CARMINA WOOD
DESIGN

ENGINEER'S REPORT

for

Proposed Retail

4548-4564 Main Street
Town of Amherst, Erie County, New York

Prepared for

Benderson Development Group, LLC

570 Delaware Avenue
Buffalo, NY 14202

Prepared by

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April 2025

Revised 6/6/2025

Table of Contents

Attachments

Section 1 - Location & Description

This redevelopment project will consist of the construction of a 2-story commercial use building that will include retail space and multi-level parking. The site is located on the north side of Main Street (NY-5), between Fruehauf Ave and Chateau Terrace in the Town of Amherst. The existing site is currently occupied by a 3-story vacant building located along the Main Street frontage. Existing surface parking is located north behind the existing building. Both the existing building and parking areas will be removed as part of this project. The project area is approximately 0.79 acres, all of which is to be disturbed for construction.

Section 2 - Storm Sewer Service

The existing side streets, Fruehauf Ave and Chateau Terrace, slope from south to north. Existing closed stormwater drainage systems are located along Main Street (NYSDOT) and Chateau Terrace (Town of Amherst). The existing northeast parking lot area sheet drains to the north and northeast to Chateau Terrace. The existing northwest parking lot is generally flat and drains to an existing closed stormwater drainage system with unknown outlet. Existing stormwater runoff collected and conveyed from the site is ultimately tributary to Ellicott Creek and the Niagara River.

The proposed dry detention basin is designed to attenuate proposed runoff to existing conditions prior to discharge via an 8" outlet control pipe connecting to the existing storm sewer system on Chateau Terrace. An emergency spillway will be provided to direct overflow toward Fruehauf Ave.

Detention Pond Summary (dry):
Top of basin elevation = 675.50
100-year elevation in basin = 675.46
Bottom of basin elevation = 672.50

Design Criteria:
Detention: Comparison of the existing 10-year vs. the proposed 25-year runoff

Runoff Summary:

Event	Ex. Runoff (cfs)	Pro. Runoff (cfs)	Result (cfs)
10-year	3.46	1.22	-2.24
25-year	4.25	1.35	-2.90

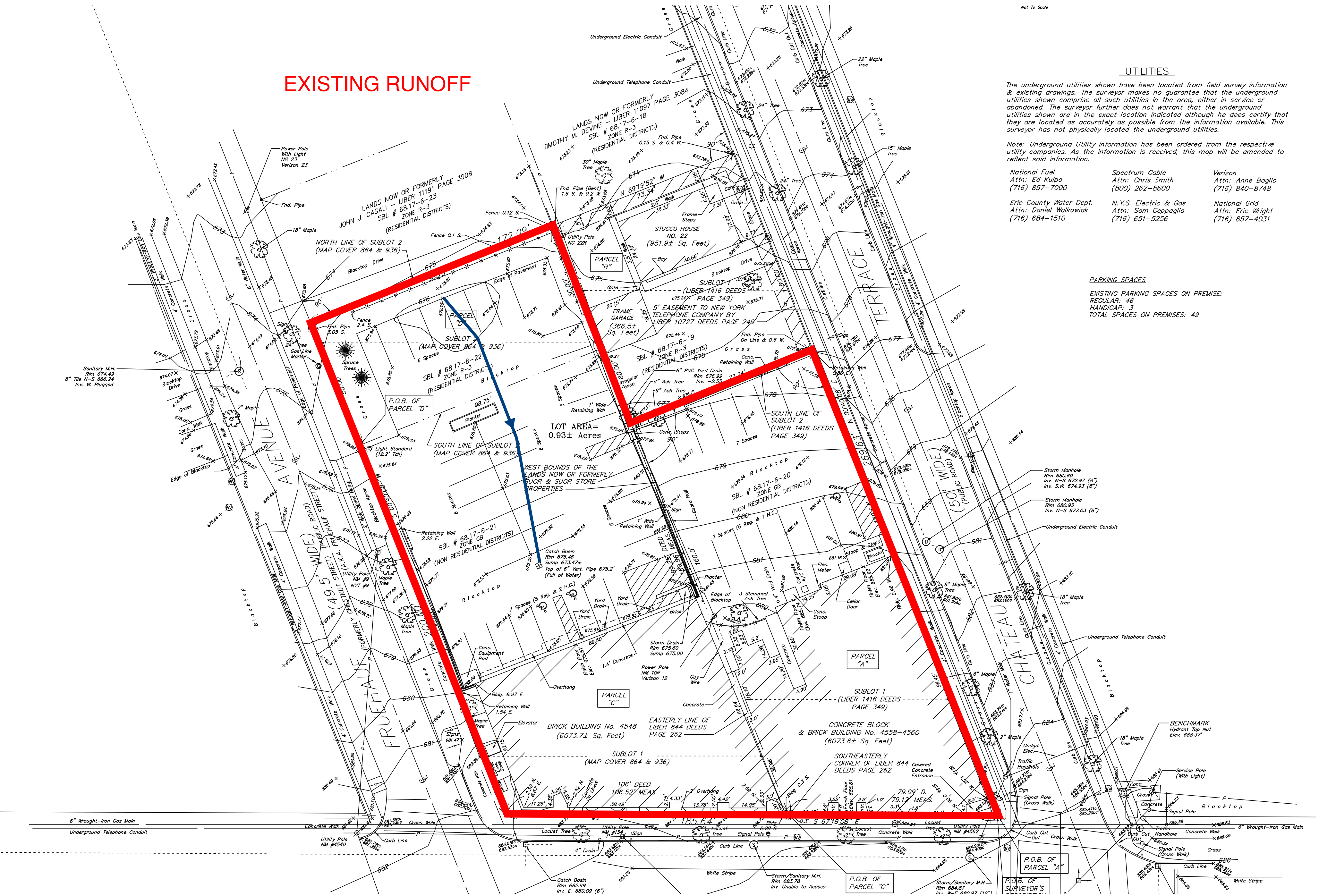
Attachment A

Storm Sewer System Drainage Calculations

Existing Runoff

Events for Subcatchment 1S: Existing Site

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
1-Year	1.81	1.93	0.098	1.49
2-Year	2.19	2.38	0.122	1.86
5-Year	2.67	2.94	0.154	2.33
10-Year	3.11	3.46	0.182	2.77
25-Year	3.79	4.25	0.227	3.44
50-Year	4.41	4.97	0.267	4.06
100-Year	**5.14**	**5.81**	**0.315**	**4.79**


EXISTING RUNOFF
Not To Scale
FRUEHAUF AVENUE
(49.5' WIDE) (PUBLIC ROAD)
(FORMERLY CHESTNUT STREET) (A.K.A. FRUEHAUF STREET)
CHATEAU TERRACE
(50' WIDE) (PUBLIC ROAD)
LANDS NOW OR FORMERLY
JOHN J. CASALI – LIBER 11191 PAGE 3508
SBL # 68.17-6-23
ZONE R-3
(RESIDENTIAL DISTRICTS)
LANDS NOW OR FORMERLY
TIMOTHY M. DEVINE – LIBER 11097 PAGE 3084
SBL # 68.17-6-18
ZONE R-3
(RESIDENTIAL DISTRICTS)
NORTH LINE OF SUBLOT 2
(MAP COVER 864 & 936)
PARCEL "D"
SUBLOT 2
(MAP COVER 864 & 936)
SBL # 68.17-6-22
ZONE R-3
(RESIDENTIAL DISTRICTS)
P.O.B. OF PARCEL "D"
SOUTH LINE OF SUBLOT 2
(MAP COVER 864 & 936)
LOT AREA=
0.93± Acres
WEST BOUNDS OF THE LANDS NOW OR FORMERLY SUOR & SUOR STORE PROPERTIES
SBL # 68.17-6-21
ZONE GB
(NON RESIDENTIAL DISTRICTS)
Catch Basin
Rim 675.46
Sump 673.47±
Top of 6" Vert. Pipe 675.2'
(Full of Water)
PARCEL "B"
STUCCO HOUSE
NO. 22
(951.9± Sq. Feet)
FRAME GARAGE
(366.5± Sq. Feet)
SUBLOT 1
(LIBER 1416 DEEDS PAGE 349)
5' EASEMENT TO NEW YORK TELEPHONE COMPANY BY LIBER 10727 DEEDS PAGE 240
SBL # 68.17-6-19
ZONE R-3
(RESIDENTIAL DISTRICTS)
SOUTH LINE OF SUBLOT 2
(LIBER 1416 DEEDS PAGE 349)
SBL # 68.17-6-20
ZONE GB
(NON RESIDENTIAL DISTRICTS)
PARCEL "C"
BRICK BUILDING No. 4548
(6073.7± Sq. Feet)
EASTERLY LINE OF LIBER 844 DEEDS PAGE 262
SUBLOT 1
(MAP COVER 864 & 936)
PARCEL "A"
SUBLOT 1
(LIBER 1416 DEEDS PAGE 349)
CONCRETE BLOCK & BRICK BUILDING No. 4558-4560
(6073.8± Sq. Feet)
SOUTHEASTERLY CORNER OF LIBER 844 DEEDS PAGE 262
P.O.B. OF PARCEL "C"
P.O.B. OF PARCEL "A"
P.O.B. OF SURVEYOR'S
BENCHMARK
Hydrant Top Nut
Elev. 688.37'
172.09'
50.00'
80.00'
269.63'
185.64'
200.00'
N 89°19'52" W
N 00°40'08" E
S 00°40'08" W
S 67°18'08" E
Underground Electric Conduit
Underground Telephone Conduit
6" Wrought-Iron Gas Main
6" Water Main
Storm Manhole
Rim 680.60
Inv. N-S 672.97 (8")
Inv. S.W. 674.93 (8")
Storm Manhole
Rim 680.93
Inv. N-S 677.03 (8")
Sanitary M.H.
Rim 674.49
8" Tile N-S 666.24
Inv. W. Plugged

UTILITIES

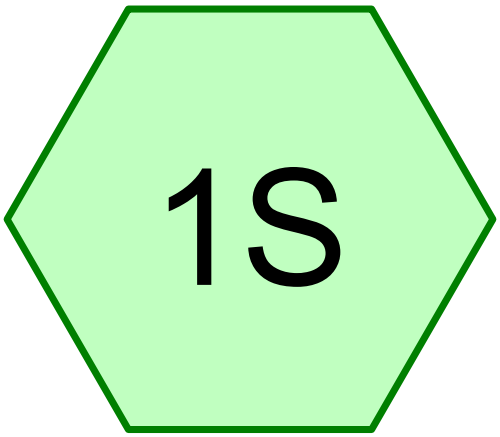
The underground utilities shown have been located from field survey information & existing drawings. The surveyor makes no guarantee that the underground utilities shown comprise all such utilities in the area, either in service or abandoned. The surveyor further does not warrant that the underground utilities shown are in the exact location indicated although he does certify that they are located as accurately as possible from the information available. This surveyor has not physically located the underground utilities.

Note: Underground Utility information has been ordered from the respective utility companies. As the information is received, this map will be amended to reflect said information.

National Fuel Attn: Ed Kulpa (716) 857-7000	Spectrum Cable Attn: Chris Smith (800) 262-8600	Verizon Attn: Anne Baglio (716) 840-8748
Erie County Water Dept. Attn: Daniel Walkowiak (716) 684-1510	N.Y.S. Electric & Gas Attn: Sam Ceppaglia (716) 651-5256	National Grid Attn: Eric Wright (716) 857-4031

PARKING SPACES

EXISTING PARKING SPACES ON PREMISE:
REGULAR: 46
HANDICAP: 3
TOTAL SPACES ON PREMISES: 49



Existing Site

Subcat Reach Pond Link

Routing Diagram for 21.152 Existing
Prepared by Carmina Wood Morris, PC, Printed 6/6/2025

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type II 24-hr		Default	24.00	1	1.81	2
2	10-Year	Type II 24-hr		Default	24.00	1	3.11	2
3	25-Year	Type II 24-hr		Default	24.00	1	3.79	2
4	100-Year	Type II 24-hr		Default	24.00	1	5.14	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.040	84	50-75% Grass cover, Fair, HSG D (1S)
0.750	98	Impervious (1S)
0.790	**97**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.040	HSG D	1S
0.750	Other	1S
0.790		**TOTAL AREA**

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	0.000	0.000	0.040	0.000	0.040	50-75% Grass cover, Fair	1S
0.000	0.000	0.000	0.000	0.750	0.750	Impervious	1S
0.000	**0.000**	**0.000**	**0.040**	**0.750**	**0.790**	**TOTAL AREA**	

Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing Site Runoff Area=0.790 ac 94.94% Impervious Runoff Depth=1.49"
Flow Length=110' Slope=0.0063 '/' Tc=5.0 min CN=97 Runoff=1.93 cfs 0.098 af

Total Runoff Area = 0.790 ac Runoff Volume = 0.098 af Average Runoff Depth = 1.49"
5.06% Pervious = 0.040 ac 94.94% Impervious = 0.750 ac

Summary for Subcatchment 1S: Existing Site

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

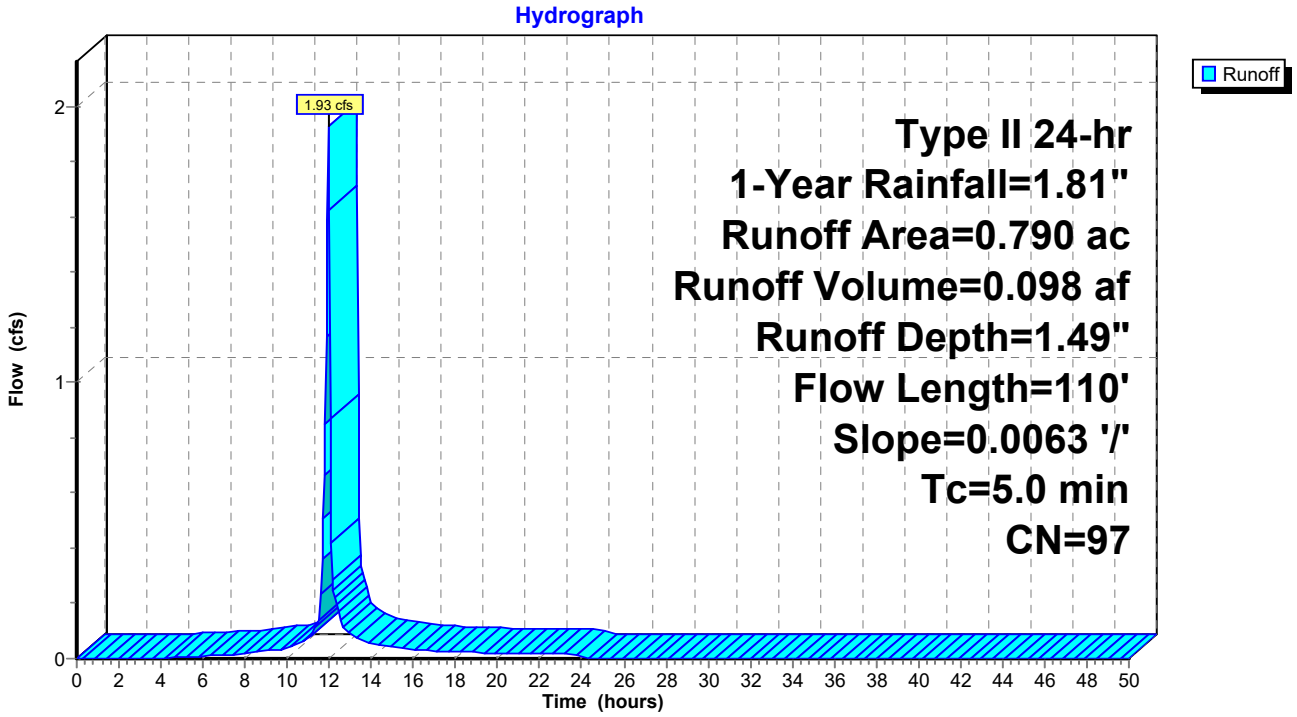
Runoff = 1.93 cfs @ 11.95 hrs, Volume= 0.098 af, Depth= 1.49"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 1-Year Rainfall=1.81"

