



## Preliminary Stormwater Drainage Report

Peterkort Towne Square – Starbucks and Pad

10910 SW Barnes Rd  
Portland, OR 97225

For

Baysinger



RENEWS:

Regular maintenance and inspection are required on all components of the stormwater system. This plan provides instruction on how to maintain and inspect the system.

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Froelich Project Number: 21-C023  
Date: July 1, 2022

## Designer's Certification and Statement

"I hereby certify that this Stormwater Management Report for this project has been prepared by me or under my supervision and meets the minimum standards of the City of Beaverton and normal standards of engineering practice. I hereby acknowledge and agree that the jurisdiction does not and will not assume liability for the sufficiency, suitability, or performance of drainage facilities design by me."

Evan Eykelbosch, PE

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Preliminary Stormwater Drainage Report

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## I. Project Overview and Description

This stormwater report has been prepared in accordance with the 2019 City of Beaverton Engineering Design Manual guideline to support the permit applications for the proposed project improvements.

Peterkort - Starbucks is a remodel/addition to a commercial development located at 10910 SW Barnes Rd (See Appendix A: Vicinity Map).

### Existing Conditions

#### On-site

The existing condition of the site is an existing single story retail unit and parking lots that are a part of the larger Peterkort Towne Square in Beaverton, OR. The existing topography is generally flat and gently sloping from south to north and west to east. The northeast edge of the site has 6'-10' retaining wall. The existing runoff from the parking lot flows into one of multiple catch basins. The runoff from the building roof uses roof downspouts to enter the stormwater system. The entire storm system for the Peterkort Towne Square is conveyed offsite to a downstream stormwater treatment vault prior to discharge into Johnson Creek. At the time of development, it was our understanding that Johnson Creek has some flow control restrictors installed to address flow control requirements.

An existing condition Basin Map is provided in Appendix B.

### Proposed Conditions

#### On-site

The development will include a new 1,124 sf addition to the existing building, a new 2,000 sf building, reconstruction of a portion of a parking lot, construction of a new plaza, a new drive-thru, and a new ADA route from SW Barnes Rd to the building. The proposed development is bound by SW Barnes Rd to the north, SW Valeria View Dr intersection to the east, Peterkort Towne Square parking lots to the south, and Wells Fargo to the west. The proposed grading will maintain the general drainage patterns of the existing conditions. The on-site development will collect and manage stormwater and will provide treatment and detention for much of the runoff. Proposed site runoff is collected in a series of roof drain and catch basins. The stormwater will tie into the existing on-site storm system which discharges into the public system that conveys to the downstream stormwater treatment facility. This downstream treatment facility is sized to provide treatment for the entire Peterkort Towne Square development.

A proposed condition Basin Map is provided in Appendix B.

'Table 1: Catchment Areas' provides the basin characteristics for the various catchment areas under the existing and proposed conditions.

## II. Methodology

Per the 2019 City of Beaverton Engineering Design Manual guideline, which references Clean Water Services Design and Construction Standards, the code requires that all development and redevelopment which creates and/or modifies 1,000 sf or more shall comply with stormwater requirements. Stormwater requirements include stormwater treatment and hydromodification. The proposed development has between 12,000 sf and 80,000 sf of new or modified impervious surface and has a reach-specific risk level rating of high, based on the Hydromodification Map Web Tool on Clean Water Services website, designating the site as a Category 3 project, per CWS Table 4-2. This result requires peak flow matching detention and LIDA or flow duration curve matching detention. The entire site is currently managed by a public stormwater treatment system located on SW Valeria View Drive and the Johnson Creek detention system. This system was approved as part of a large development from the early 2000's (WA CO Case No. 99-456.).



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Due to the tight design constraints of redeveloping an existing site, it is not always possible to collect, treat, and manage all the new and redeveloped surfaces. In order to meet the code, the proposed development will maximize the new/redevelopment areas it can treat and detain, while offsetting those area that cannot be managed with existing “unmanaged” areas. Additionally, the goal of this development was not only to meet the required management requirements but to exceed them where possible to accrue “credits” for redevelopment of future challenging areas around the Peterkort Towne Square property. A clear delineation of the required and additional areas will be provided in the tables (See Appendix B: Basin Map and Areas).

To meet the Category 3 requirements for treatment and hydromodification. The project is proceeding with the option to provide a peak-flow matching detention system while treating 30% of the impervious areas with a LIDA facility. Due to the size of the stormwater treatment facility and contribution area, these facilities were designed using the Volume In - Volume Out analysis (See Appendix D: Water Quality Calculations).

The detention system was designed for peak flow matching of 2-yr post development to ½ the 2-year predevelopment, and post development to predevelopment for the 5-year and the 10-year event (See Appendix E: Detention Calculations). The conveyance calculations were designed for the 25-year storm event (3.90 in/24-hr) per Table 4-4 of CWS Design and Construction Standards (See Appendix F: Conveyance Calculations).

- Total Area of Disturbance = 50,650 sf
- Required LIDA Treatment Area = 30% (50,650) = 15,195 sf
- Provided LIDA Treatment Area = 51,510 sf
- Excess Treatment Area = 51,510 – 15,195 = 36,315 sf / (30%) = 121,050 sf
- Required Peak Flow Detention System Area = 50,650 sf
- Provided Peak Flow Detention System Area = 96,638 sf

## Preliminary Stormwater Drainage Report

### III. Analysis

The analysis of the project is based on the Santa Barbara Urban Hydrograph (SBUH) Method and was implemented using a NRCS Type 1A rainfall distribution for a 24-hour storm. The system was designed using HydroCAD software. Conveyance calculations are based on the Manning Formula for uniform pipe flow. (See Appendix F: Conveyance Calculations).

The existing and proposed site is divided into three separate drainage basins. The development of this portion of the property will reduce the overall impervious area for each basin and will result in a reduced site runoff.

**Table 1: Catchment Areas**

Existing

<u>Disposal</u>	<u>Basin</u>	<u>Area</u>						<u>Total</u>	
		<u>pervious</u>		<u>impervious - disturbed</u>		<u>impervious - non disturbed</u>			
		<u>sf</u>	<u>ac</u>	<u>sf</u>	<u>ac</u>	<u>sf</u>	<u>ac</u>	<u>sf</u>	<u>ac</u>
North	Basin A	2,153	0.05	6,408	0.15	2,627	0.06	11,188	0.26
East	Basin B	3,629	0.08	25,110	0.58	7,545	0.17	36,284	0.83
West	Basin C	2,874	0.07	19,132	0.44	54,011	1.24	76,016	1.75
	Total	8,655	0.20	50,650	1.16	64,182	1.47	123,488	2.83

Proposed

<u>Disposal</u>	<u>Basin</u>	<u>Area</u>						<u>Total</u>	
		<u>pervious</u>		<u>impervious - new/mod</u>		<u>impervious - existing</u>			
		<u>sf</u>	<u>ac</u>	<u>sf</u>	<u>ac</u>	<u>sf</u>	<u>ac</u>	<u>sf</u>	<u>ac</u>
North	N-1	1,911	0.04	2,767	0.06	0	0.00	4,678	0.11
East	E-1	0	0.00	0	0.00	2,483	0.06	2,483	0.06
	E-2	0	0.00	2,001	0.05	0	0.00	2,001	0.05
	E-3	543	0.01	13,907	0.32	0	0.00	14,451	0.33
	E-4	892	0.02	2,895	0.07	3,713	0.09	7,500	0.17
	E-5	1,214	0.03	2,605	0.06	3,978	0.09	7,797	0.18
	E-6	2,677	0.06	0	0.00	0	0.00	2,677	0.06
	E-7	106	0.00	1,047	0.02	0	0.00	1,153	0.03
West	W-1	0	0.00	444	0.01	31,612	0.73	32,056	0.74
	W-2	28	0.00	316	0.01	1,937	0.04	2,281	0.05
	W-3	898	0.02	4,462	0.10	4,609	0.11	9,969	0.23
	W-4	854	0.02	4,220	0.10	9,483	0.22	14,557	0.33
	W-5	1,709	0.04	6,165	0.14	0	0.00	7,874	0.18
	W-6	0	0.00	2,113	0.05	0	0.00	2,113	0.05
	W-7	2,084	0.05	0	0.00	0	0.00	2,084	0.05
	W-8	2,539	0.06	381	0.01	0	0.00	2,920	0.07
	W-9	7	0.00	517	0.01	6,371	0.15	6,895	0.16
	Total	15,463	0.35	43,839	1.01	64,185	1.47	123,487	2.83

## **IV. Engineering Conclusion**

Based on the requirements of the Engineering Design Manual, all facilities and conveyance components have enough capacity to handle the runoff from the required storm event and should be approved as designed.

## **V. Appendices**

# Appendix A: Vicinity Map





## **Appendix B: Basin Map and Areas**



**Basin Areas**

Stormwater Management Requirements

Existing

Disposal	Basin	Area						Total	
		pervious		impervious - disturbed		impervious - non disturbed		sf	ac
		sf	ac	sf	ac	sf	ac		
North	Basin A	2,153	0.05	6,408	0.15	2,627	0.06	11,188	0.26
East	Basin B	3,629	0.08	25,110	0.58	7,545	0.17	36,284	0.83
West	Basin C	2,874	0.07	19,132	0.44	54,011	1.24	76,016	1.75
	Total	8,655	0.20	50,650	1.16	64,182	1.47	123,488	2.83

Proposed

Disposal	Basin	Area						Total		Flow Q (25-YR)
		pervious		impervious - new/mod		impervious - existing		sf	ac	cfs
		sf	ac	sf	ac	sf	ac			
North	N-1	1,911	0.04	2,767	0.06	0	0.00	4,678	0.11	0.073
East	E-1	0	0.00	0	0.00	2,483	0.06	2,483	0.06	0.053
	E-2	0	0.00	2,001	0.05	0	0.00	2,001	0.05	0.043
	E-3	543	0.01	13,907	0.32	0	0.00	14,451	0.33	0.304
	E-4	892	0.02	2,895	0.07	3,713	0.09	7,500	0.17	0.150
	E-5	1,214	0.03	2,605	0.06	3,978	0.09	7,797	0.18	0.152
	E-6	2,677	0.06	0	0.00	0	0.00	2,677	0.06	0.020
	E-7	106	0.00	1,047	0.02	0	0.00	1,153	0.03	0.024
West	W-1	0	0.00	444	0.01	31,612	0.73	32,056	0.74	0.685
	W-2	28	0.00	316	0.01	1,937	0.04	2,281	0.05	0.049
	W-3	898	0.02	4,462	0.10	4,609	0.11	9,969	0.23	0.205
	W-4	854	0.02	4,220	0.10	9,483	0.22	14,557	0.33	0.306
	W-5	1,709	0.04	6,165	0.14	0	0.00	7,874	0.18	0.148
	W-6	0	0.00	2,113	0.05	0	0.00	2,113	0.05	0.045
	W-7	2,084	0.05	0	0.00	0	0.00	2,084	0.05	0.016
	W-8	2,539	0.06	381	0.01	0	0.00	2,920	0.07	0.026
	W-9	7	0.00	517	0.01	6,371	0.15	6,895	0.16	0.147
	Total	15,463	0.35	43,839	1.01	64,185	1.47	123,487	2.83	

Required Treatment Area = 30% of New/Modified Impervious = 0.3(50,650) = 15,195sf

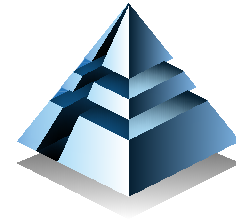
Basin W-3 and W-9 meet the required treatment area = 15,959sf

Basin E-4, E-5, W-4, W-5, W-6, and W-8 are additional treatment areas = 35,551sf

Basin E-4, E-5, W-2, W-3, W-4, W-6, and W-9 are detained to meet the detention requirements = 51,111sf

Basin E-6, W-1, W-5, and W-8 are additional detention areas = 45,527sf

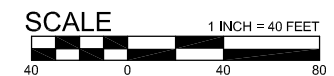




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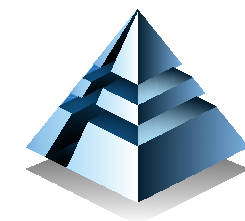


**EXISTING BASIN**

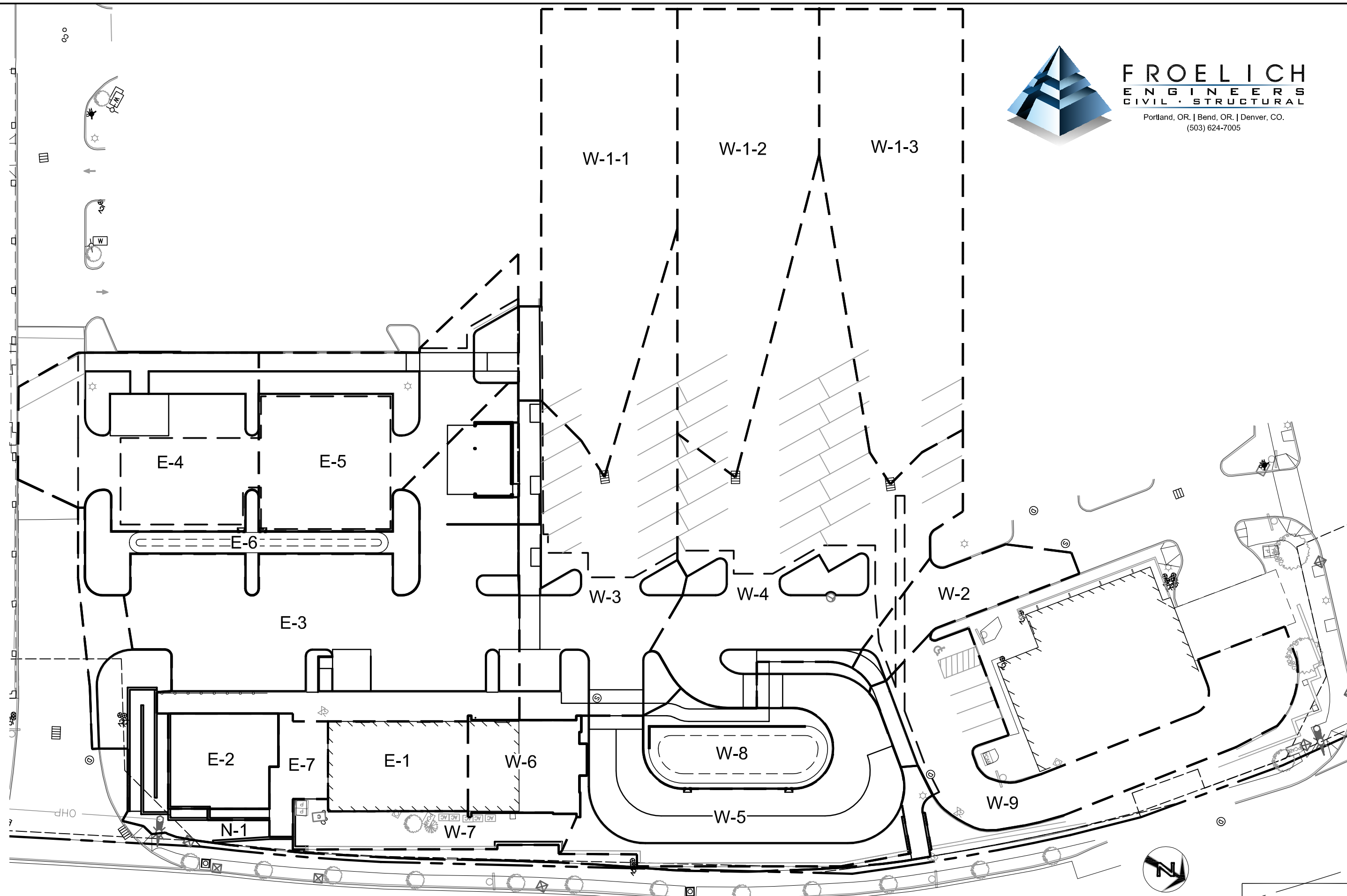


SHEET NO.  
**Existing**

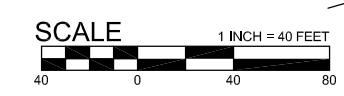
11x17-EXHIBIT File: P:\2021\21-C023 (Peterkort Towne Square - Starbucks)\400 Calculations\401 Storm\21-C023\_xBASIN.dwg TAB:Existing



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# PROPOSED BASIN



SHEET NO. **Proposed**

11x17-Exhibit File: P:\2021\21-C023 (Peterkort Towne Square - Starbucks)\400 Calculations\401 Storm\21-C023\_xBASIN.dwg TAB:Proposed  
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## **Appendix C: Assumptions**



## Assumptions

Peterkort - Starbucks  
Project #21-C023

### Santa Barbara Unit Hydrograph (SBUH) Assumptions:

WQ Storm Event=	<b>0.36 in x Drainage Area (3 hour event)</b>
2-year Storm Event=	<b>2.50</b> in/24-hours per CWS Design Standards 12/19
5-year Storm Event=	<b>3.10</b> in/24-hours per CWS Design Standards 12/19
10-year Storm Event=	<b>3.45</b> in/24-hours per CWS Design Standards 12/19
25-year Storm Event =	<b>3.90</b> in/24-hours per CWS Design Standards 12/19

Time of Concentration    **5.0**    minutes

Roughness Coefficient    **0.013**

#### Curve Number Assumptions:

Impervious Area =	<b>98</b>	Per NRCS
Pervious Area =	<b>74</b>	Per NRCS
Existing Pervious Area=	<b>75</b>	per CWS Design Standards 12/19

**NRCS Soil Group                    C**

## **Appendix D: Water Quality Calculations**

## Rain Garden Sizing Calculations

The rain gardens utilize the natural filtering ability that occurs from infiltrating through vegetation and growing medium. The growing medium is specified to have an infiltration rate of at least 2 inch per hour (6.0 in/hr with a clogging factor of 3). Infiltration is solely dependent on the filtration rate of the engineered soil medium.

The rain gardens located on this site are dry between storm periods. The rain garden works effectively in removing both dissolved pollutants and particulates through the basin's soil medium. Plants and other vegetated material are landscaped along the floor and sides of the swale. The roots of the vegetated plants help maintain permeable soils and help grasses absorb some water-soluble nutrients. The grass helps minimize the re-suspension of pollutants during large storms. The rain garden is sized with enough bottom surface area and storage depth to treat at least the Water Quality storm event without overflowing into the storm system.

The basic equation to determine the maximum runoff area a given treatment facility can handle without overflowing is...

$$V_{IN} - V_{OUT} < V_{STORAGE\_AVAILABLE}$$

Where...

$V_{IN}$  = Stormwater volume into the facility every 10 minutes (runoff from site)

$V_{OUT}$  = Stormwater volume out of the facility every 10 minutes (infiltration through topsoil)

$V_{STORAGE\_AVAILABLE}$  = Volume available to store excess  $V_{IN}$  (empty reservoir of facility)

$V_{IN}$  is calculated using the Clean Water Services Water Quality Volume equation from section 4.08.5 with the following assumptions...

Rainfall = 0.36 in (Water Quality Storm Event)

A = Area Draining to Facility (sf)

This yields a runoff flow rate ( $Q_{IN}$ ) every 10 minutes ( $T_{10min}$ ) throughout the storm event.

$V_{IN}$  can now be calculated from...

$$Q = \frac{V}{T}$$

$$\therefore V_{IN} = Q_{IN} \times T_{10\ min}$$

$V_{OUT}$  is obtained by first calculating the infiltration flow rate ( $Q_{OUT}$ ) through the growing medium using the following...

I = Soil infiltration rate = 6 inches/hour with a clogging factor of 3

*Therefore, the soil infiltration rate is **2.0 inches/hour** = 0.00004630 ft/sec*

BA = Bottom area of facility where infiltration occurs (sf)

$$I \times BA = Q_{OUT}$$

$$\therefore V_{OUT} = Q_{OUT} \times T_{10\ min}$$

$V_{STORAGE\_AVAILABLE}$  is obtained by first calculating...

$$V_{IN} - V_{OUT} = V_{DIFF}$$

If...  $V_{DIFF} \leq 0$  then  $V_{OUT}$  exceeds  $V_{IN}$  and the facility remains empty or empties by that amount if facility had previously stored excess during prior 10 minute intervals.

If...  $V_{DIFF} > 0$  then  $V_{IN}$  exceeds  $V_{OUT}$  and the facility will need to store the excess volume as well as any excess volume from previous 10 minute intervals where this was also true.

Therefore, cumulative required storage volume is calculated after each interval by the following...

$$V_{DIFF1} + V_{DIFF2} + V_{DIFF3} + \dots = V_{STORAGE\ REQUIRED}$$

$V_{STORAGE\ AVAILABLE}$  can then be obtained from the following...

$$V_{STORAGE} - V_{STORAGE\ REQUIRED} = V_{STORAGE\ AVAILABLE}$$

Where...

$$V_{STORAGE} = \text{Total reservoir volume below overflow structure (reservoir of facility)}$$

If...  $V_{STORAGE\ AVAILABLE} < 0$  then the facility will overflow

Calculating the WQ storm event and routing it through its infiltration basins, as described above, it was calculated that the rain gardens would not overflow. Therefore, the basin is sized adequately to "treat" the water quality storm event.



**VOLUME IN - VOLUME OUT CALCULATION**

Rain Garden - 1	
DESIGN SECTION	
IMPERVIOUS AREA (sf)	38,320
WQ VOLUME (cf)	1149.61
WQ DURATION (hr)	3
FACILITY SIZE	
BASIN LENGTH (ft)	~67.00
BASIN WIDTH (ft)	~17.00
BASIN DEPTH (in)	6
SIDE SLOPE x:1	3
SOIL INFILTRATION RATE (in/hr)	6
CLOGGING FACTOR	3
DESIGN SOIL INFILTRATION RATE (in/hr)	2
BASIN SIZE	
BASIN AREA @ BOTTOM (sf)	1138.99
BASIN AREA @ OVERFLOW (sf)	1388.25
BASIN VOLUME (cf)	631.809

DESIGN CALCULATIONS				
10 MIN INTERVAL	VOLUME IN (cf)	VOLUME OUT (cf)	BASIN VOL. USED (cf)	CAPACITY
0	0.00	0.00	0.00	
1	63.87	0.00	63.87	OKAY
2	63.87	31.64	96.10	OKAY
3	63.87	31.64	128.32	OKAY
4	63.87	31.64	160.55	OKAY
5	63.87	31.64	192.78	OKAY
6	63.87	31.64	225.01	OKAY
7	63.87	31.64	257.24	OKAY
8	63.87	31.64	289.47	OKAY
9	63.87	31.64	321.70	OKAY
10	63.87	31.64	353.92	OKAY
11	63.87	31.64	386.15	OKAY
12	63.87	31.64	418.38	OKAY
13	63.87	31.64	450.61	OKAY
14	63.87	31.64	482.84	OKAY
15	63.87	31.64	515.07	OKAY
16	63.87	31.64	547.30	OKAY
17	63.87	31.64	579.52	OKAY
18	63.87	31.64	611.75	OKAY
19	0.00	31.64	580.11	OKAY
20	0.00	31.64	548.48	OKAY
21	0.00	31.64	516.84	OKAY
22	0.00	31.64	485.20	OKAY
23	0.00	31.64	453.56	OKAY
24	0.00	31.64	421.92	OKAY



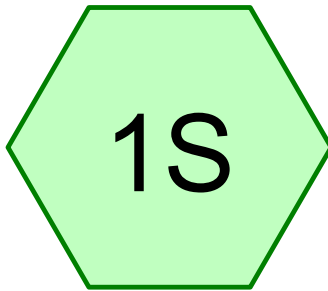


**VOLUME IN - VOLUME OUT CALCULATION**

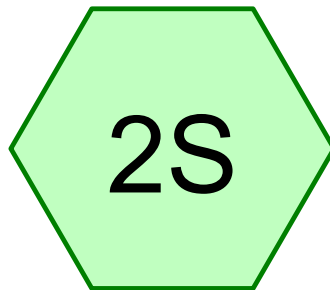
Rain Garden - 2	
DESIGN SECTION	
IMPERVIOUS AREA (sf)	13,190
WQ VOLUME (cf)	395.69
WQ DURATION (hr)	3
FACILITY SIZE	
BASIN LENGTH (ft)	~106.00
BASIN WIDTH (ft)	~3.00
BASIN DEPTH (in)	6
SIDE SLOPE x:1	3
SOIL INFILTRATION RATE (in/hr)	6
CLOGGING FACTOR	3
DESIGN SOIL INFILTRATION RATE (in/hr)	2
BASIN SIZE	
BASIN AREA @ BOTTOM (sf)	325.07
BASIN AREA @ OVERFLOW (sf)	664.27
BASIN VOLUME (cf)	247.336

DESIGN CALCULATIONS				
10 MIN INTERVAL	VOLUME IN (cf)	VOLUME OUT (cf)	BASIN VOL. USED (cf)	CAPACITY
0	0.00	0.00	0.00	
1	21.98	0.00	21.98	OKAY
2	21.98	9.03	34.94	OKAY
3	21.98	9.03	47.89	OKAY
4	21.98	9.03	60.84	OKAY
5	21.98	9.03	73.80	OKAY
6	21.98	9.03	86.75	OKAY
7	21.98	9.03	99.70	OKAY
8	21.98	9.03	112.66	OKAY
9	21.98	9.03	125.61	OKAY
10	21.98	9.03	138.56	OKAY
11	21.98	9.03	151.52	OKAY
12	21.98	9.03	164.47	OKAY
13	21.98	9.03	177.42	OKAY
14	21.98	9.03	190.38	OKAY
15	21.98	9.03	203.33	OKAY
16	21.98	9.03	216.28	OKAY
17	21.98	9.03	229.24	OKAY
18	21.98	9.03	242.19	OKAY
19	0.00	9.03	233.16	OKAY
20	0.00	9.03	224.13	OKAY
21	0.00	9.03	215.10	OKAY
22	0.00	9.03	206.07	OKAY
23	0.00	9.03	197.04	OKAY
24	0.00	9.03	188.01	OKAY

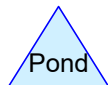
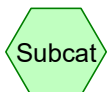
## **Appendix E: Detention Calculations**



