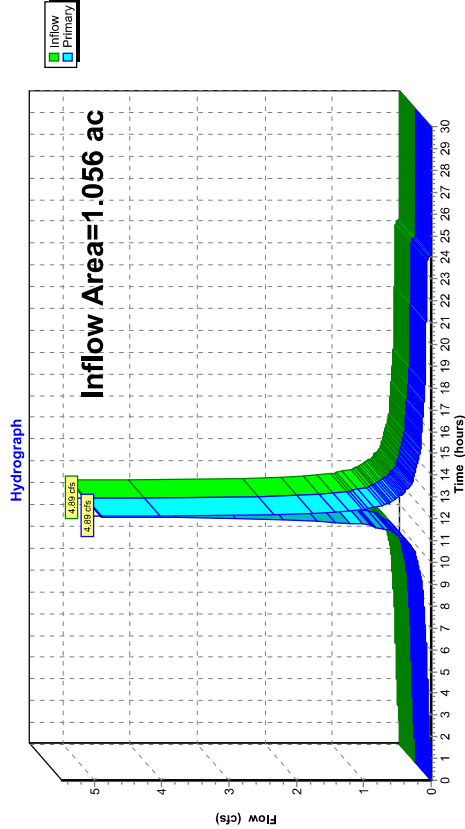
Hydrograph for Subcatchment 4S: Proposed Pervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	5.22	2.37	0.00
0.50	0.03	0.00	0.00	26.50	5.22	2.37	0.00
1.00	0.06	0.00	0.00	27.00	5.22	2.37	0.00
1.50	0.09	0.00	0.00	27.50	5.22	2.37	0.00
2.00	0.13	0.00	0.00	28.00	5.22	2.37	0.00
2.50	0.16	0.00	0.00	28.50	5.22	2.37	0.00
3.00	0.20	0.00	0.00	29.00	5.22	2.37	0.00
3.50	0.23	0.00	0.00	29.50	5.22	2.37	0.00
4.00	0.27	0.00	0.00	30.00	5.22	2.37	0.00
4.50	0.31	0.00	0.00				
5.00	0.36	0.00	0.00				
5.50	0.40	0.00	0.00				
6.00	0.45	0.00	0.00				
6.50	0.49	0.00	0.00				
7.00	0.55	0.00	0.00				
7.50	0.61	0.00	0.00				
8.00	0.68	0.00	0.00				
8.50	0.75	0.00	0.00				
9.00	0.83	0.00	0.00				
9.50	0.92	0.01	0.00				
10.00	1.03	0.02	0.01				
10.50	1.17	0.04	0.01				
11.00	1.36	0.08	0.03				
11.50	1.65	0.16	0.06				
12.00	2.50	0.53	0.38				
12.50	3.57	1.16	0.16				
13.00	3.86	1.36	0.09				
13.50	4.05	1.50	0.06				
14.00	4.19	1.59	0.05				
14.50	4.30	1.67	0.04				
15.00	4.39	1.74	0.03				
15.50	4.47	1.80	0.03				
16.00	4.54	1.85	0.03				
16.50	4.61	1.90	0.02				
17.00	4.67	1.95	0.02				
17.50	4.73	1.99	0.02				
18.00	4.77	2.03	0.02				
18.50	4.82	2.06	0.02				
19.00	4.86	2.09	0.02				
19.50	4.91	2.13	0.02				
20.00	4.95	2.16	0.02				
20.50	4.99	2.19	0.02				
21.00	5.02	2.22	0.01				
21.50	5.06	2.24	0.01				
22.00	5.09	2.27	0.01				
22.50	5.13	2.30	0.01				
23.00	5.16	2.32	0.01				
23.50	5.19	2.35	0.01				
24.00	5.22	2.37	0.01				
24.50	5.22	2.37	0.00				
25.00	5.22	2.37	0.00				
25.50	5.22	2.37	0.00				

Summary for Link 5L: Existing Total

Inflow Area = 1.056 ac, 80.40% Impervious, Inflow Depth = 4.44" for 10-Year event
Inflow = 4.89 cfs @ 12.10 hrs, Volume= 0.390 af
Primary = 4.89 cfs @ 12.10 hrs, Volume= 0.390 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link 5L: Existing Total



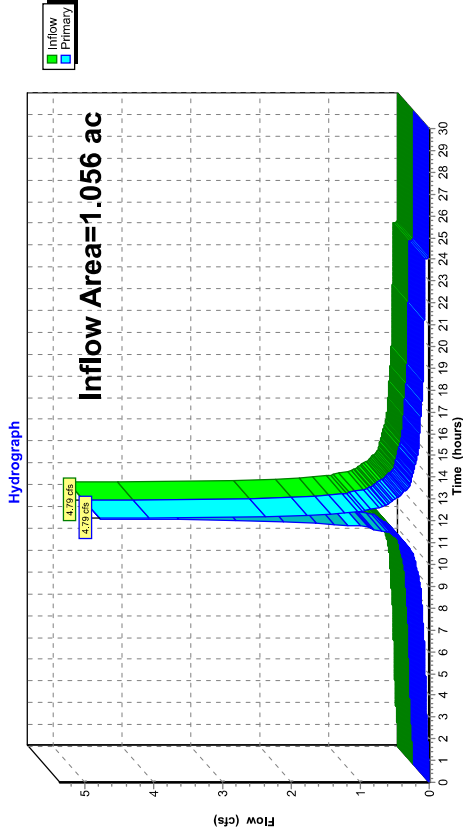
Hydrograph for Link 5L: Existing Total

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00	26.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00	26.50	0.00	0.00	0.00
1.00	0.00	0.00	0.01	27.00	0.00	0.00	0.00
1.50	0.02	0.00	0.02	27.50	0.00	0.00	0.00
2.00	0.03	0.00	0.03	28.00	0.00	0.00	0.00
2.50	0.04	0.00	0.04	28.50	0.00	0.00	0.00
3.00	0.04	0.00	0.04	29.00	0.00	0.00	0.00
3.50	0.05	0.00	0.05	29.50	0.00	0.00	0.00
4.00	0.05	0.00	0.05	30.00	0.00	0.00	0.00
4.50	0.06	0.00	0.06				
5.00	0.06	0.00	0.06				
5.50	0.07	0.00	0.07				
6.00	0.07	0.00	0.07				
6.50	0.08	0.00	0.08				
7.00	0.09	0.00	0.09				
7.50	0.10	0.00	0.10				
8.00	0.11	0.00	0.11				
8.50	0.12	0.00	0.12				
9.00	0.13	0.00	0.13				
9.50	0.17	0.00	0.17				
10.00	0.21	0.00	0.21				
10.50	0.24	0.00	0.24				
11.00	0.38	0.00	0.38				
11.50	0.63	0.00	0.63				
12.00	2.89	0.00	2.89				
12.50	0.94	0.00	0.94				
13.00	0.49	0.00	0.49				
13.50	0.32	0.00	0.32				
14.00	0.25	0.00	0.25				
14.50	0.21	0.00	0.21				
15.00	0.17	0.00	0.17				
15.50	0.15	0.00	0.15				
16.00	0.14	0.00	0.14				
16.50	0.13	0.00	0.13				
17.00	0.12	0.00	0.12				
17.50	0.11	0.00	0.11				
18.00	0.09	0.00	0.09				
18.50	0.09	0.00	0.09				
19.00	0.09	0.00	0.09				
19.50	0.08	0.00	0.08				
20.00	0.08	0.00	0.08				
20.50	0.08	0.00	0.08				
21.00	0.08	0.00	0.08				
21.50	0.07	0.00	0.07				
22.00	0.07	0.00	0.07				
22.50	0.07	0.00	0.07				
23.00	0.06	0.00	0.06				
23.50	0.06	0.00	0.06				
24.00	0.06	0.00	0.06				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				

Summary for Link 6L: Proposed Total

Inflow Area = 1.056 ac, 75.89% Impervious, Inflow Depth = 4.35" for 10-Year event
Inflow = 4.79 cfs @ 12.11 hrs, Volume= 0.383 af
Primary = 4.79 cfs @ 12.11 hrs, Volume= 0.383 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link 6L: Proposed Total