	Area (ac)	CN	Description
	0.040	84	50-75% Grass cover, Fair, HSG D
*	0.750	98	Impervious
	0.790	97	Weighted Average
	0.040		5.06% Pervious Area
	0.750		94.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	110	0.0063	0.78		**Sheet Flow, Overland - Pvmt.** Smooth surfaces n= 0.011 P2= 2.50"
2.3	110	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: Existing Site



Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing Site Runoff Area=0.790 ac 94.94% Impervious Runoff Depth=2.77"
Flow Length=110' Slope=0.0063 '/' Tc=5.0 min CN=97 Runoff=3.46 cfs 0.182 af

Total Runoff Area = 0.790 ac Runoff Volume = 0.182 af Average Runoff Depth = 2.77"
5.06% Pervious = 0.040 ac 94.94% Impervious = 0.750 ac

Summary for Subcatchment 1S: Existing Site

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

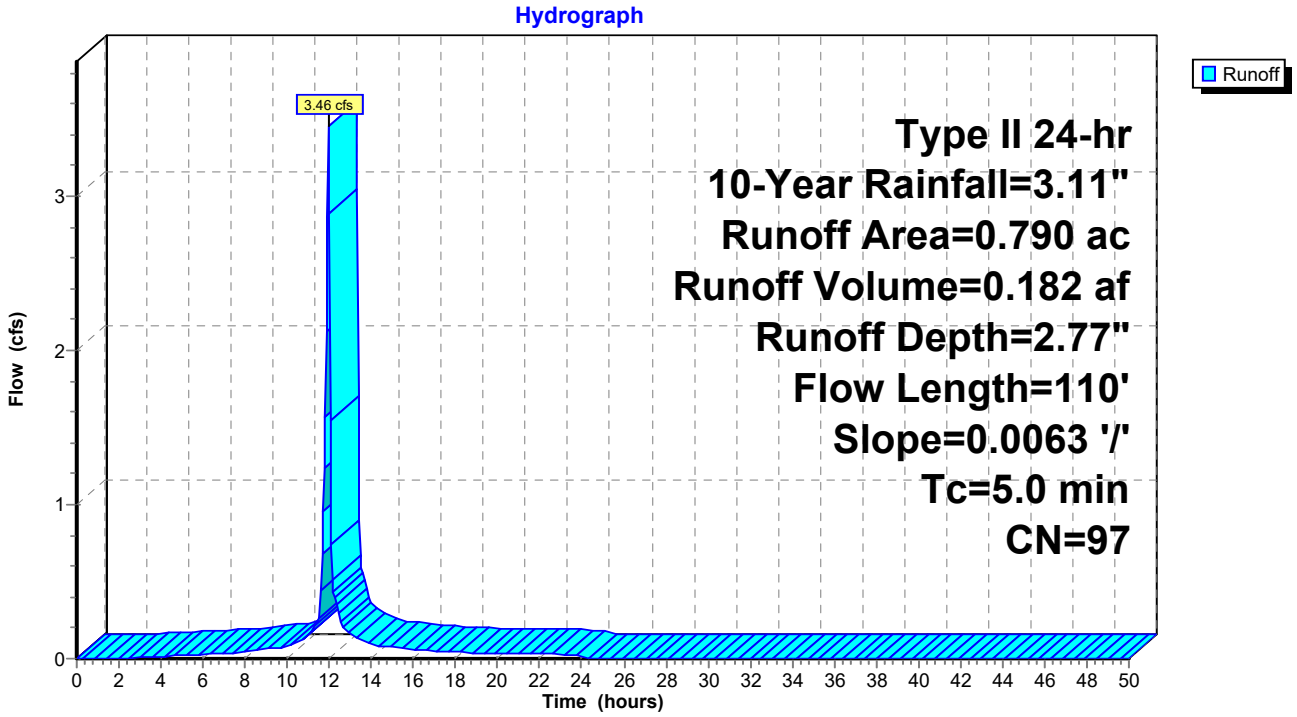
Runoff = 3.46 cfs @ 11.95 hrs, Volume= 0.182 af, Depth= 2.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.11"

	Area (ac)	CN	Description
	0.040	84	50-75% Grass cover, Fair, HSG D
*	0.750	98	Impervious
	0.790	97	Weighted Average
	0.040		5.06% Pervious Area
	0.750		94.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	110	0.0063	0.78		**Sheet Flow, Overland - Pvmt.** Smooth surfaces n= 0.011 P2= 2.50"
2.3	110	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: Existing Site



Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing Site Runoff Area=0.790 ac 94.94% Impervious Runoff Depth=3.44"
Flow Length=110' Slope=0.0063 '/' Tc=5.0 min CN=97 Runoff=4.25 cfs 0.227 af

Total Runoff Area = 0.790 ac Runoff Volume = 0.227 af Average Runoff Depth = 3.44"
5.06% Pervious = 0.040 ac 94.94% Impervious = 0.750 ac

Summary for Subcatchment 1S: Existing Site

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

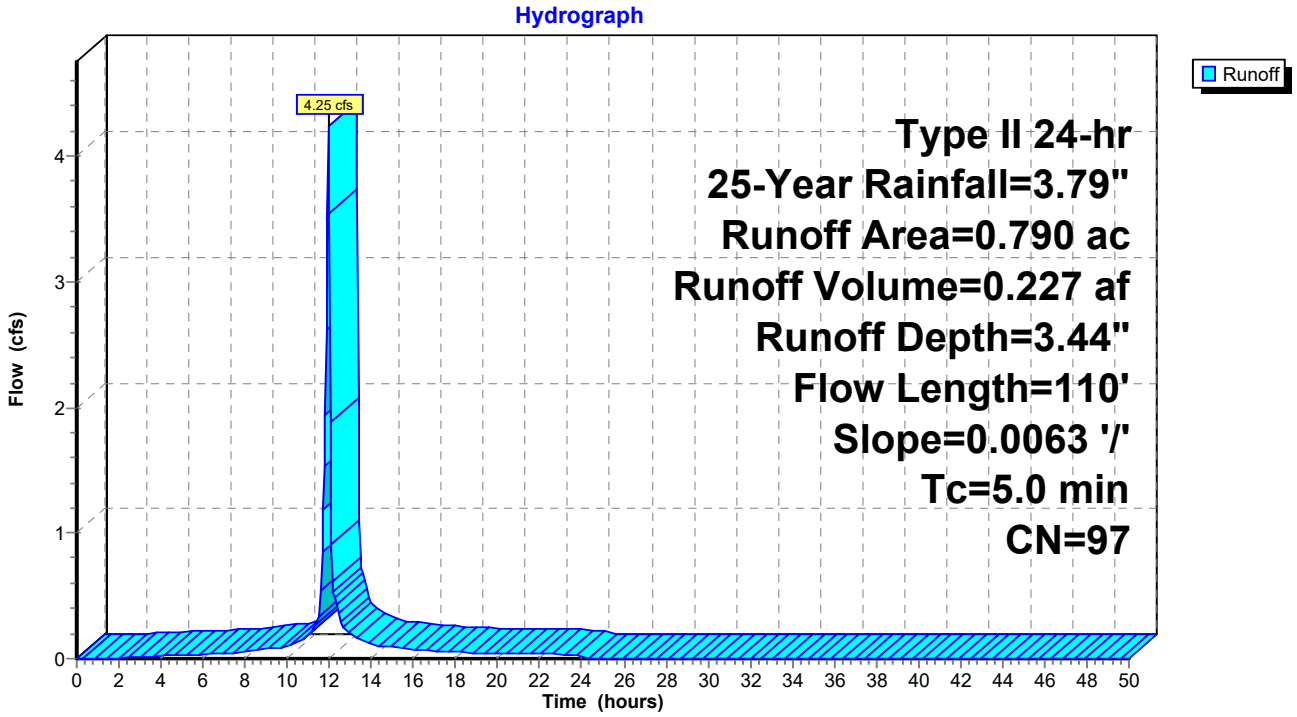
Runoff = 4.25 cfs @ 11.95 hrs, Volume= 0.227 af, Depth= 3.44"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 25-Year Rainfall=3.79"

	Area (ac)	CN	Description
	0.040	84	50-75% Grass cover, Fair, HSG D
*	0.750	98	Impervious
	0.790	97	Weighted Average
	0.040		5.06% Pervious Area
	0.750		94.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	110	0.0063	0.78		**Sheet Flow, Overland - Pvmt.** Smooth surfaces n= 0.011 P2= 2.50"
2.3	110	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: Existing Site



Time span=0.00-50.00 hrs, dt=0.05 hrs, 1001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Existing Site Runoff Area=0.790 ac 94.94% Impervious Runoff Depth=4.79"
Flow Length=110' Slope=0.0063 '/' Tc=5.0 min CN=97 Runoff=5.81 cfs 0.315 af

Total Runoff Area = 0.790 ac Runoff Volume = 0.315 af Average Runoff Depth = 4.79"
5.06% Pervious = 0.040 ac 94.94% Impervious = 0.750 ac

Summary for Subcatchment 1S: Existing Site

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

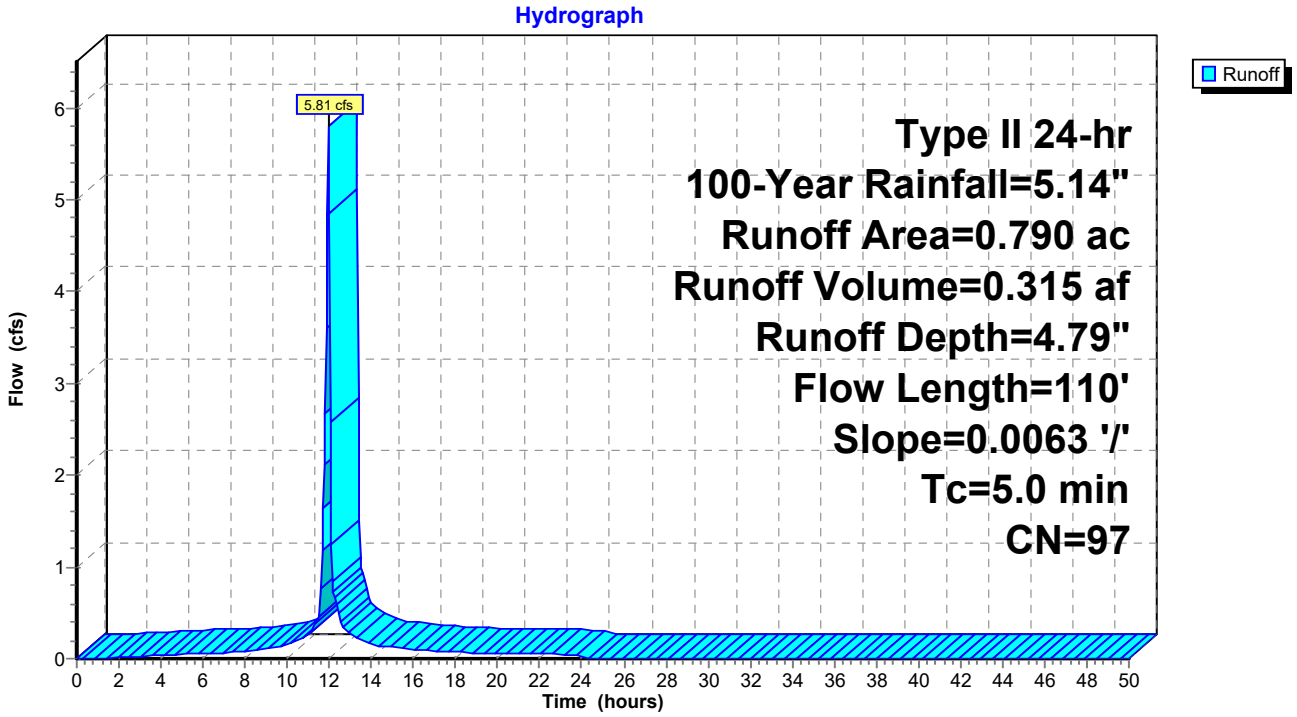
Runoff = 5.81 cfs @ 11.95 hrs, Volume= 0.315 af, Depth= 4.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=5.14"

	Area (ac)	CN	Description
	0.040	84	50-75% Grass cover, Fair, HSG D
*	0.750	98	Impervious
	0.790	97	Weighted Average
	0.040		5.06% Pervious Area
	0.750		94.94% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.3	110	0.0063	0.78		**Sheet Flow, Overland - Pvmt.** Smooth surfaces n= 0.011 P2= 2.50"
2.3	110	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: Existing Site



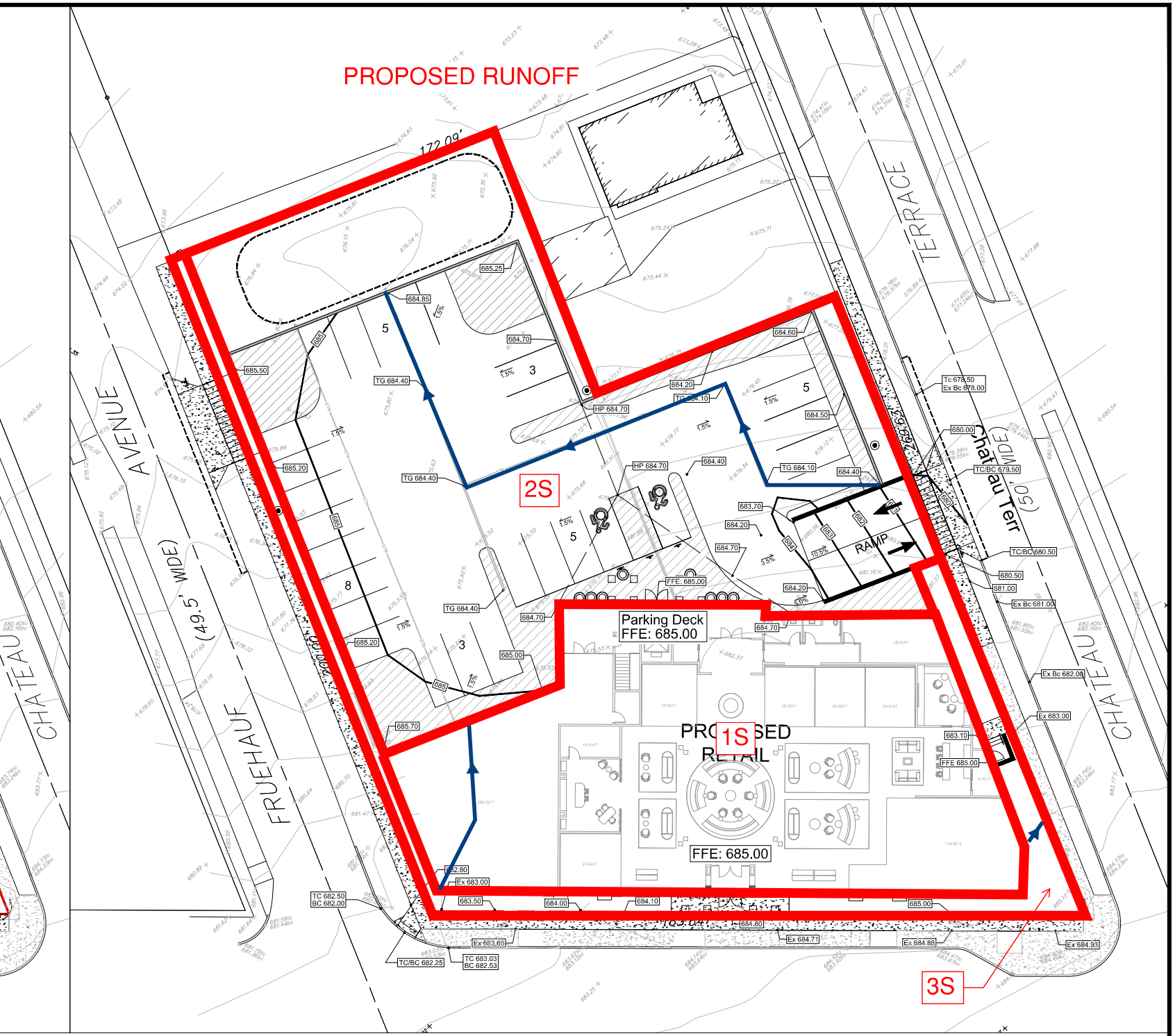
Proposed Runoff

Events for Pond 1P: Proposed Stormwater Storage & Outlet

Event	Inflow (cfs)	Outflow (cfs)	Primary (cfs)	Secondary (cfs)	Elevation (feet)	Storage (cubic-feet)
1-Year	1.71	0.87	0.87	0.00	673.58	468
2-Year	2.12	0.94	0.94	0.00	673.92	722
5-Year	2.64	1.01	1.01	0.00	674.32	1,075
10-Year	3.12	1.07	1.07	0.00	674.64	1,419
25-Year	3.85	1.14	1.14	0.00	675.08	1,977
50-Year	4.51	2.16	1.18	0.98	675.35	2,366
100-Year	**5.29**	**3.95**	**1.20**	**2.76**	**675.46**	**2,525**

Events for Link 1L: Proposed Runoff

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)
1-Year	0.92	0.92	**0.00**
2-Year	1.01	1.01	0.00
5-Year	1.12	1.12	0.00
10-Year	1.22	1.22	0.00
25-Year	1.35	1.35	0.00
50-Year	2.34	2.34	0.00
100-Year	**4.30**	**4.30**	0.00



Ground Level

DRAWING REVISIONS:

No.	DATE	BY	REMARKS

SPECIAL INFORMATION:

ALL CONTRACTORS SHALL GUARANTEE THEIR WORK FOR A PERIOD OF ONE YEAR FROM THE DATE OF OWNERS ACCEPTANCE.