Basin A



N-1



# Peterkort - Starbucks - HydroCAD - North and East

Prepared by Froelich Engineers

HydroCAD® 10.10-6a s/n 10688 © 2020 HydroCAD Software Solutions LLC

Printed 7/1/2022

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## Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type IA 24-hr		Default	24.00	1	2.50	2
2	5-Year	Type IA 24-hr		Default	24.00	1	3.10	2
3	10-Year	Type IA 24-hr		Default	24.00	1	3.45	2



**Summary for Subcatchment 1S: Basin A**

Runoff = 0.027 cfs @ 8.02 hrs, Volume= 0.014 af, Depth= 0.65"

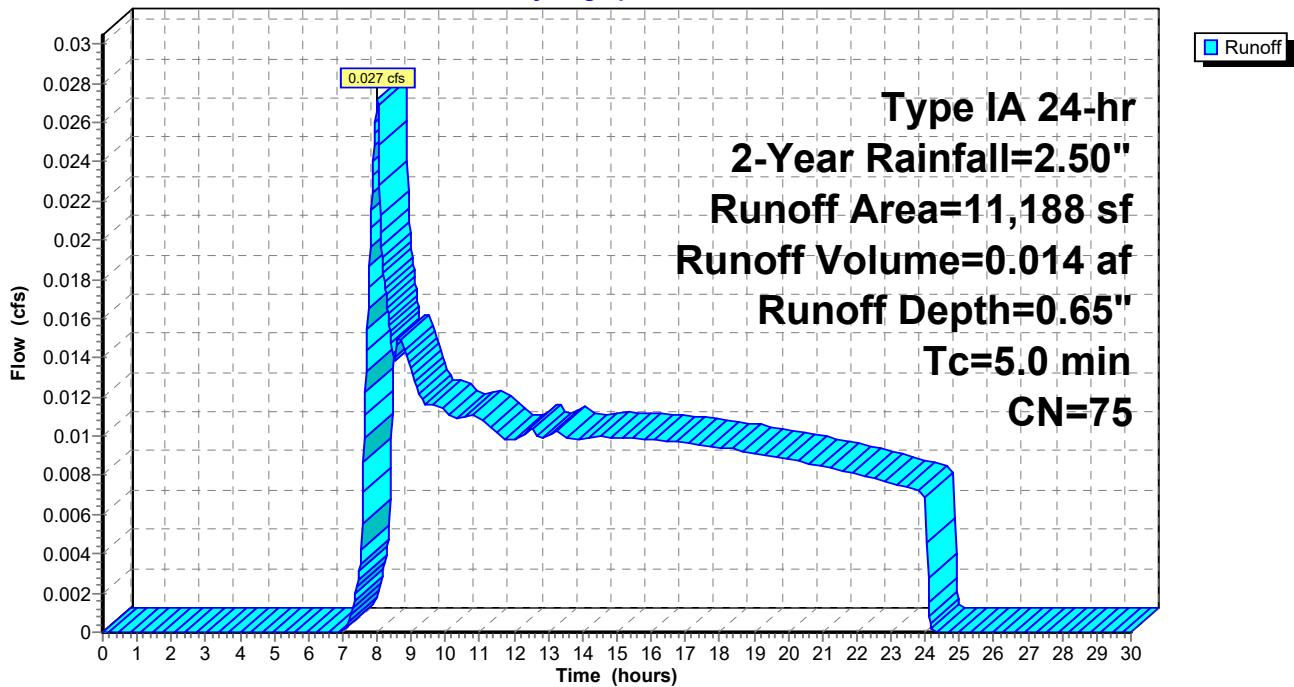
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
* 11,188	75	
11,188		100.00% Pervious Area

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

**Subcatchment 1S: Basin A**

Hydrograph



**Summary for Subcatchment 2S: N-1**

Runoff = 0.036 cfs @ 7.95 hrs, Volume= 0.012 af, Depth= 1.38"

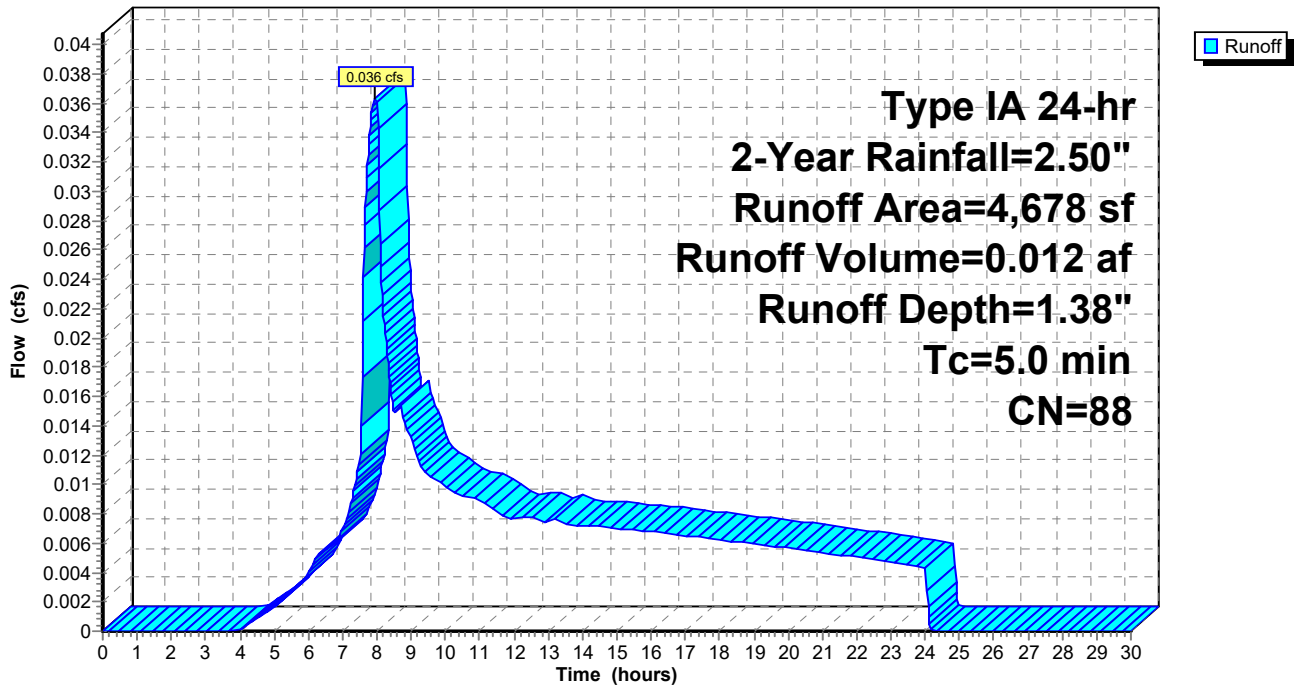
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
1,911	74	>75% Grass cover, Good, HSG C
2,767	98	Unconnected pavement, HSG C
4,678	88	Weighted Average
1,911		40.85% Pervious Area
2,767		59.15% Impervious Area
2,767		100.00% Unconnected

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

**Subcatchment 2S: N-1**

Hydrograph







**Summary for Subcatchment 1S: Basin A**

Runoff = 0.052 cfs @ 8.01 hrs, Volume= 0.022 af, Depth= 1.03"

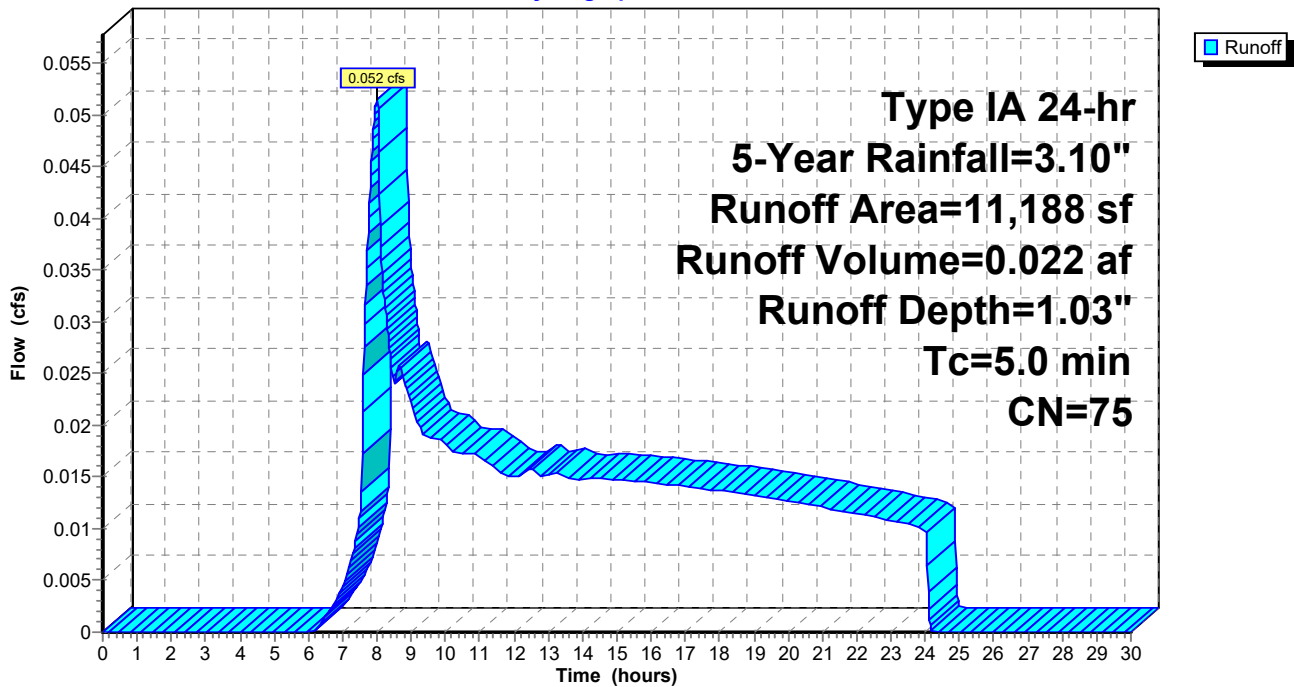
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
* 11,188	75	
11,188		100.00% Pervious Area

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

**Subcatchment 1S: Basin A**

Hydrograph



**Summary for Subcatchment 2S: N-1**

Runoff = 0.052 cfs @ 7.93 hrs, Volume= 0.017 af, Depth= 1.91"

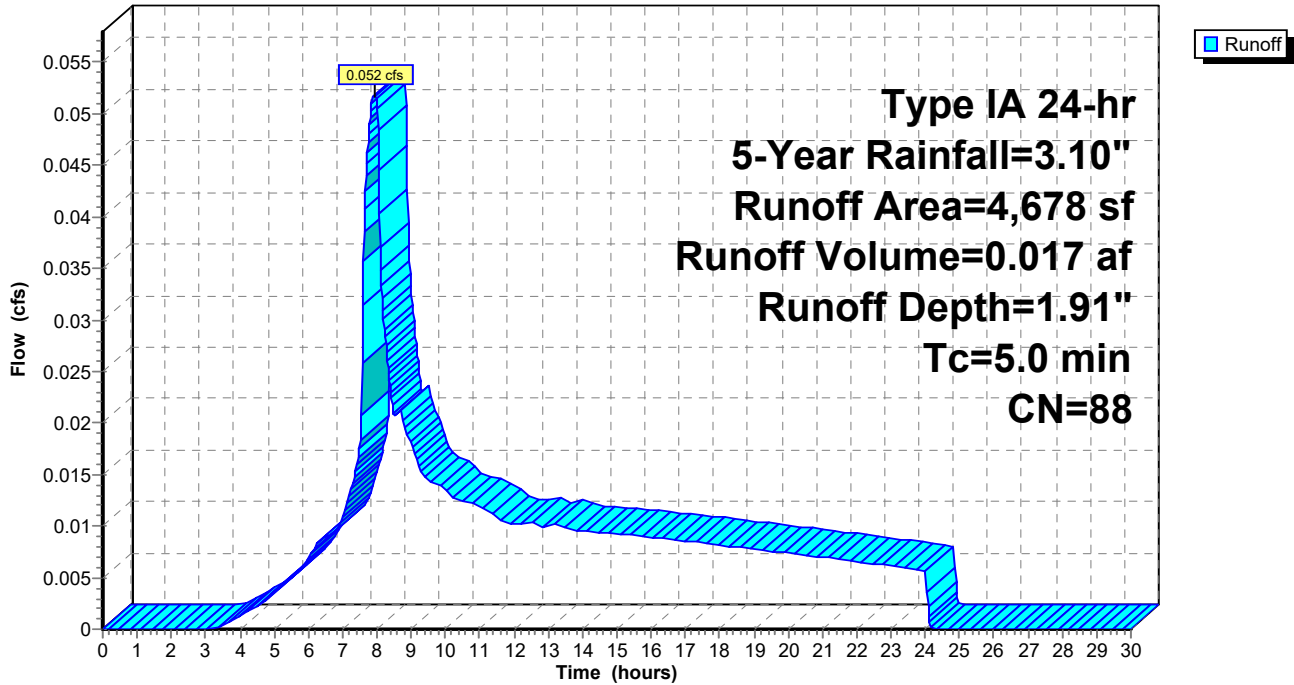
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
1,911	74	>75% Grass cover, Good, HSG C
2,767	98	Unconnected pavement, HSG C
4,678	88	Weighted Average
1,911		40.85% Pervious Area
2,767		59.15% Impervious Area
2,767		100.00% Unconnected

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

**Subcatchment 2S: N-1**

Hydrograph



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 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: Basin A** Runoff Area=11,188 sf 0.00% Impervious Runoff Depth=1.27"  
Tc=5.0 min CN=75 Runoff=0.068 cfs 0.027 af

**Subcatchment2S: N-1** Runoff Area=4,678 sf 59.15% Impervious Runoff Depth=2.22"  
Tc=5.0 min CN=88 Runoff=0.061 cfs 0.020 af

**Total Runoff Area = 0.364 ac Runoff Volume = 0.047 af Average Runoff Depth = 1.55"**  
**82.56% Pervious = 0.301 ac 17.44% Impervious = 0.064 ac**

**Summary for Subcatchment 1S: Basin A**

Runoff = 0.068 cfs @ 8.00 hrs, Volume= 0.027 af, Depth= 1.27"

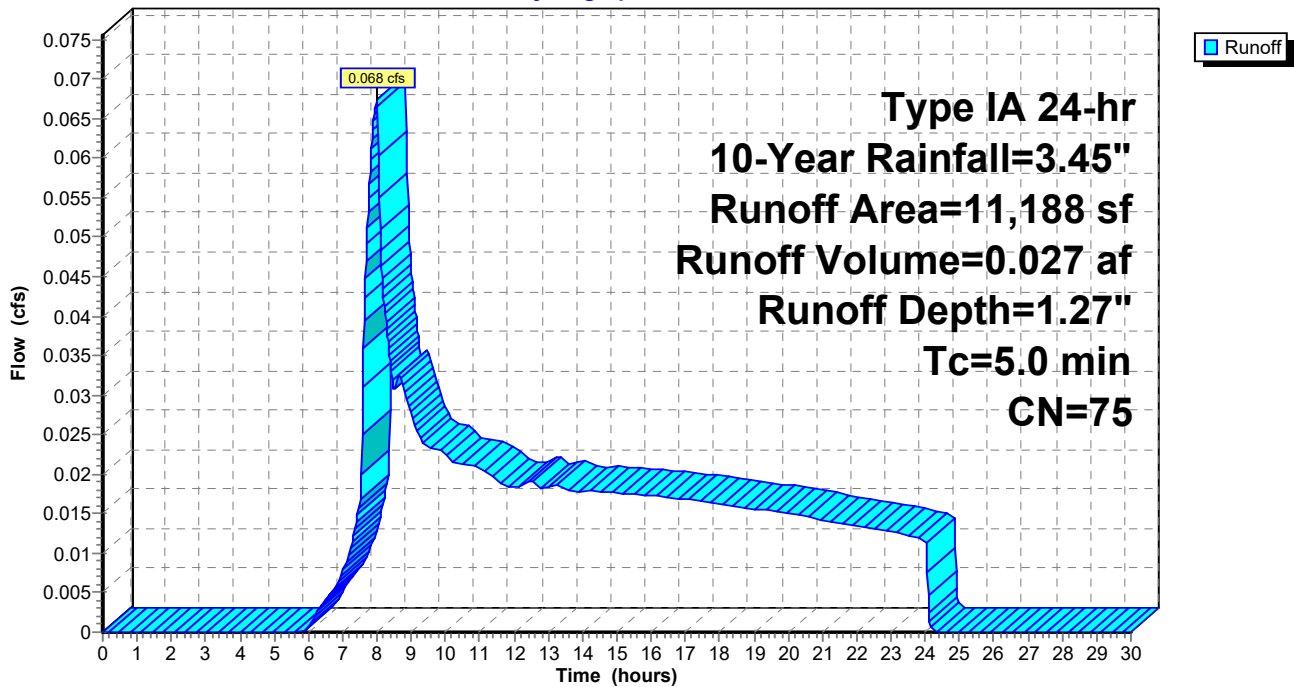
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
* 11,188	75	
11,188		100.00% Pervious Area

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

**Subcatchment 1S: Basin A**

Hydrograph



**Summary for Subcatchment 2S: N-1**

Runoff = 0.061 cfs @ 7.92 hrs, Volume= 0.020 af, Depth= 2.22"

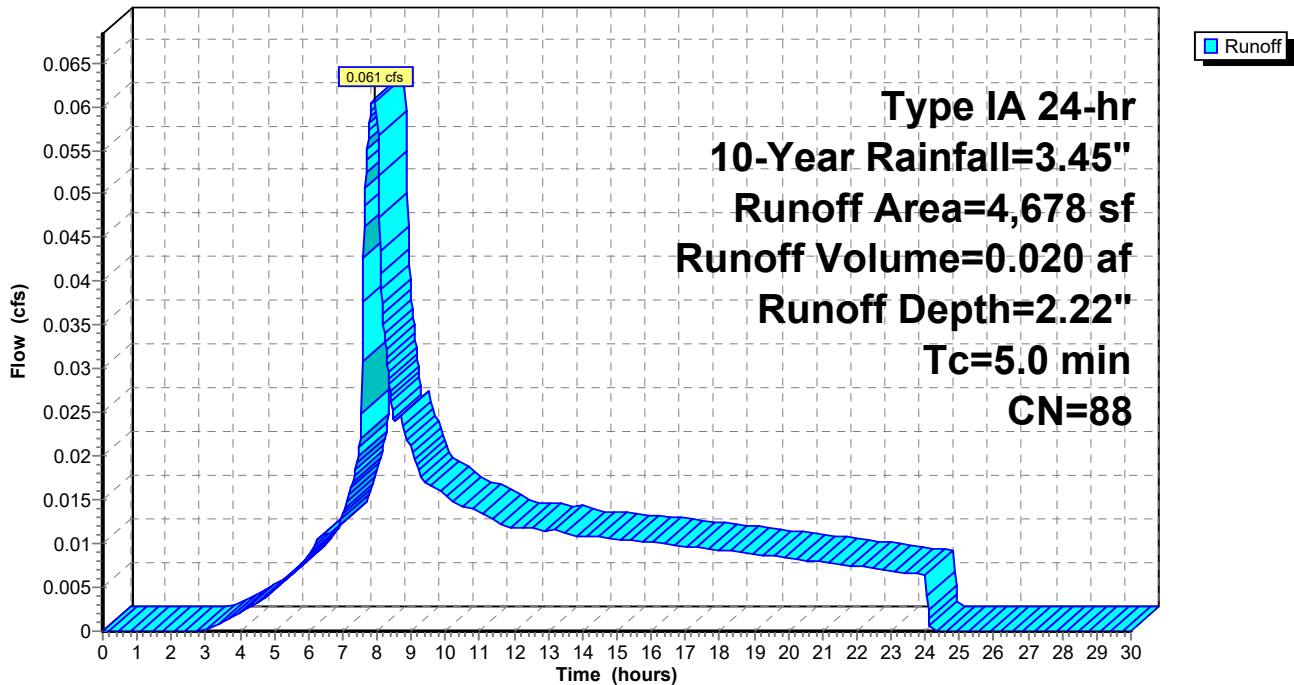
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
1,911	74	>75% Grass cover, Good, HSG C
2,767	98	Unconnected pavement, HSG C
4,678	88	Weighted Average
1,911		40.85% Pervious Area
2,767		59.15% Impervious Area
2,767		100.00% Unconnected

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

**Subcatchment 2S: N-1**

Hydrograph



**Peterkort - Starbucks - HydroCAD - North and East**

Prepared by Froelich Engineers

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*Multi-Event Tables*

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**Events for Subcatchment 1S: Basin A**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.027	0.014	0.65
5-Year	3.10	0.052	0.022	1.03
10-Year	<b>3.45</b>	<b>0.068</b>	<b>0.027</b>	<b>1.27</b>

**Peterkort - Starbucks - HydroCAD - North and East**

Prepared by Froelich Engineers

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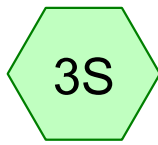
*Multi-Event Tables*

Printed 7/1/2022

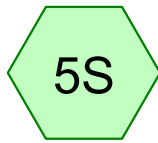
Page 13

**Events for Subcatchment 2S: N-1**

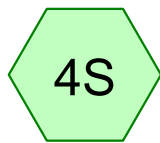
Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.036	0.012	1.38
5-Year	3.10	0.052	0.017	1.91
10-Year	<b>3.45</b>	<b>0.061</b>	<b>0.020</b>	<b>2.22</b>



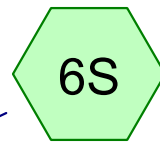
Basin B



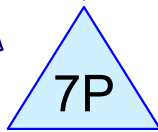
E-5



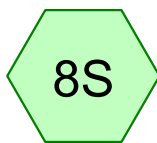
E-4



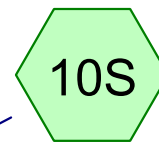
E-6



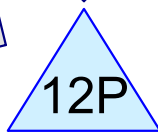
Detention - 2



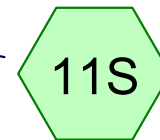
E-1



E-3

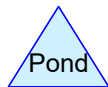
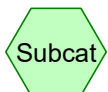


E-2



E-7

Discharge



Routing Diagram for Peterkort - Starbucks - HydroCAD - North and East

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# Peterkort - Starbucks - HydroCAD - North and East

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## Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type IA 24-hr		Default	24.00	1	2.50	2
2	5-Year	Type IA 24-hr		Default	24.00	1	3.10	2
3	10-Year	Type IA 24-hr		Default	24.00	1	3.45	2

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment3S: Basin B</b>	Runoff Area=36,284 sf   0.00% Impervious   Runoff Depth=0.65" Tc=5.0 min   CN=75   Runoff=0.088 cfs   0.045 af
<b>Subcatchment4S: E-4</b>	Runoff Area=7,500 sf   88.11% Impervious   Runoff Depth=1.96" Tc=5.0 min   CN=95   Runoff=0.089 cfs   0.028 af
<b>Subcatchment5S: E-5</b>	Runoff Area=7,797 sf   84.43% Impervious   Runoff Depth=1.87" Tc=5.0 min   CN=94   Runoff=0.088 cfs   0.028 af
<b>Subcatchment6S: E-6</b>	Runoff Area=2,677 sf   0.00% Impervious   Runoff Depth=0.61" Tc=5.0 min   CN=74   Runoff=0.006 cfs   0.003 af
<b>Pond 7P: Detention - 2</b>	Peak Elev=3.26'   Storage=0.034 af   Inflow=0.181 cfs   0.059 af Outflow=0.022 cfs   0.034 af
<b>Subcatchment8S: E-1</b>	Runoff Area=2,483 sf   100.00% Impervious   Runoff Depth=2.27" Tc=5.0 min   CN=98   Runoff=0.033 cfs   0.011 af
<b>Subcatchment9S: E-2</b>	Runoff Area=2,001 sf   100.00% Impervious   Runoff Depth=2.27" Tc=5.0 min   CN=98   Runoff=0.027 cfs   0.009 af
<b>Subcatchment10S: E-3</b>	Runoff Area=14,450 sf   96.24% Impervious   Runoff Depth=2.16" Tc=5.0 min   CN=97   Runoff=0.187 cfs   0.060 af
<b>Subcatchment11S: E-7</b>	Runoff Area=1,153 sf   90.81% Impervious   Runoff Depth=2.06" Tc=5.0 min   CN=96   Runoff=0.014 cfs   0.005 af
<b>Pond 12P: Discharge</b>	Inflow=0.273 cfs   0.118 af Primary=0.273 cfs   0.118 af

**Total Runoff Area = 1.707 ac   Runoff Volume = 0.188 af   Average Runoff Depth = 1.32"**  
**56.11% Pervious = 0.958 ac   43.89% Impervious = 0.749 ac**

**Summary for Subcatchment 3S: Basin B**

Runoff = 0.088 cfs @ 8.02 hrs, Volume= 0.045 af, Depth= 0.65"