Hydrograph for Link 6L: Proposed Total

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00	26.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00	26.50	0.00	0.00	0.00
1.00	0.01	0.00	0.01	27.00	0.00	0.00	0.00
1.50	0.02	0.00	0.02	27.50	0.00	0.00	0.00
2.00	0.03	0.00	0.03	28.00	0.00	0.00	0.00
2.50	0.03	0.00	0.03	28.50	0.00	0.00	0.00
3.00	0.04	0.00	0.04	29.00	0.00	0.00	0.00
3.50	0.05	0.00	0.05	29.50	0.00	0.00	0.00
4.00	0.05	0.00	0.05	30.00	0.00	0.00	0.00
4.50	0.05	0.00	0.05				
5.00	0.06	0.00	0.06				
5.50	0.06	0.00	0.06				
6.00	0.07	0.00	0.07				
6.50	0.07	0.00	0.07				
7.00	0.08	0.00	0.08				
7.50	0.09	0.00	0.09				
8.00	0.10	0.00	0.10				
8.50	0.11	0.00	0.11				
9.00	0.13	0.00	0.13				
9.50	0.16	0.00	0.16				
10.00	0.20	0.00	0.20				
10.50	0.24	0.00	0.24				
11.00	0.37	0.00	0.37				
11.50	0.61	0.00	0.61				
12.00	2.81	0.00	2.81				
12.50	0.93	0.00	0.93				
13.00	0.49	0.00	0.49				
13.50	0.32	0.00	0.32				
14.00	0.25	0.00	0.25				
14.50	0.21	0.00	0.21				
15.00	0.17	0.00	0.17				
15.50	0.15	0.00	0.15				
16.00	0.14	0.00	0.14				
16.50	0.13	0.00	0.13				
17.00	0.12	0.00	0.12				
17.50	0.11	0.00	0.11				
18.00	0.09	0.00	0.09				
18.50	0.09	0.00	0.09				
19.00	0.09	0.00	0.09				
19.50	0.08	0.00	0.08				
20.00	0.08	0.00	0.08				
20.50	0.08	0.00	0.08				
21.00	0.08	0.00	0.08				
21.50	0.07	0.00	0.07				
22.00	0.07	0.00	0.07				
22.50	0.07	0.00	0.07				
23.00	0.06	0.00	0.06				
23.50	0.06	0.00	0.06				
24.00	0.06	0.00	0.06				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				

Time span=0.00-30.00 hrs, dt=0.05 hrs, 601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1S: Existing Impervious	Runoff Area=36,974 sf	100.00% Impervious	Runoff Depth=8.42"
	Flow Length=267'	Tc=4.3 min	CN=98
			Runoff=7.23 cfs
			0.596 af
Subcatchment2S: Existing Pervious	Runoff Area=9,011 sf	0.00% Impervious	Runoff Depth=5.04"
	Tc=4.3 min	CN=70	Runoff=1.25 cfs
			0.087 af
Subcatchment3S: Proposed Impervious	Runoff Area=34,891 sf	100.00% Impervious	Runoff Depth=8.42"
	Flow Length=410'	Tc=4.5 min	CN=98
			Runoff=6.77 cfs
			0.562 af
Subcatchment4S: Proposed Pervious	Runoff Area=11,087 sf	0.00% Impervious	Runoff Depth=5.28"
	Tc=4.5 min	CN=72	Runoff=1.59 cfs
			0.112 af
Link 5L: Existing Total			Inflow=8.48 cfs
			Primary=8.48 cfs
			0.682 af
Link 6L: Proposed Total			Inflow=8.37 cfs
			Primary=8.37 cfs
			0.674 af

Total Runoff Area = 2.111 ac Runoff Volume = 1.356 af Average Runoff Depth = 7.71"
21.85% Pervious = 0.461 ac 78.15% Impervious = 1.650 ac

Summary for Subcatchment 1S: Existing Impervious

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 1520% of capacity of segment #4

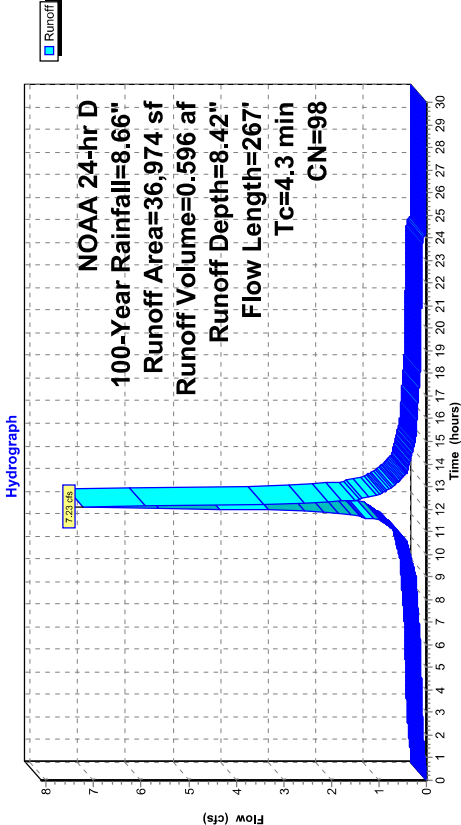
Runoff = 7.23 cfs @ 12.10 hrs, Volume= 0.596 af, Depth= 8.42"
Routed to Link 5L : Existing Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

Area (sf)	CN	Description
36,974	98	Unconnected pavement, HSG B
36,974	100.00%	Impervious Area
36,974	100.00%	Unconnected

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	27	0.0700	0.15		Sheet Flow, Sheet Flow - AB Grass: Dense n= 0.240 P2= 3.35"
0.7	73	0.0410	1.76		Sheet Flow, Sheet Flow - BC Smooth surfaces n= 0.011 P2= 3.35"
0.4	96	0.0470	4.40		Shallow Concentrated Flow, SCF - CD Paved Kv= 20.3 fps
0.2	50	0.0370	5.45	0.48	Pipe Channel, Pipe Flow - DE 4.0" Round Area= 0.1 sf Perim= 1.0' r= 0.08'
0.0	21	0.1380	19.40	10.58	Pipe Channel, Pipe Flow - EF 10.0" Round Area= 0.5 sf Perim= 2.6' r= 0.21'
4.3	267	Total			n= 0.010 PVC, smooth interior

Subcatchment 1S: Existing Impervious



Hydrograph for Subcatchment 1S: Existing Impervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	8.66	8.42	0.00
0.50	0.05	0.00	0.00	26.50	8.66	8.42	0.00
1.00	0.10	0.01	0.03	27.00	8.66	8.42	0.00
1.50	0.15	0.04	0.05	27.50	8.66	8.42	0.00
2.00	0.21	0.08	0.07	28.00	8.66	8.42	0.00
2.50	0.27	0.12	0.08	28.50	8.66	8.42	0.00
3.00	0.33	0.17	0.09	29.00	8.66	8.42	0.00
3.50	0.39	0.22	0.09	29.50	8.66	8.42	0.00
4.00	0.45	0.28	0.10	30.00	8.66	8.42	0.00
4.50	0.52	0.34	0.11				
5.00	0.59	0.40	0.11				
5.50	0.66	0.47	0.12				
6.00	0.74	0.54	0.12				
6.50	0.82	0.62	0.14				
7.00	0.91	0.71	0.16				
7.50	1.01	0.80	0.17				
8.00	1.12	0.91	0.19				
8.50	1.24	1.03	0.21				
9.00	1.37	1.16	0.22				
9.50	1.53	1.31	0.28				
10.00	1.72	1.49	0.34				
10.50	1.94	1.71	0.40				
11.00	2.25	2.02	0.61				
11.50	2.75	2.51	0.98				
12.00	4.15	3.91	4.35				
12.50	5.91	5.68	1.35				
13.00	6.41	6.17	0.71				
13.50	6.72	6.48	0.45				
14.00	6.94	6.70	0.36				
14.50	7.13	6.89	0.30				
15.00	7.29	7.05	0.24				
15.50	7.42	7.18	0.22				
16.00	7.54	7.30	0.20				
16.50	7.65	7.41	0.18				
17.00	7.75	7.51	0.17				
17.50	7.84	7.60	0.15				
18.00	7.92	7.68	0.13				
18.50	8.00	7.76	0.13				
19.00	8.07	7.83	0.12				
19.50	8.14	7.90	0.12				
20.00	8.21	7.97	0.11				
20.50	8.27	8.03	0.11				
21.00	8.33	8.09	0.11				
21.50	8.39	8.15	0.10				
22.00	8.45	8.21	0.10				
22.50	8.51	8.27	0.09				
23.00	8.56	8.32	0.09				
23.50	8.61	8.37	0.09				
24.00	8.66	8.42	0.08				
24.50	8.66	8.42	0.00				
25.00	8.66	8.42	0.00				
25.50	8.66	8.42	0.00				