SHOP DRAWING SUBMITTALS ARE REQUIRED FOR ANY AND ALL STRUCTURES.

NOTICE

UNAUTHORIZED ALTERATIONS OF THIS DOCUMENT ARE IN VIOLATION OF SECTION #7209 OF THE STATE EDUCATION LAW.

CONSTRUCTION SET

NORTH

811 Know what's below. Call before you dig.

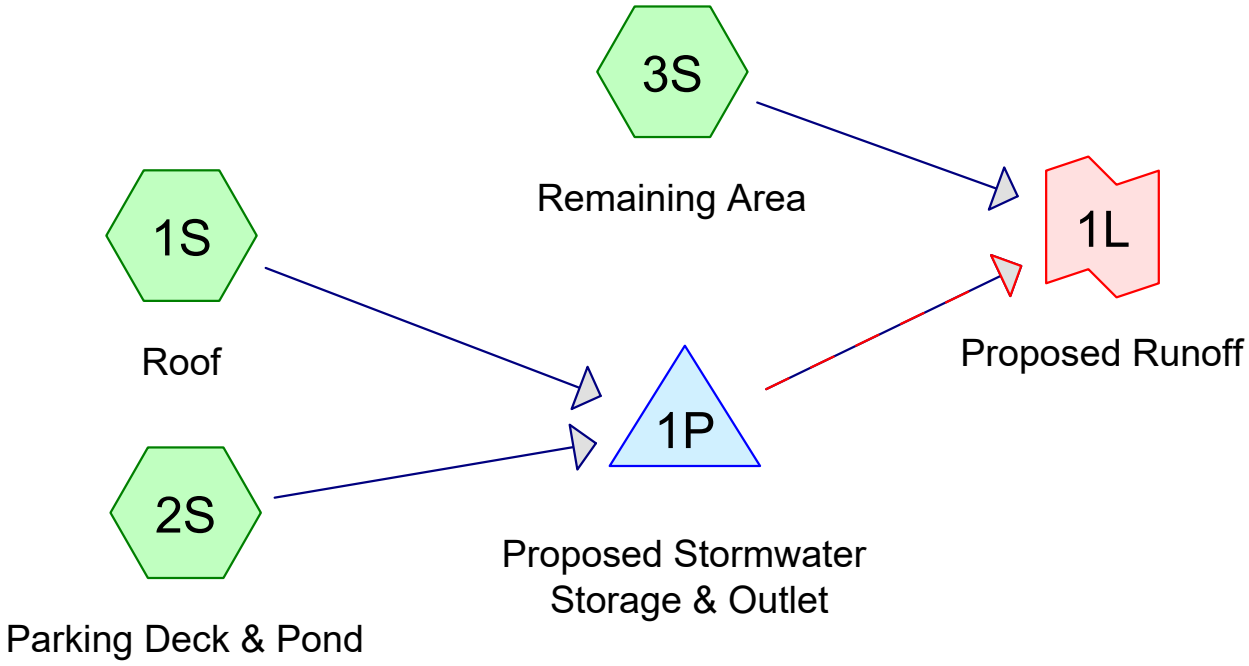
PROPERTY NUMBER: #5202

AREA: -

Main St - Snyder
4548-4564 Main St.
Amherst, NY14226

PROPOSED RETAIL

CONSULTANT



Subcat Reach Pond Link

Routing Diagram for 21.152 Proposed
Prepared by Carmina Wood Morris, PC, Printed 6/6/2025

Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	1-Year	Type II 24-hr		Default	24.00	1	1.81	2
2	10-Year	Type II 24-hr		Default	24.00	1	3.11	2
3	25-Year	Type II 24-hr		Default	24.00	1	3.79	2
4	100-Year	Type II 24-hr		Default	24.00	1	5.14	2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.140	80	>75% Grass cover, Good, HSG D (2S, 3S)
0.650	98	Impervious, HSG D (1S, 2S)
0.790	**95**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.790	HSG D	1S, 2S, 3S
0.000	Other	
0.790		**TOTAL AREA**

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	0.000	0.000	0.140	0.000	0.140	>75% Grass cover, Good	2S, 3S
0.000	0.000	0.000	0.650	0.000	0.650	Impervious	1S, 2S
0.000	**0.000**	**0.000**	**0.790**	**0.000**	**0.790**	**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)
1	1P	671.15	670.80	160.0	0.0022	0.020	0.0	8.0	0.0

Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Roof Runoff Area=0.280 ac 100.00% Impervious Runoff Depth=1.59"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=98 Runoff=0.72 cfs 0.037 af

Subcatchment2S: Parking Deck & Pond Runoff Area=0.430 ac 86.05% Impervious Runoff Depth=1.30"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=95 Runoff=0.99 cfs 0.047 af

Subcatchment3S: Remaining Area Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=0.45"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=80 Runoff=0.06 cfs 0.003 af

Pond 1P: Proposed Stormwater Storage & Peak Elev=673.58' Storage=468 cf Inflow=1.71 cfs 0.084 af
Primary=0.87 cfs 0.084 af Secondary=0.00 cfs 0.000 af Outflow=0.87 cfs 0.084 af

Link 1L: Proposed Runoff Inflow=0.92 cfs 0.087 af
Primary=0.92 cfs 0.087 af

Total Runoff Area = 0.790 ac Runoff Volume = 0.087 af Average Runoff Depth = 1.32"
17.72% Pervious = 0.140 ac 82.28% Impervious = 0.650 ac

Summary for Subcatchment 1S: Roof

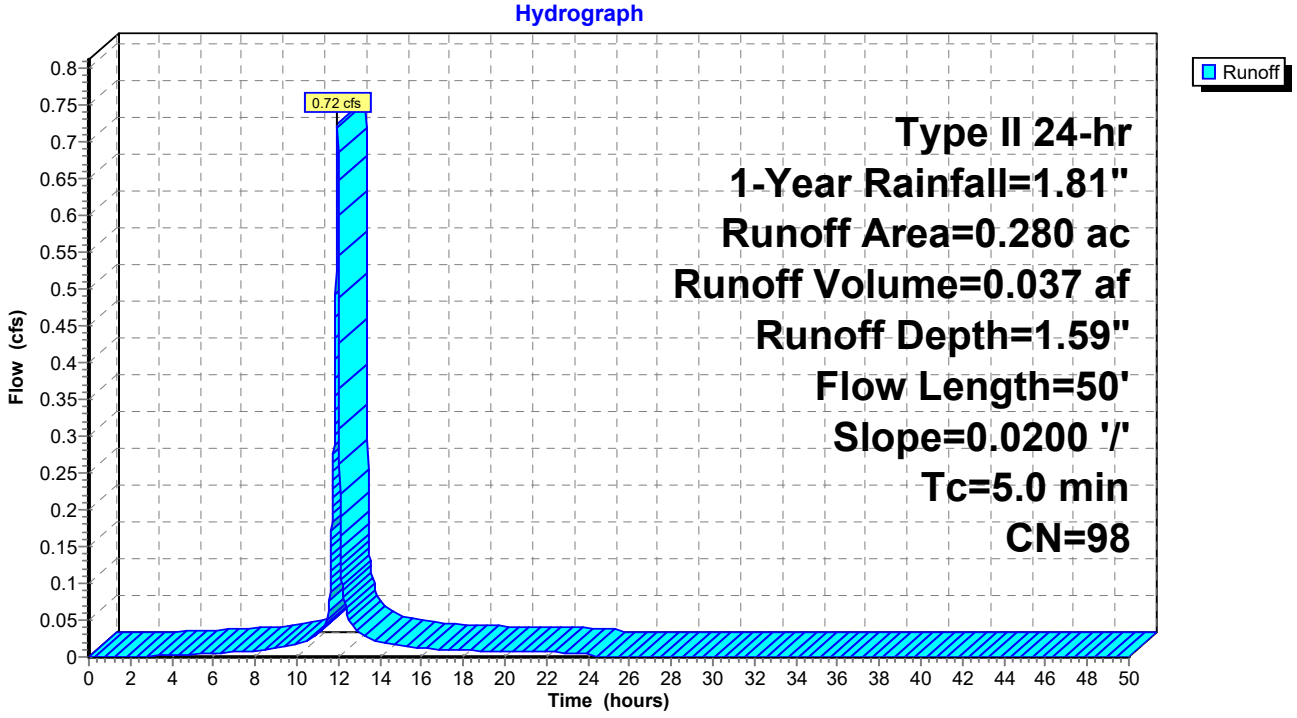
Runoff = 0.72 cfs @ 11.96 hrs, Volume= 0.037 af, Depth= 1.59"
Routed to Pond 1P : Proposed Stormwater Storage & Outlet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.81"

	Area (ac)	CN	Description
*	0.280	98	Impervious, HSG D
	0.280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: Roof



Summary for Subcatchment 2S: Parking Deck & Pond

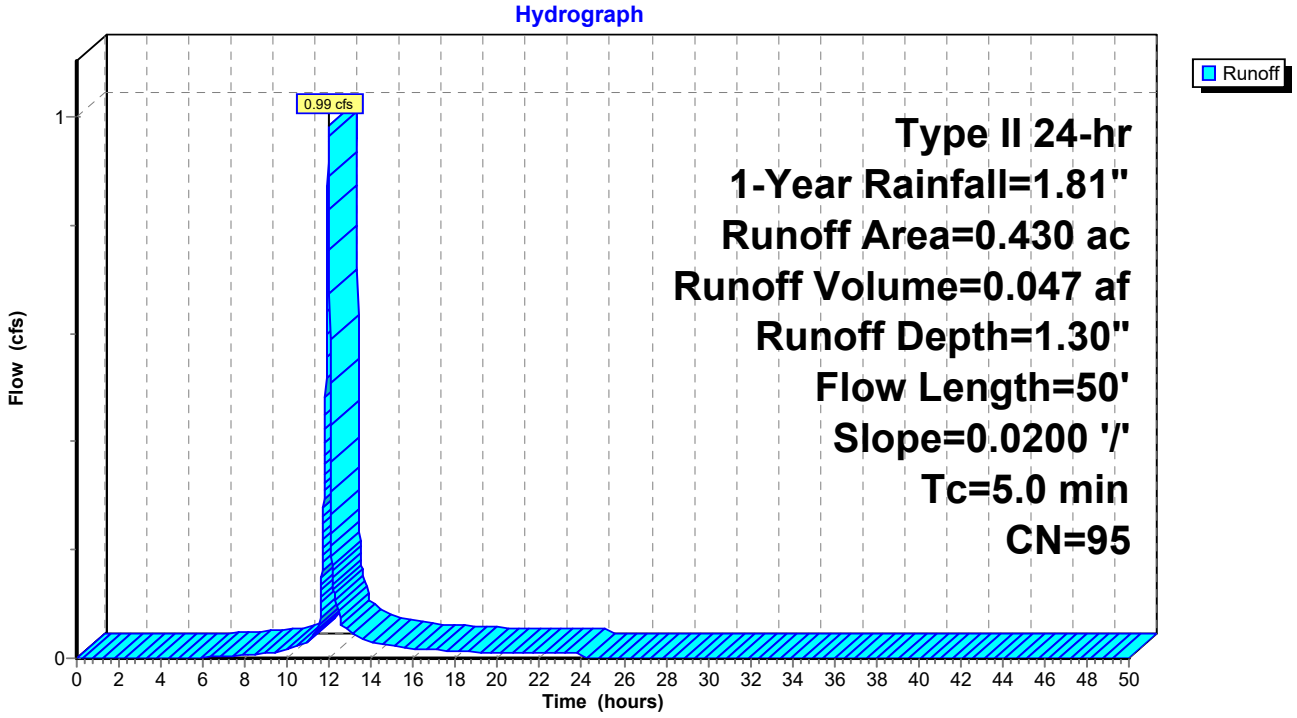
Runoff = 0.99 cfs @ 11.96 hrs, Volume= 0.047 af, Depth= 1.30"
Routed to Pond 1P : Proposed Stormwater Storage & Outlet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.81"

	Area (ac)	CN	Description
	0.060	80	>75% Grass cover, Good, HSG D
*	0.370	98	Impervious, HSG D
	0.430	95	Weighted Average
	0.060		13.95% Pervious Area
	0.370		86.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 2S: Parking Deck & Pond



Summary for Subcatchment 3S: Remaining Area

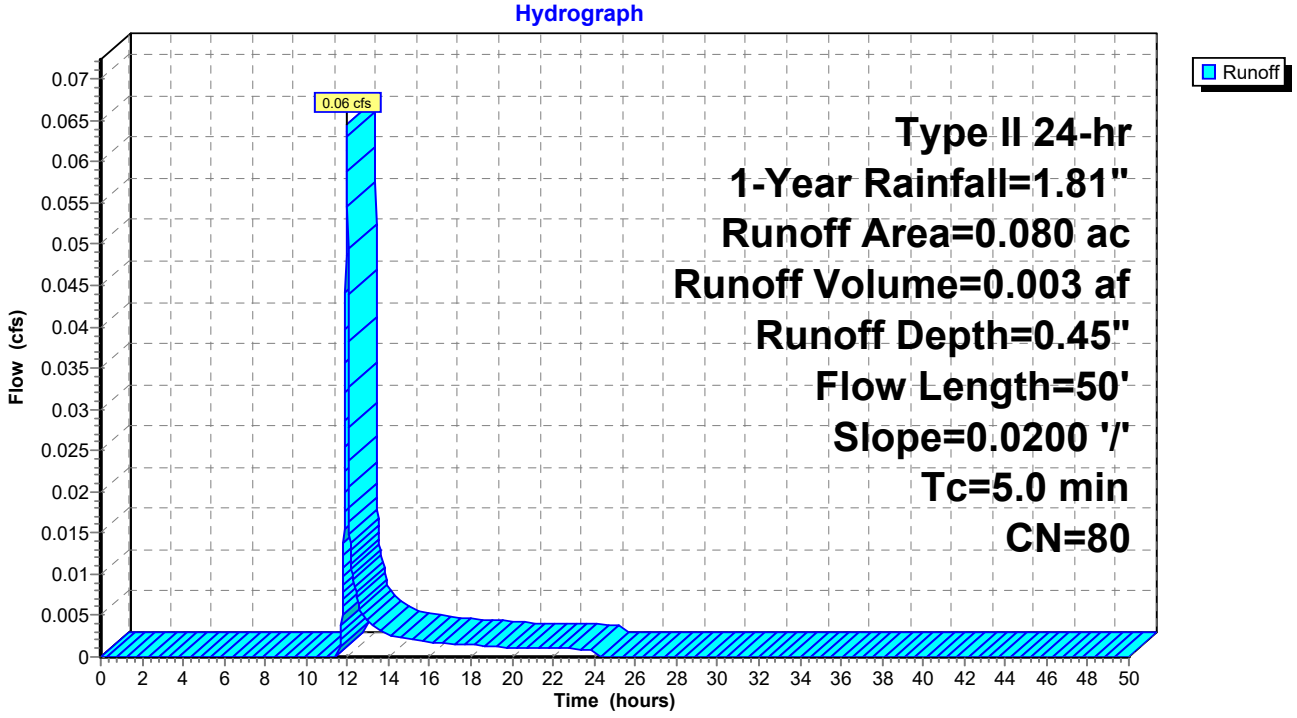
Runoff = 0.06 cfs @ 11.97 hrs, Volume= 0.003 af, Depth= 0.45"
Routed to Link 1L : Proposed Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 1-Year Rainfall=1.81"