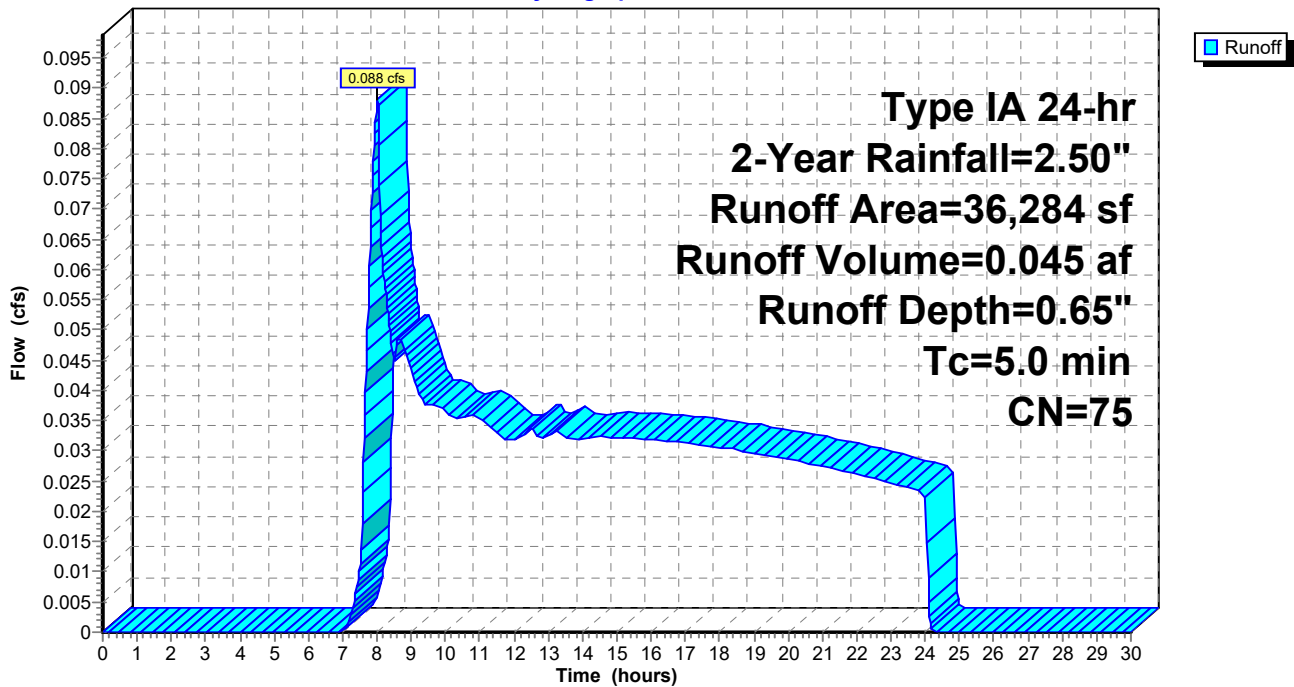
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
* 36,284	75	
36,284		100.00% Pervious Area

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

**Subcatchment 3S: Basin B**

Hydrograph



**Summary for Subcatchment 4S: E-4**

Runoff = 0.089 cfs @ 7.89 hrs, Volume= 0.028 af, Depth= 1.96"  
 Routed to Pond 7P : Detention - 2

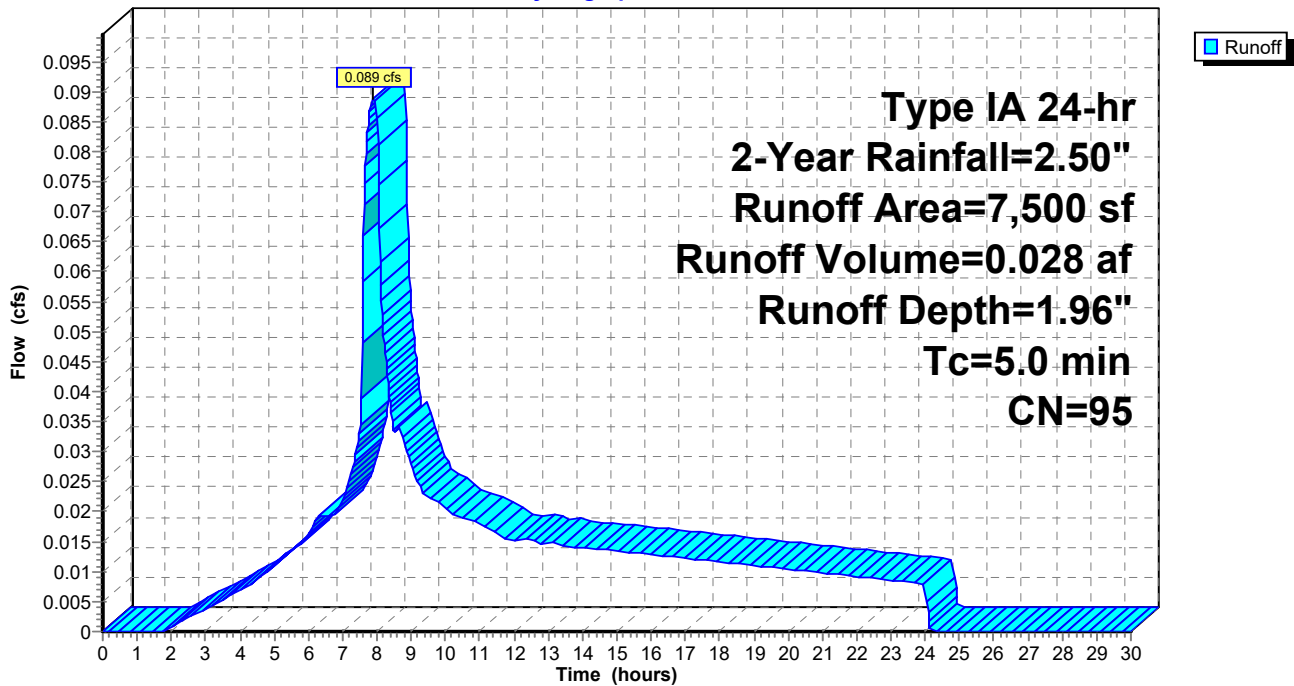
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
892	74	>75% Grass cover, Good, HSG C
2,895	98	Paved parking, HSG C
3,713	98	Paved parking, HSG C
7,500	95	Weighted Average
892		11.89% Pervious Area
6,608		88.11% Impervious Area

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

**Subcatchment 4S: E-4**

Hydrograph



**Summary for Subcatchment 5S: E-5**

Runoff = 0.088 cfs @ 7.89 hrs, Volume= 0.028 af, Depth= 1.87"  
 Routed to Pond 7P : Detention - 2

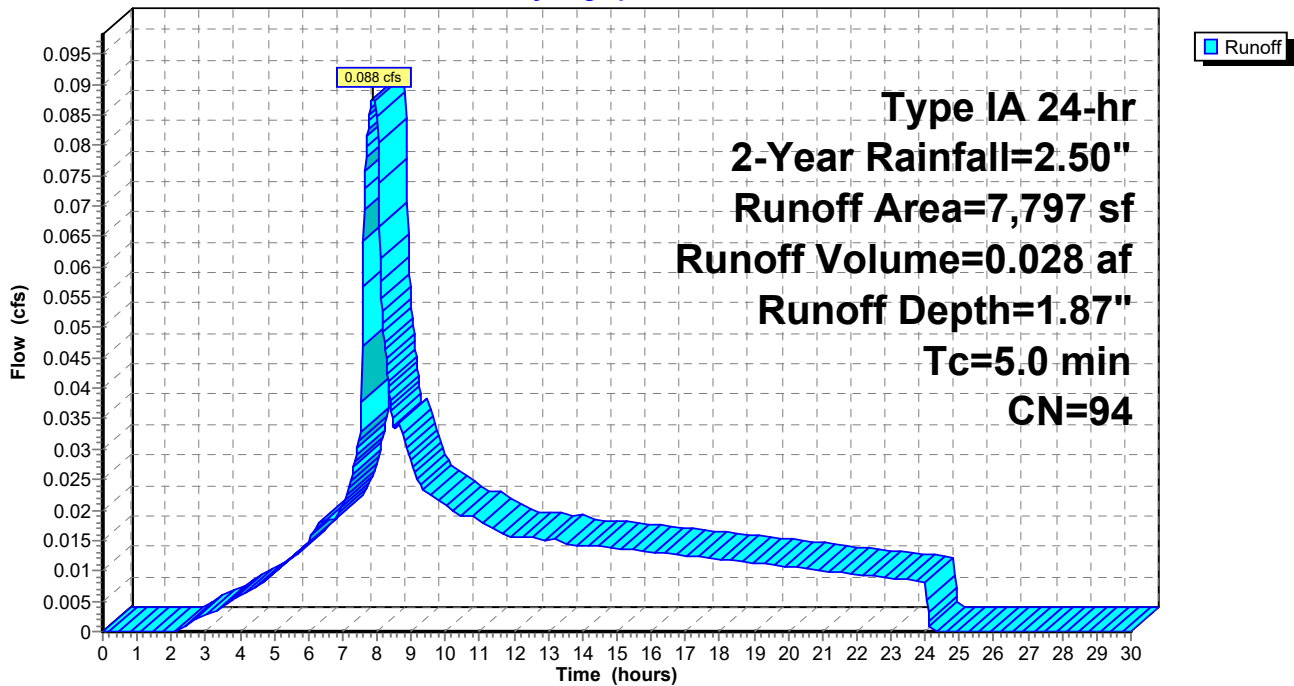
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
1,214	74	>75% Grass cover, Good, HSG C
2,605	98	Paved parking, HSG C
3,978	98	Paved parking, HSG C
7,797	94	Weighted Average
1,214		15.57% Pervious Area
6,583		84.43% Impervious Area

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

**Subcatchment 5S: E-5**

Hydrograph



**Summary for Subcatchment 6S: E-6**

Runoff = 0.006 cfs @ 8.02 hrs, Volume= 0.003 af, Depth= 0.61"  
 Routed to Pond 7P : Detention - 2

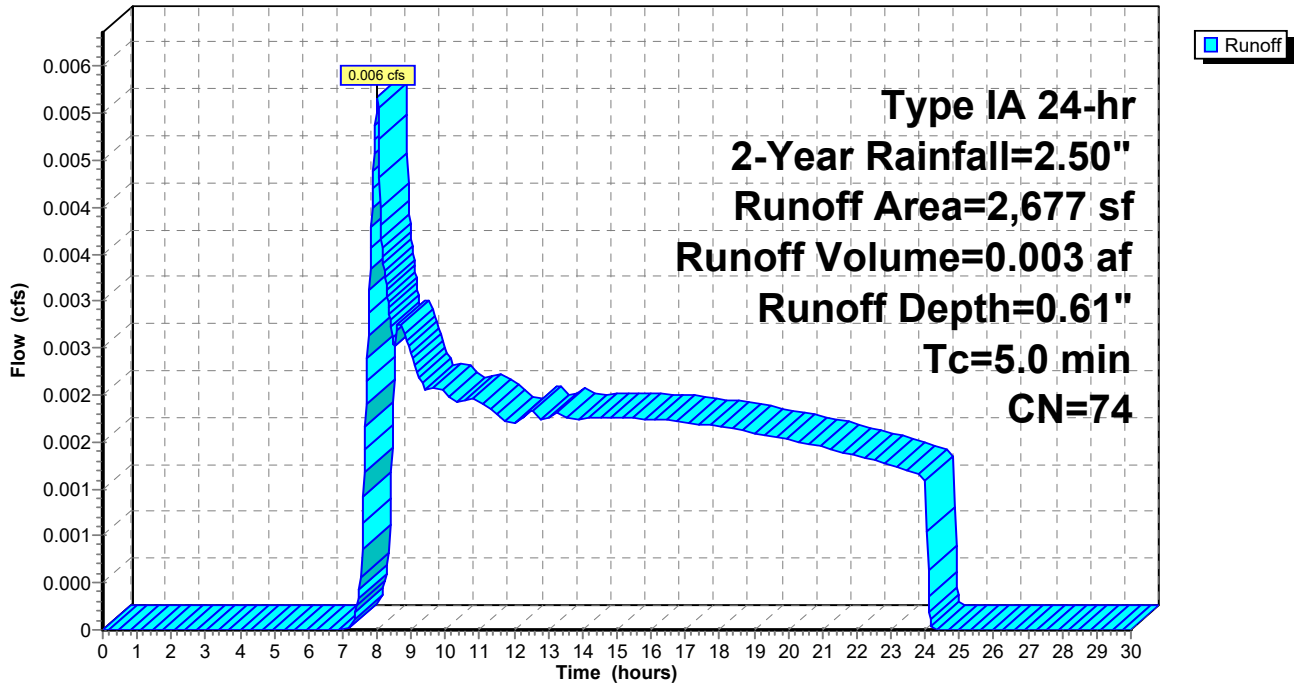
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
2,677	74	>75% Grass cover, Good, HSG C
2,677		100.00% Pervious Area

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

**Subcatchment 6S: E-6**

Hydrograph



**Summary for Pond 7P: Detention - 2**

Inflow Area = 0.413 ac, 73.39% Impervious, Inflow Depth = 1.72" for 2-Year event  
 Inflow = 0.181 cfs @ 7.90 hrs, Volume= 0.059 af  
 Outflow = 0.022 cfs @ 20.57 hrs, Volume= 0.034 af, Atten= 88%, Lag= 760.4 min  
 Primary = 0.022 cfs @ 20.57 hrs, Volume= 0.034 af  
 Routed to Pond 12P : Discharge

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Peak Elev= 3.26' @ 20.57 hrs Surf.Area= 0.017 ac Storage= 0.034 af

Plug-Flow detention time= 608.8 min calculated for 0.034 af (57% of inflow)  
 Center-of-Mass det. time= 369.8 min ( 1,098.9 - 729.1 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.016 af	<b>11.00'W x 67.70'L x 3.50'H Field A</b> 0.060 af Overall - 0.019 af Embedded = 0.041 af x 40.0% Voids
#2A	0.50'	0.019 af	<b>ADS_StormTech SC-740 +Cap</b> x 18 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56"L with 0.44' Overlap 18 Chambers in 2 Rows
		0.035 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>0.625" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#2	Primary	3.25'	<b>8.000" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.022 cfs @ 20.57 hrs HW=3.26' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 0.019 cfs @ 8.688 fps)  
 2=Orifice/Grate (Weir Controls 0.003 cfs @ 0.253 fps)

**Pond 7P: Detention - 2 - Chamber Wizard Field A**

**Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +12.0" End Stone x 2 = 67.70' Base Length

2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,606.3 cf Field - 826.9 cf Chambers = 1,779.4 cf Stone x 40.0% Voids = 711.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,538.7 cf = 0.035 af

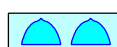
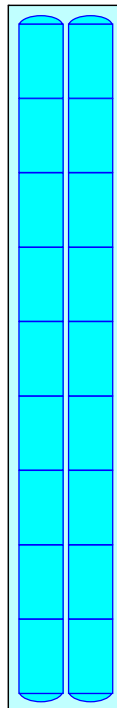
Overall Storage Efficiency = 59.0%

Overall System Size = 67.70' x 11.00' x 3.50'

18 Chambers

96.5 cy Field

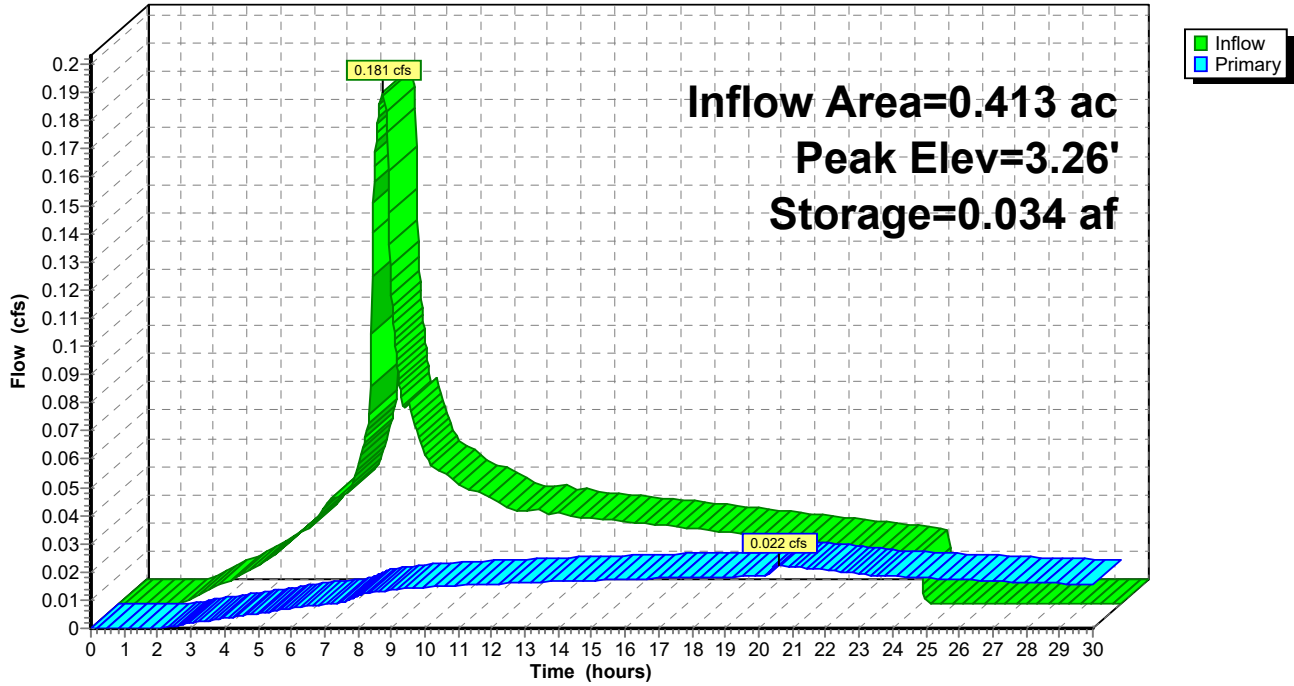
65.9 cy Stone





### Pond 7P: Detention - 2

Hydrograph



**Summary for Subcatchment 8S: E-1**

Runoff = 0.033 cfs @ 7.86 hrs, Volume= 0.011 af, Depth= 2.27"  
 Routed to Pond 12P : Discharge

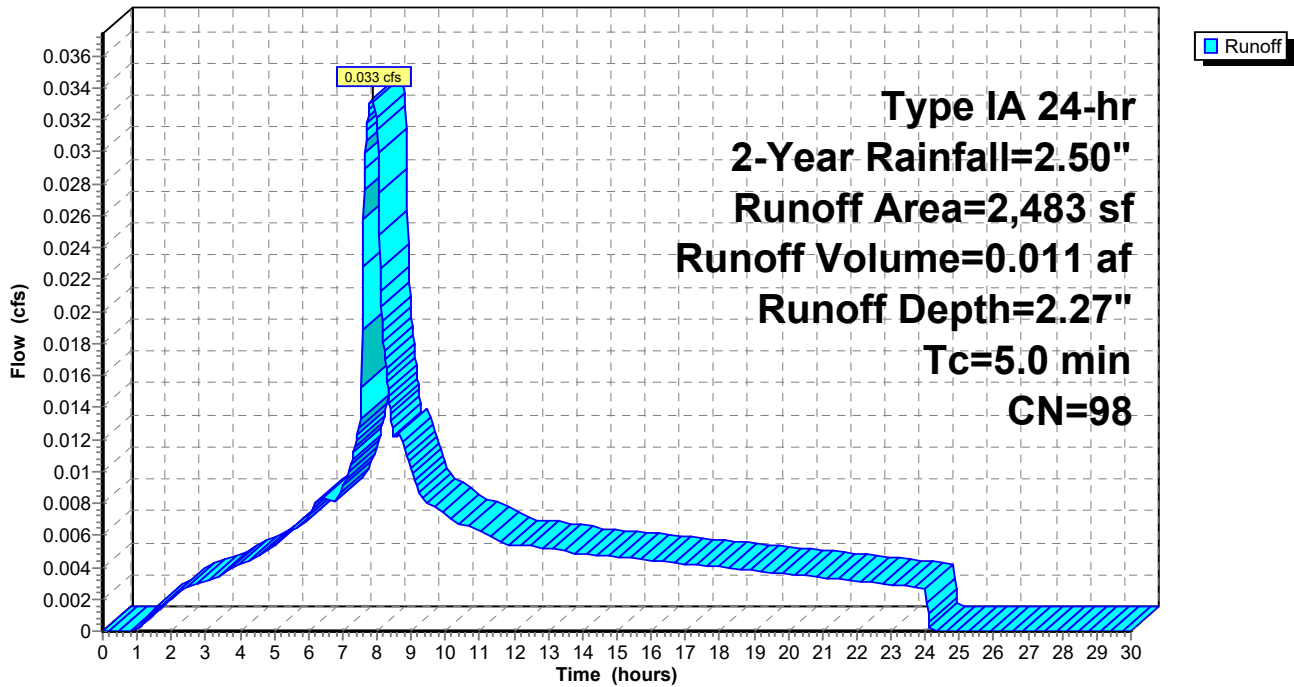
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
2,483	98	Unconnected roofs, HSG C
2,483		100.00% Impervious Area
2,483		100.00% Unconnected

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

**Subcatchment 8S: E-1**

Hydrograph



**Summary for Subcatchment 9S: E-2**

Runoff = 0.027 cfs @ 7.86 hrs, Volume= 0.009 af, Depth= 2.27"  
 Routed to Pond 12P : Discharge

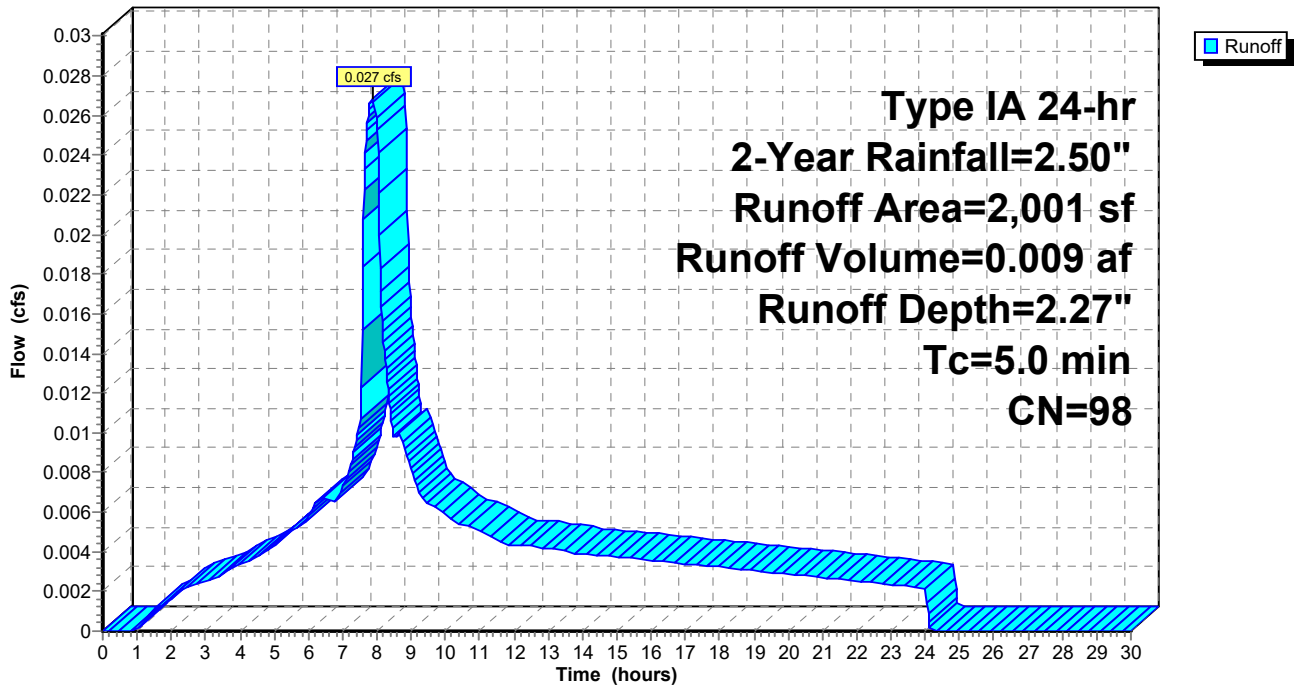
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
2,001	98	Unconnected roofs, HSG C
2,001		100.00% Impervious Area
2,001		100.00% Unconnected

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

**Subcatchment 9S: E-2**

Hydrograph



**Summary for Subcatchment 10S: E-3**

Runoff = 0.187 cfs @ 7.87 hrs, Volume= 0.060 af, Depth= 2.16"  
 Routed to Pond 12P : Discharge

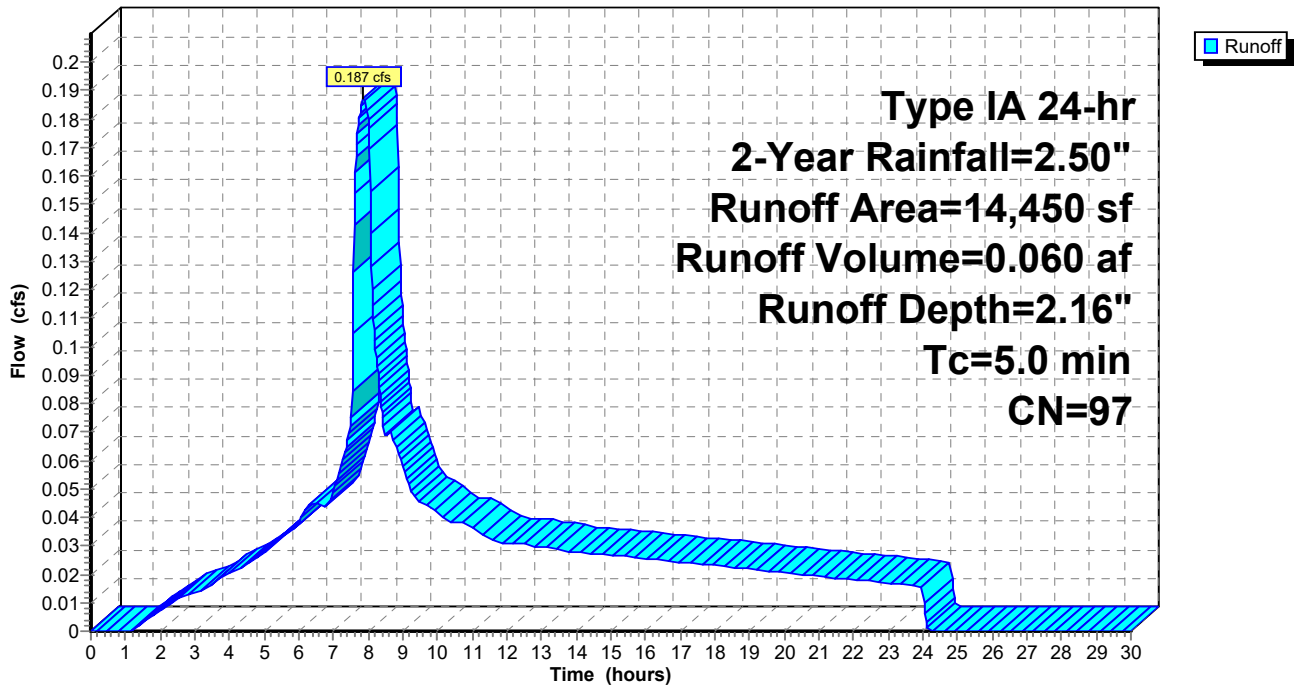
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
543	74	>75% Grass cover, Good, HSG C
13,907	98	Paved parking, HSG C
14,450	97	Weighted Average
543		3.76% Pervious Area
13,907		96.24% Impervious Area