Summary for Subcatchment 2S: Existing Pervious

[49] Hint: Tc<2dt may require smaller dt

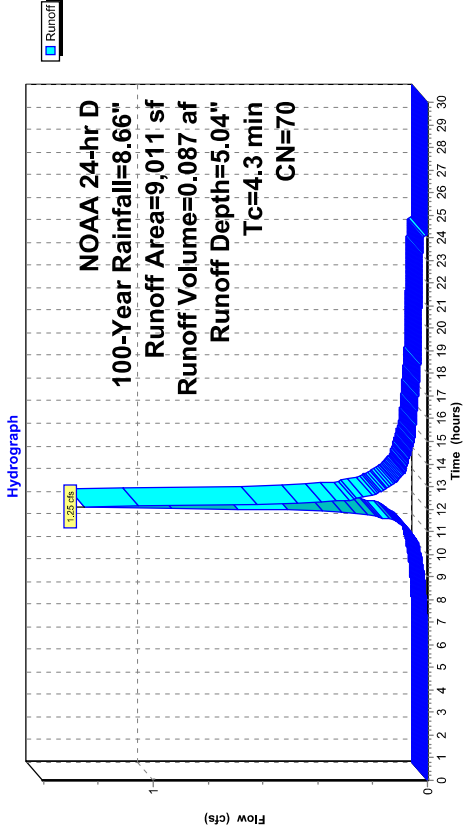
Runoff = 1.25 cfs @ 12.11 hrs, Volume= 0.087 af, Depth= 5.04"
Routed to Link 5L : Existing Total

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

Area (sf)	CN	Description
3,045	61	>75% Grass cover, Good, HSG B
5,966	74	>75% Grass cover, Good, HSG C
9,011	70	Weighted Average
9,011		100.00% Pervious Area

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

Subcatchment 2S: Existing Pervious



Hydrograph for Subcatchment 2S: Existing Pervious

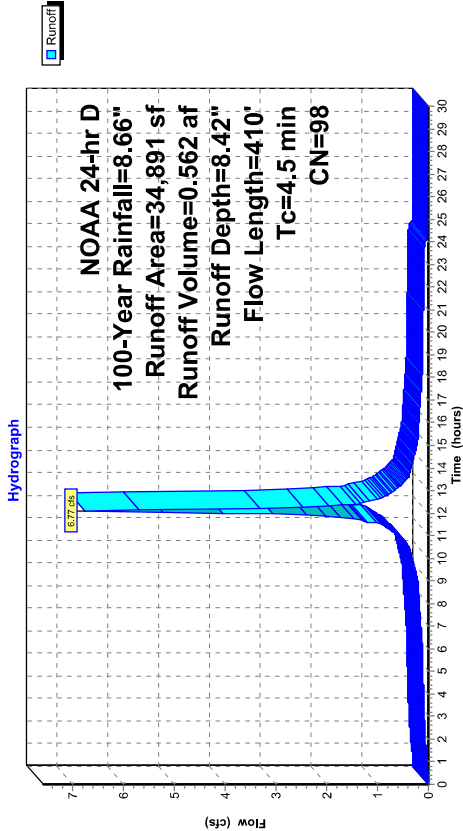
Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	8.66	5.04	0.00
0.50	0.05	0.00	0.00	26.50	8.66	5.04	0.00
1.00	0.10	0.00	0.00	27.00	8.66	5.04	0.00
1.50	0.15	0.00	0.00	27.50	8.66	5.04	0.00
2.00	0.21	0.00	0.00	28.00	8.66	5.04	0.00
2.50	0.27	0.00	0.00	28.50	8.66	5.04	0.00
3.00	0.33	0.00	0.00	29.00	8.66	5.04	0.00
3.50	0.39	0.00	0.00	29.50	8.66	5.04	0.00
4.00	0.45	0.00	0.00	30.00	8.66	5.04	0.00
4.50	0.52	0.00	0.00				
5.00	0.59	0.00	0.00				
5.50	0.66	0.00	0.00				
6.00	0.74	0.00	0.00				
6.50	0.82	0.00	0.00				
7.00	0.91	0.00	0.00				
7.50	1.01	0.01	0.00				
8.00	1.12	0.02	0.01				
8.50	1.24	0.03	0.01				
9.00	1.37	0.06	0.01				
9.50	1.53	0.09	0.02				
10.00	1.72	0.14	0.03				
10.50	1.94	0.22	0.03				
11.00	2.25	0.34	0.06				
11.50	2.75	0.58	0.12				
12.00	4.15	1.43	0.69				
12.50	5.91	2.74	0.26				
13.00	6.41	3.13	0.14				
13.50	6.72	3.39	0.09				
14.00	6.94	3.57	0.07				
14.50	7.13	3.73	0.06				
15.00	7.29	3.86	0.05				
15.50	7.42	3.97	0.04				
16.00	7.54	4.07	0.04				
16.50	7.65	4.16	0.04				
17.00	7.75	4.25	0.03				
17.50	7.84	4.33	0.03				
18.00	7.92	4.40	0.03				
18.50	8.00	4.46	0.03				
19.00	8.07	4.52	0.03				
19.50	8.14	4.58	0.02				
20.00	8.21	4.64	0.02				
20.50	8.27	4.70	0.02				
21.00	8.33	4.75	0.02				
21.50	8.39	4.80	0.02				
22.00	8.45	4.86	0.02				
22.50	8.51	4.90	0.02				
23.00	8.56	4.95	0.02				
23.50	8.61	4.99	0.02				
24.00	8.66	5.04	0.02				
24.50	8.66	5.04	0.00				
25.00	8.66	5.04	0.00				
25.50	8.66	5.04	0.00				

Summary for Subcatchment 3S: Proposed Impervious

[49] Hint: Tc<2dt may require smaller dt
[47] Hint: Peak is 114% of capacity of segment #5
[47] Hint: Peak is 114% of capacity of segment #6
Runoff = 6.77 cfs @ 12.10 hrs, Volume= 0.562 af, Depth= 8.42"
Routed to Link 6L : Proposed Total
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs
NOAA 24-hr D 100-Year Rainfall=8.66"

Area (sf)	CN	Description			
34,891	98	Unconnected pavement, HSG B			
34,891		100.00% Impervious Area			
34,891		100.00% Unconnected			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
1.4	21	0.1050	0.25		Sheet Flow, Sheet Flow - AB Grass: Short n= 0.150 P2= 3.35"
2.0	21	0.0450	0.18		Sheet Flow, Sheet Flow - BC Grass: Short n= 0.150 P2= 3.35"
0.5	52	0.0400	1.63		Sheet Flow, Sheet Flow - CD Smooth surfaces n= 0.011 P2= 3.35"
0.1	64	0.0300	9.29	7.29	Pipe Channel, Pipe Flow - DE 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.2	81	0.0200	7.58	5.95	Pipe Channel, Pipe Flow - EF 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.3	144	0.0200	7.58	5.95	Pipe Channel, Pipe Flow - FG 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.011 Concrete pipe, straight & clean
0.0	27	0.0300	10.78	13.22	Pipe Channel, Pipe Flow - GH 15.0" Round Area= 1.2 sf Perim= 3.9' r= 0.31' n= 0.011 Concrete pipe, straight & clean
4.5	410	Total			