Area (ac)	CN	Description
0.080	80	>75% Grass cover, Good, HSG D
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 3S: Remaining Area



Summary for Pond 1P: Proposed Stormwater Storage & Outlet

Inflow Area = 0.710 ac, 91.55% Impervious, Inflow Depth = 1.41" for 1-Year event
Inflow = 1.71 cfs @ 11.96 hrs, Volume= 0.084 af
Outflow = 0.87 cfs @ 12.04 hrs, Volume= 0.084 af, Atten= 49%, Lag= 5.0 min
Primary = 0.87 cfs @ 12.04 hrs, Volume= 0.084 af
Routed to Link 1L : Proposed Runoff
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 1L : Proposed Runoff

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 673.58' @ 12.04 hrs Surf.Area= 659 sf Storage= 468 cf

Plug-Flow detention time= 2.9 min calculated for 0.084 af (100% of inflow)
Center-of-Mass det. time= 2.8 min (785.4 - 782.6)

Volume	Invert	Avail.Storage	Storage Description
#1	672.50'	2,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

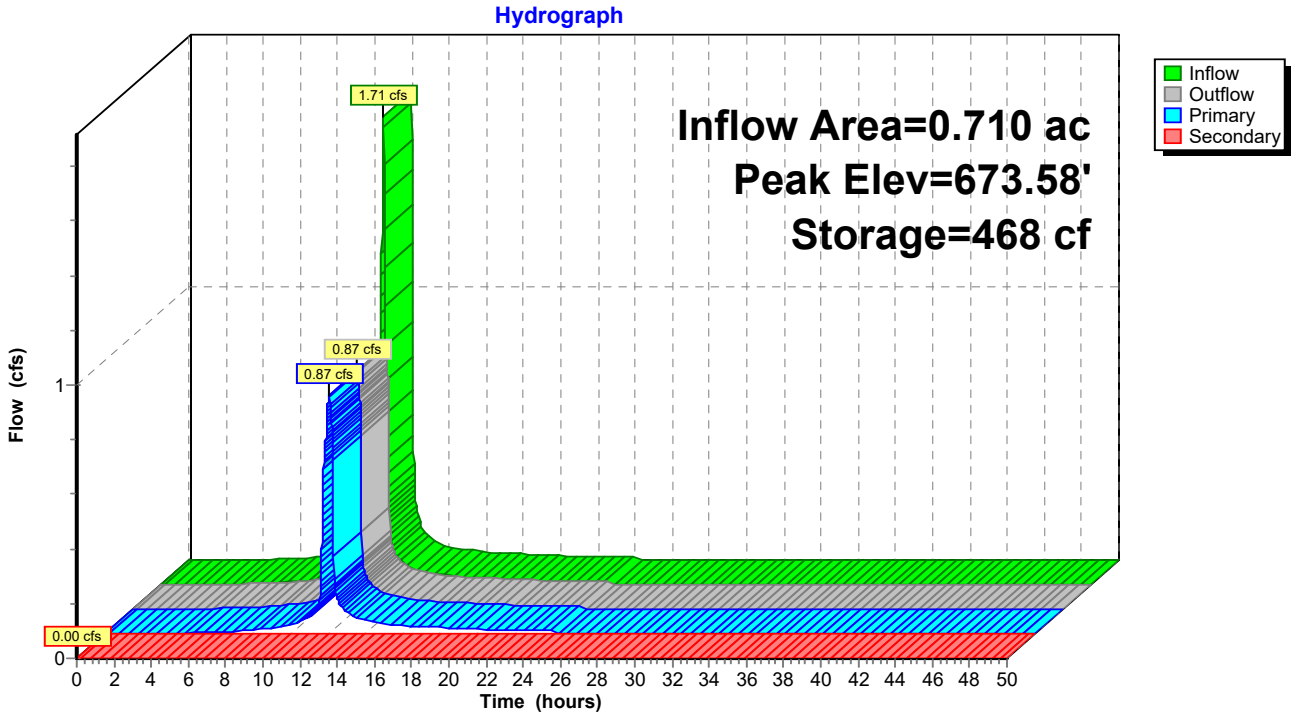
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
672.50	222	0	0
673.00	414	159	159
674.00	839	627	786
675.00	1,321	1,080	1,866
675.50	1,584	726	2,592

Device	Routing	Invert	Outlet Devices
#1	Primary	671.15'	**8.0" Round Outlet Pipe** L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.15' / 670.80' S= 0.0022 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.35 sf
#2	Device 1	672.50'	**24.0" x 24.0" Horiz. Grate - Outlet Structure** C= 0.600 Limited to weir flow at low heads
#3	Secondary	675.25'	**10.0' long (Profile 1) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

Primary OutFlow Max=0.87 cfs @ 12.04 hrs HW=673.58' TW=0.00' (Dynamic Tailwater)
↑—**1=Outlet Pipe** (Barrel Controls 0.87 cfs @ 2.49 fps)
↑—**2=Grate - Outlet Structure** (Passes 0.87 cfs of 19.98 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.50' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Proposed Stormwater Storage & Outlet

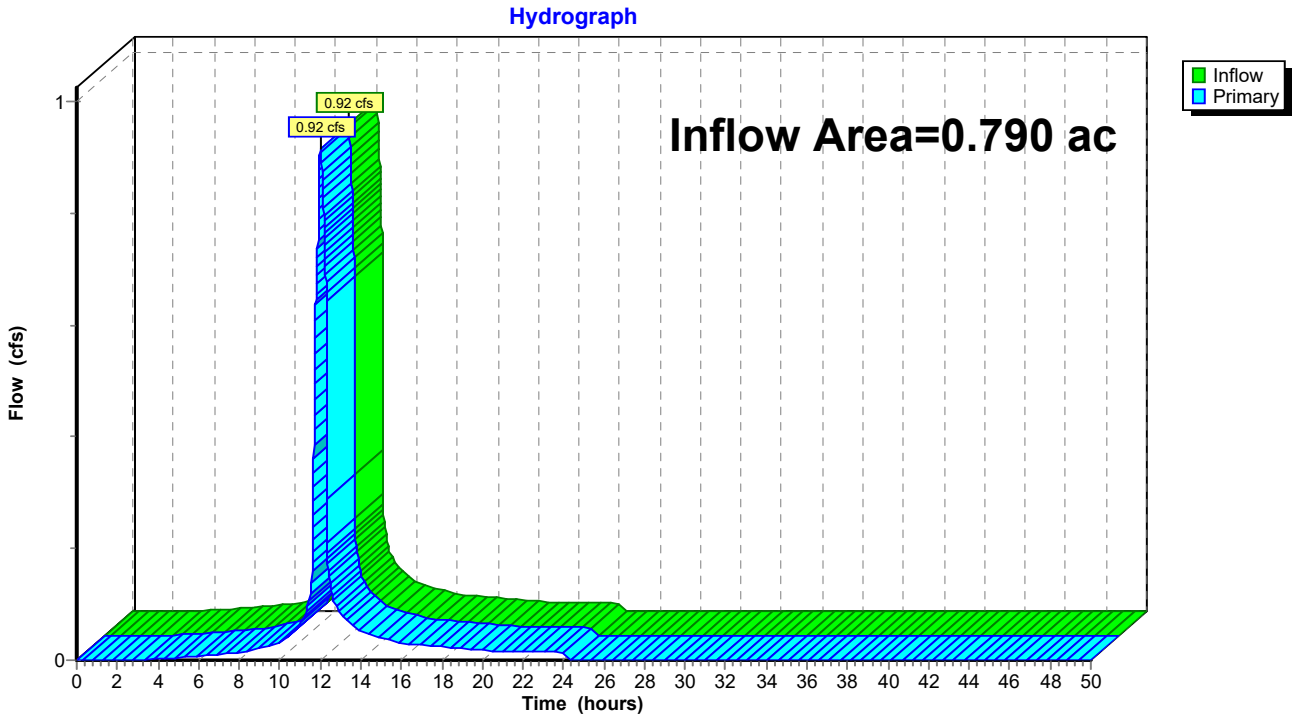


Summary for Link 1L: Proposed Runoff

Inflow Area = 0.790 ac, 82.28% Impervious, Inflow Depth = 1.32" for 1-Year event
Inflow = 0.92 cfs @ 12.01 hrs, Volume= 0.087 af
Primary = 0.92 cfs @ 12.01 hrs, Volume= 0.087 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Link 1L: Proposed Runoff



Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Roof Runoff Area=0.280 ac 100.00% Impervious Runoff Depth=2.88"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=98 Runoff=1.27 cfs 0.067 af

Subcatchment2S: Parking Deck & Pond Runoff Area=0.430 ac 86.05% Impervious Runoff Depth=2.56"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=95 Runoff=1.85 cfs 0.092 af

Subcatchment3S: Remaining Area Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=1.33"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=80 Runoff=0.20 cfs 0.009 af

Pond 1P: Proposed Stormwater Storage & Peak Elev=674.64' Storage=1,419 cf Inflow=3.12 cfs 0.159 af
Primary=1.07 cfs 0.159 af Secondary=0.00 cfs 0.000 af Outflow=1.07 cfs 0.159 af

Link 1L: Proposed Runoff Inflow=1.22 cfs 0.168 af
Primary=1.22 cfs 0.168 af

Total Runoff Area = 0.790 ac Runoff Volume = 0.168 af Average Runoff Depth = 2.55"
17.72% Pervious = 0.140 ac 82.28% Impervious = 0.650 ac

Summary for Subcatchment 1S: Roof

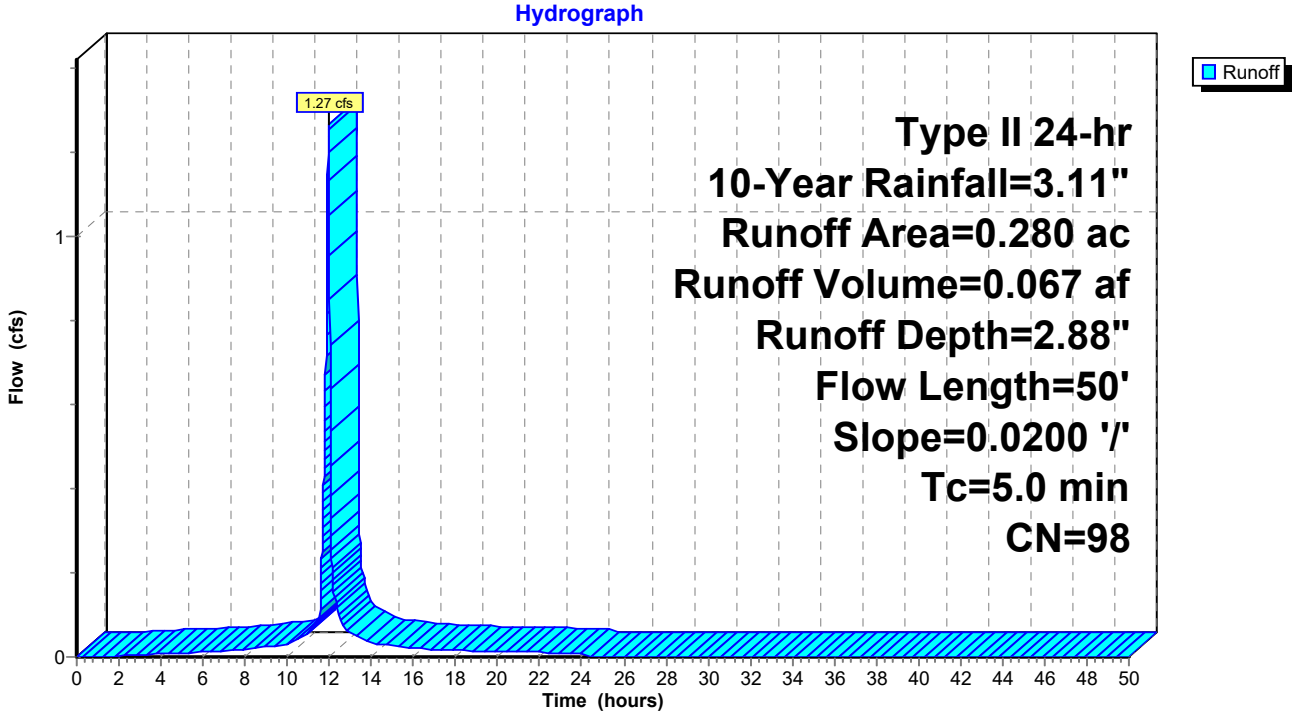
Runoff = 1.27 cfs @ 11.96 hrs, Volume= 0.067 af, Depth= 2.88"
Routed to Pond 1P : Proposed Stormwater Storage & Outlet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.11"

	Area (ac)	CN	Description
*	0.280	98	Impervious, HSG D
	0.280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: Roof



Summary for Subcatchment 2S: Parking Deck & Pond

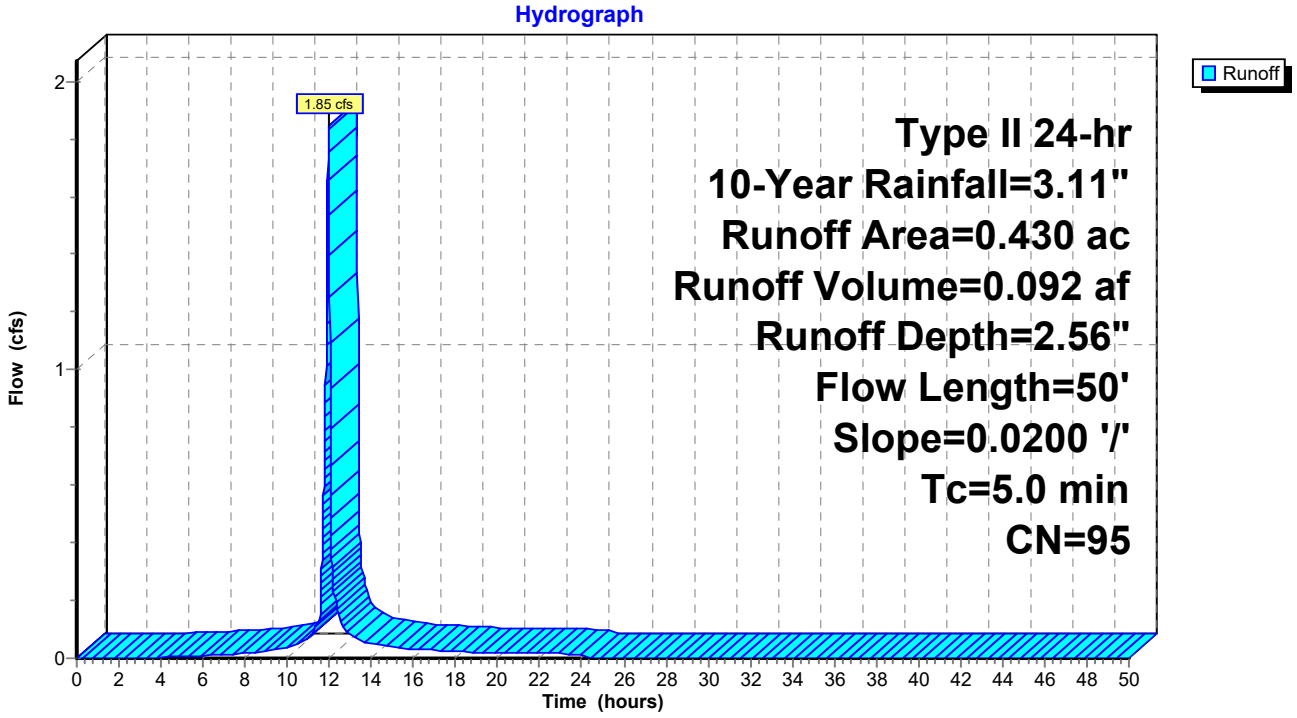
Runoff = 1.85 cfs @ 11.96 hrs, Volume= 0.092 af, Depth= 2.56"
Routed to Pond 1P : Proposed Stormwater Storage & Outlet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.11"