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

**Subcatchment 10S: E-3**

Hydrograph



**Summary for Subcatchment 11S: E-7**

Runoff = 0.014 cfs @ 7.88 hrs, Volume= 0.005 af, Depth= 2.06"  
 Routed to Pond 12P : Discharge

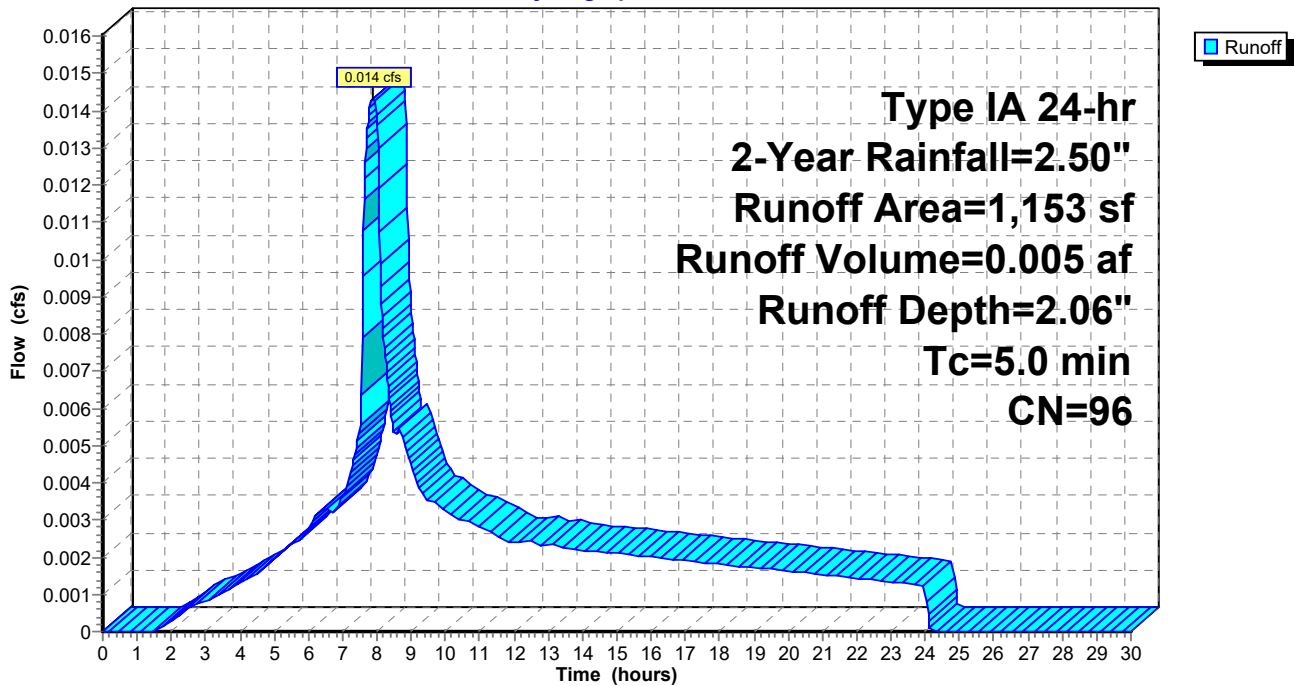
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
106	74	>75% Grass cover, Good, HSG C
1,047	98	Unconnected pavement, HSG C
1,153	96	Weighted Average
106		9.19% Pervious Area
1,047		90.81% Impervious Area
1,047		100.00% Unconnected

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

**Subcatchment 11S: E-7**

Hydrograph



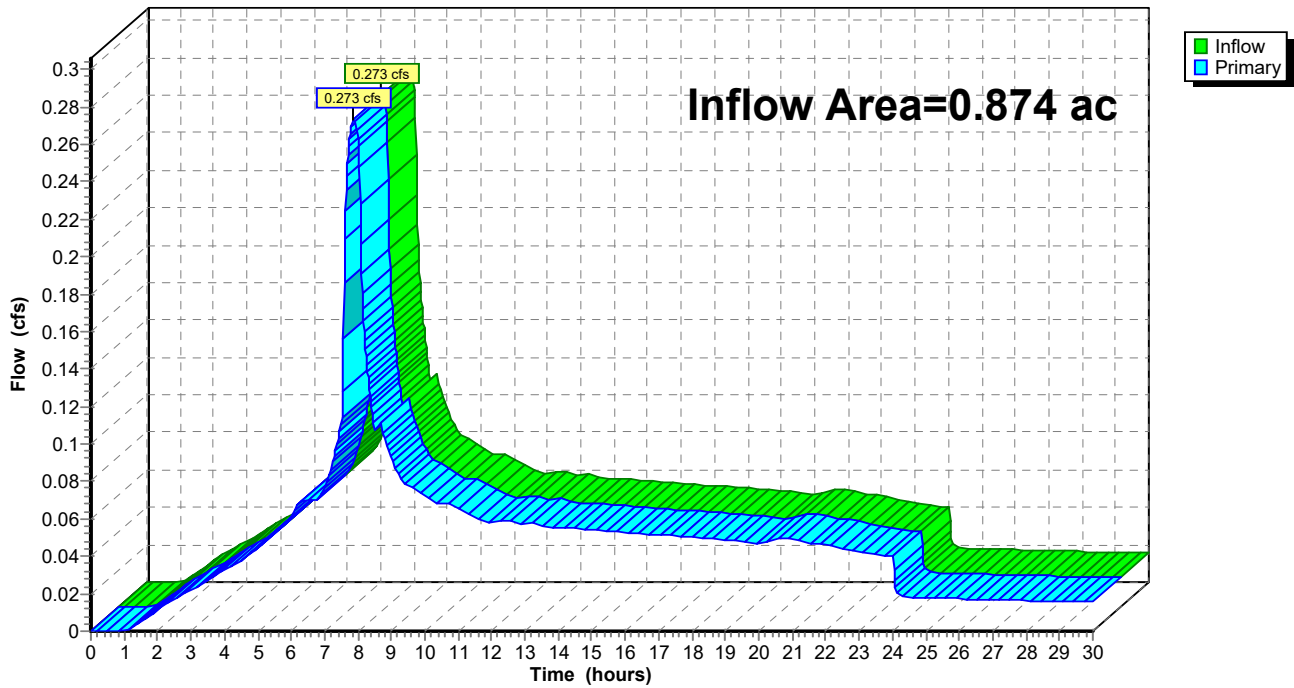
### Summary for Pond 12P: Discharge

Inflow Area = 0.874 ac, 85.73% Impervious, Inflow Depth > 1.62" for 2-Year event  
Inflow = 0.273 cfs @ 7.87 hrs, Volume= 0.118 af  
Primary = 0.273 cfs @ 7.87 hrs, Volume= 0.118 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

### Pond 12P: Discharge

Hydrograph



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment3S: Basin B</b>	Runoff Area=36,284 sf   0.00% Impervious   Runoff Depth=1.03" Tc=5.0 min   CN=75   Runoff=0.167 cfs   0.071 af
<b>Subcatchment4S: E-4</b>	Runoff Area=7,500 sf   88.11% Impervious   Runoff Depth=2.55" Tc=5.0 min   CN=95   Runoff=0.115 cfs   0.037 af
<b>Subcatchment5S: E-5</b>	Runoff Area=7,797 sf   84.43% Impervious   Runoff Depth=2.45" Tc=5.0 min   CN=94   Runoff=0.115 cfs   0.036 af
<b>Subcatchment6S: E-6</b>	Runoff Area=2,677 sf   0.00% Impervious   Runoff Depth=0.97" Tc=5.0 min   CN=74   Runoff=0.011 cfs   0.005 af
<b>Pond 7P: Detention - 2</b>	Peak Elev=3.27'   Storage=0.034 af   Inflow=0.241 cfs   0.078 af Outflow=0.050 cfs   0.053 af
<b>Subcatchment8S: E-1</b>	Runoff Area=2,483 sf   100.00% Impervious   Runoff Depth=2.87" Tc=5.0 min   CN=98   Runoff=0.042 cfs   0.014 af
<b>Subcatchment9S: E-2</b>	Runoff Area=2,001 sf   100.00% Impervious   Runoff Depth=2.87" Tc=5.0 min   CN=98   Runoff=0.034 cfs   0.011 af
<b>Subcatchment10S: E-3</b>	Runoff Area=14,450 sf   96.24% Impervious   Runoff Depth=2.76" Tc=5.0 min   CN=97   Runoff=0.237 cfs   0.076 af
<b>Subcatchment11S: E-7</b>	Runoff Area=1,153 sf   90.81% Impervious   Runoff Depth=2.65" Tc=5.0 min   CN=96   Runoff=0.018 cfs   0.006 af
<b>Pond 12P: Discharge</b>	Inflow=0.344 cfs   0.159 af Primary=0.344 cfs   0.159 af

**Total Runoff Area = 1.707 ac   Runoff Volume = 0.256 af   Average Runoff Depth = 1.80"**  
**56.11% Pervious = 0.958 ac   43.89% Impervious = 0.749 ac**

**Summary for Subcatchment 3S: Basin B**

Runoff = 0.167 cfs @ 8.01 hrs, Volume= 0.071 af, Depth= 1.03"

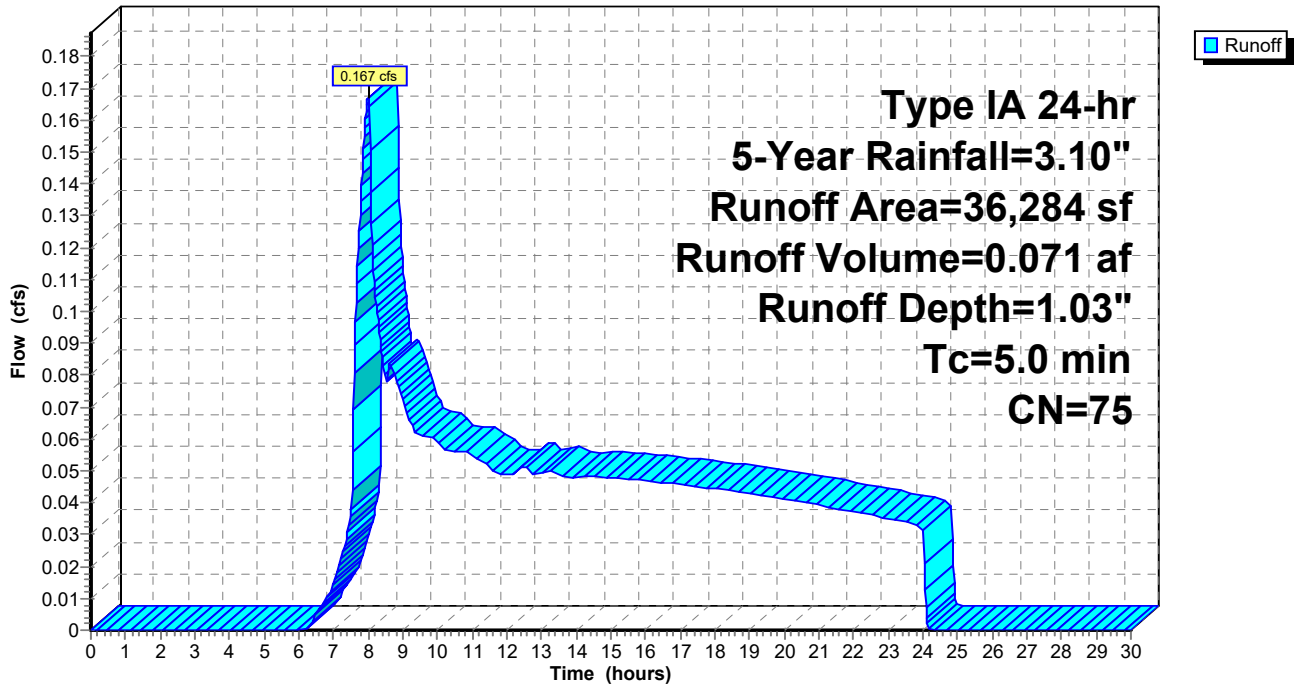
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
* 36,284	75	
36,284		100.00% Pervious Area

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

**Subcatchment 3S: Basin B**

Hydrograph





**Summary for Subcatchment 4S: E-4**

Runoff = 0.115 cfs @ 7.88 hrs, Volume= 0.037 af, Depth= 2.55"  
 Routed to Pond 7P : Detention - 2

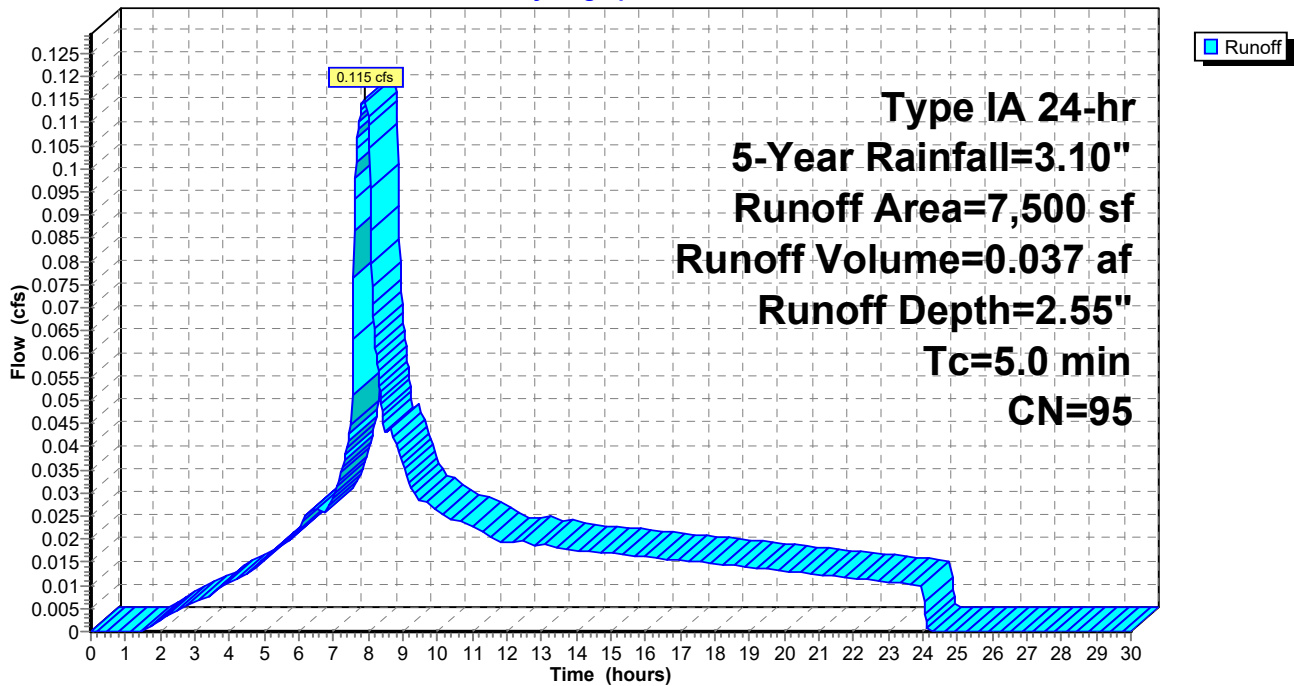
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
892	74	>75% Grass cover, Good, HSG C
2,895	98	Paved parking, HSG C
3,713	98	Paved parking, HSG C
7,500	95	Weighted Average
892		11.89% Pervious Area
6,608		88.11% Impervious Area

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

**Subcatchment 4S: E-4**

Hydrograph



**Summary for Subcatchment 5S: E-5**

Runoff = 0.115 cfs @ 7.89 hrs, Volume= 0.036 af, Depth= 2.45"  
 Routed to Pond 7P : Detention - 2

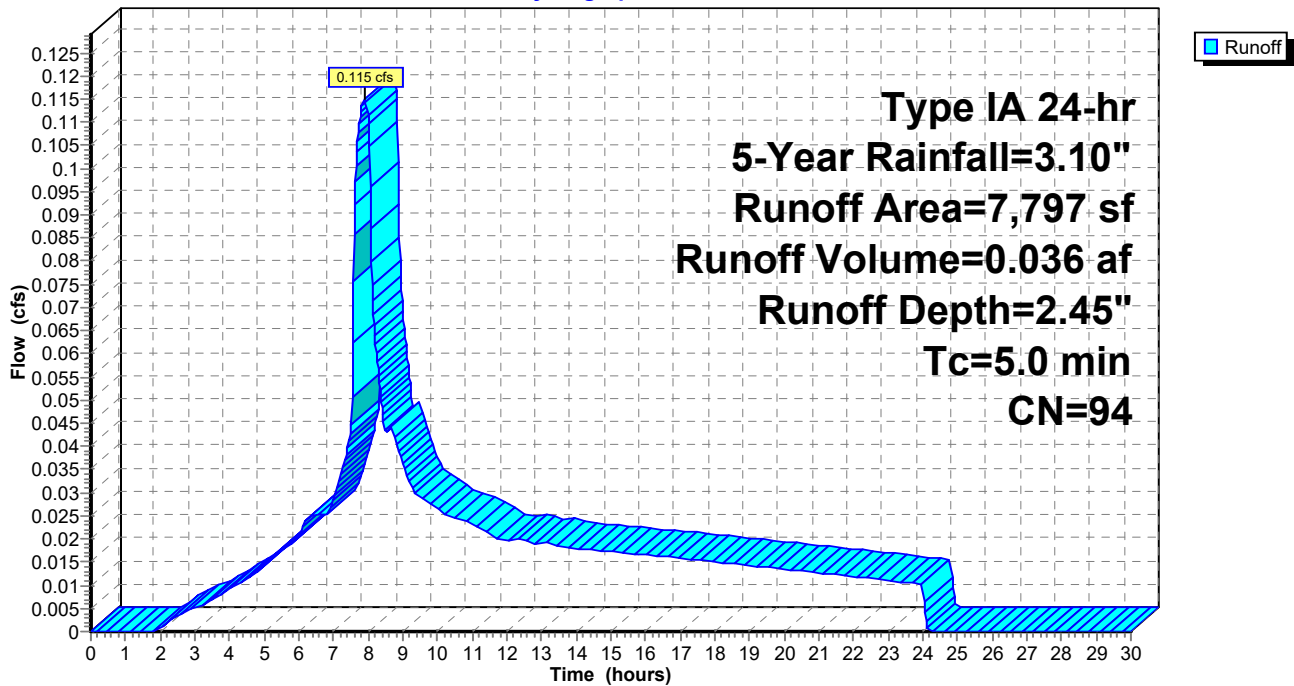
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
1,214	74	>75% Grass cover, Good, HSG C
2,605	98	Paved parking, HSG C
3,978	98	Paved parking, HSG C
7,797	94	Weighted Average
1,214		15.57% Pervious Area
6,583		84.43% Impervious Area

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

**Subcatchment 5S: E-5**

Hydrograph



**Summary for Subcatchment 6S: E-6**

Runoff = 0.011 cfs @ 8.01 hrs, Volume= 0.005 af, Depth= 0.97"  
 Routed to Pond 7P : Detention - 2

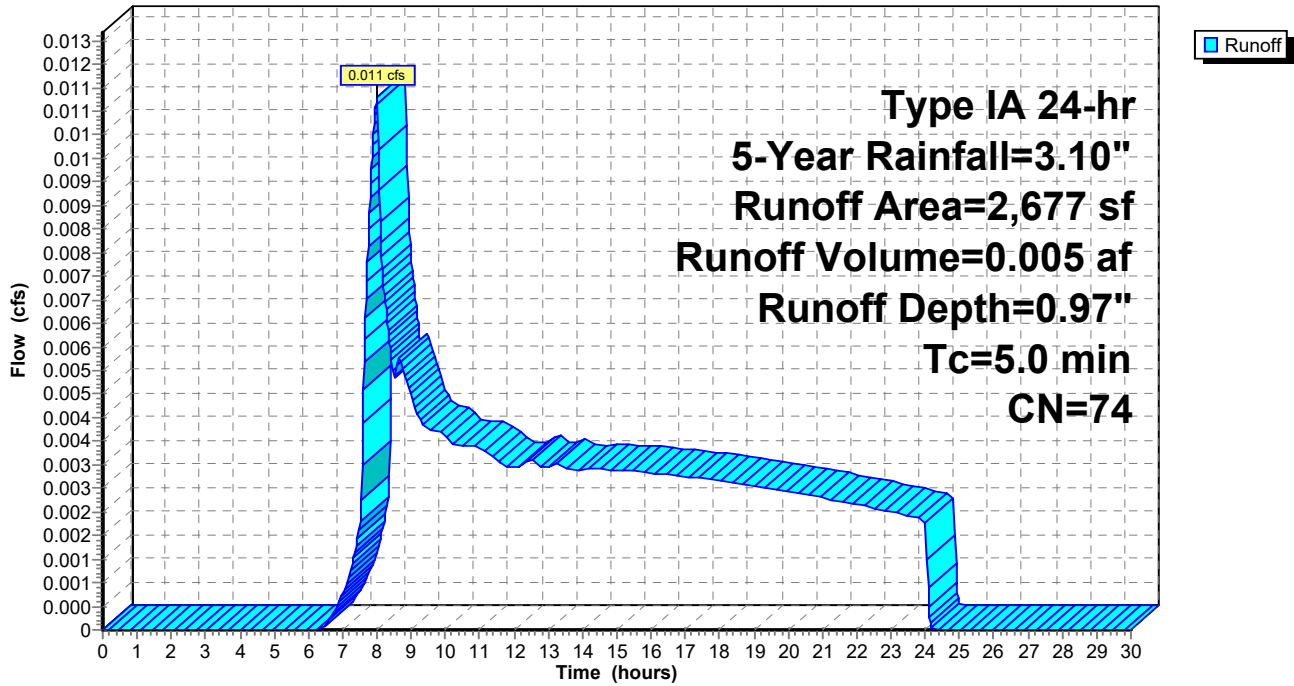
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
2,677	74	>75% Grass cover, Good, HSG C
2,677		100.00% Pervious Area

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

**Subcatchment 6S: E-6**

Hydrograph



**Summary for Pond 7P: Detention - 2**

Inflow Area = 0.413 ac, 73.39% Impervious, Inflow Depth = 2.27" for 5-Year event  
 Inflow = 0.241 cfs @ 7.89 hrs, Volume= 0.078 af  
 Outflow = 0.050 cfs @ 11.01 hrs, Volume= 0.053 af, Atten= 79%, Lag= 187.3 min  
 Primary = 0.050 cfs @ 11.01 hrs, Volume= 0.053 af  
 Routed to Pond 12P : Discharge

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Peak Elev= 3.27' @ 11.01 hrs Surf.Area= 0.017 ac Storage= 0.034 af

Plug-Flow detention time= 502.5 min calculated for 0.053 af (67% of inflow)  
 Center-of-Mass det. time= 308.4 min ( 1,025.9 - 717.5 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.016 af	<b>11.00"W x 67.70"L x 3.50"H Field A</b> 0.060 af Overall - 0.019 af Embedded = 0.041 af x 40.0% Voids
#2A	0.50'	0.019 af	<b>ADS_StormTech SC-740 +Cap</b> x 18 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56"L with 0.44' Overlap 18 Chambers in 2 Rows
		0.035 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>0.625" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#2	Primary	3.25'	<b>8.000" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.044 cfs @ 11.01 hrs HW=3.27' (Free Discharge)  
 ↖ **1=Orifice/Grate** (Orifice Controls 0.019 cfs @ 8.713 fps)  
 ↘ **2=Orifice/Grate** (Weir Controls 0.026 cfs @ 0.509 fps)

**Pond 7P: Detention - 2 - Chamber Wizard Field A**

**Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +12.0" End Stone x 2 = 67.70' Base Length

2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,606.3 cf Field - 826.9 cf Chambers = 1,779.4 cf Stone x 40.0% Voids = 711.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,538.7 cf = 0.035 af

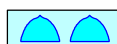
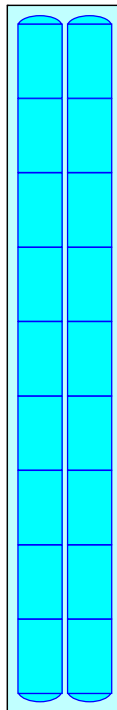
Overall Storage Efficiency = 59.0%

Overall System Size = 67.70' x 11.00' x 3.50'