Subcatchment 3S: Proposed Impervious



Hydrograph for Subcatchment 3S: Proposed Impervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	8.66	8.42	0.00
0.50	0.05	0.00	0.00	26.50	8.66	8.42	0.00
1.00	0.10	0.01	0.03	27.00	8.66	8.42	0.00
1.50	0.15	0.04	0.05	27.50	8.66	8.42	0.00
2.00	0.21	0.08	0.06	28.00	8.66	8.42	0.00
2.50	0.27	0.12	0.07	28.50	8.66	8.42	0.00
3.00	0.33	0.17	0.08	29.00	8.66	8.42	0.00
3.50	0.39	0.22	0.09	29.50	8.66	8.42	0.00
4.00	0.45	0.28	0.09	30.00	8.66	8.42	0.00
4.50	0.52	0.34	0.10				
5.00	0.59	0.40	0.11				
5.50	0.66	0.47	0.11				
6.00	0.74	0.54	0.12				
6.50	0.82	0.62	0.13				
7.00	0.91	0.71	0.15				
7.50	1.01	0.80	0.16				
8.00	1.12	0.91	0.18				
8.50	1.24	1.03	0.20				
9.00	1.37	1.16	0.21				
9.50	1.53	1.31	0.27				
10.00	1.72	1.49	0.32				
10.50	1.94	1.71	0.38				
11.00	2.25	2.02	0.57				
11.50	2.75	2.51	0.92				
12.00	4.15	3.91	4.06				
12.50	5.91	5.68	1.28				
13.00	6.41	6.17	0.67				
13.50	6.72	6.48	0.43				
14.00	6.94	6.70	0.34				
14.50	7.13	6.89	0.28				
15.00	7.29	7.05	0.23				
15.50	7.42	7.18	0.20				
16.00	7.54	7.30	0.19				
16.50	7.65	7.41	0.17				
17.00	7.75	7.51	0.16				
17.50	7.84	7.60	0.14				
18.00	7.92	7.68	0.13				
18.50	8.00	7.76	0.12				
19.00	8.07	7.83	0.12				
19.50	8.14	7.90	0.11				
20.00	8.21	7.97	0.11				
20.50	8.27	8.03	0.10				
21.00	8.33	8.09	0.10				
21.50	8.39	8.15	0.10				
22.00	8.45	8.21	0.09				
22.50	8.51	8.27	0.09				
23.00	8.56	8.32	0.08				
23.50	8.61	8.37	0.08				
24.00	8.66	8.42	0.08				
24.50	8.66	8.42	0.00				
25.00	8.66	8.42	0.00				
25.50	8.66	8.42	0.00				

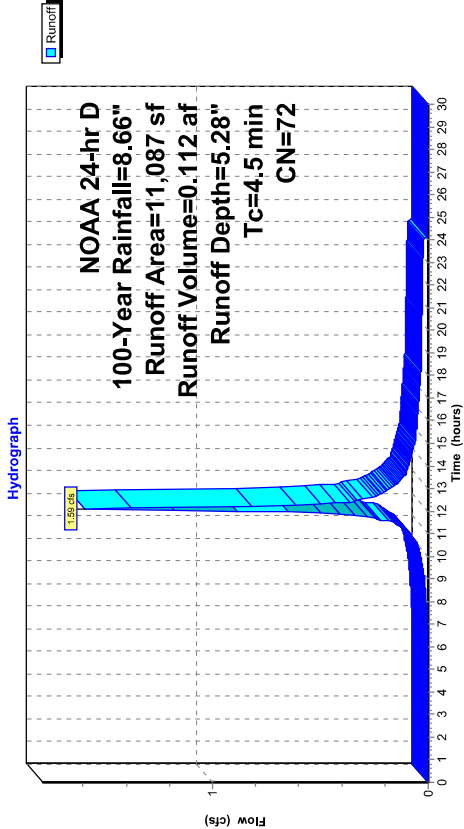
Summary for Subcatchment 4S: Proposed Pervious

[49] Hint: Tc<2dt may require smaller dt

Runoff	=	1.59 cfs @ 12.11 hrs,	Volume=	0.112 af, Depth= 5.28"
Routed to Link 6L : Proposed Total				
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs				
NOAA 24-hr D 100-Year Rainfall=8.66"				
Area (sf)	CN	Description		
2,096	61	>75% Grass cover, Good, HSG B		
8,158	74	>75% Grass cover, Good, HSG C		
833	80	>75% Grass cover, Good, HSG D		
11,087	72	Weighted Average		
11,087		100.00% Pervious Area		

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

Subcatchment 4S: Proposed Pervious



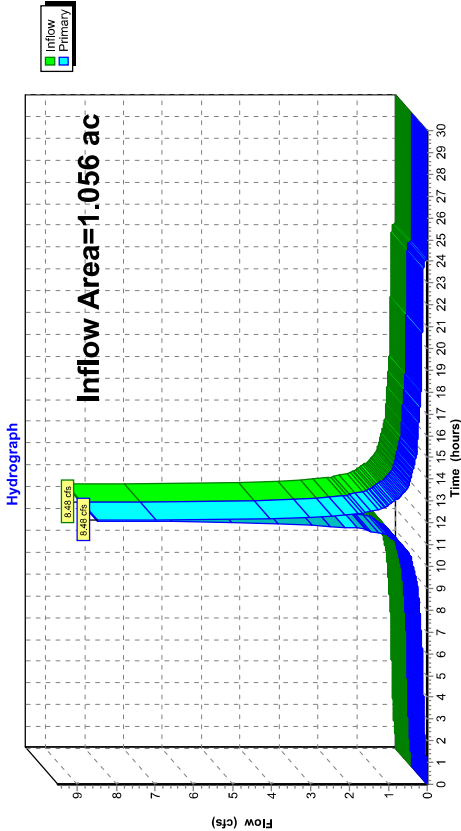
Hydrograph for Subcatchment 4S: Proposed Pervious

Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)	Time (hours)	Precip. (inches)	Excess (inches)	Runoff (cfs)
0.00	0.00	0.00	0.00	26.00	8.66	5.28	0.00
0.50	0.05	0.00	0.00	26.50	8.66	5.28	0.00
1.00	0.10	0.00	0.00	27.00	8.66	5.28	0.00
1.50	0.15	0.00	0.00	27.50	8.66	5.28	0.00
2.00	0.21	0.00	0.00	28.00	8.66	5.28	0.00
2.50	0.27	0.00	0.00	28.50	8.66	5.28	0.00
3.00	0.33	0.00	0.00	29.00	8.66	5.28	0.00
3.50	0.39	0.00	0.00	29.50	8.66	5.28	0.00
4.00	0.45	0.00	0.00	30.00	8.66	5.28	0.00
4.50	0.52	0.00	0.00				
5.00	0.59	0.00	0.00				
5.50	0.66	0.00	0.00				
6.00	0.74	0.00	0.00				
6.50	0.82	0.00	0.00				
7.00	0.91	0.00	0.00				
7.50	1.01	0.01	0.01				
8.00	1.12	0.03	0.01				
8.50	1.24	0.05	0.01				
9.00	1.37	0.08	0.02				
9.50	1.53	0.12	0.02				
10.00	1.72	0.18	0.04				
10.50	1.94	0.27	0.05				
11.00	2.25	0.40	0.09				
11.50	2.75	0.66	0.16				
12.00	4.15	1.57	0.88				
12.50	5.91	2.92	0.33				
13.00	6.41	3.33	0.18				
13.50	6.72	3.59	0.11				
14.00	6.94	3.78	0.09				
14.50	7.13	3.94	0.08				
15.00	7.29	4.07	0.06				
15.50	7.42	4.19	0.06				
16.00	7.54	4.29	0.05				
16.50	7.65	4.39	0.05				
17.00	7.75	4.47	0.04				
17.50	7.84	4.55	0.04				
18.00	7.92	4.62	0.04				
18.50	8.00	4.69	0.03				
19.00	8.07	4.75	0.03				
19.50	8.14	4.82	0.03				
20.00	8.21	4.88	0.03				
20.50	8.27	4.93	0.03				
21.00	8.33	4.99	0.03				
21.50	8.39	5.04	0.03				
22.00	8.45	5.09	0.03				
22.50	8.51	5.14	0.02				
23.00	8.56	5.19	0.02				
23.50	8.61	5.24	0.02				
24.00	8.66	5.28	0.02				
24.50	8.66	5.28	0.00				
25.00	8.66	5.28	0.00				
25.50	8.66	5.28	0.00				

Summary for Link 5L: Existing Total

Inflow Area = 1.056 ac, 80.40% Impervious, Inflow Depth = 7.76" for 100-Year event
Inflow = 8.48 cfs @ 12.10 hrs, Volume= 0.682 af
Primary = 8.48 cfs @ 12.10 hrs, Volume= 0.682 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link 5L: Existing Total