	Area (ac)	CN	Description
	0.060	80	>75% Grass cover, Good, HSG D
*	0.370	98	Impervious, HSG D
	0.430	95	Weighted Average
	0.060		13.95% Pervious Area
	0.370		86.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 2S: Parking Deck & Pond



Summary for Subcatchment 3S: Remaining Area

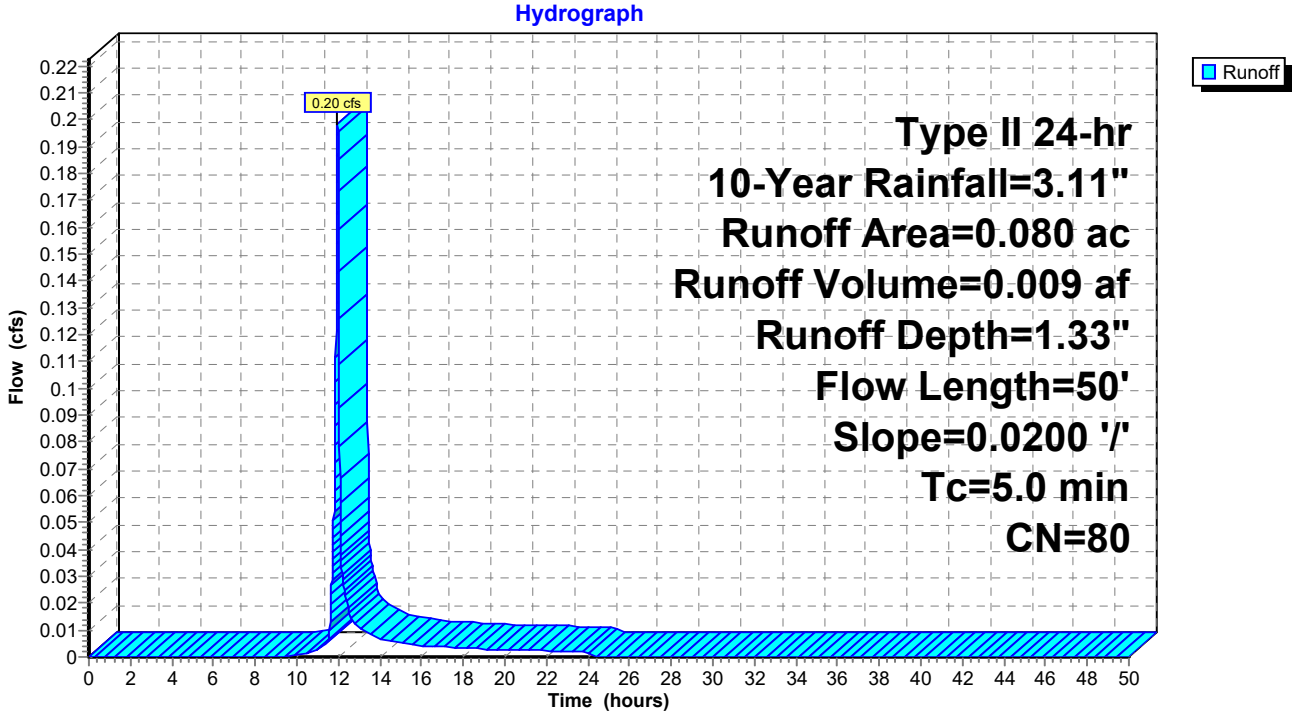
Runoff = 0.20 cfs @ 11.96 hrs, Volume= 0.009 af, Depth= 1.33"
Routed to Link 1L : Proposed Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 10-Year Rainfall=3.11"

Area (ac)	CN	Description
0.080	80	>75% Grass cover, Good, HSG D
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 3S: Remaining Area



Summary for Pond 1P: Proposed Stormwater Storage & Outlet

Inflow Area = 0.710 ac, 91.55% Impervious, Inflow Depth = 2.68" for 10-Year event
Inflow = 3.12 cfs @ 11.96 hrs, Volume= 0.159 af
Outflow = 1.07 cfs @ 12.06 hrs, Volume= 0.159 af, Atten= 66%, Lag= 6.4 min
Primary = 1.07 cfs @ 12.06 hrs, Volume= 0.159 af
Routed to Link 1L : Proposed Runoff
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 1L : Proposed Runoff

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 674.64' @ 12.06 hrs Surf.Area= 1,147 sf Storage= 1,419 cf

Plug-Flow detention time= 6.8 min calculated for 0.159 af (100% of inflow)
Center-of-Mass det. time= 6.6 min (773.5 - 766.8)

Volume	Invert	Avail.Storage	Storage Description
#1	672.50'	2,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

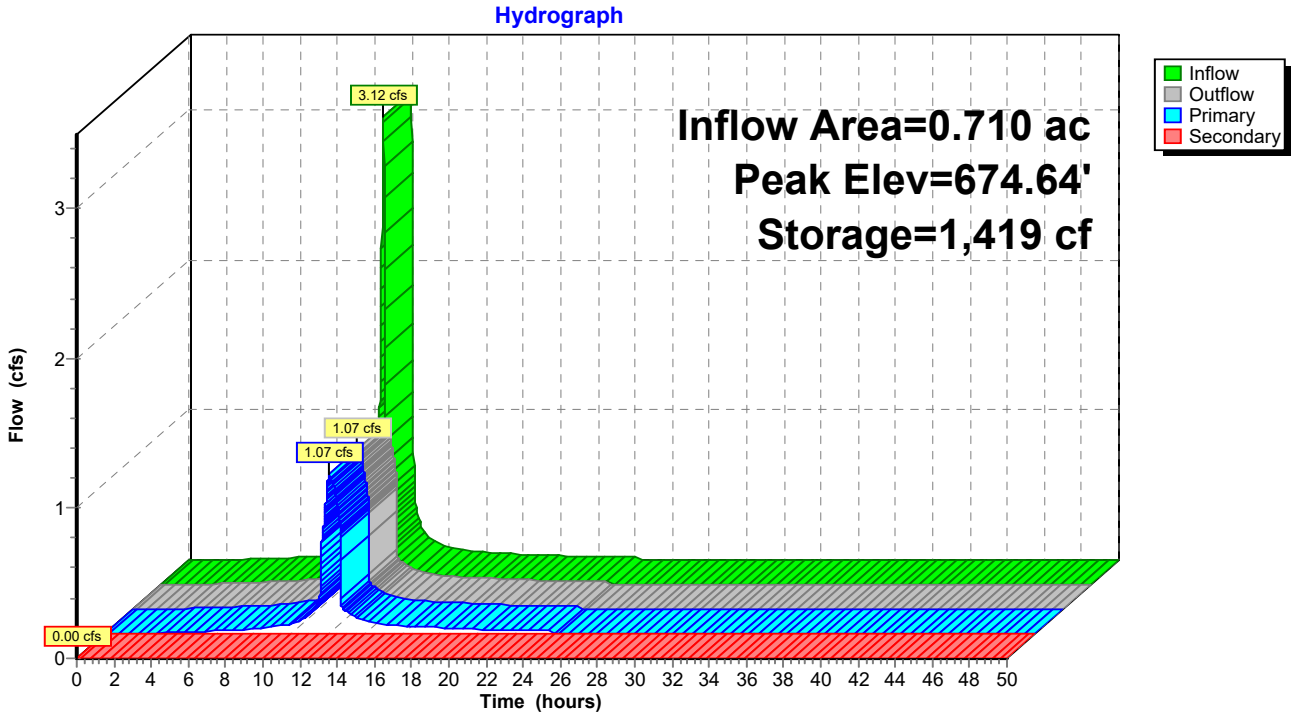
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
672.50	222	0	0
673.00	414	159	159
674.00	839	627	786
675.00	1,321	1,080	1,866
675.50	1,584	726	2,592

Device	Routing	Invert	Outlet Devices
#1	Primary	671.15'	**8.0" Round Outlet Pipe** L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.15' / 670.80' S= 0.0022 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.35 sf
#2	Device 1	672.50'	**24.0" x 24.0" Horiz. Grate - Outlet Structure** C= 0.600 Limited to weir flow at low heads
#3	Secondary	675.25'	**10.0' long (Profile 1) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

Primary OutFlow Max=1.07 cfs @ 12.06 hrs HW=674.64' TW=0.00' (Dynamic Tailwater)
└**1=Outlet Pipe** (Barrel Controls 1.07 cfs @ 3.05 fps)
└**2=Grate - Outlet Structure** (Passes 1.07 cfs of 28.16 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.50' TW=0.00' (Dynamic Tailwater)
└**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Proposed Stormwater Storage & Outlet

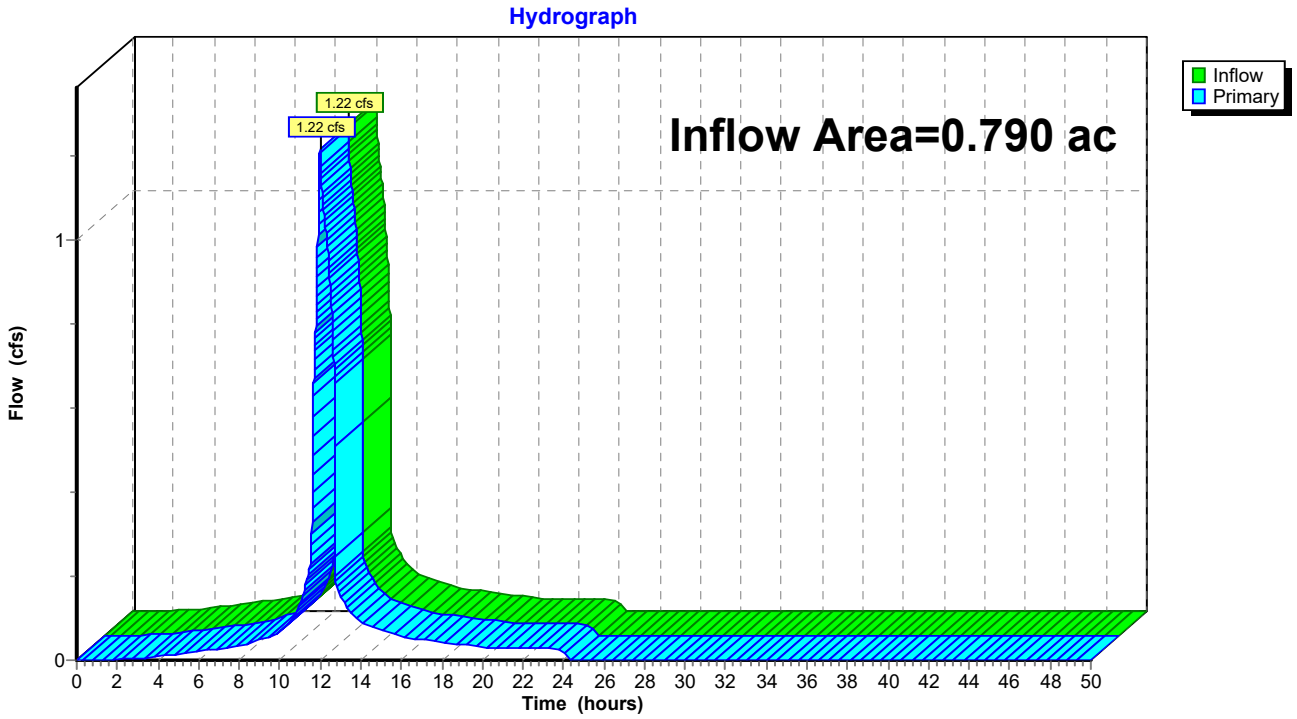


Summary for Link 1L: Proposed Runoff

Inflow Area = 0.790 ac, 82.28% Impervious, Inflow Depth = 2.55" for 10-Year event
Inflow = 1.22 cfs @ 11.99 hrs, Volume= 0.168 af
Primary = 1.22 cfs @ 11.99 hrs, Volume= 0.168 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Link 1L: Proposed Runoff



Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Roof Runoff Area=0.280 ac 100.00% Impervious Runoff Depth=3.56"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=98 Runoff=1.55 cfs 0.083 af

Subcatchment2S: Parking Deck & Pond Runoff Area=0.430 ac 86.05% Impervious Runoff Depth=3.22"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=95 Runoff=2.30 cfs 0.116 af

Subcatchment3S: Remaining Area Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=1.87"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=80 Runoff=0.28 cfs 0.012 af

Pond 1P: Proposed Stormwater Storage & Peak Elev=675.08' Storage=1,977 cf Inflow=3.85 cfs 0.198 af
Primary=1.14 cfs 0.198 af Secondary=0.00 cfs 0.000 af Outflow=1.14 cfs 0.198 af

Link 1L: Proposed Runoff Inflow=1.35 cfs 0.211 af
Primary=1.35 cfs 0.211 af

Total Runoff Area = 0.790 ac Runoff Volume = 0.211 af Average Runoff Depth = 3.20"
17.72% Pervious = 0.140 ac 82.28% Impervious = 0.650 ac

Summary for Subcatchment 1S: Roof

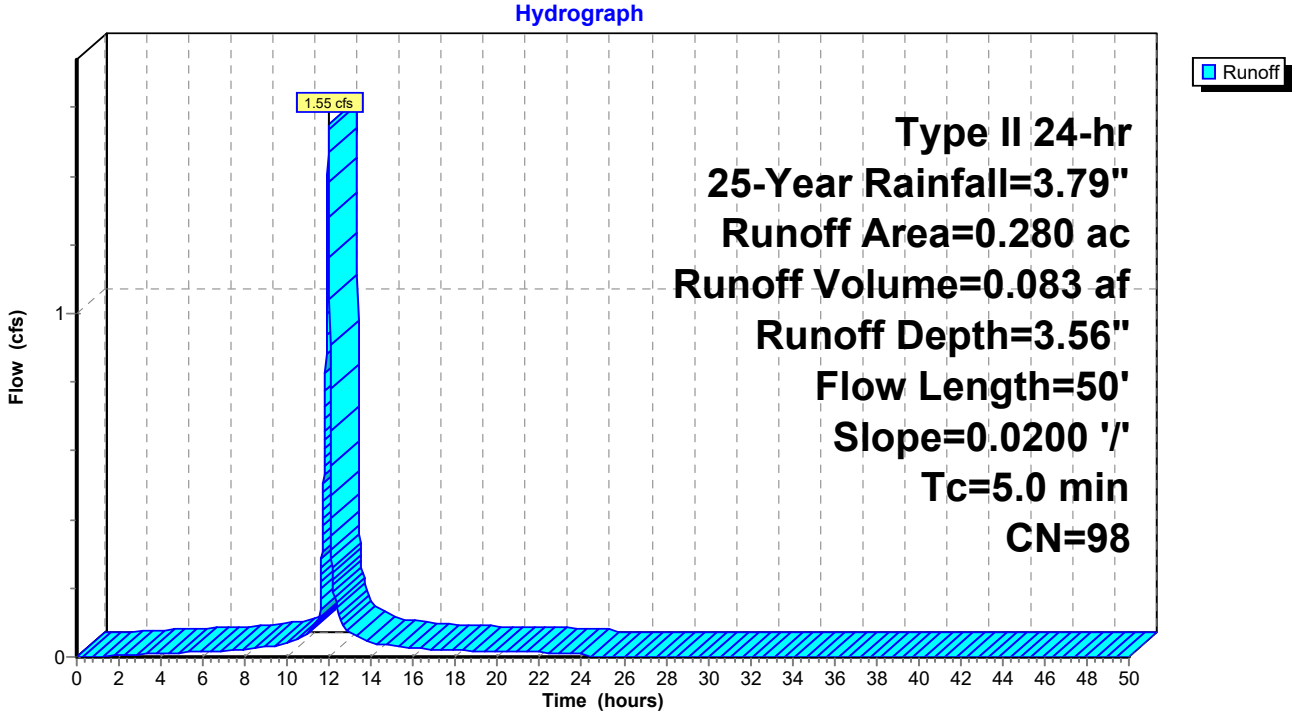
Runoff = 1.55 cfs @ 11.96 hrs, Volume= 0.083 af, Depth= 3.56"
Routed to Pond 1P : Proposed Stormwater Storage & Outlet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.79"