18 Chambers

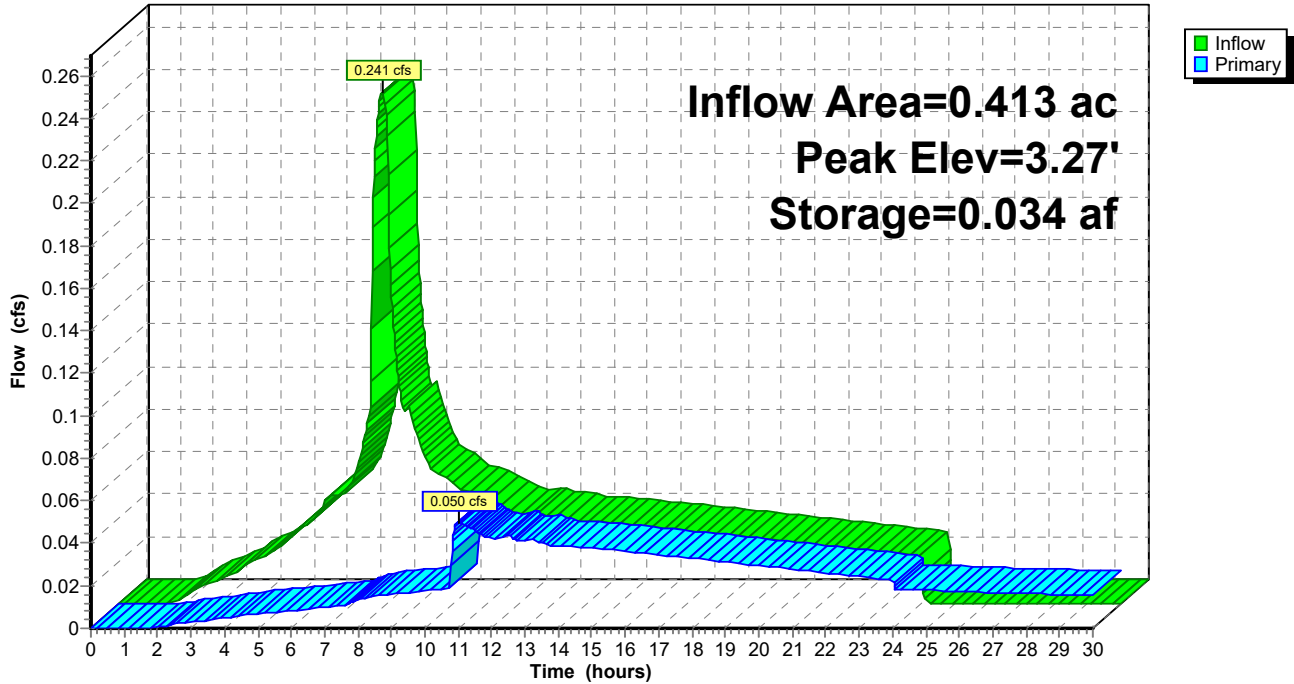
96.5 cy Field

65.9 cy Stone



### Pond 7P: Detention - 2

Hydrograph



**Summary for Subcatchment 8S: E-1**

Runoff = 0.042 cfs @ 7.86 hrs, Volume= 0.014 af, Depth= 2.87"  
 Routed to Pond 12P : Discharge

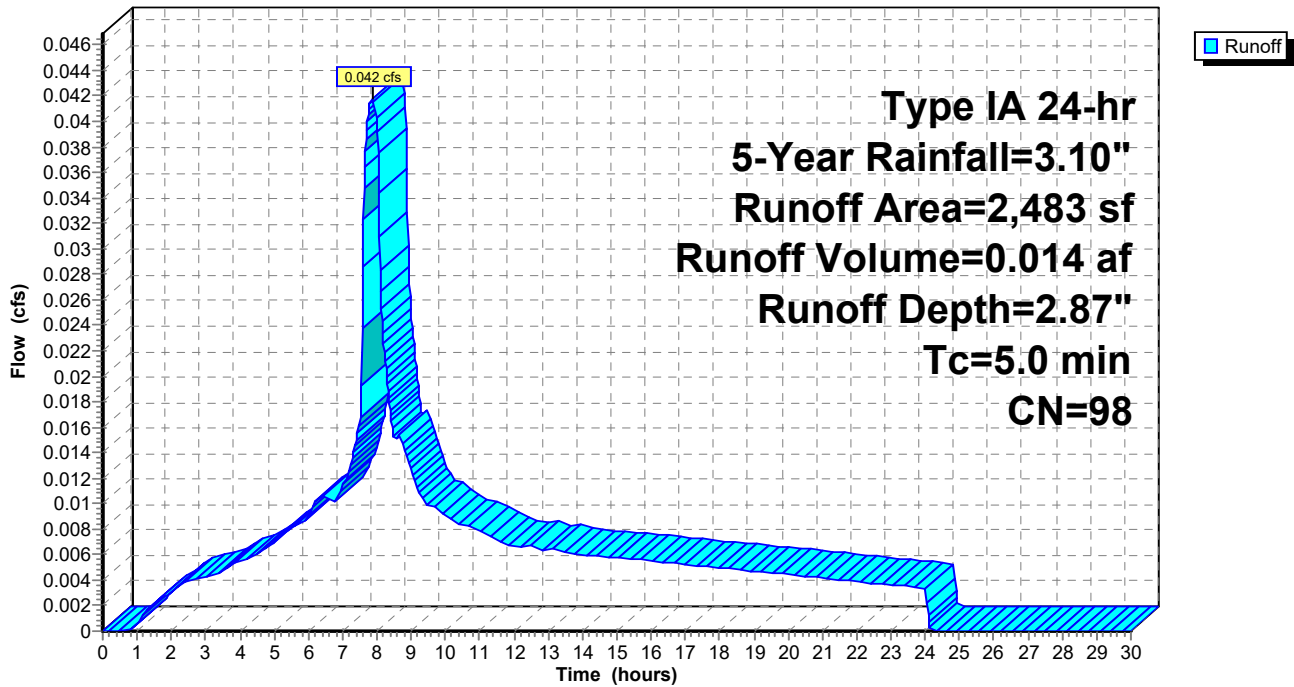
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
2,483	98	Unconnected roofs, HSG C
2,483		100.00% Impervious Area
2,483		100.00% Unconnected

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

**Subcatchment 8S: E-1**

Hydrograph



**Summary for Subcatchment 9S: E-2**

Runoff = 0.034 cfs @ 7.86 hrs, Volume= 0.011 af, Depth= 2.87"  
 Routed to Pond 12P : Discharge

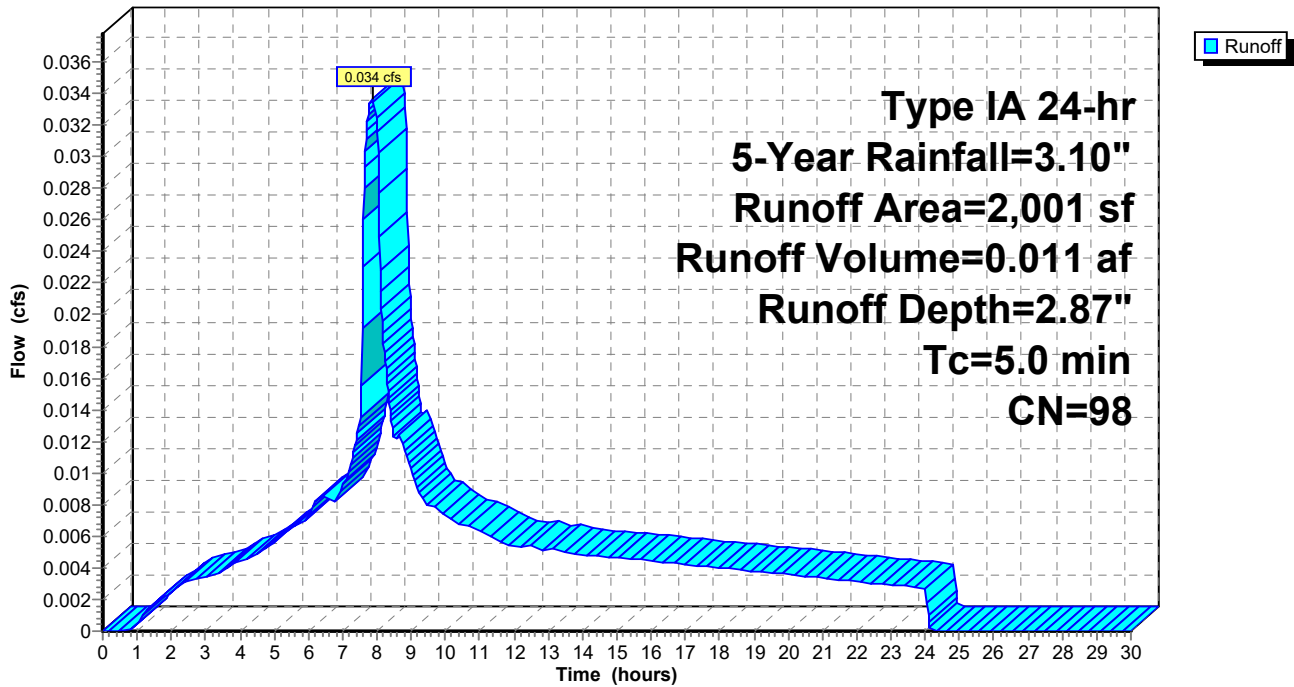
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
2,001	98	Unconnected roofs, HSG C
2,001		100.00% Impervious Area
2,001		100.00% Unconnected

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

**Subcatchment 9S: E-2**

Hydrograph





**Summary for Subcatchment 10S: E-3**

Runoff = 0.237 cfs @ 7.86 hrs, Volume= 0.076 af, Depth= 2.76"  
 Routed to Pond 12P : Discharge

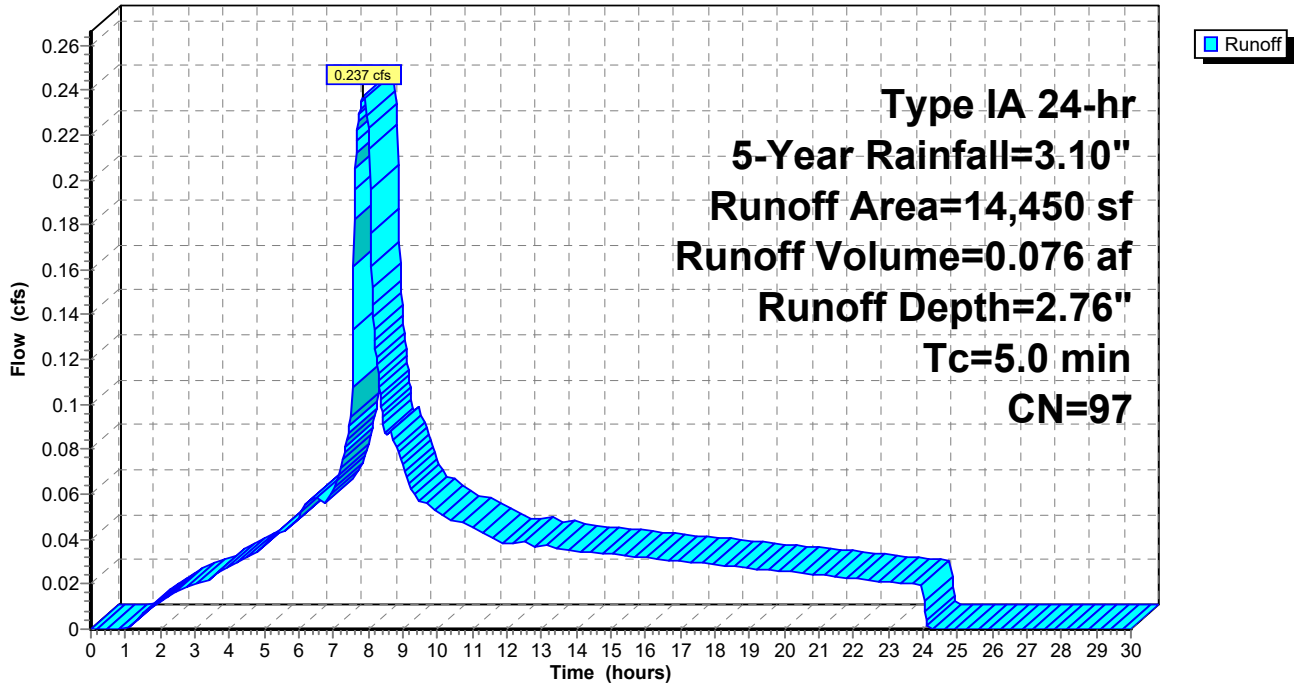
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
543	74	>75% Grass cover, Good, HSG C
13,907	98	Paved parking, HSG C
14,450	97	Weighted Average
543		3.76% Pervious Area
13,907		96.24% Impervious Area

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

**Subcatchment 10S: E-3**

Hydrograph



**Summary for Subcatchment 11S: E-7**

Runoff = 0.018 cfs @ 7.87 hrs, Volume= 0.006 af, Depth= 2.65"  
 Routed to Pond 12P : Discharge

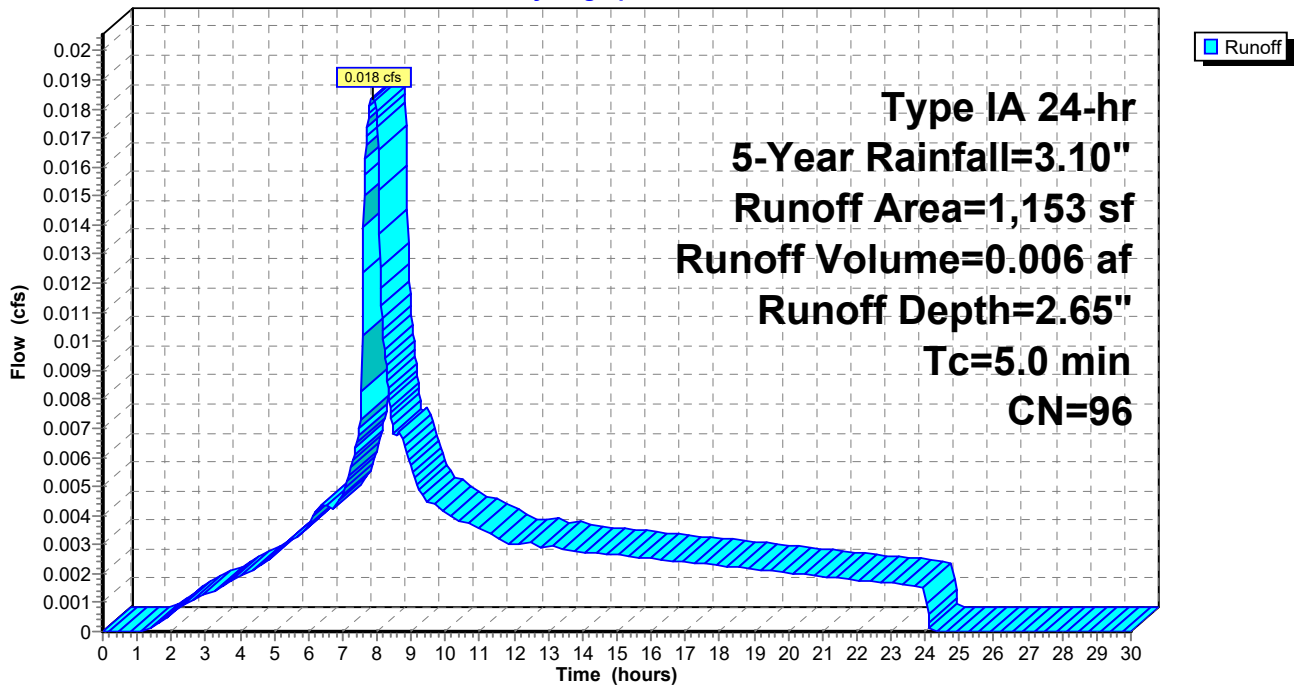
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
106	74	>75% Grass cover, Good, HSG C
1,047	98	Unconnected pavement, HSG C
1,153	96	Weighted Average
106		9.19% Pervious Area
1,047		90.81% Impervious Area
1,047		100.00% Unconnected

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

**Subcatchment 11S: E-7**

Hydrograph



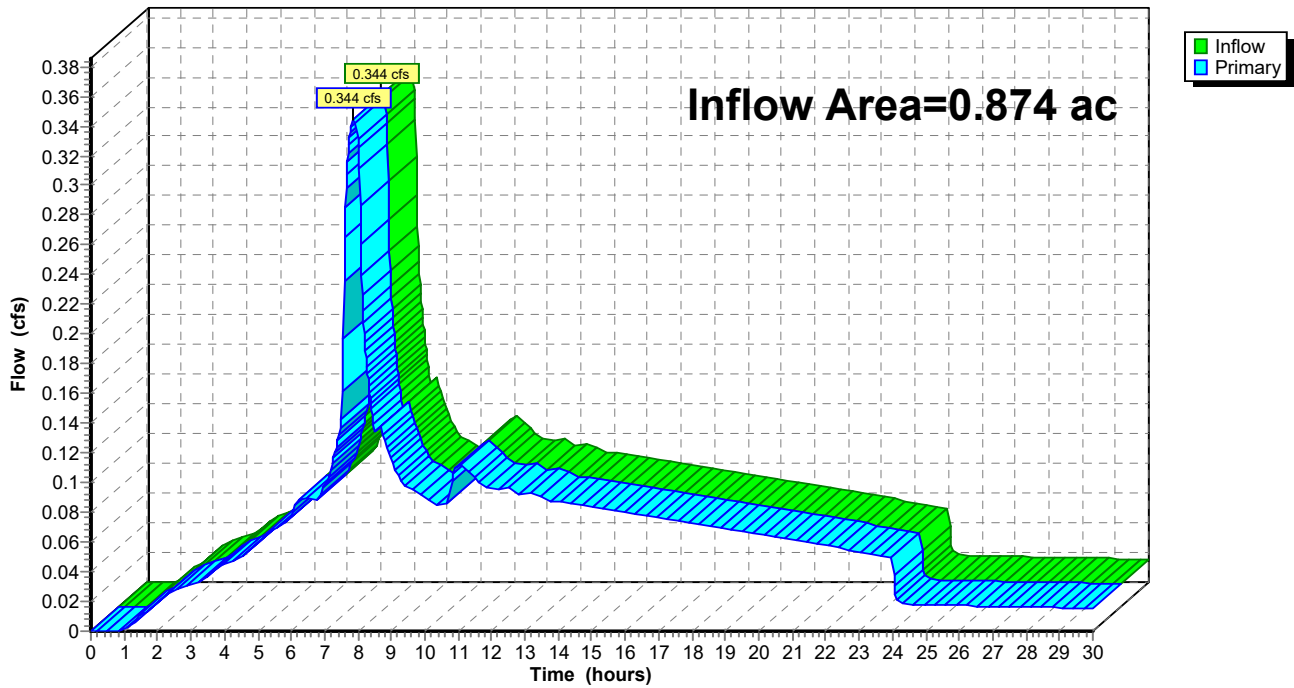
### Summary for Pond 12P: Discharge

Inflow Area = 0.874 ac, 85.73% Impervious, Inflow Depth > 2.19" for 5-Year event  
Inflow = 0.344 cfs @ 7.87 hrs, Volume= 0.159 af  
Primary = 0.344 cfs @ 7.87 hrs, Volume= 0.159 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

### Pond 12P: Discharge

Hydrograph



Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment3S: Basin B</b>	Runoff Area=36,284 sf 0.00% Impervious Runoff Depth=1.27" Tc=5.0 min CN=75 Runoff=0.219 cfs 0.088 af
<b>Subcatchment4S: E-4</b>	Runoff Area=7,500 sf 88.11% Impervious Runoff Depth=2.89" Tc=5.0 min CN=95 Runoff=0.131 cfs 0.041 af
<b>Subcatchment5S: E-5</b>	Runoff Area=7,797 sf 84.43% Impervious Runoff Depth=2.79" Tc=5.0 min CN=94 Runoff=0.131 cfs 0.042 af
<b>Subcatchment6S: E-6</b>	Runoff Area=2,677 sf 0.00% Impervious Runoff Depth=1.21" Tc=5.0 min CN=74 Runoff=0.015 cfs 0.006 af
<b>Pond 7P: Detention - 2</b>	Peak Elev=3.29' Storage=0.034 af Inflow=0.276 cfs 0.089 af Outflow=0.070 cfs 0.064 af
<b>Subcatchment8S: E-1</b>	Runoff Area=2,483 sf 100.00% Impervious Runoff Depth=3.22" Tc=5.0 min CN=98 Runoff=0.047 cfs 0.015 af
<b>Subcatchment9S: E-2</b>	Runoff Area=2,001 sf 100.00% Impervious Runoff Depth=3.22" Tc=5.0 min CN=98 Runoff=0.038 cfs 0.012 af
<b>Subcatchment10S: E-3</b>	Runoff Area=14,450 sf 96.24% Impervious Runoff Depth=3.10" Tc=5.0 min CN=97 Runoff=0.266 cfs 0.086 af
<b>Subcatchment11S: E-7</b>	Runoff Area=1,153 sf 90.81% Impervious Runoff Depth=3.00" Tc=5.0 min CN=96 Runoff=0.021 cfs 0.007 af
<b>Pond 12P: Discharge</b>	Inflow=0.385 cfs 0.184 af Primary=0.385 cfs 0.184 af

**Total Runoff Area = 1.707 ac Runoff Volume = 0.297 af Average Runoff Depth = 2.09"**  
**56.11% Pervious = 0.958 ac 43.89% Impervious = 0.749 ac**

**Summary for Subcatchment 3S: Basin B**

Runoff = 0.219 cfs @ 8.00 hrs, Volume= 0.088 af, Depth= 1.27"

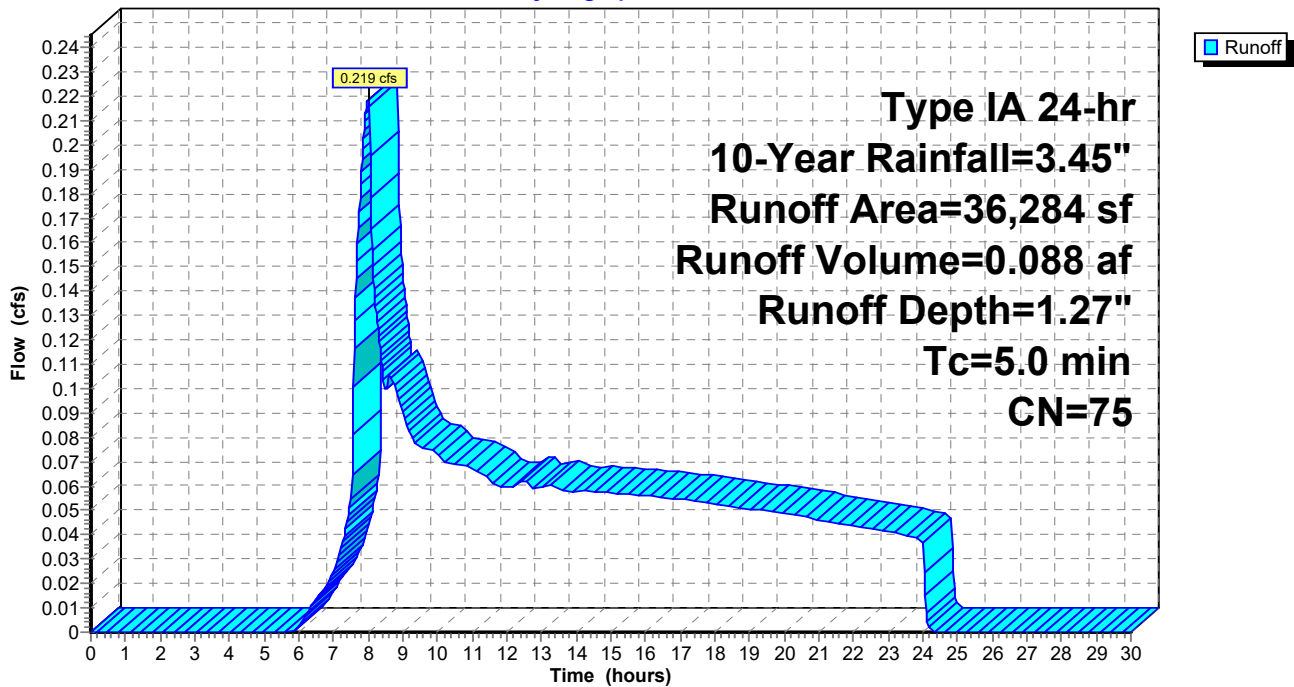
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
* 36,284	75	
36,284		100.00% Pervious Area

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

**Subcatchment 3S: Basin B**

Hydrograph



**Summary for Subcatchment 4S: E-4**

Runoff = 0.131 cfs @ 7.87 hrs, Volume= 0.041 af, Depth= 2.89"  
 Routed to Pond 7P : Detention - 2

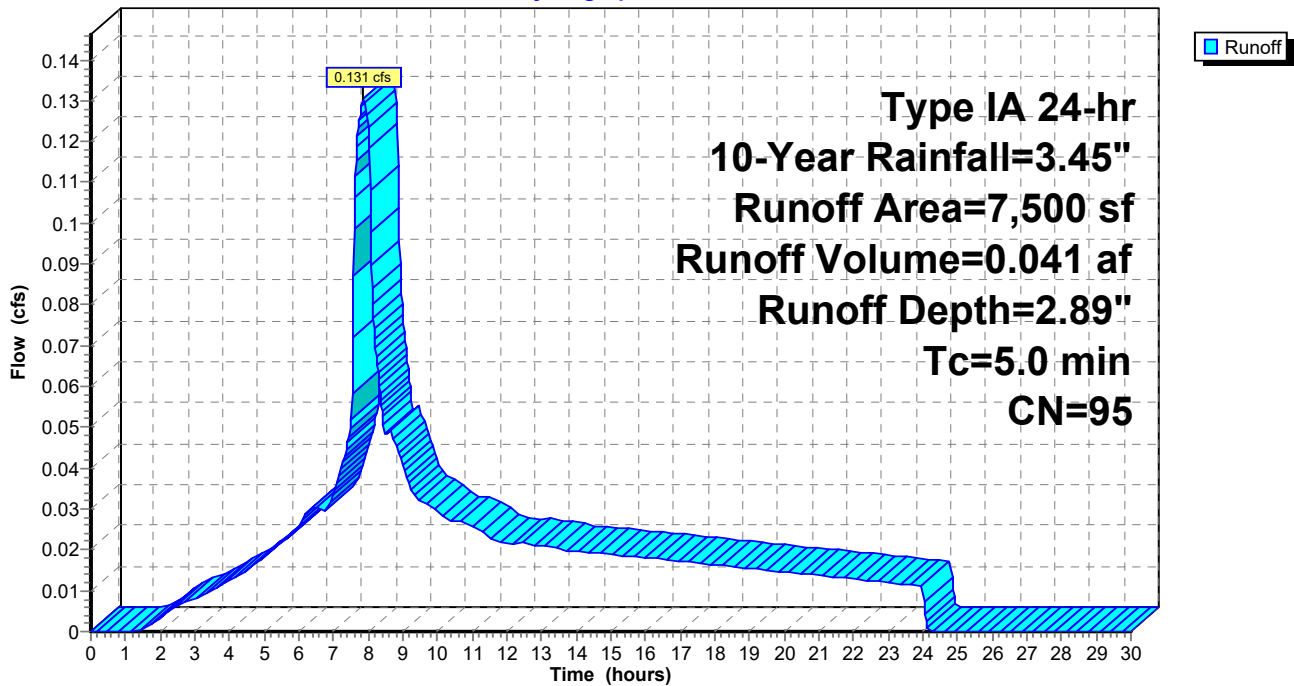
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
892	74	>75% Grass cover, Good, HSG C
2,895	98	Paved parking, HSG C
3,713	98	Paved parking, HSG C
7,500	95	Weighted Average
892		11.89% Pervious Area
6,608		88.11% Impervious Area