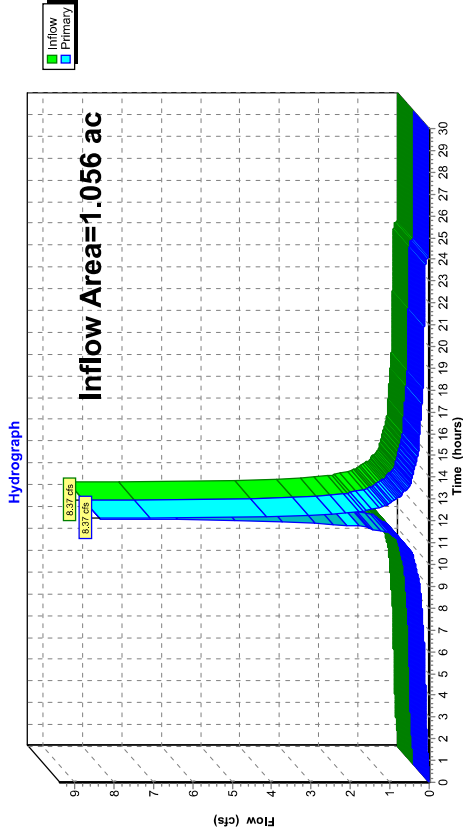
Hydrograph for Link 5L: Existing Total

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00	26.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00	26.50	0.00	0.00	0.00
1.00	0.03	0.00	0.03	27.00	0.00	0.00	0.00
1.50	0.05	0.00	0.05	27.50	0.00	0.00	0.00
2.00	0.07	0.00	0.07	28.00	0.00	0.00	0.00
2.50	0.08	0.00	0.08	28.50	0.00	0.00	0.00
3.00	0.09	0.00	0.09	29.00	0.00	0.00	0.00
3.50	0.09	0.00	0.09	29.50	0.00	0.00	0.00
4.00	0.10	0.00	0.10	30.00	0.00	0.00	0.00
4.50	0.11	0.00	0.11				
5.00	0.11	0.00	0.11				
5.50	0.12	0.00	0.12				
6.00	0.12	0.00	0.12				
6.50	0.14	0.00	0.14				
7.00	0.16	0.00	0.16				
7.50	0.18	0.00	0.18				
8.00	0.20	0.00	0.20				
8.50	0.21	0.00	0.21				
9.00	0.24	0.00	0.24				
9.50	0.30	0.00	0.30				
10.00	0.37	0.00	0.37				
10.50	0.43	0.00	0.43				
11.00	0.67	0.00	0.67				
11.50	1.10	0.00	1.10				
12.00	5.04	0.00	5.04				
12.50	1.61	0.00	1.61				
13.00	0.84	0.00	0.84				
13.50	0.54	0.00	0.54				
14.00	0.43	0.00	0.43				
14.50	0.36	0.00	0.36				
15.00	0.29	0.00	0.29				
15.50	0.26	0.00	0.26				
16.00	0.24	0.00	0.24				
16.50	0.22	0.00	0.22				
17.00	0.20	0.00	0.20				
17.50	0.18	0.00	0.18				
18.00	0.16	0.00	0.16				
18.50	0.15	0.00	0.15				
19.00	0.15	0.00	0.15				
19.50	0.14	0.00	0.14				
20.00	0.14	0.00	0.14				
20.50	0.13	0.00	0.13				
21.00	0.13	0.00	0.13				
21.50	0.12	0.00	0.12				
22.00	0.12	0.00	0.12				
22.50	0.11	0.00	0.11				
23.00	0.11	0.00	0.11				
23.50	0.10	0.00	0.10				
24.00	0.10	0.00	0.10				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				

Summary for Link 6L: Proposed Total

Inflow Area = 1.056 ac, 75.89% Impervious, Inflow Depth = 7.66" for 100-Year event
Inflow = 8.37 cfs @ 12.11 hrs, Volume= 0.674 af
Primary = 8.37 cfs @ 12.11 hrs, Volume= 0.674 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.05 hrs

Link 6L: Proposed Total



Hydrograph for Link 6L: Proposed Total

Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)	Time (hours)	Inflow (cfs)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.00	0.00	26.00	0.00	0.00	0.00
0.50	0.00	0.00	0.00	26.50	0.00	0.00	0.00
1.00	0.03	0.00	0.03	27.00	0.00	0.00	0.00
1.50	0.05	0.00	0.05	27.50	0.00	0.00	0.00
2.00	0.06	0.00	0.06	28.00	0.00	0.00	0.00
2.50	0.07	0.00	0.07	28.50	0.00	0.00	0.00
3.00	0.08	0.00	0.08	29.00	0.00	0.00	0.00
3.50	0.09	0.00	0.09	29.50	0.00	0.00	0.00
4.00	0.09	0.00	0.09	30.00	0.00	0.00	0.00
4.50	0.10	0.00	0.10				
5.00	0.11	0.00	0.11				
5.50	0.11	0.00	0.11				
6.00	0.12	0.00	0.12				
6.50	0.13	0.00	0.13				
7.00	0.15	0.00	0.15				
7.50	0.17	0.00	0.17				
8.00	0.19	0.00	0.19				
8.50	0.21	0.00	0.21				
9.00	0.23	0.00	0.23				
9.50	0.29	0.00	0.29				
10.00	0.36	0.00	0.36				
10.50	0.42	0.00	0.42				
11.00	0.66	0.00	0.66				
11.50	1.09	0.00	1.09				
12.00	4.94	0.00	4.94				
12.50	1.61	0.00	1.61				
13.00	0.84	0.00	0.84				
13.50	0.54	0.00	0.54				
14.00	0.43	0.00	0.43				
14.50	0.36	0.00	0.36				
15.00	0.29	0.00	0.29				
15.50	0.26	0.00	0.26				
16.00	0.24	0.00	0.24				
16.50	0.22	0.00	0.22				
17.00	0.20	0.00	0.20				
17.50	0.18	0.00	0.18				
18.00	0.16	0.00	0.16				
18.50	0.15	0.00	0.15				
19.00	0.15	0.00	0.15				
19.50	0.14	0.00	0.14				
20.00	0.14	0.00	0.14				
20.50	0.13	0.00	0.13				
21.00	0.13	0.00	0.13				
21.50	0.12	0.00	0.12				
22.00	0.12	0.00	0.12				
22.50	0.11	0.00	0.11				
23.00	0.11	0.00	0.11				
23.50	0.10	0.00	0.10				
24.00	0.10	0.00	0.10				
24.50	0.00	0.00	0.00				
25.00	0.00	0.00	0.00				
25.50	0.00	0.00	0.00				