	Area (ac)	CN	Description
*	0.280	98	Impervious, HSG D
	0.280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: Roof



Summary for Subcatchment 2S: Parking Deck & Pond

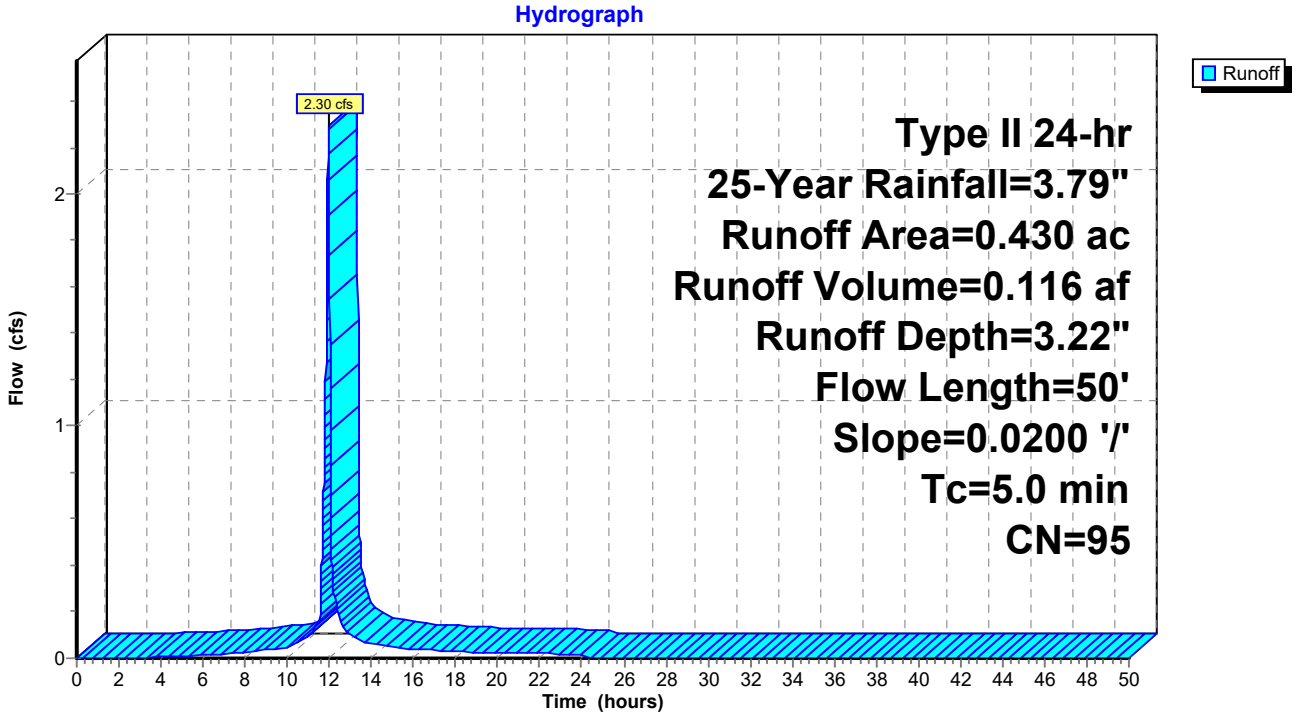
Runoff = 2.30 cfs @ 11.96 hrs, Volume= 0.116 af, Depth= 3.22"
Routed to Pond 1P : Proposed Stormwater Storage & Outlet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.79"

	Area (ac)	CN	Description
	0.060	80	>75% Grass cover, Good, HSG D
*	0.370	98	Impervious, HSG D
	0.430	95	Weighted Average
	0.060		13.95% Pervious Area
	0.370		86.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 2S: Parking Deck & Pond



Summary for Subcatchment 3S: Remaining Area

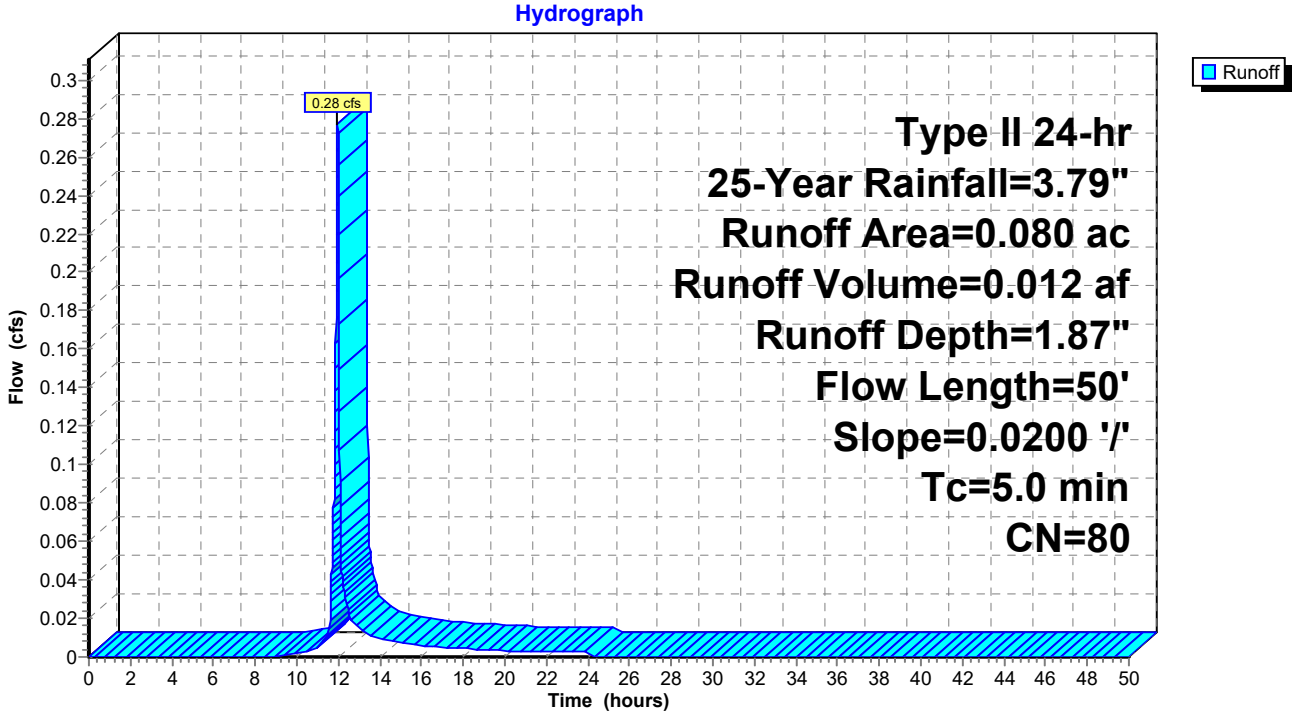
Runoff = 0.28 cfs @ 11.96 hrs, Volume= 0.012 af, Depth= 1.87"
Routed to Link 1L : Proposed Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 25-Year Rainfall=3.79"

Area (ac)	CN	Description
0.080	80	>75% Grass cover, Good, HSG D
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 3S: Remaining Area



Summary for Pond 1P: Proposed Stormwater Storage & Outlet

Inflow Area = 0.710 ac, 91.55% Impervious, Inflow Depth = 3.35" for 25-Year event
Inflow = 3.85 cfs @ 11.96 hrs, Volume= 0.198 af
Outflow = 1.14 cfs @ 12.07 hrs, Volume= 0.198 af, Atten= 70%, Lag= 7.0 min
Primary = 1.14 cfs @ 12.07 hrs, Volume= 0.198 af
Routed to Link 1L : Proposed Runoff
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routed to Link 1L : Proposed Runoff

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 675.08' @ 12.07 hrs Surf.Area= 1,365 sf Storage= 1,977 cf

Plug-Flow detention time= 9.0 min calculated for 0.198 af (100% of inflow)
Center-of-Mass det. time= 8.8 min (770.6 - 761.7)

Volume	Invert	Avail.Storage	Storage Description
#1	672.50'	2,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

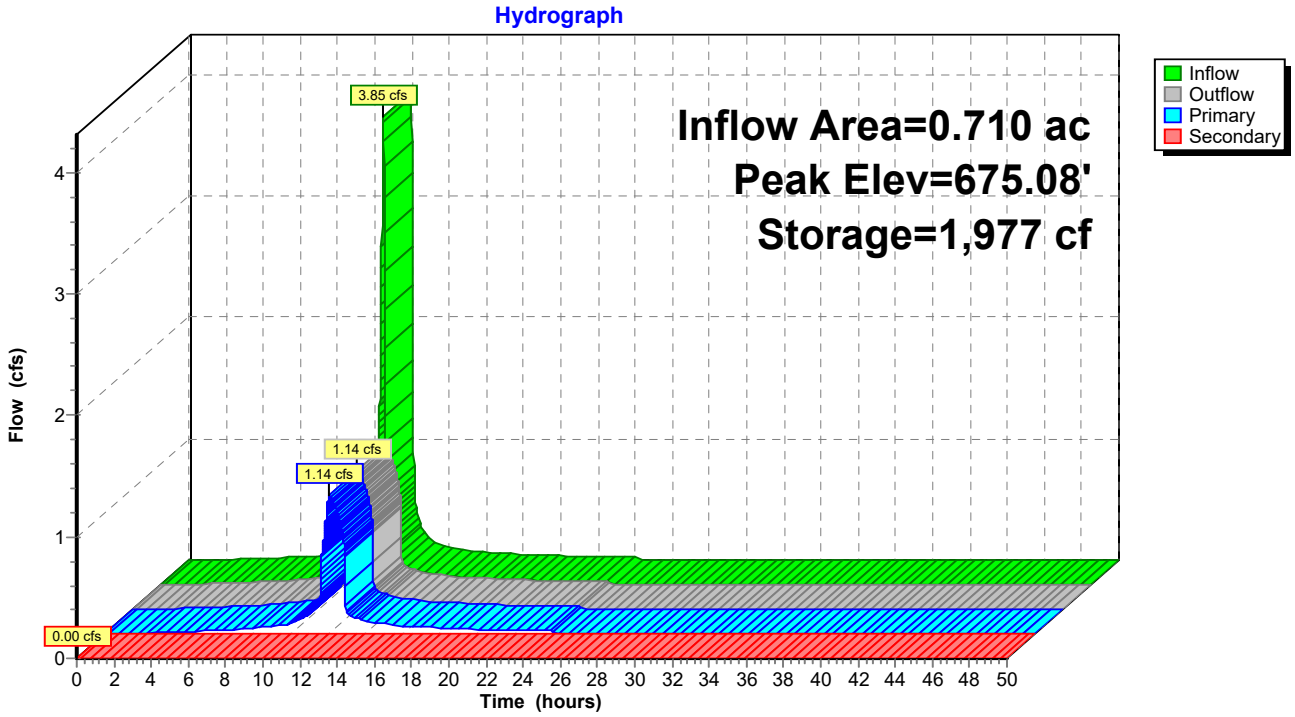
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
672.50	222	0	0
673.00	414	159	159
674.00	839	627	786
675.00	1,321	1,080	1,866
675.50	1,584	726	2,592

Device	Routing	Invert	Outlet Devices
#1	Primary	671.15'	**8.0" Round Outlet Pipe** L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.15' / 670.80' S= 0.0022 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.35 sf
#2	Device 1	672.50'	**24.0" x 24.0" Horiz. Grate - Outlet Structure** C= 0.600 Limited to weir flow at low heads
#3	Secondary	675.25'	**10.0' long (Profile 1) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

Primary OutFlow Max=1.14 cfs @ 12.07 hrs HW=675.08' TW=0.00' (Dynamic Tailwater)
↑—**1=Outlet Pipe** (Barrel Controls 1.14 cfs @ 3.26 fps)
↑—**2=Grate - Outlet Structure** (Passes 1.14 cfs of 30.95 cfs potential flow)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=672.50' TW=0.00' (Dynamic Tailwater)
↑—**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: Proposed Stormwater Storage & Outlet

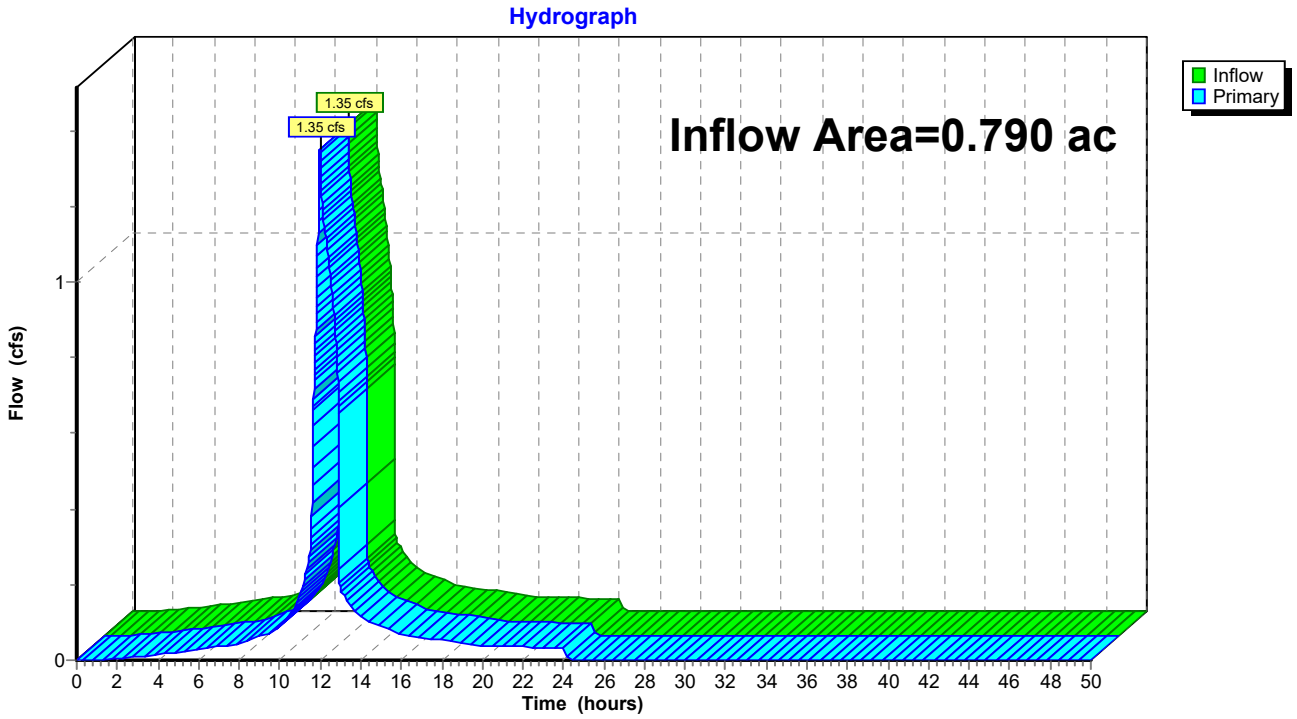


Summary for Link 1L: Proposed Runoff

Inflow Area = 0.790 ac, 82.28% Impervious, Inflow Depth = 3.20" for 25-Year event
Inflow = 1.35 cfs @ 11.98 hrs, Volume= 0.211 af
Primary = 1.35 cfs @ 11.98 hrs, Volume= 0.211 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Link 1L: Proposed Runoff