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

**Subcatchment 4S: E-4**

Hydrograph



**Summary for Subcatchment 5S: E-5**

Runoff = 0.131 cfs @ 7.88 hrs, Volume= 0.042 af, Depth= 2.79"  
 Routed to Pond 7P : Detention - 2

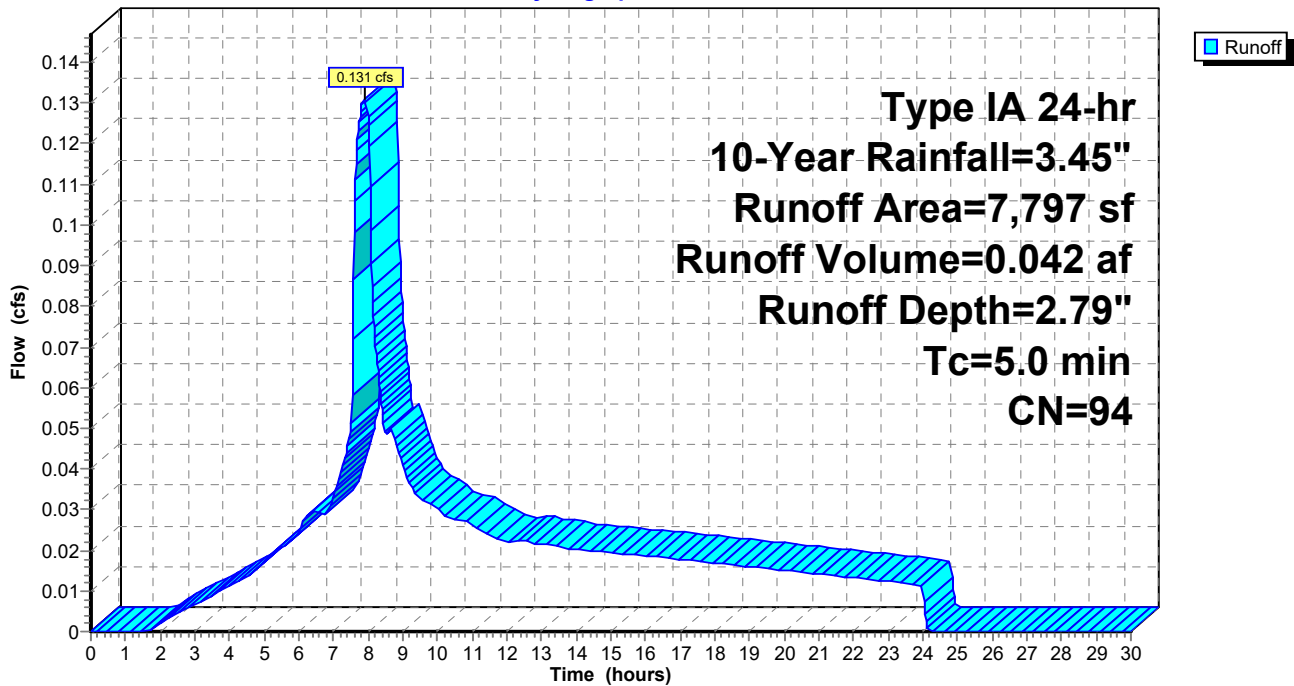
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
1,214	74	>75% Grass cover, Good, HSG C
2,605	98	Paved parking, HSG C
3,978	98	Paved parking, HSG C
7,797	94	Weighted Average
1,214		15.57% Pervious Area
6,583		84.43% Impervious Area

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

**Subcatchment 5S: E-5**

Hydrograph



**Summary for Subcatchment 6S: E-6**

Runoff = 0.015 cfs @ 8.00 hrs, Volume= 0.006 af, Depth= 1.21"  
 Routed to Pond 7P : Detention - 2

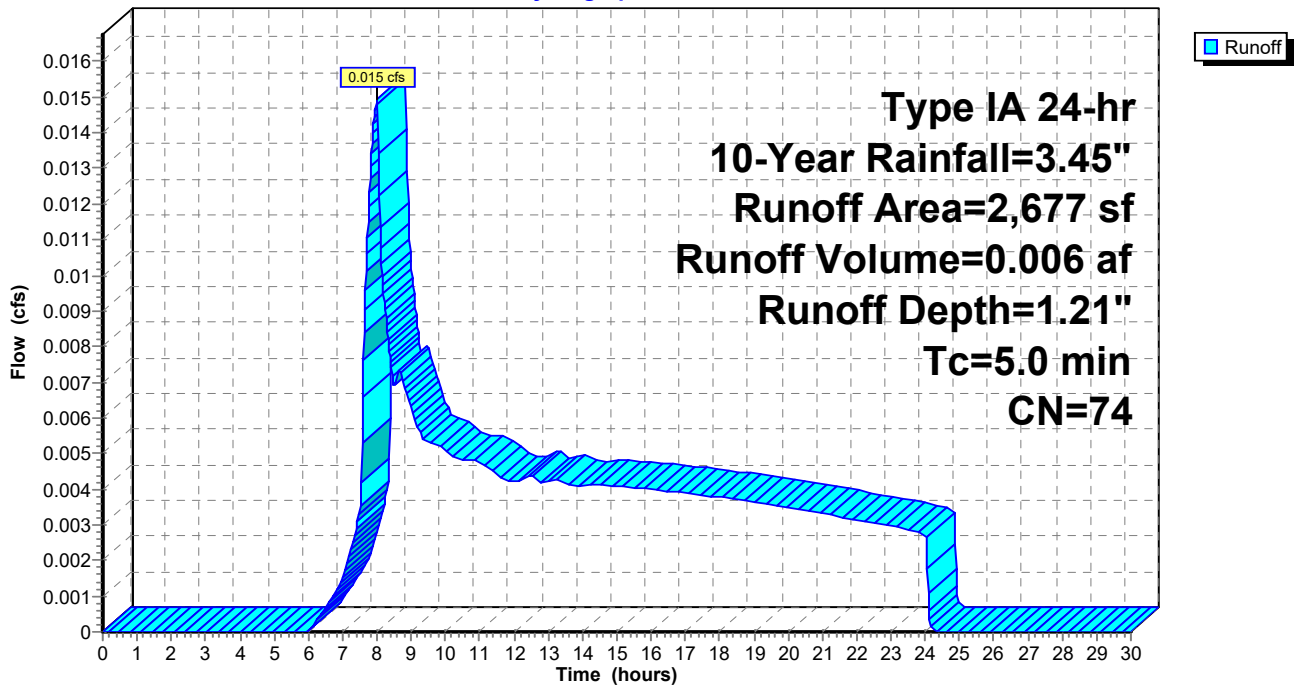
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
2,677	74	>75% Grass cover, Good, HSG C
2,677		100.00% Pervious Area

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

**Subcatchment 6S: E-6**

Hydrograph





**Summary for Pond 7P: Detention - 2**

Inflow Area = 0.413 ac, 73.39% Impervious, Inflow Depth = 2.59" for 10-Year event  
 Inflow = 0.276 cfs @ 7.89 hrs, Volume= 0.089 af  
 Outflow = 0.070 cfs @ 9.47 hrs, Volume= 0.064 af, Atten= 75%, Lag= 95.1 min  
 Primary = 0.070 cfs @ 9.47 hrs, Volume= 0.064 af  
 Routed to Pond 12P : Discharge

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Peak Elev= 3.29' @ 9.47 hrs Surf.Area= 0.017 ac Storage= 0.034 af

Plug-Flow detention time= 441.4 min calculated for 0.064 af (71% of inflow)  
 Center-of-Mass det. time= 267.2 min ( 979.3 - 712.2 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.016 af	<b>11.00"W x 67.70"L x 3.50"H Field A</b> 0.060 af Overall - 0.019 af Embedded = 0.041 af x 40.0% Voids
#2A	0.50'	0.019 af	<b>ADS_StormTech SC-740 +Cap</b> x 18 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56"L with 0.44' Overlap 18 Chambers in 2 Rows
		0.035 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>0.625" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#2	Primary	3.25'	<b>8.000" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.068 cfs @ 9.47 hrs HW=3.29' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 0.019 cfs @ 8.730 fps)  
 2=Orifice/Grate (Weir Controls 0.050 cfs @ 0.634 fps)

### Pond 7P: Detention - 2 - Chamber Wizard Field A

**Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

9 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 65.70' Row Length +12.0" End Stone x 2 = 67.70' Base Length

2 Rows x 51.0" Wide + 6.0" Spacing x 1 + 12.0" Side Stone x 2 = 11.00' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

18 Chambers x 45.9 cf = 826.9 cf Chamber Storage

2,606.3 cf Field - 826.9 cf Chambers = 1,779.4 cf Stone x 40.0% Voids = 711.8 cf Stone Storage

Chamber Storage + Stone Storage = 1,538.7 cf = 0.035 af

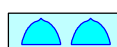
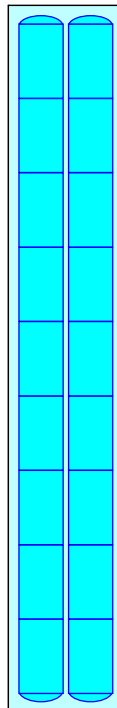
Overall Storage Efficiency = 59.0%

Overall System Size = 67.70' x 11.00' x 3.50'

18 Chambers

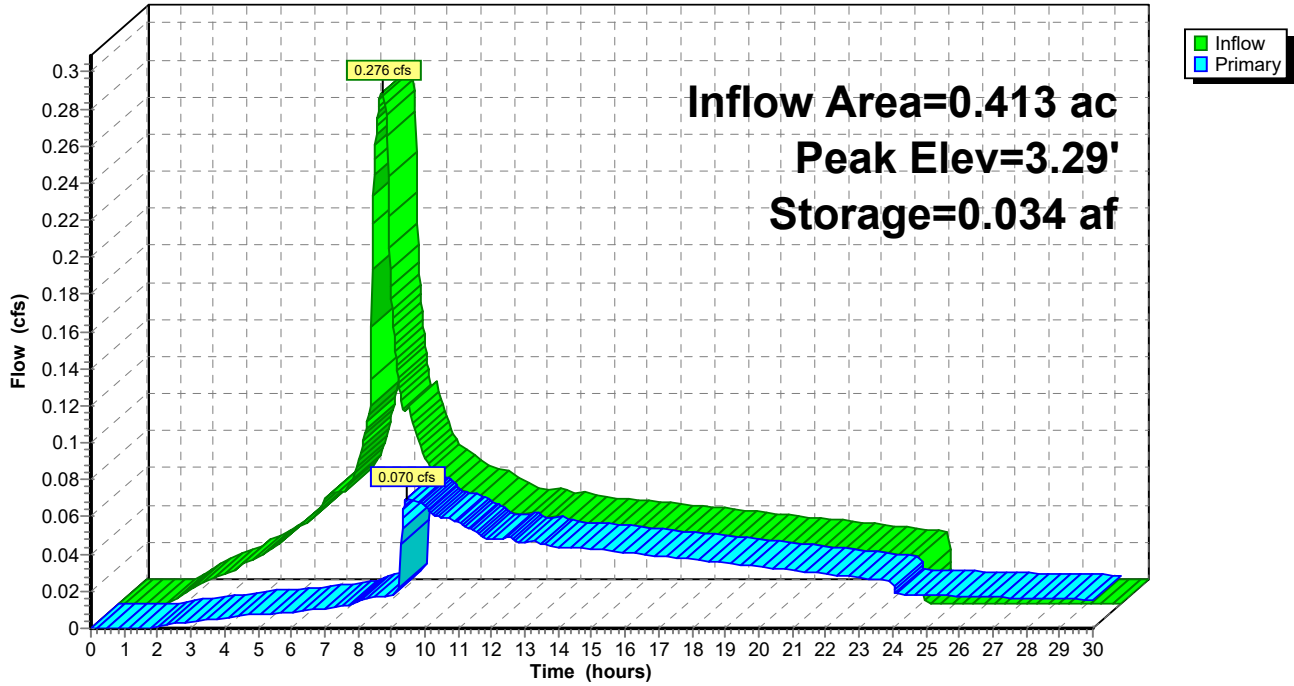
96.5 cy Field

65.9 cy Stone



### Pond 7P: Detention - 2

Hydrograph



**Summary for Subcatchment 8S: E-1**

Runoff = 0.047 cfs @ 7.86 hrs, Volume= 0.015 af, Depth= 3.22"  
 Routed to Pond 12P : Discharge

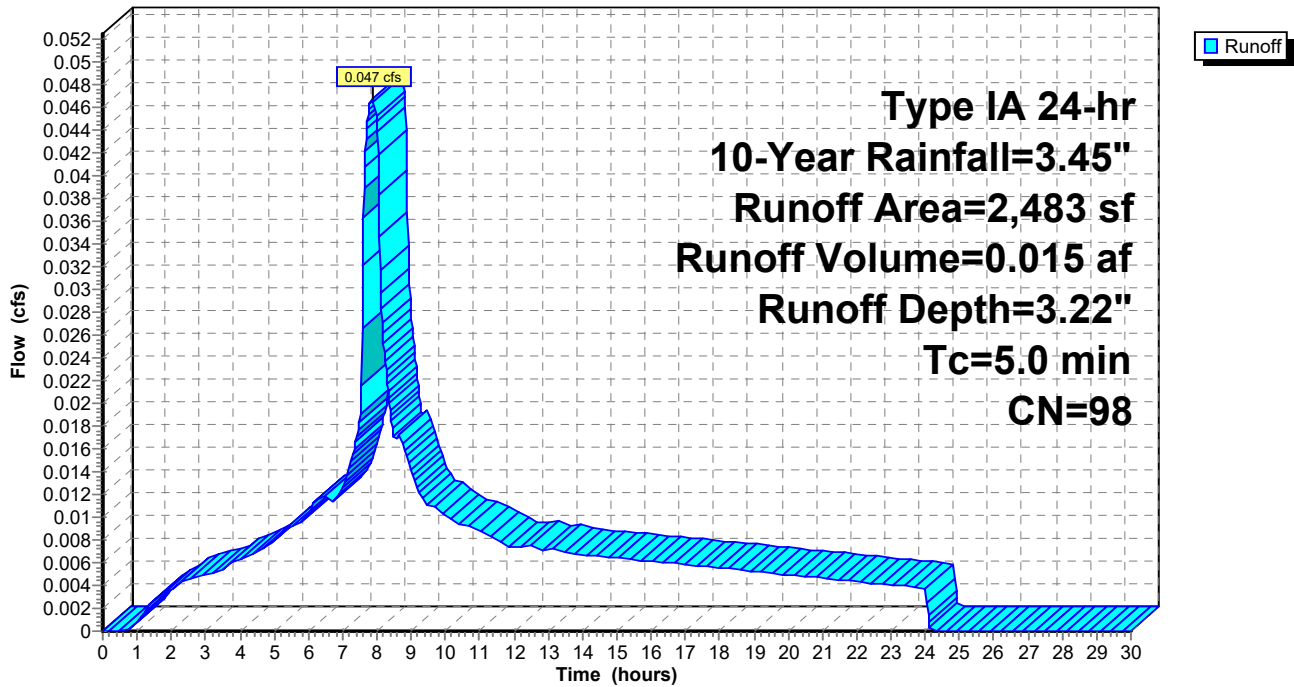
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
2,483	98	Unconnected roofs, HSG C
2,483		100.00% Impervious Area
2,483		100.00% Unconnected

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

**Subcatchment 8S: E-1**

Hydrograph



**Summary for Subcatchment 9S: E-2**

Runoff = 0.038 cfs @ 7.86 hrs, Volume= 0.012 af, Depth= 3.22"  
 Routed to Pond 12P : Discharge

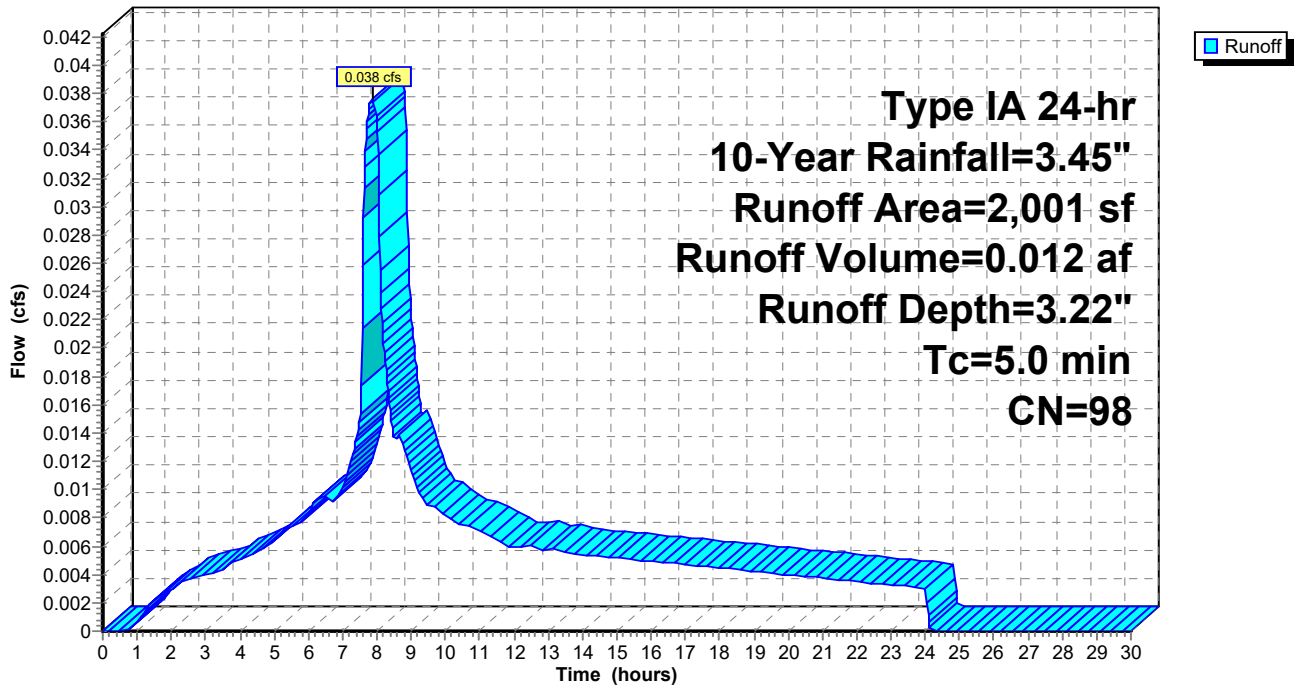
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
2,001	98	Unconnected roofs, HSG C
2,001		100.00% Impervious Area
2,001		100.00% Unconnected

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

**Subcatchment 9S: E-2**

Hydrograph



**Summary for Subcatchment 10S: E-3**

Runoff = 0.266 cfs @ 7.86 hrs, Volume= 0.086 af, Depth= 3.10"  
 Routed to Pond 12P : Discharge

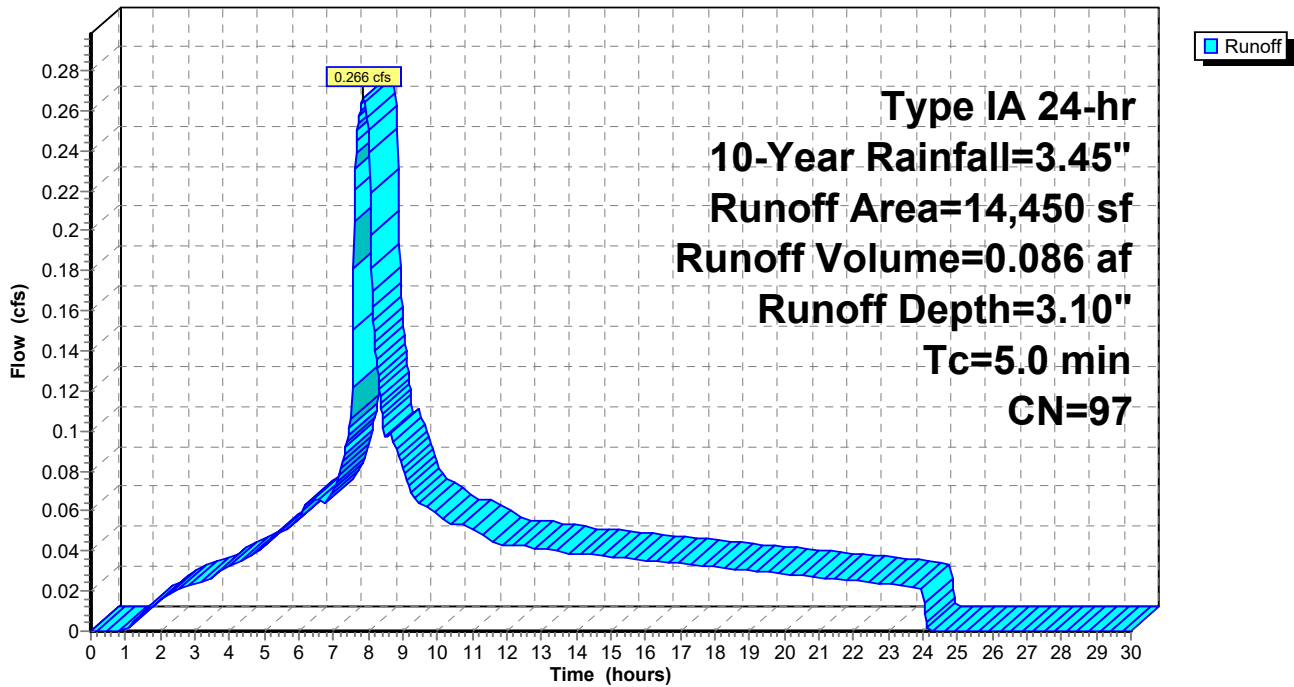
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
543	74	>75% Grass cover, Good, HSG C
13,907	98	Paved parking, HSG C
14,450	97	Weighted Average
543		3.76% Pervious Area
13,907		96.24% Impervious Area

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

**Subcatchment 10S: E-3**

Hydrograph



**Summary for Subcatchment 11S: E-7**

Runoff = 0.021 cfs @ 7.87 hrs, Volume= 0.007 af, Depth= 3.00"  
 Routed to Pond 12P : Discharge

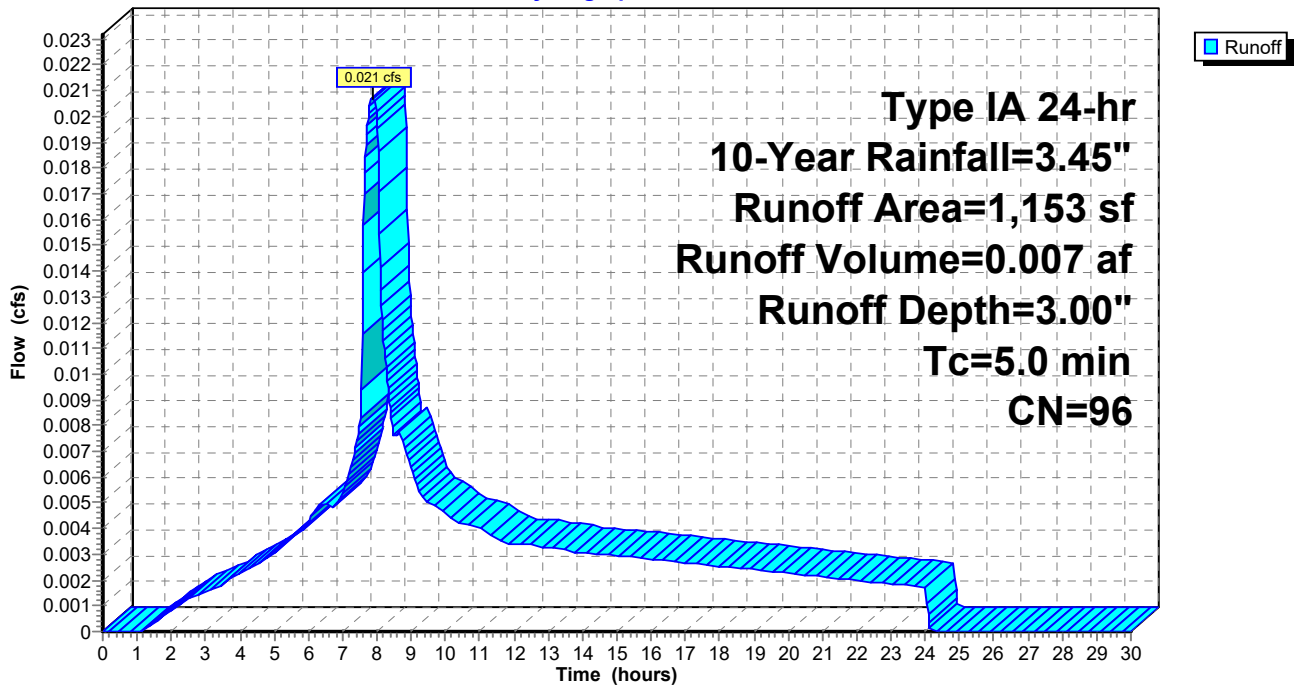
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
106	74	>75% Grass cover, Good, HSG C
1,047	98	Unconnected pavement, HSG C
1,153	96	Weighted Average
106		9.19% Pervious Area
1,047		90.81% Impervious Area
1,047		100.00% Unconnected