**MULTI-HYDROGRAPH PLOT – EXISTING AND
PROPOSED SUPERIMPOSED
2-, 10- & 100-YR**

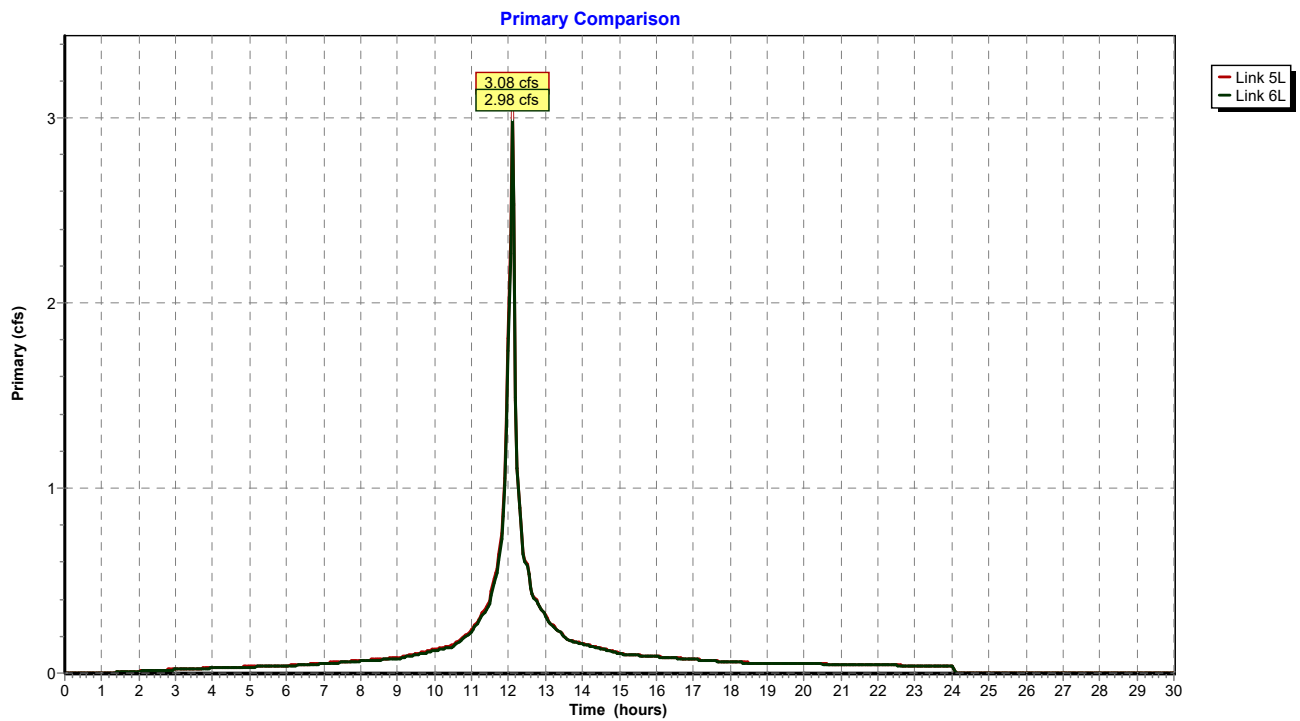
2024-04 HydroCAD

Prepared by Dynamic Engineering

HydroCAD® 10.20-5a s/n 08640 © 2023 HydroCAD Software Solutions LLC

NOAA 24-hr D 2-Year Rainfall=3.44"

Printed 6/5/2024



Primary Comparison

Time (hours)	Link 5L (cfs)	Link 6L (cfs)
0.00	0.00	0.00
1.00	0.00	0.00
2.00	0.01	0.01
3.00	0.02	0.02
4.00	0.03	0.03
5.00	0.04	0.03
6.00	0.04	0.04
7.00	0.05	0.05
8.00	0.07	0.06
9.00	0.08	0.08
10.00	0.13	0.12
11.00	0.23	0.22
12.00	1.81	1.74
13.00	0.31	0.31
14.00	0.16	0.16
15.00	0.11	0.11
16.00	0.09	0.09
17.00	0.08	0.07
18.00	0.06	0.06
19.00	0.06	0.05
20.00	0.05	0.05
21.00	0.05	0.05
22.00	0.04	0.04
23.00	0.04	0.04
24.00	0.04	0.04
25.00	0.00	0.00
26.00	0.00	0.00
27.00	0.00	0.00
28.00	0.00	0.00
29.00	0.00	0.00
30.00	0.00	0.00

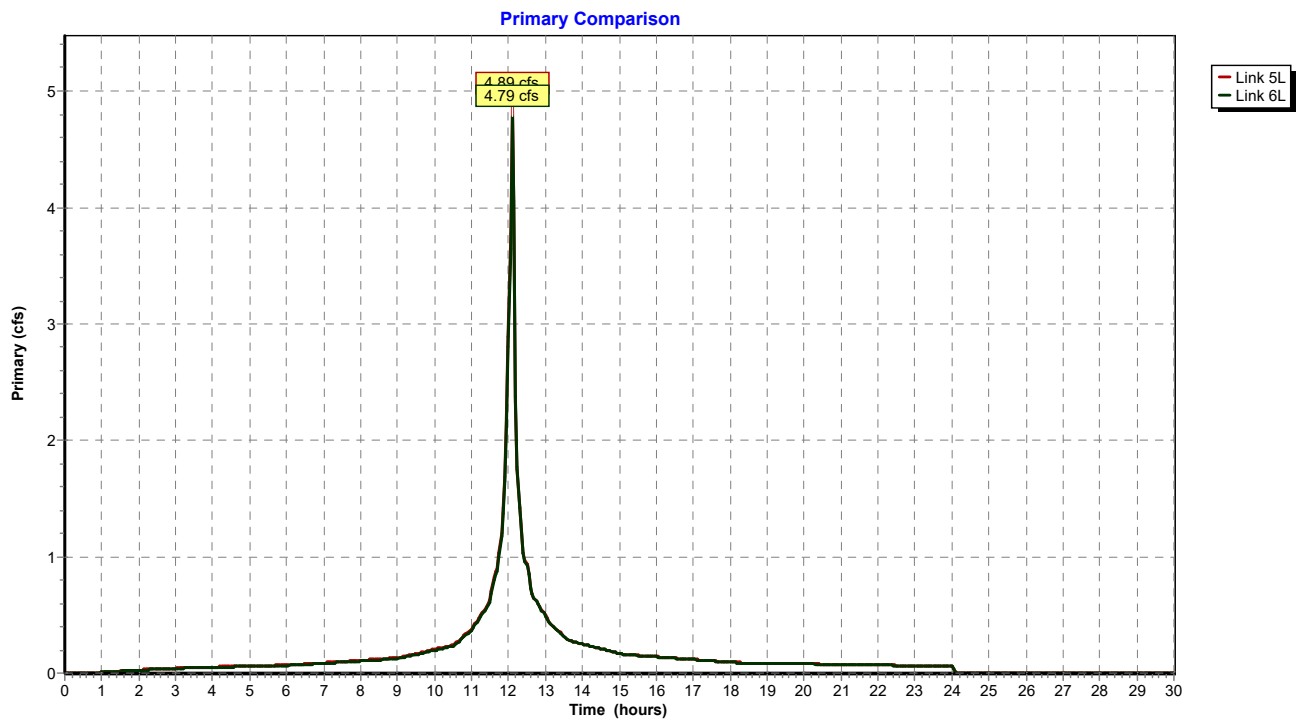
2024-04 HydroCAD

Prepared by Dynamic Engineering

HydroCAD® 10.20-5a s/n 08640 © 2023 HydroCAD Software Solutions LLC

NOAA 24-hr D 10-Year Rainfall=5.22"

Printed 6/5/2024



Primary Comparison

Time (hours)	Link 5L (cfs)	Link 6L (cfs)
0.00	0.00	0.00
1.00	0.01	0.01
2.00	0.03	0.03
3.00	0.04	0.04
4.00	0.05	0.05
5.00	0.06	0.06
6.00	0.07	0.07
7.00	0.09	0.08
8.00	0.11	0.10
9.00	0.13	0.13
10.00	0.21	0.20
11.00	0.38	0.37
12.00	2.89	2.81
13.00	0.49	0.49
14.00	0.25	0.25
15.00	0.17	0.17
16.00	0.14	0.14
17.00	0.12	0.12
18.00	0.09	0.09
19.00	0.09	0.09
20.00	0.08	0.08
21.00	0.08	0.08
22.00	0.07	0.07
23.00	0.06	0.06
24.00	0.06	0.06
25.00	0.00	0.00
26.00	0.00	0.00
27.00	0.00	0.00
28.00	0.00	0.00
29.00	0.00	0.00
30.00	0.00	0.00