Time span=0.00-50.00 hrs, dt=0.01 hrs, 5001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment1S: Roof Runoff Area=0.280 ac 100.00% Impervious Runoff Depth=4.90"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=98 Runoff=2.11 cfs 0.114 af

Subcatchment2S: Parking Deck & Pond Runoff Area=0.430 ac 86.05% Impervious Runoff Depth=4.56"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=95 Runoff=3.17 cfs 0.163 af

Subcatchment3S: Remaining Area Runoff Area=0.080 ac 0.00% Impervious Runoff Depth=3.02"
Flow Length=50' Slope=0.0200 '/' Tc=5.0 min CN=80 Runoff=0.44 cfs 0.020 af

Pond 1P: Proposed Stormwater Storage & Peak Elev=675.46' Storage=2,525 cf Inflow=5.29 cfs 0.278 af
Primary=1.20 cfs 0.257 af Secondary=2.76 cfs 0.020 af Outflow=3.95 cfs 0.278 af

Link 1L: Proposed Runoff Inflow=4.30 cfs 0.298 af
Primary=4.30 cfs 0.298 af

Total Runoff Area = 0.790 ac Runoff Volume = 0.298 af Average Runoff Depth = 4.52"
17.72% Pervious = 0.140 ac 82.28% Impervious = 0.650 ac

Summary for Subcatchment 1S: Roof

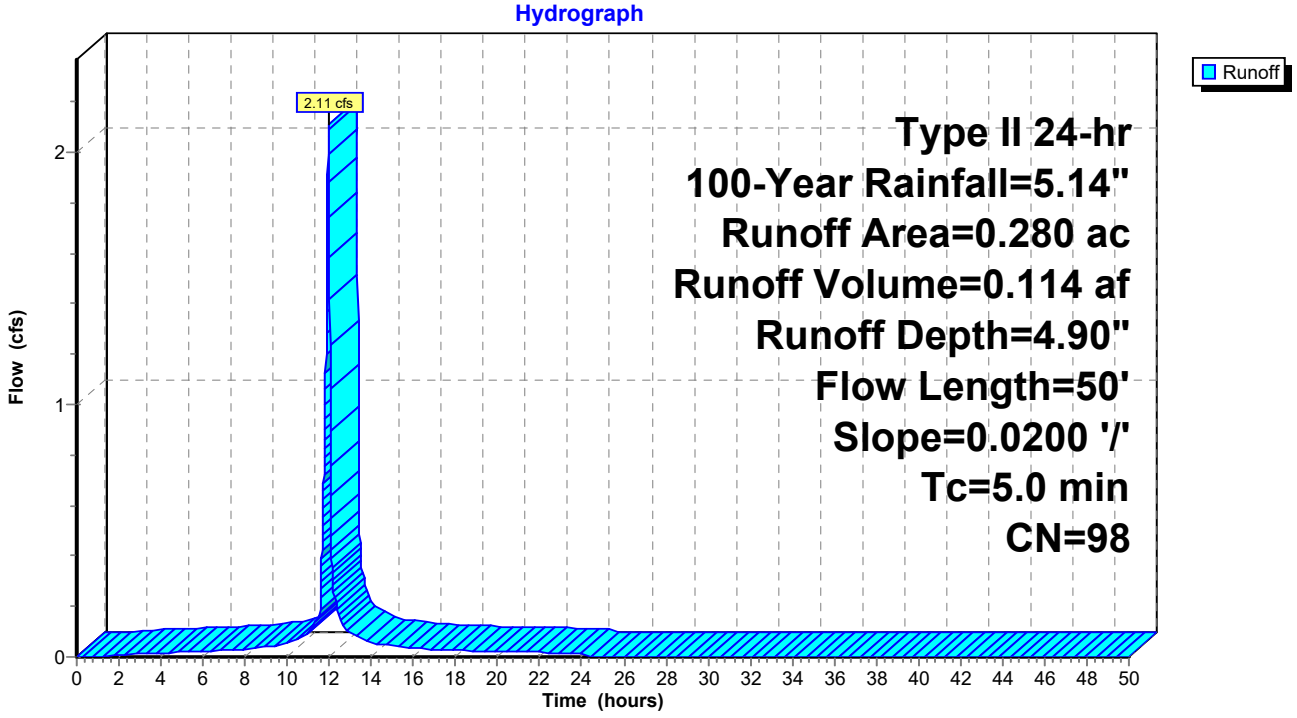
Runoff = 2.11 cfs @ 11.96 hrs, Volume= 0.114 af, Depth= 4.90"
Routed to Pond 1P : Proposed Stormwater Storage & Outlet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.14"

	Area (ac)	CN	Description
*	0.280	98	Impervious, HSG D
	0.280		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 1S: Roof



Summary for Subcatchment 2S: Parking Deck & Pond

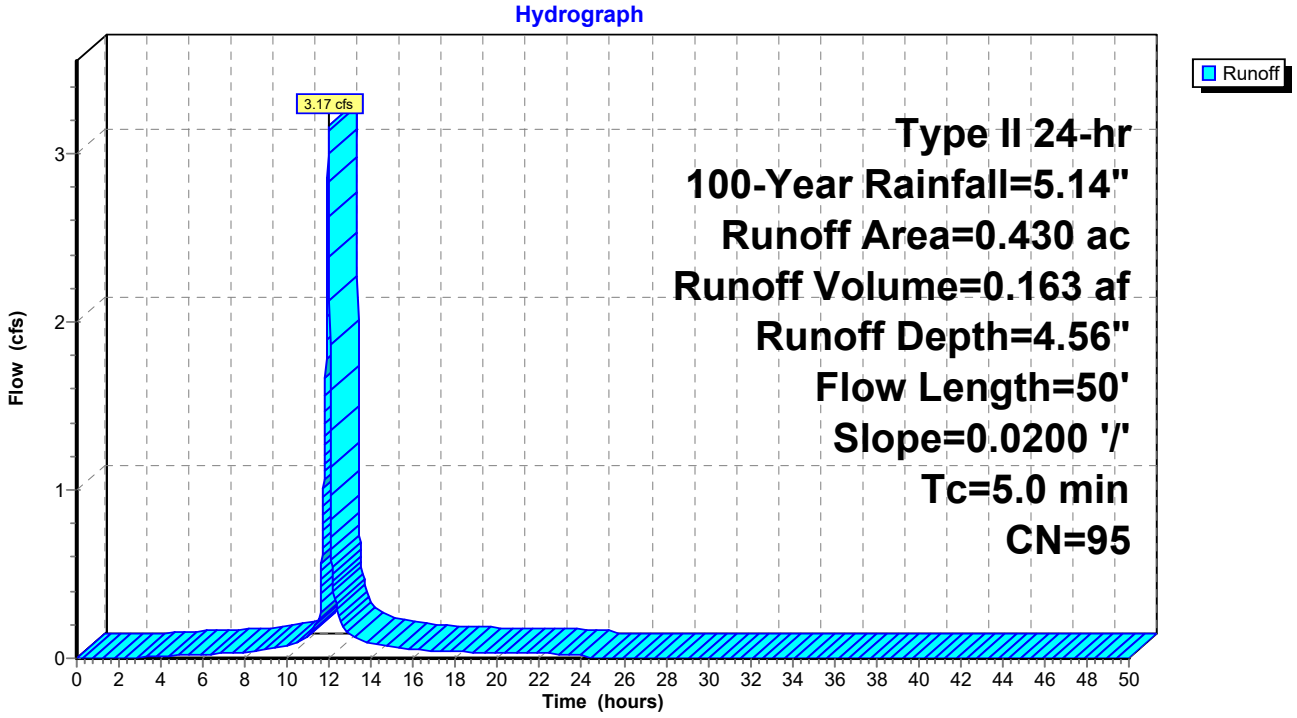
Runoff = 3.17 cfs @ 11.96 hrs, Volume= 0.163 af, Depth= 4.56"
Routed to Pond 1P : Proposed Stormwater Storage & Outlet

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.14"

	Area (ac)	CN	Description
	0.060	80	>75% Grass cover, Good, HSG D
*	0.370	98	Impervious, HSG D
	0.430	95	Weighted Average
	0.060		13.95% Pervious Area
	0.370		86.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 2S: Parking Deck & Pond



Summary for Subcatchment 3S: Remaining Area

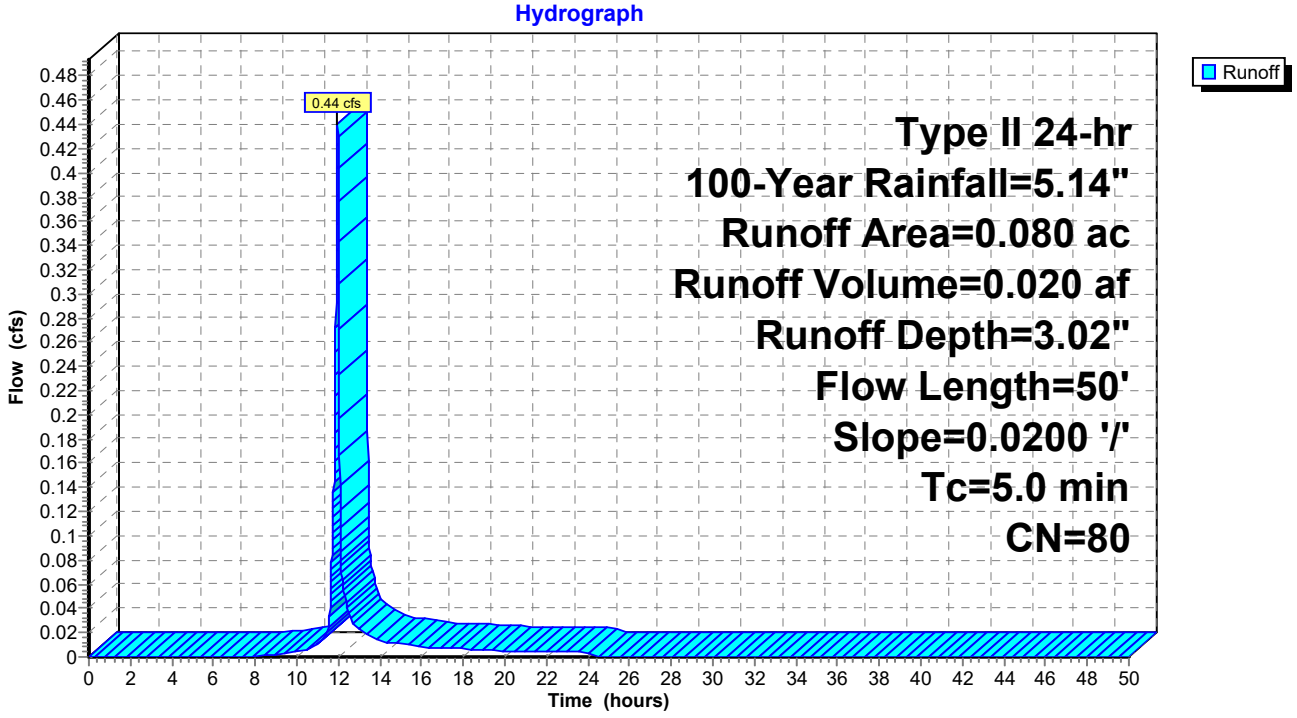
Runoff = 0.44 cfs @ 11.96 hrs, Volume= 0.020 af, Depth= 3.02"
Routed to Link 1L : Proposed Runoff

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Type II 24-hr 100-Year Rainfall=5.14"

Area (ac)	CN	Description
0.080	80	>75% Grass cover, Good, HSG D
0.080		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	50	0.0200	1.06		**Sheet Flow, Tc<5.0 min** Smooth surfaces n= 0.011 P2= 2.50"
0.8	50	Total, Increased to minimum Tc = 5.0 min			

Subcatchment 3S: Remaining Area



Summary for Pond 1P: Proposed Stormwater Storage & Outlet

Inflow Area = 0.710 ac, 91.55% Impervious, Inflow Depth = 4.69" for 100-Year event
Inflow = 5.29 cfs @ 11.96 hrs, Volume= 0.278 af
Outflow = 3.95 cfs @ 12.01 hrs, Volume= 0.278 af, Atten= 25%, Lag= 3.3 min
Primary = 1.20 cfs @ 12.01 hrs, Volume= 0.257 af
Routed to Link 1L : Proposed Runoff
Secondary = 2.76 cfs @ 12.01 hrs, Volume= 0.020 af
Routed to Link 1L : Proposed Runoff

Routing by Dyn-Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs
Peak Elev= 675.46' @ 12.01 hrs Surf.Area= 1,562 sf Storage= 2,525 cf

Plug-Flow detention time= 9.3 min calculated for 0.278 af (100% of inflow)
Center-of-Mass det. time= 9.3 min (763.8 - 754.5)

Volume	Invert	Avail.Storage	Storage Description
#1	672.50'	2,592 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

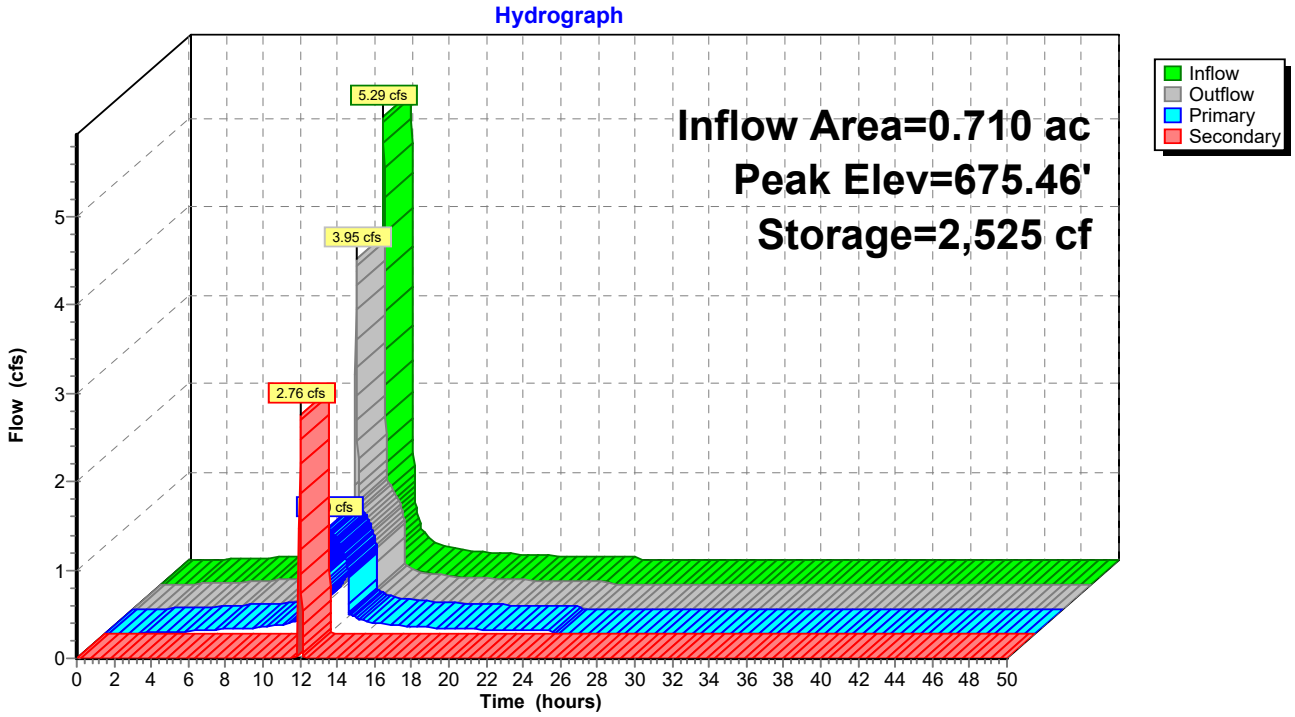
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
672.50	222	0	0
673.00	414	159	159
674.00	839	627	786
675.00	1,321	1,080	1,866
675.50	1,584	726	2,592