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

**Subcatchment 11S: E-7**

Hydrograph



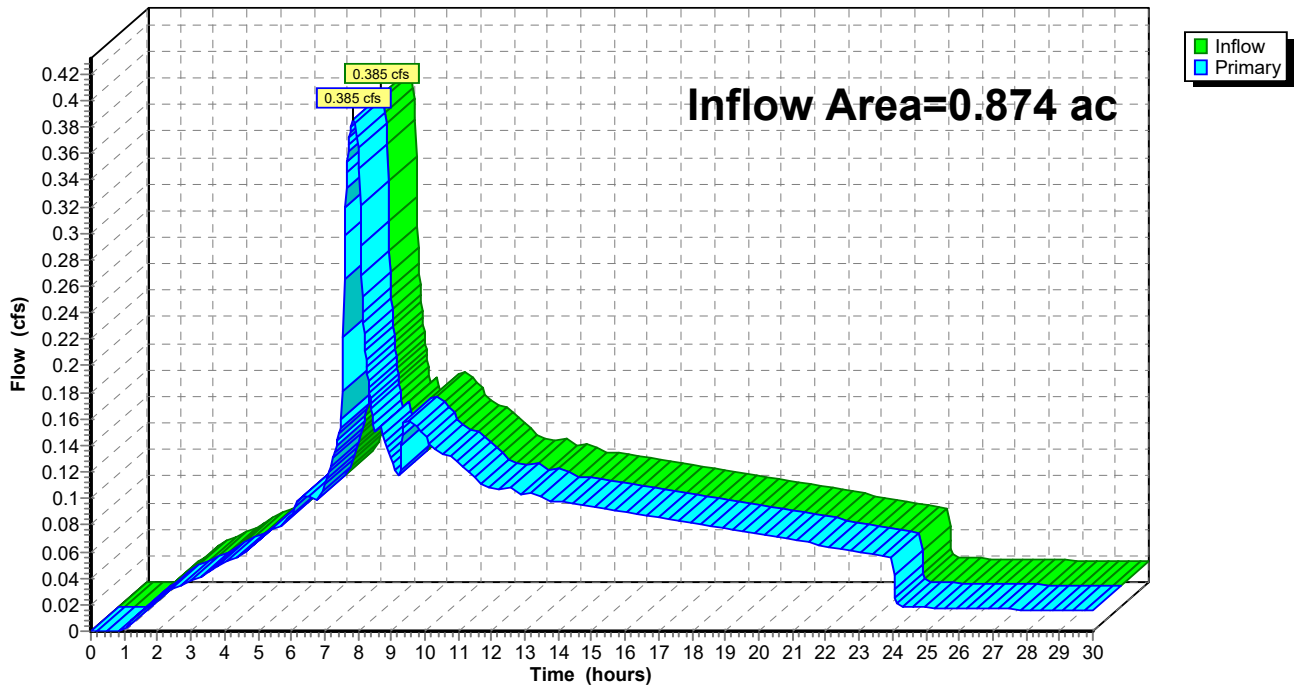
### Summary for Pond 12P: Discharge

Inflow Area = 0.874 ac, 85.73% Impervious, Inflow Depth > 2.52" for 10-Year event  
Inflow = 0.385 cfs @ 7.87 hrs, Volume= 0.184 af  
Primary = 0.385 cfs @ 7.87 hrs, Volume= 0.184 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

### Pond 12P: Discharge

Hydrograph





**Events for Subcatchment 3S: Basin B**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.088	0.045	0.65
5-Year	3.10	0.167	0.071	1.03
10-Year	<b>3.45</b>	<b>0.219</b>	<b>0.088</b>	<b>1.27</b>

**Events for Subcatchment 4S: E-4**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.089	0.028	1.96
5-Year	3.10	0.115	0.037	2.55
10-Year	<b>3.45</b>	<b>0.131</b>	<b>0.041</b>	<b>2.89</b>

**Events for Subcatchment 5S: E-5**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.088	0.028	1.87
5-Year	3.10	0.115	0.036	2.45
10-Year	<b>3.45</b>	<b>0.131</b>	<b>0.042</b>	<b>2.79</b>

**Events for Subcatchment 6S: E-6**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.006	0.003	0.61
5-Year	3.10	0.011	0.005	0.97
10-Year	<b>3.45</b>	<b>0.015</b>	<b>0.006</b>	<b>1.21</b>

**Peterkort - Starbucks - HydroCAD - North and East**

Prepared by Froelich Engineers

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*Multi-Event Tables*

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**Events for Pond 7P: Detention - 2**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.181	0.022	3.26	0.034
5-Year	0.241	0.050	3.27	0.034
10-Year	<b>0.276</b>	<b>0.070</b>	<b>3.29</b>	<b>0.034</b>

**Peterkort - Starbucks - HydroCAD - North and East**

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*Multi-Event Tables*

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**Events for Subcatchment 8S: E-1**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.033	0.011	2.27
5-Year	3.10	0.042	0.014	2.87
10-Year	<b>3.45</b>	<b>0.047</b>	<b>0.015</b>	<b>3.22</b>

**Events for Subcatchment 9S: E-2**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.027	0.009	2.27
5-Year	3.10	0.034	0.011	2.87
10-Year	<b>3.45</b>	<b>0.038</b>	<b>0.012</b>	<b>3.22</b>

**Peterkort - Starbucks - HydroCAD - North and East**

Prepared by Froelich Engineers

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*Multi-Event Tables*

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**Events for Subcatchment 10S: E-3**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.187	0.060	2.16
5-Year	3.10	0.237	0.076	2.76
10-Year	<b>3.45</b>	<b>0.266</b>	<b>0.086</b>	<b>3.10</b>



**Events for Subcatchment 11S: E-7**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.014	0.005	2.06
5-Year	3.10	0.018	0.006	2.65
10-Year	<b>3.45</b>	<b>0.021</b>	<b>0.007</b>	<b>3.00</b>

**Events for Pond 12P: Discharge**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.273	0.273	<b>0.00</b>	<b>0.000</b>
5-Year	0.344	0.344	0.00	0.000
10-Year	<b>0.385</b>	<b>0.385</b>	0.00	0.000

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	



# 21-C023 (PETERKORT - STARBUCKS) - DETENTION-2

## BEAVERTON, OR

### SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

### NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
  - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
  - NO RUBBER TIRED LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
  - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

**USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.**

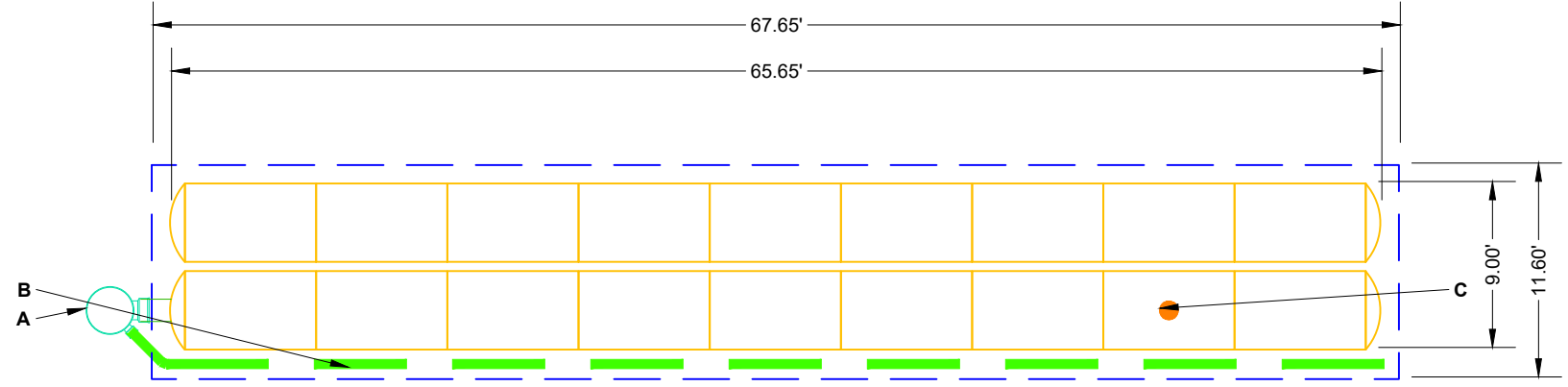
CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.


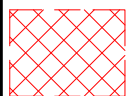

PROPOSED LAYOUT		CONCEPTUAL ELEVATIONS	
18	STORMTECH SC-740 CHAMBERS	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	11.00
4	STORMTECH SC-740 END CAPS	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	5.00
6	STONE ABOVE (in)	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	4.50
6	STONE BELOW (in)	MINIMUM ALLOWABLE GRADE (TOP OF RIGID CONCRETE PAVEMENT):	4.50
40	STONE VOID	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	4.50
1595	INSTALLED SYSTEM VOLUME (CF)	TOP OF STONE:	3.50
	(PERIMETER STONE INCLUDED)	TOP OF SC-740 CHAMBER:	3.00
	(COVER STONE INCLUDED)	12" BOTTOM CONNECTION INVERT:	0.60
	(BASE STONE INCLUDED)	BOTTOM OF SC-740 CHAMBER:	0.50
785	SYSTEM AREA (SF)	UNDERDRAIN INVERT:	0.00
158.5	SYSTEM PERIMETER (ft)	BOTTOM OF STONE:	0.00

*INVERT ABOVE BASE OF CHAMBER			
PART TYPE	ITEM ON LAYOUT	DESCRIPTION	INVERT*
NYLOPLAST (OUTLET)	A	30" DIAMETER (DESIGN BY ENGINEER)	
UNDERDRAIN	B	6" ADS N-12 DUAL WALL PERFORATED HDPE UNDERDRAIN	
INSPECTION PORT	C	4" SEE DETAIL	

21-C023 (PETERKORT -  
STARBUCKS) - DETENTION-2  
BEAVERTON, OR

DATE: \_\_\_\_\_ DRAWN: CC  
PROJECT #: \_\_\_\_\_ CHECKED: N/A



-  NO ISOLATOR ROW PLUS
-  NO WOVEN GEOTEXTILE
-  BED LIMITS

**NOTES**

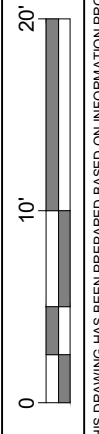
- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE.
- DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER COVER REQUIREMENTS ARE MET.
- THIS CHAMBER SYSTEM WAS DESIGNED WITHOUT SITE-SPECIFIC INFORMATION ON SOIL CONDITIONS OR BEARING CAPACITY. THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR DETERMINING THE SUITABILITY OF THE SOIL AND PROVIDING THE BEARING CAPACITY OF THE INSITU SOILS. THE BASE STONE DEPTH MAY BE INCREASED OR DECREASED ONCE THIS INFORMATION IS PROVIDED.
- **NOT FOR CONSTRUCTION:** THIS LAYOUT IS FOR DIMENSIONAL PURPOSES ONLY TO PROVE CONCEPT & THE REQUIRED STORAGE VOLUME CAN BE ACHIEVED ON SITE.

DATE	DRW	CHK	DESCRIPTION

**StormTech®**  
Chamber System

888-892-2694 | WWW.STORMTECH.COM

4640 TRUEMAN BLVD  
HILLIARD, OH 43026  
1-800-733-7473



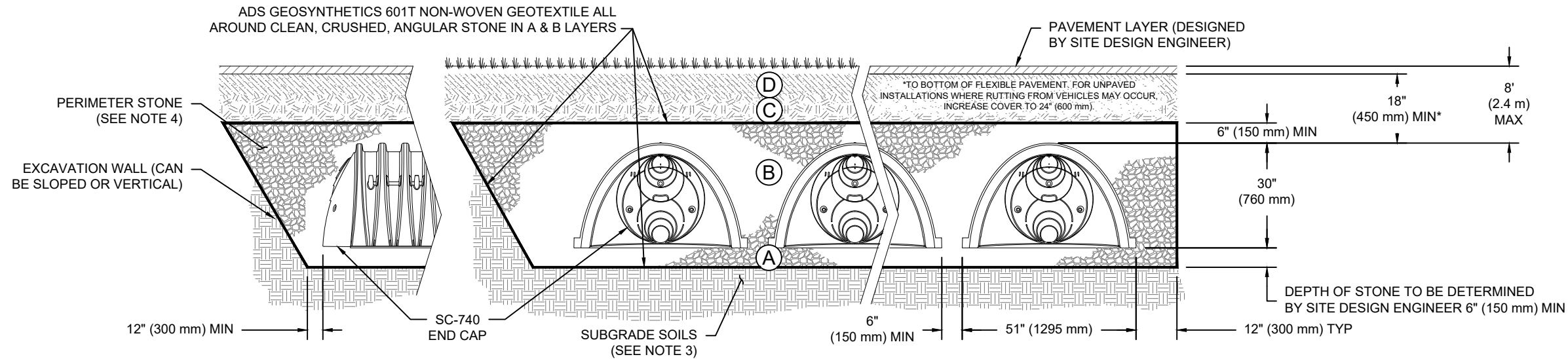
THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

## ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	<b>FINAL FILL:</b> FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	<b>INITIAL FILL:</b> FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE.  MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 <sup>1</sup> A-1, A-2-4, A-3  OR  AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	<b>EMBEDMENT STONE:</b> FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	<b>FOUNDATION STONE:</b> FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 <sup>1</sup> 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. <sup>2,3</sup>

**PLEASE NOTE:**

- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
- STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
- WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
- ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



**NOTES:**

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

21-C023 (PETERKORT - STARBUCKS) - DETENTION-2  
BEAVERTON, OH

DATE: \_\_\_\_\_ DRAWN: CC  
PROJECT #: \_\_\_\_\_ CHECKED: N/A

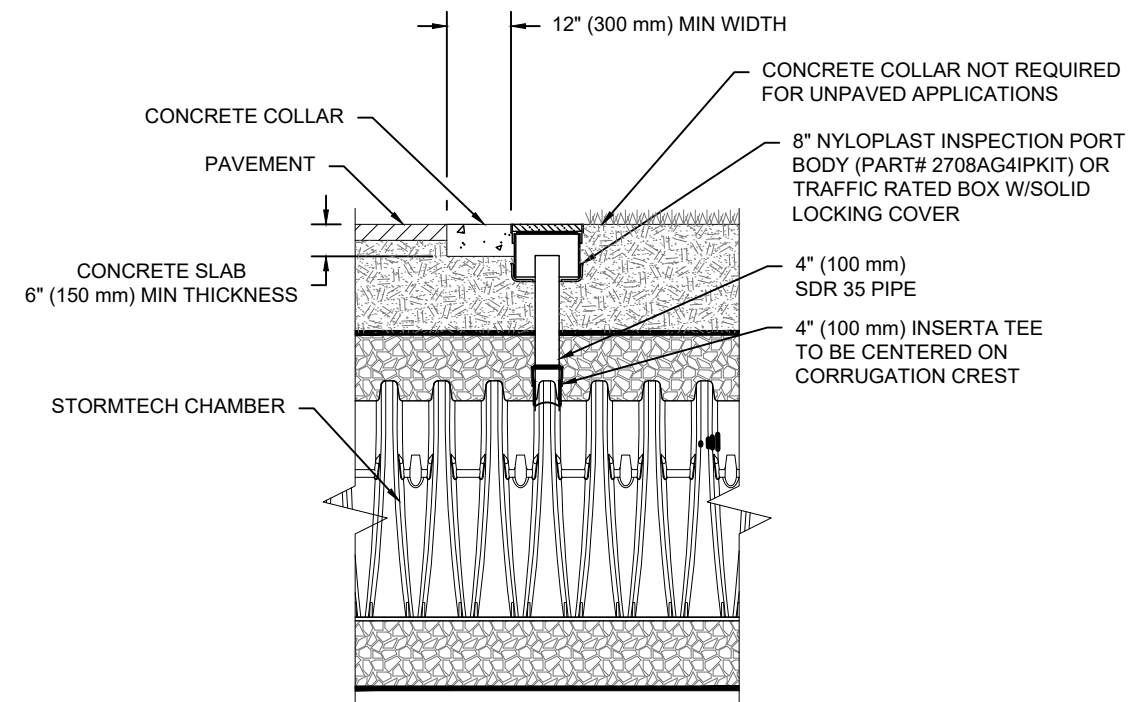
DESCRIPTION  
DATE  
CHK  
DRW

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SHEET  
3 OF 6

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NOTE:  
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

**4" PVC INSPECTION PORT DETAIL  
(SC SERIES CHAMBER)**

NTS

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21-C023 (PETERKORT -  
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BEAVERTON, OR

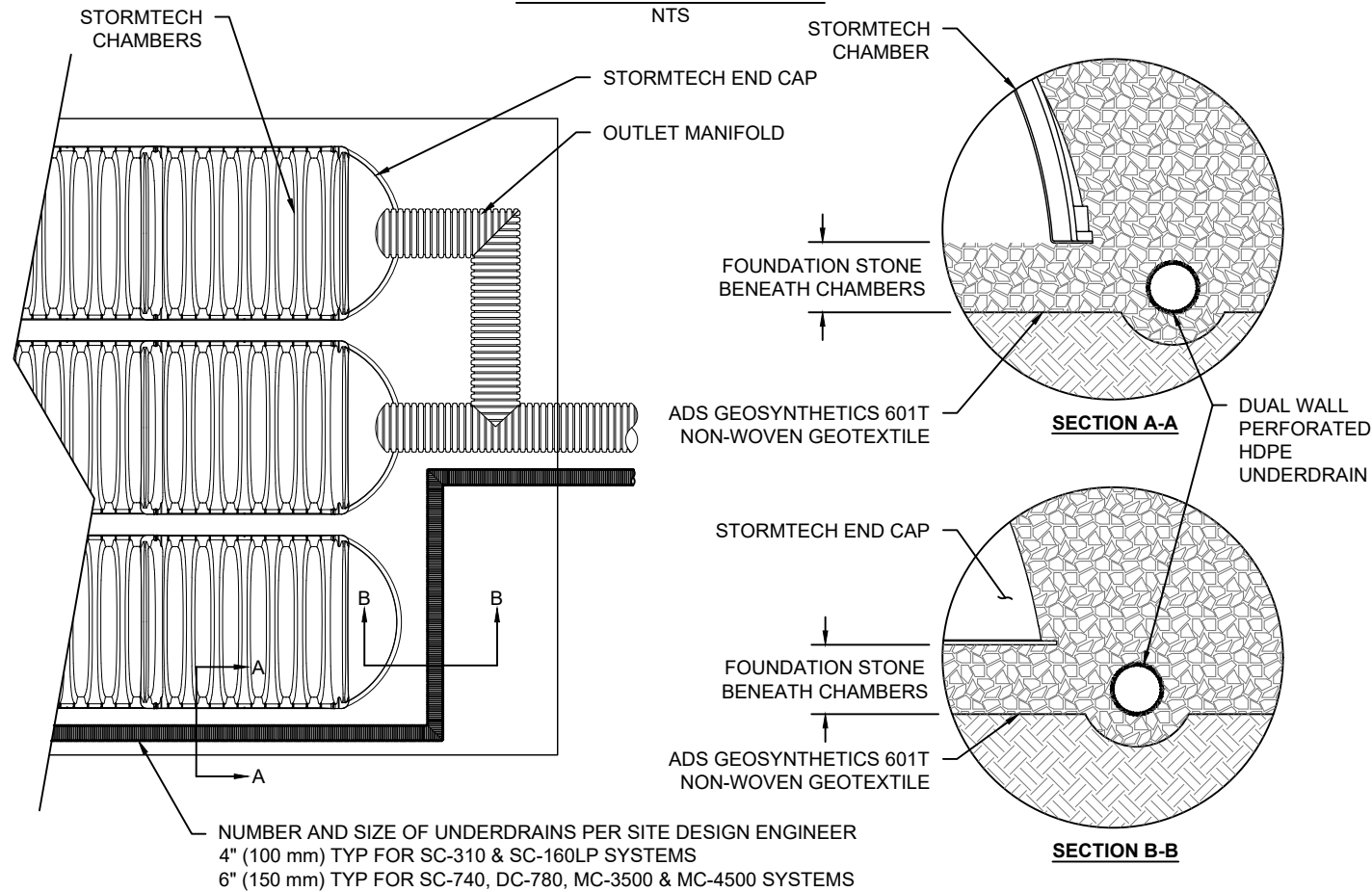
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PROJECT #:	CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

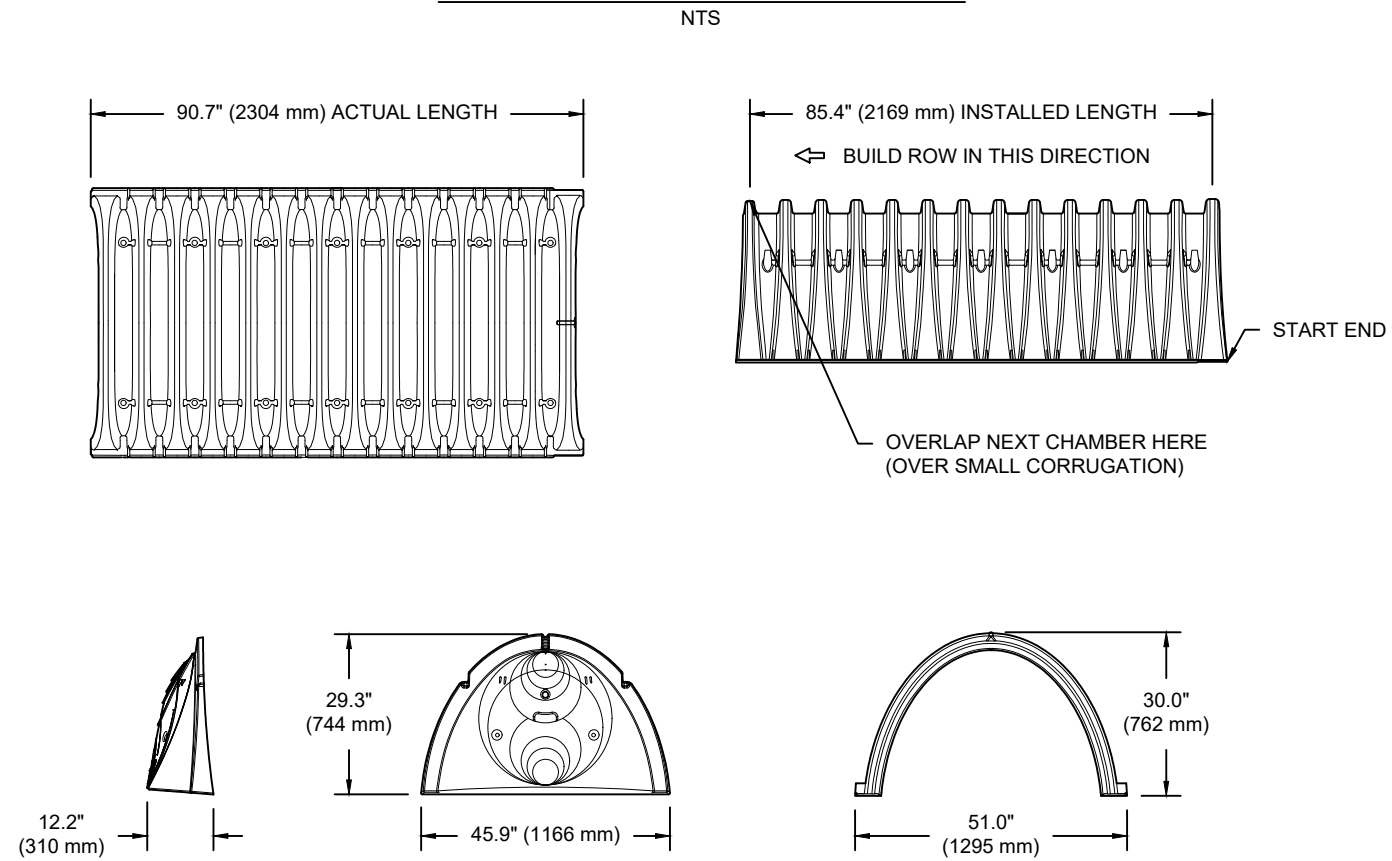
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**UNDERDRAIN DETAIL**



**SC-740 TECHNICAL SPECIFICATION**

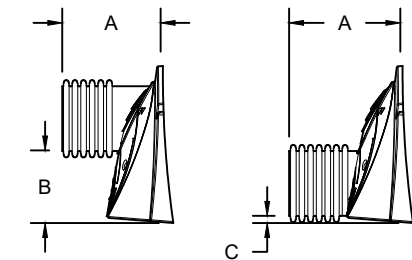


**NOMINAL CHAMBER SPECIFICATIONS**

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m <sup>3</sup> )
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m <sup>3</sup> )
WEIGHT	75.0 lbs.	(33.6 kg)

\*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS

PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"  
 PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"  
 PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"  
 PRE-CORED END CAPS END WITH "PC"



PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC	---	---	---	0.5" (13 mm)
SC740EPE08T / SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC	---	---	---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC	---	---	---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC	---	---	---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC	---	---	---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC	---	---	---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

\* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

21-C023 (PETERKORT - STARBUCKS) - DETENTION-2  
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DATE	DESCRIPTION	CHK	DATE	DRW	CHK