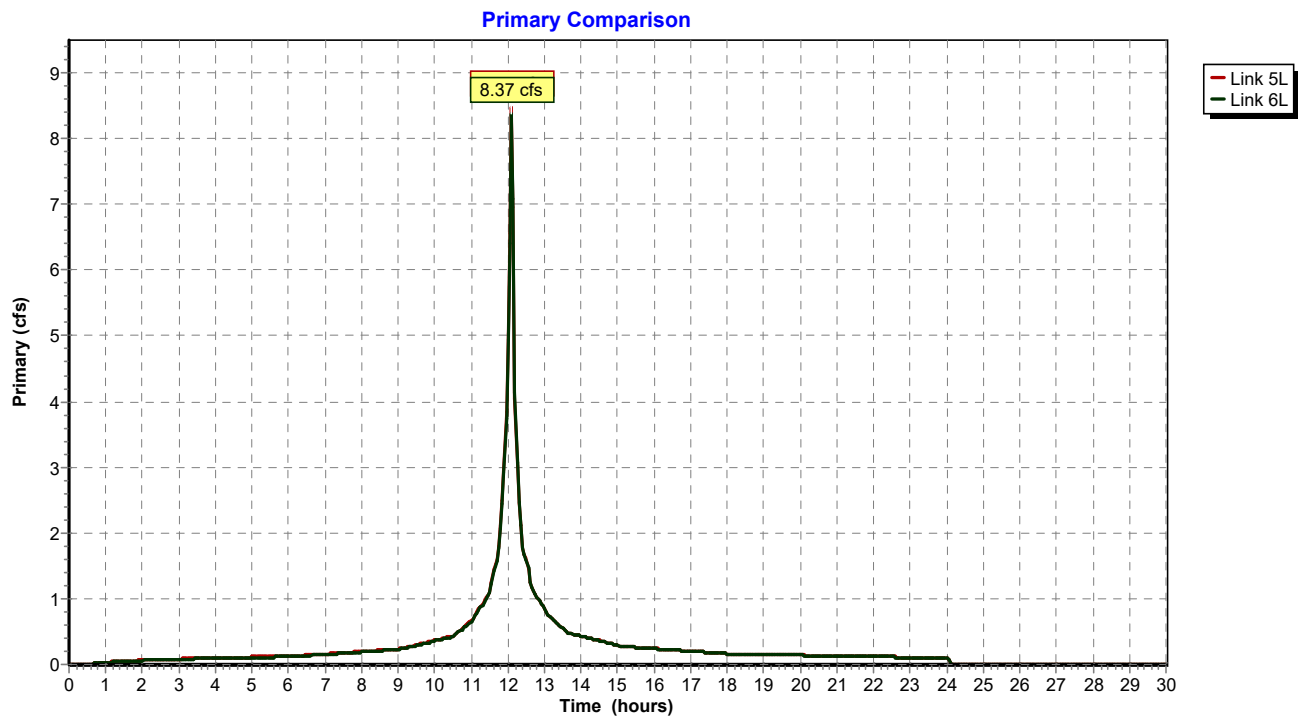
2024-04 HydroCAD

Prepared by Dynamic Engineering

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NOAA 24-hr D 100-Year Rainfall=8.66"

Printed 6/5/2024



Primary Comparison

Time (hours)	Link 5L (cfs)	Link 6L (cfs)
0.00	0.00	0.00
1.00	0.03	0.03
2.00	0.07	0.06
3.00	0.09	0.08
4.00	0.10	0.09
5.00	0.11	0.11
6.00	0.12	0.12
7.00	0.16	0.15
8.00	0.20	0.19
9.00	0.24	0.23
10.00	0.37	0.36
11.00	0.67	0.66
12.00	5.04	4.94
13.00	0.84	0.84
14.00	0.43	0.43
15.00	0.29	0.29
16.00	0.24	0.24
17.00	0.20	0.20
18.00	0.16	0.16
19.00	0.15	0.15
20.00	0.14	0.14
21.00	0.13	0.13
22.00	0.12	0.12
23.00	0.11	0.11
24.00	0.10	0.10
25.00	0.00	0.00
26.00	0.00	0.00
27.00	0.00	0.00
28.00	0.00	0.00
29.00	0.00	0.00
30.00	0.00	0.00

**STORMWATER COLLECTION SYSTEM
CLACULATIONS (PIPE SIZING)**



Inlet Area Summary and Average Coefficient (C) Calculations

Project: Proposed Popeyes & IHOP Restaurant
Job #: 1021-99-025
Location: West Orange, NJ

Computed By: DG
Checked By: MJB
Date: 6/5/2024

Drainage Area	Impervious Area (sf)	Coefficient (C) Used	Open Space (SF)	Coefficient (C) Used	Average Coefficient (C) Used	Total Area (SF)	Total Area (acres)
Inlet Area #2	1,215	0.95	566	0.35	0.76	1781	0.04
Inlet Area #3	3,408	0.95	906	0.35	0.82	4314	0.10
Inlet Area #4	2,861	0.95	1,690	0.35	0.73	4551	0.10
Inlet Area #5	1,716	0.95	1,270	0.35	0.69	2986	0.07
Inlet Area #6	6,559	0.95	105	0.35	0.94	6664	0.15
Inlet Area #9	500	0.95	176	0.35	0.79	676	0.02
Inlet Area #10	1,909	0.95	125	0.35	0.91	2034	0.05
Inlet Area #11	1,552	0.95	768	0.35	0.75	2320	0.05
Inlet Area #12	6,545	0.95	1,326	0.35	0.85	7871	0.18
Inlet Area #13	872	0.95	65	0.35	0.91	937	0.02
Roof Rear	3,358	0.95	-	0.35	0.95	3358	0.08
Roof Front	2,830	0.95	-	0.35	0.95	2830	0.06



DYNAMIC ENGINEERING

Stormwater Collection System Calculations

Project: Proposed Popeyes & IHOP Restaurant

Job #: 1021-99-025

Location: West Orange, NJ

Design Storm: 25 Year

Computed By: DG

Checked By: MJB

Date: 6/5/2024

NOTES:

1) Design method used is Rational Method, unless otherwise noted.

2) Refer to Weighted Runoff Coefficient table
for calculation of incremental areas and C values