Device	Routing	Invert	Outlet Devices
#1	Primary	671.15'	**8.0" Round Outlet Pipe** L= 160.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 671.15' / 670.80' S= 0.0022 '/' Cc= 0.900 n= 0.020 Corrugated PE, corrugated interior, Flow Area= 0.35 sf
#2	Device 1	672.50'	**24.0" x 24.0" Horiz. Grate - Outlet Structure** C= 0.600 Limited to weir flow at low heads
#3	Secondary	675.25'	**10.0' long (Profile 1) Broad-Crested Rectangular Weir** Head (feet) 0.49 0.98 1.48 Coef. (English) 2.92 3.37 3.59

Primary OutFlow Max=1.20 cfs @ 12.01 hrs HW=675.46' TW=0.00' (Dynamic Tailwater)
↑**1=Outlet Pipe** (Barrel Controls 1.20 cfs @ 3.42 fps)
↑**2=Grate - Outlet Structure** (Passes 1.20 cfs of 33.12 cfs potential flow)

Secondary OutFlow Max=2.75 cfs @ 12.01 hrs HW=675.46' TW=0.00' (Dynamic Tailwater)
↑**3=Broad-Crested Rectangular Weir** (Weir Controls 2.75 cfs @ 1.33 fps)

Pond 1P: Proposed Stormwater Storage & Outlet

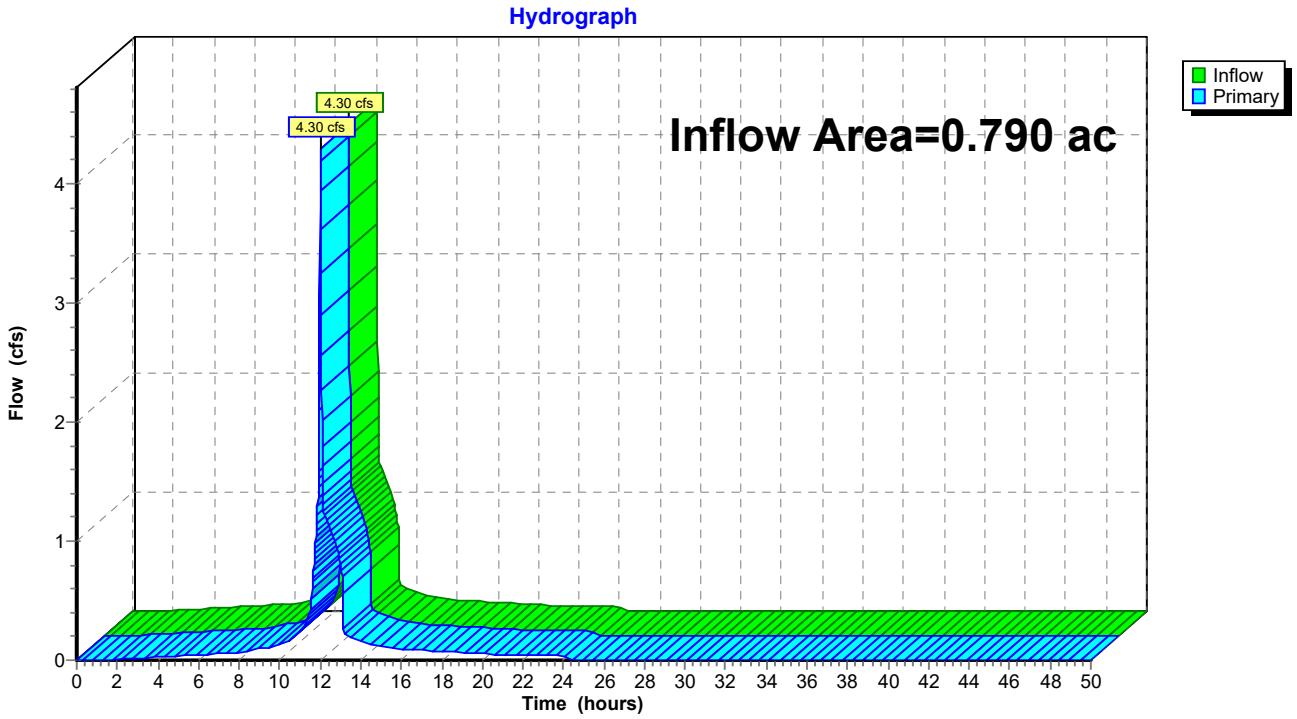


Summary for Link 1L: Proposed Runoff

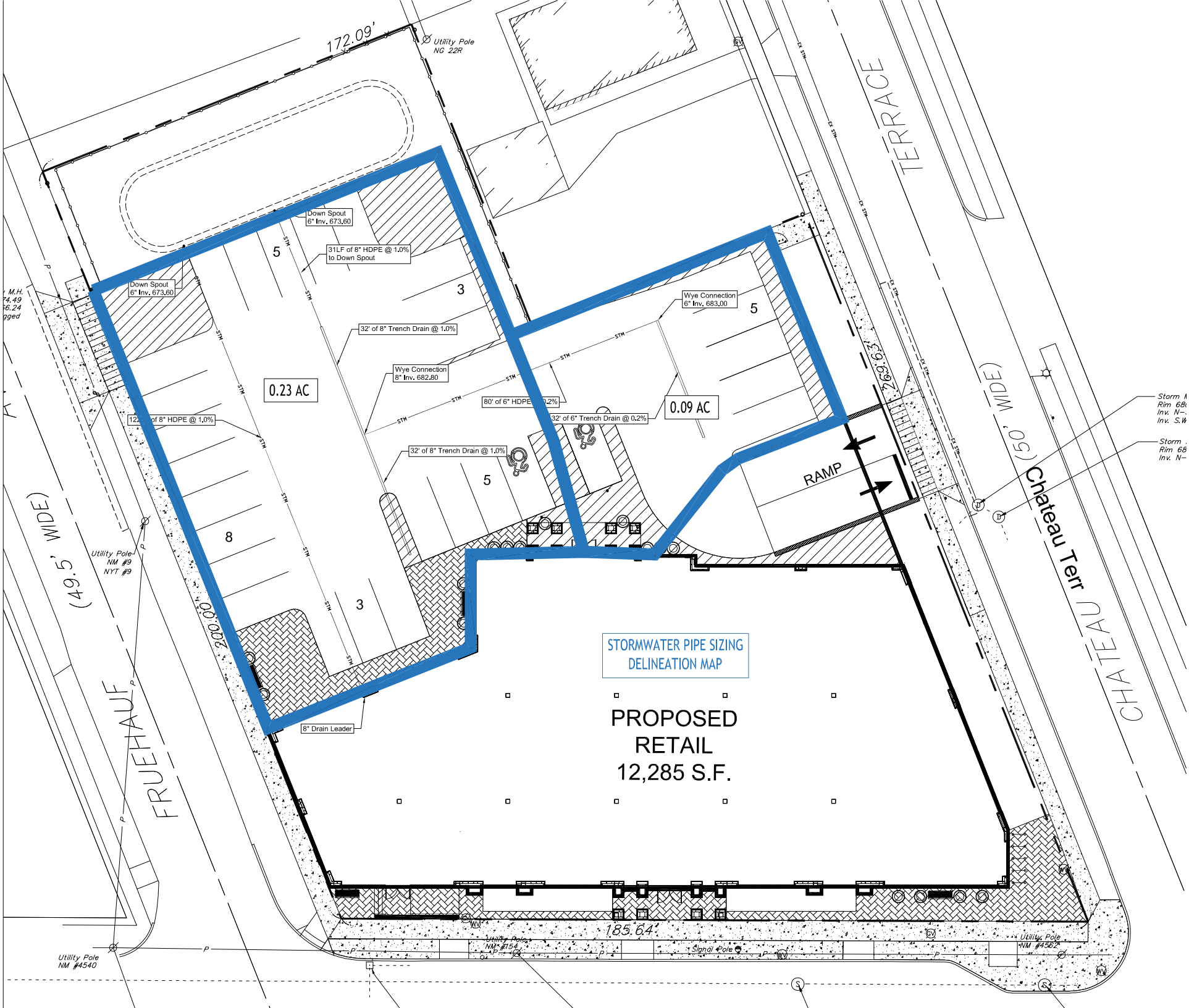
Inflow Area = 0.790 ac, 82.28% Impervious, Inflow Depth = 4.52" for 100-Year event
Inflow = 4.30 cfs @ 12.01 hrs, Volume= 0.298 af
Primary = 4.30 cfs @ 12.01 hrs, Volume= 0.298 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-50.00 hrs, dt= 0.01 hrs

Link 1L: Proposed Runoff



Storm Pipe Sizing Calculations


172.09'
Utility Pole
NG 22R
TERRACE
(50' WIDE)
Chateau Terr
CHATEAU
Down Spout
6" Inv. 673.60
31LF of 8" HDPE @ 1.0%
to Down Spout
Down Spout
6" Inv. 673.60
32' of 8" Trench Drain @ 1.0%
Wye Connection
8" Inv. 682.80
Wye Connection
6" Inv. 683.00
80' of 6" HDPE @ 0.2%
32' of 6" Trench Drain @ 0.2%
32' of 8" Trench Drain @ 1.0%
0.23 AC
0.09 AC
RAMP
8" Drain Leader
STORMWATER PIPE SIZING
DELINEATION MAP
PROPOSED
RETAIL
12,285 S.F.
(49.5' WIDE)
FRUEHAUF
200.00'
Utility Pole
NM #9
NYT #9
Utility Pole
NM #4540
185.64'
Utility Pole
NM #154
Signal Pole
Utility Pole
NM #4562
Storm M
Rim 68
Inv. N-
Inv. S.W
Storm
Rim 68
Inv. N-

PROPOSED STORM DRAINAGE PIPE SIZING: 10-YR STORM CONVEYANCE

Drain 684.25	Drainage Area, A (ac) =	0.09
	Impervious (ac) =	0.09
	Greenspace (ac) =	0
	Runoff Coefficient,c =	0.90
	*10-Yr Rainfall Intensity, i (in/hr) =	5.5
	Peak Discharge (cfs), Q=ciA =	0.45

*Note: Assume Time of Concentration is less than 5.0 min. and i=5.5 in/hr per Intensity/Duration/Frequency curve

Mannings Equation (see attached spreadsheet): use 8" HDPE @ 0.2% = 0.70 cfs

Drain 684.20	Drainage Area, A (ac) =	0.32
	Impervious (ac) =	0.32
	Greenspace (ac) =	0
	Runoff Coefficient,c =	0.90
	*10-Yr Rainfall Intensity, i (in/hr) =	5.5
	Peak Discharge (cfs), Q=ciA =	1.58

Mannings Equation (see attached spreadsheet): use 8" HDPE @ 1.0% = 1.58 cfs

Manning's Equation for Circular Pipes Flowing Full

Slope(%) = 0.2

n = 0.01 hdpe

n = 0.013 concrete

n = 0.02 cmp

Diameter (ft)	Diameter (in)	Area (ft^2)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	HDPE		CONCRETE		CMP	
					Flow (cfs)	Velocity (ft/s)	Flow (cfs)	Velocity (ft/s)	Flow (cfs)	Velocity (ft/s)
0.33	4	0.1	1.05	0.08	0.11	1.27	0.09	0.98	0.06	0.64
0.5	6	0.2	1.57	0.13	0.33	1.67	0.25	1.28	0.16	0.83
0.67	8	0.3	2.09	0.17	0.70	2.02	0.54	1.55	0.35	1.01
0.83	10	0.5	2.62	0.21	1.28	2.34	0.98	1.80	0.64	1.17
1	12	0.8	3.14	0.25	2.08	2.64	1.60	2.03	1.04	1.32
1.25	15	1.2	3.93	0.31	3.77	3.07	2.90	2.36	1.88	1.53
1.5	18	1.8	4.71	0.38	6.12	3.47	4.71	2.67	3.06	1.73
1.75	21	2.4	5.50	0.44	9.24	3.84	7.11	2.95	4.62	1.92
2	24	3.1	6.28	0.50	13.19	4.20	10.14	3.23	6.59	2.10
2.5	30	4.9	7.85	0.63	23.91	4.87	18.39	3.75	11.96	2.44
3	36	6.1	9.04	0.67	30.93	5.10	23.79	3.93	15.46	2.55
3.5	42	9.6	11.00	0.88	58.65	6.10	45.12	4.69	29.32	3.05
4	48	12.6	12.57	1.00	83.74	6.66	64.41	5.13	41.87	3.33
4.5	54	15.9	14.14	1.13	114.64	7.21	88.18	5.54	57.32	3.60
5	60	19.6	15.71	1.25	151.82	7.73	116.79	5.95	75.91	3.87
6	72	28.3	18.85	1.50	246.88	8.73	189.91	6.72	123.44	4.37
7	84	38.5	21.99	1.75	372.40	9.68	286.46	7.44	186.20	4.84
8	96	50.3	25.13	2.00	531.69	10.58	408.99	8.14	265.84	5.29

Manning's Equation for Circular Pipes Flowing Full

Slope(%) = 1

n = 0.01 hdpe

n = 0.013 concrete

n = 0.02 cmp

Diameter (ft)	Diameter (in)	Area (ft^2)	Wetted Perimeter (ft)	Hydraulic Radius (ft)	HDPE		CONCRETE		CMP	
					Flow (cfs)	Velocity (ft/s)	Flow (cfs)	Velocity (ft/s)	Flow (cfs)	Velocity (ft/s)
0.33	4	0.1	1.05	0.08	0.25	2.84	0.19	2.19	0.12	1.42
0.5	6	0.2	1.57	0.13	0.73	3.73	0.56	2.87	0.37	1.86
0.67	8	0.3	2.09	0.17	1.58	4.51	1.21	3.47	0.79	2.26
0.83	10	0.5	2.62	0.21	2.86	5.24	2.20	4.03	1.43	2.62
1	12	0.8	3.14	0.25	4.64	5.91	3.57	4.55	2.32	2.96
1.25	15	1.2	3.93	0.31	8.42	6.86	6.48	5.28	4.21	3.43
1.5	18	1.8	4.71	0.38	13.69	7.75	10.53	5.96	6.85	3.87
1.75	21	2.4	5.50	0.44	20.65	8.59	15.89	6.61	10.33	4.29
2	24	3.1	6.28	0.50	29.49	9.39	22.68	7.22	14.74	4.69
2.5	30	4.9	7.85	0.63	53.47	10.89	41.13	8.38	26.73	5.45
3	36	6.1	9.04	0.67	69.16	11.41	53.20	8.78	34.58	5.71
3.5	42	9.6	11.00	0.88	131.14	13.63	100.88	10.49	65.57	6.82
4	48	12.6	12.57	1.00	187.24	14.90	144.03	11.46	93.62	7.45
4.5	54	15.9	14.14	1.13	256.33	16.12	197.18	12.40	128.17	8.06
5	60	19.6	15.71	1.25	339.49	17.29	261.14	13.30	169.74	8.64
6	72	28.3	18.85	1.50	552.04	19.52	424.65	15.02	276.02	9.76
7	84	38.5	21.99	1.75	832.72	21.64	640.55	16.64	416.36	10.82
8	96	50.3	25.13	2.00	1188.89	23.65	914.53	18.19	594.45	11.83