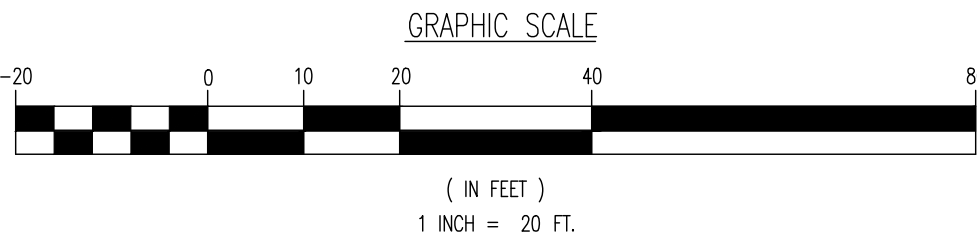
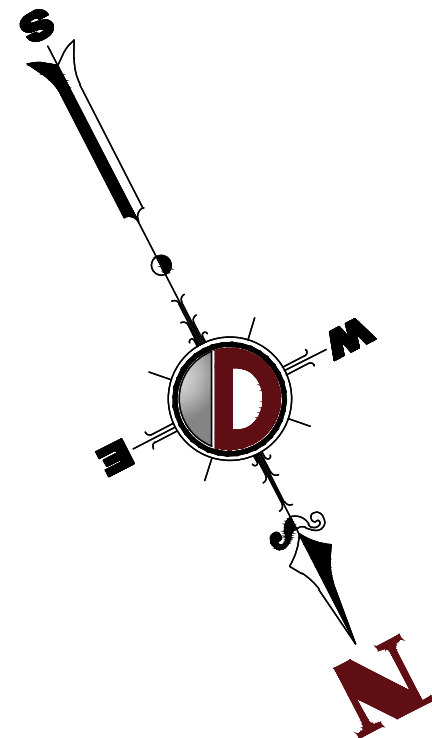
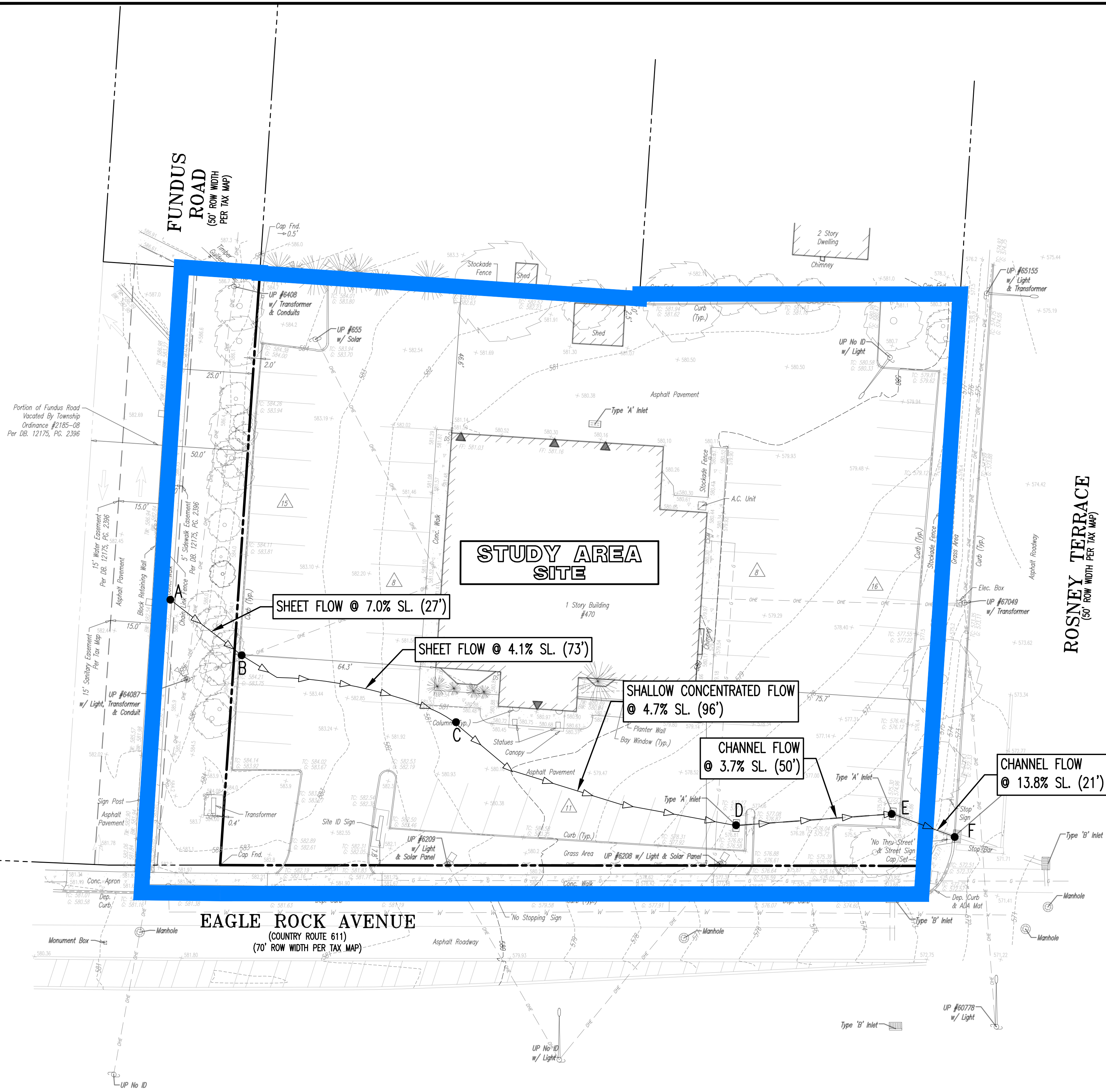
PIPE SECTION		SUBCATCHMENT AREA	INCREMENTAL		CUMULATIVE	TIME OF CONCENTRATION			I	PEAK RUNOFF		PIPING INPUT			PIPING DATA		
FROM	TO	Area (Acres)	"C"	A x C Ac	A x C (acres)	Tc to Inlet (min)	Tc in Pipe (min.)	Final Tc (min)	(In/Hr)	Q to Inlet (CFS)	Q cum. for Pipe (CFS)	Dia. (In)	Length (Ft)	Man. "n"	Slope (ft/ft)	Pipe Capacity (cfs)	Pipe Velocity (fps)
Roof Rear	Inlet #2	0.08	0.95	0.08	0.08	10.00	0.03	10.00	6.80	0.54	0.54	6	6.0	0.010	0.0100	0.73	3.72
Inlet #2	Inlet #3	0.04	0.76	0.03	0.11	10.00	0.03	10.03	6.80	0.20	0.75	12	15.0	0.013	0.0300	6.17	7.86
Inlet #3	Inlet #4	0.10	0.82	0.08	0.19	10.00	0.14	10.06	6.80	0.54	1.29	12	64.0	0.013	0.0300	6.17	7.86
Inlet #4	Inlet #5	0.10	0.73	0.07	0.26	10.00	0.21	10.20	6.80	0.48	1.77	12	81.0	0.013	0.0200	5.04	6.42
Inlet #5	Inlet #6	0.07	0.69	0.05	0.31	10.00	0.37	10.41	6.80	0.34	2.11	12	144.0	0.013	0.0200	5.04	6.42
Roof Front	Inlet #9	0.06	0.95	0.06	0.06	10.00	0.03	10.00	6.80	0.41	0.41	6	6.0	0.010	0.0092	0.70	3.57
Inlet #9	Inlet #10	0.02	0.79	0.02	0.08	10.00	0.04	10.03	6.80	0.14	0.54	12	18.0	0.013	0.0250	5.63	7.17
Inlet #10	Inlet #11	0.05	0.91	0.05	0.13	10.00	0.14	10.07	6.80	0.34	0.88	12	59.0	0.013	0.0252	5.65	7.20
Inlet #11	Inlet #12	0.05	0.75	0.04	0.17	10.00	0.24	10.21	6.80	0.27	1.16	12	111.0	0.013	0.0300	6.17	7.86
Inlet #12	Inlet #13	0.18	0.85	0.15	0.32	10.00	0.12	10.45	6.80	1.02	2.18	12	48.0	0.013	0.0200	5.04	6.42
Inlet #13	Inlet #6	0.02	0.91	0.02	0.34	10.00	0.07	10.57	6.68	0.13	2.27	12	26.0	0.013	0.0200	5.04	6.42
Inlet #6	Ex. Inlet	0.15	0.94	0.14	0.79	10.00	0.05	10.78	6.68	0.94	5.28	15	27.0	0.013	0.0300	11.18	9.11

DRAINAGE & INLET AREA MAPS

Product Ver. 24.3s (LMS Tech)
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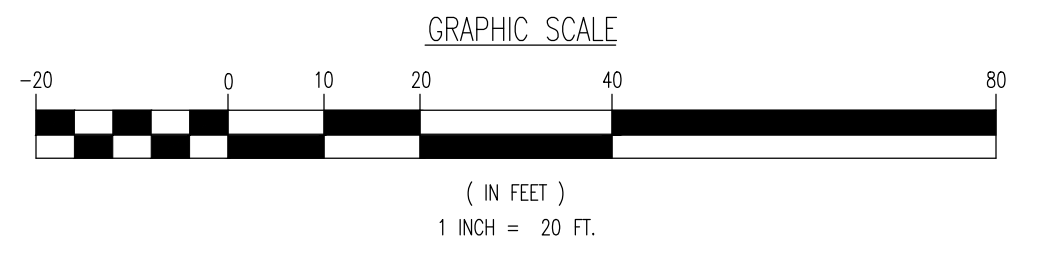
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TITLE: EXISTING DRAINAGE AREA MAP			
PROJECT: MPB REALTY, LLC PROPOSED POPEYE'S & IHOP RESTAURANT BLOCK 153, LOT 38 470 EAGLE ROCK AVENUE (CR-611) TOWNSHIP OF WEST ORANGE, ESSEX COUNTY, NEW JERSEY		JOB No: 1021-99-025 DATE: 06/07/2024 DRAWN BY: PSD DESIGNED BY: DG/MMW CHECKED BY: MJB CHECKED BY: -	
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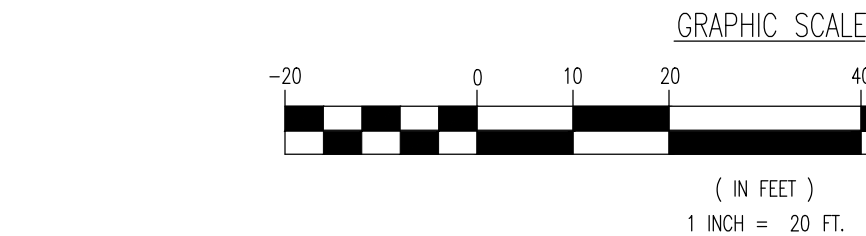
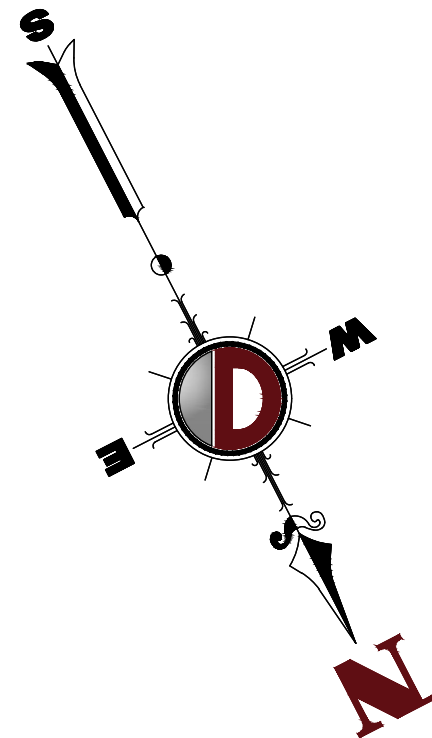
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