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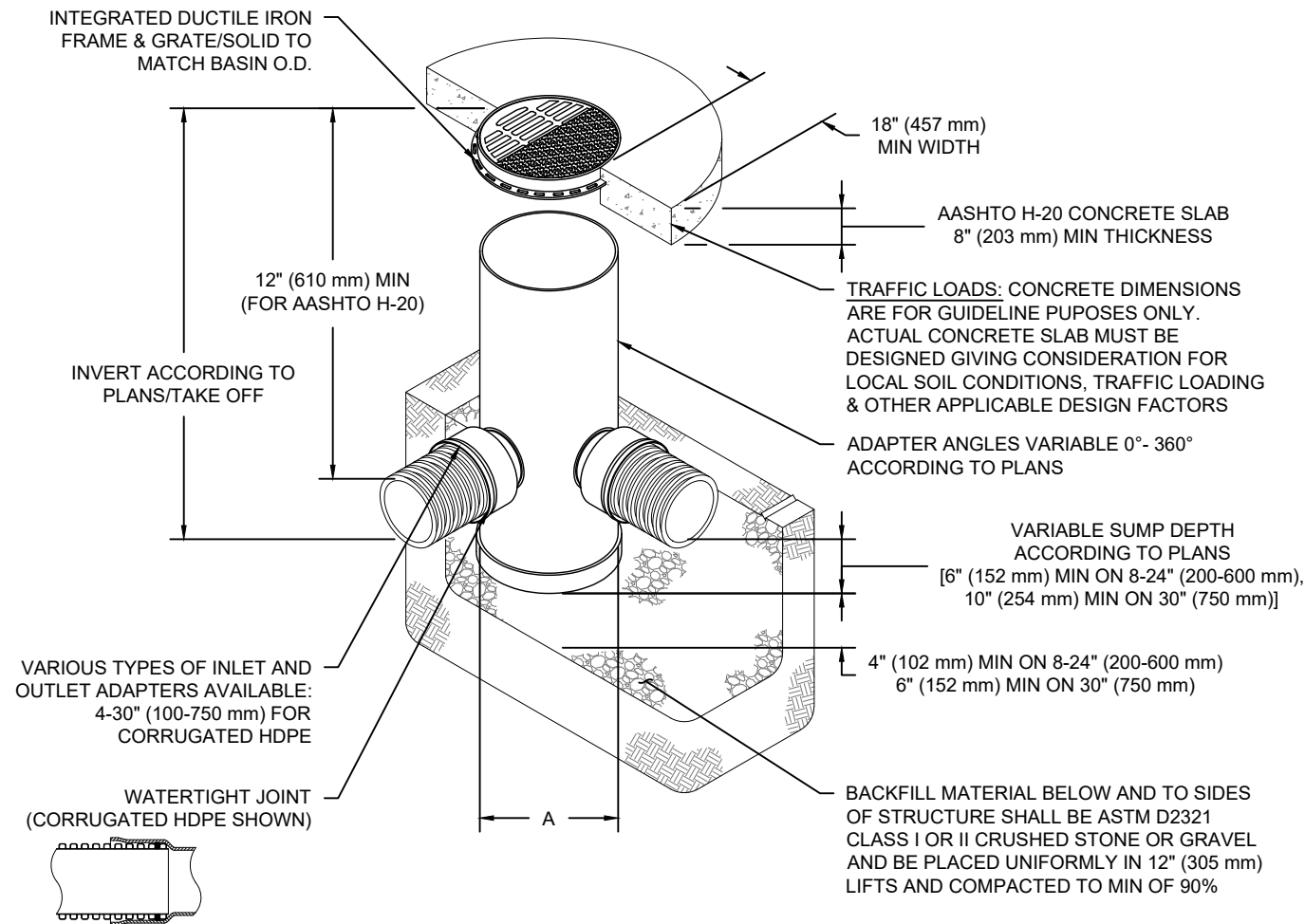
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# NYLOPLAST DRAIN BASIN

NTS



## NOTES

- 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
- DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
- FOR COMPLETE DESIGN AND PRODUCT INFORMATION: [WWW.NYLOPLAST-US.COM](http://WWW.NYLOPLAST-US.COM)
- TO ORDER CALL: 800-821-6710

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

21-C023 (PETERKORT - STARBUCKS) - DETENTION-2  
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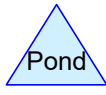
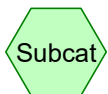
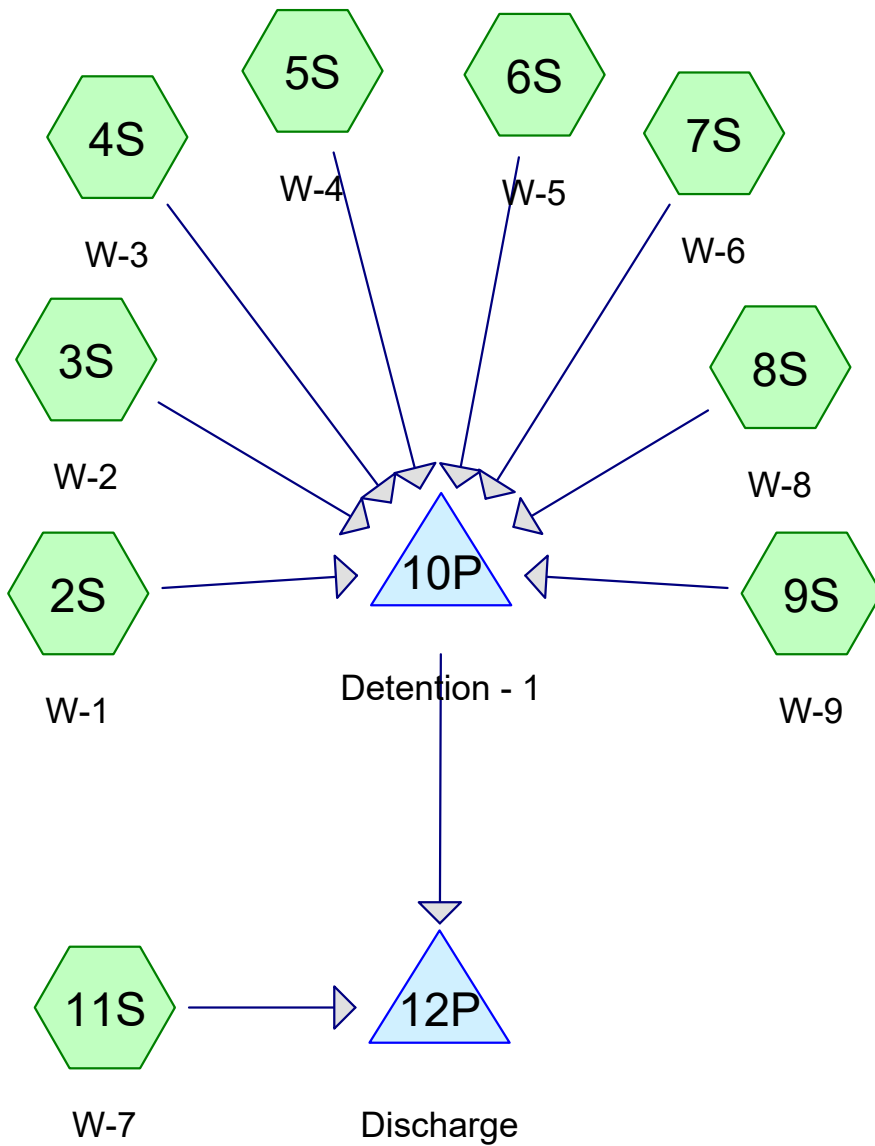
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Basin C



**Routing Diagram for Peterkort - Starbucks - HydroCAD - West**  
Prepared by Froelich Engineers, Printed 7/1/2022  
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# Peterkort - Starbucks - HydroCAD - West

Prepared by Froelich Engineers

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Page 2

## Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	2-Year	Type IA 24-hr		Default	24.00	1	2.50	2
2	5-Year	Type IA 24-hr		Default	24.00	1	3.10	2
3	10-Year	Type IA 24-hr		Default	24.00	1	3.45	2

**Peterkort - Starbucks - HydroCAD - West**

Type IA 24-hr 2-Year Rainfall=2.50"

Prepared by Froelich Engineers

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Page 3

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment1S: Basin C</b>	Runoff Area=76,016 sf 0.00% Impervious Runoff Depth=0.65" Tc=5.0 min CN=75 Runoff=0.185 cfs 0.095 af
<b>Subcatchment2S: W-1</b>	Runoff Area=32,056 sf 100.00% Impervious Runoff Depth=2.27" Tc=5.0 min CN=98 Runoff=0.431 cfs 0.139 af
<b>Subcatchment3S: W-2</b>	Runoff Area=2,281 sf 98.77% Impervious Runoff Depth=2.27" Tc=5.0 min CN=98 Runoff=0.031 cfs 0.010 af
<b>Subcatchment4S: W-3</b>	Runoff Area=9,969 sf 90.99% Impervious Runoff Depth=2.06" Tc=5.0 min CN=96 Runoff=0.124 cfs 0.039 af
<b>Subcatchment5S: W-4</b>	Runoff Area=14,557 sf 94.13% Impervious Runoff Depth=2.16" Tc=5.0 min CN=97 Runoff=0.189 cfs 0.060 af
<b>Subcatchment6S: W-5</b>	Runoff Area=7,874 sf 78.30% Impervious Runoff Depth=1.78" Tc=5.0 min CN=93 Runoff=0.084 cfs 0.027 af
<b>Subcatchment7S: W-6</b>	Runoff Area=2,113 sf 100.00% Impervious Runoff Depth=2.27" Tc=5.0 min CN=98 Runoff=0.028 cfs 0.009 af
<b>Subcatchment8S: W-8</b>	Runoff Area=2,920 sf 13.05% Impervious Runoff Depth=0.74" Tc=5.0 min CN=77 Runoff=0.009 cfs 0.004 af
<b>Subcatchment9S: W-9</b>	Runoff Area=6,895 sf 99.90% Impervious Runoff Depth=2.27" Tc=5.0 min CN=98 Runoff=0.093 cfs 0.030 af
<b>Pond 10P: Detention - 1</b>	Peak Elev=3.26' Storage=0.193 af Inflow=0.987 cfs 0.319 af Outflow=0.093 cfs 0.167 af
<b>Subcatchment11S: W-7</b>	Runoff Area=2,084 sf 0.00% Impervious Runoff Depth=0.61" Tc=5.0 min CN=74 Runoff=0.004 cfs 0.002 af
<b>Pond 12P: Discharge</b>	Inflow=0.094 cfs 0.169 af Primary=0.094 cfs 0.169 af

**Total Runoff Area = 3.599 ac Runoff Volume = 0.416 af Average Runoff Depth = 1.39"**  
**53.67% Pervious = 1.931 ac 46.33% Impervious = 1.667 ac**

**Summary for Subcatchment 1S: Basin C**

Runoff = 0.185 cfs @ 8.02 hrs, Volume= 0.095 af, Depth= 0.65"  
 Routed to nonexistent node 21P

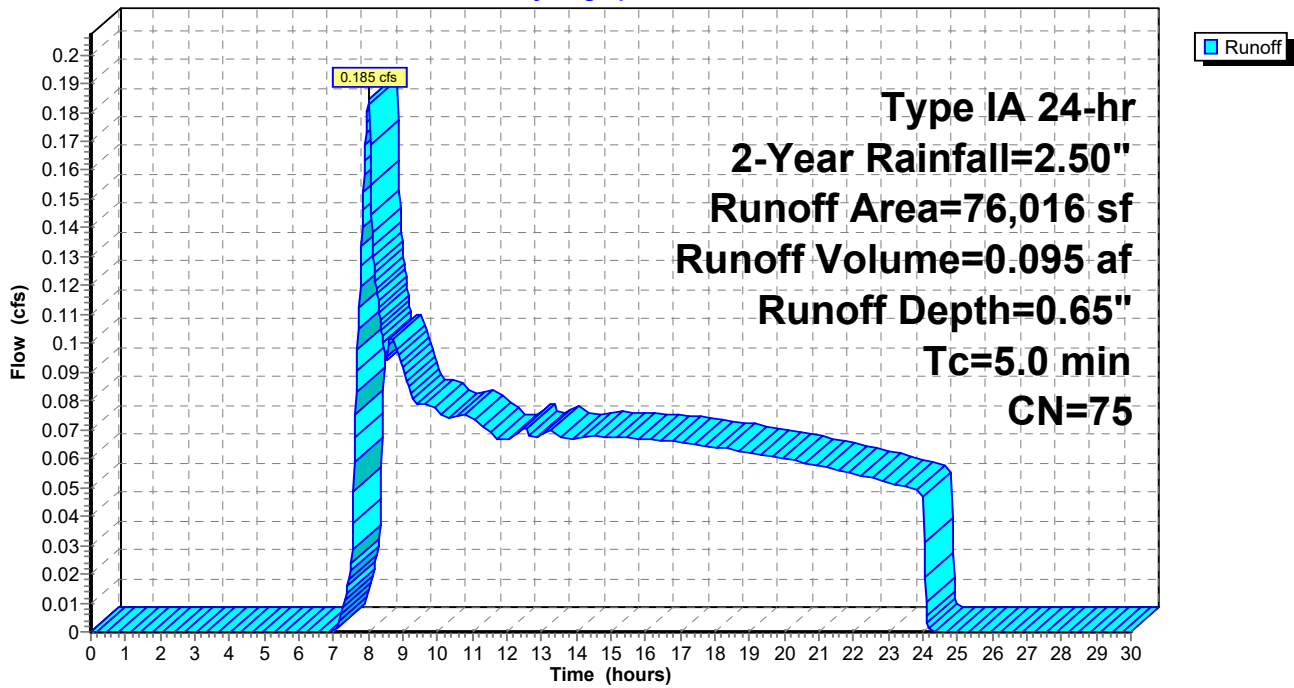
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
* 76,016	75	
76,016		100.00% Pervious Area

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

**Subcatchment 1S: Basin C**

Hydrograph



**Summary for Subcatchment 2S: W-1**

Runoff = 0.431 cfs @ 7.86 hrs, Volume= 0.139 af, Depth= 2.27"  
 Routed to Pond 10P : Detention - 1

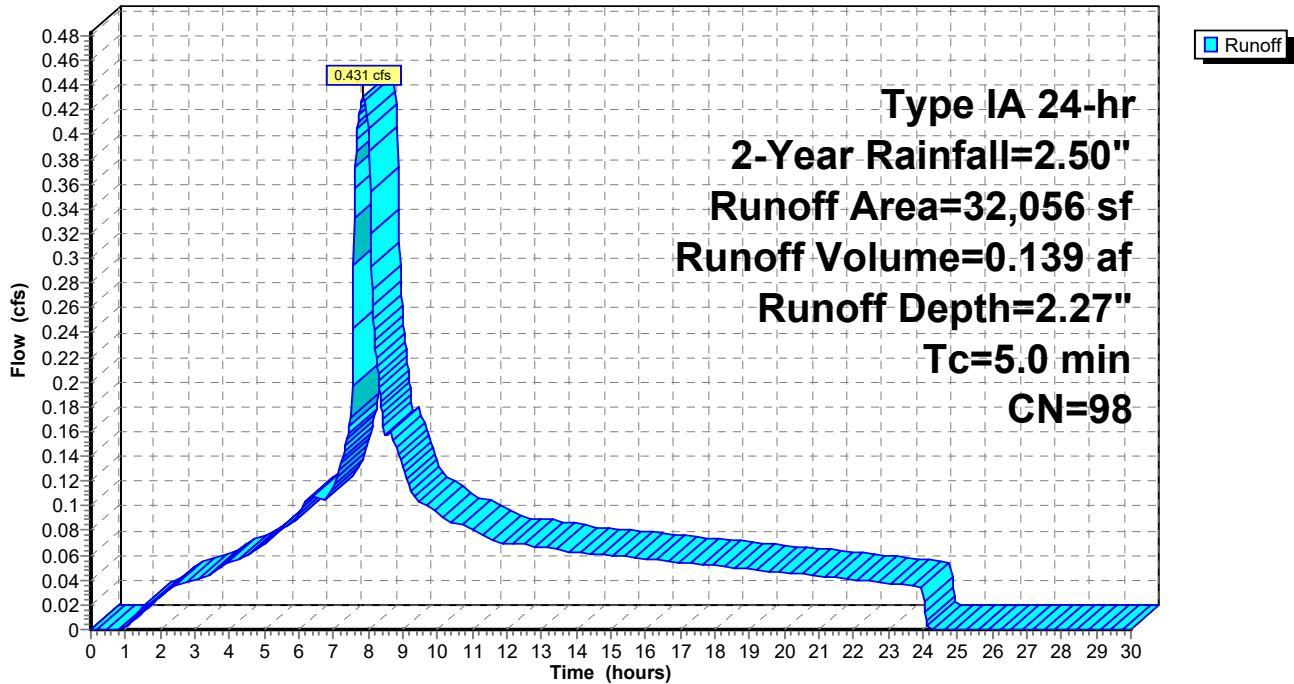
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
444	98	Paved parking, HSG C
31,612	98	Paved parking, HSG C
32,056	98	Weighted Average
32,056		100.00% Impervious Area

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

**Subcatchment 2S: W-1**

Hydrograph



**Summary for Subcatchment 3S: W-2**

Runoff = 0.031 cfs @ 7.86 hrs, Volume= 0.010 af, Depth= 2.27"  
 Routed to Pond 10P : Detention - 1

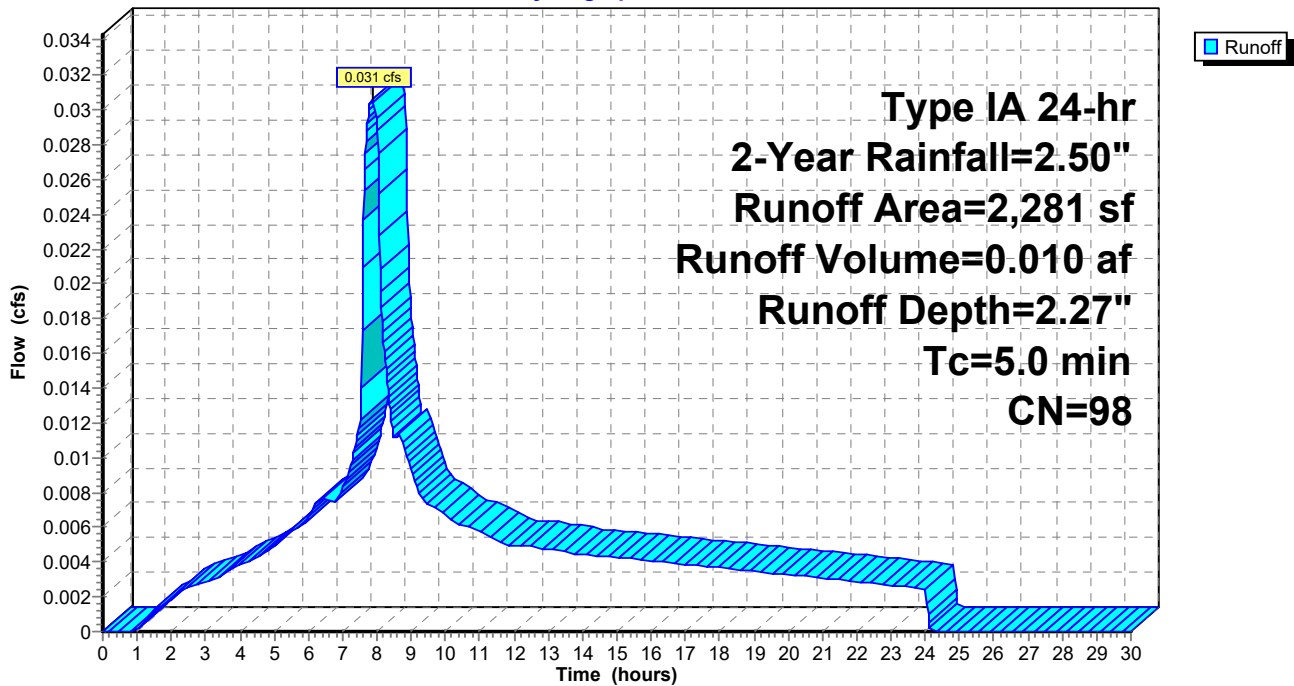
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
28	74	>75% Grass cover, Good, HSG C
316	98	Paved parking, HSG C
1,937	98	Paved parking, HSG C
2,281	98	Weighted Average
28		1.23% Pervious Area
2,253		98.77% Impervious Area

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

**Subcatchment 3S: W-2**

Hydrograph



**Summary for Subcatchment 4S: W-3**

Runoff = 0.124 cfs @ 7.88 hrs, Volume= 0.039 af, Depth= 2.06"  
 Routed to Pond 10P : Detention - 1

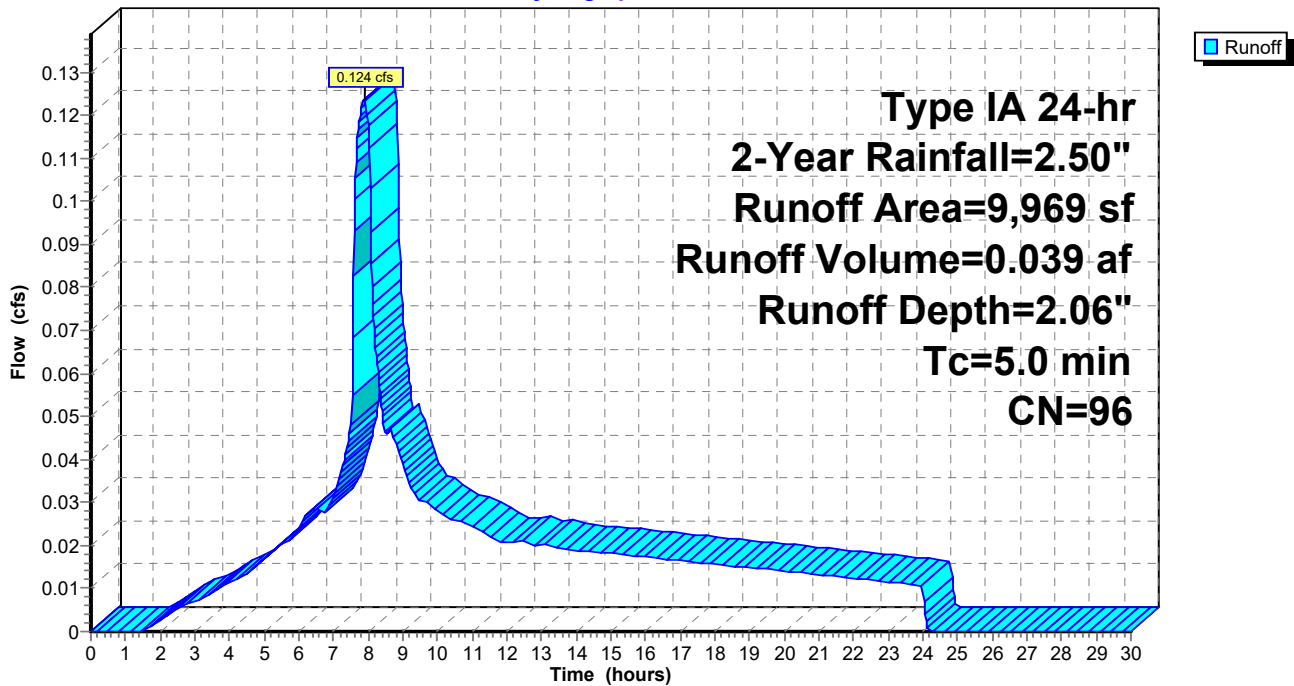
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
898	74	>75% Grass cover, Good, HSG C
4,462	98	Paved parking, HSG C
4,609	98	Paved parking, HSG C
9,969	96	Weighted Average
898		9.01% Pervious Area
9,071		90.99% Impervious Area

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

**Subcatchment 4S: W-3**

Hydrograph



**Summary for Subcatchment 5S: W-4**

Runoff = 0.189 cfs @ 7.87 hrs, Volume= 0.060 af, Depth= 2.16"  
 Routed to Pond 10P : Detention - 1

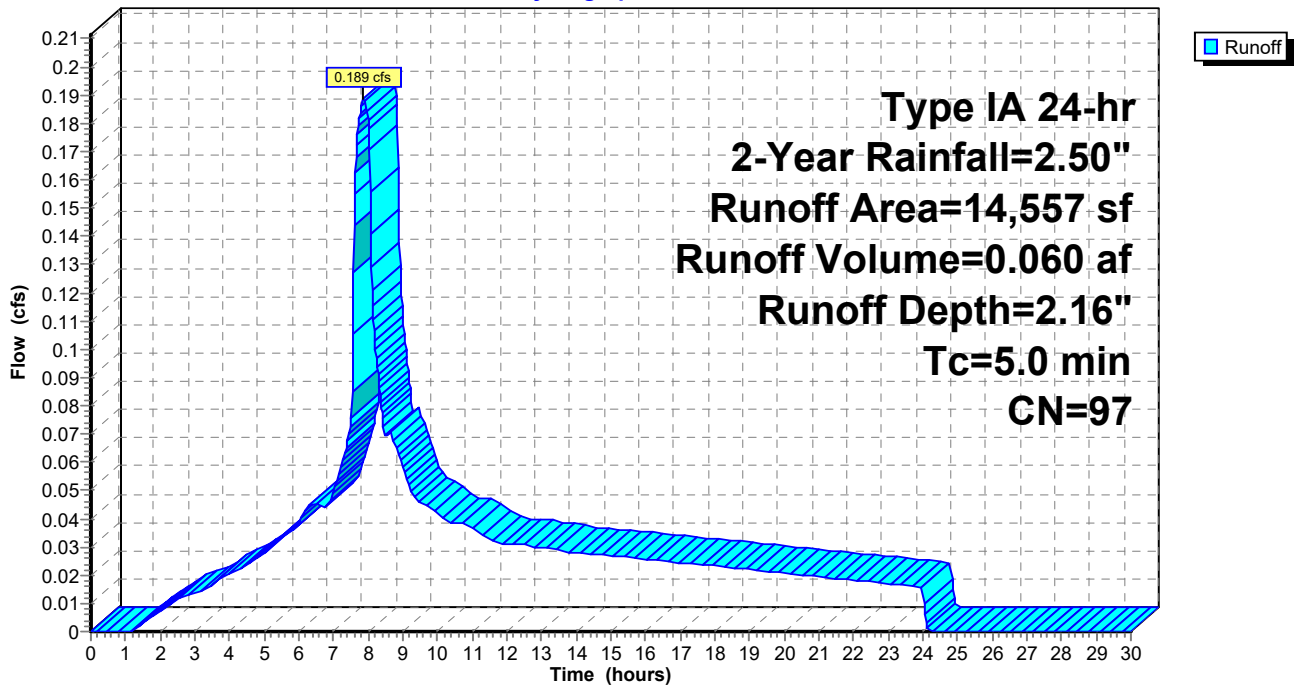
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
854	74	>75% Grass cover, Good, HSG C
4,220	98	Paved parking, HSG C
9,483	98	Paved parking, HSG C
14,557	97	Weighted Average
854		5.87% Pervious Area
13,703		94.13% Impervious Area

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

**Subcatchment 5S: W-4**

Hydrograph





**Summary for Subcatchment 6S: W-5**

Runoff = 0.084 cfs @ 7.90 hrs, Volume= 0.027 af, Depth= 1.78"  
 Routed to Pond 10P : Detention - 1

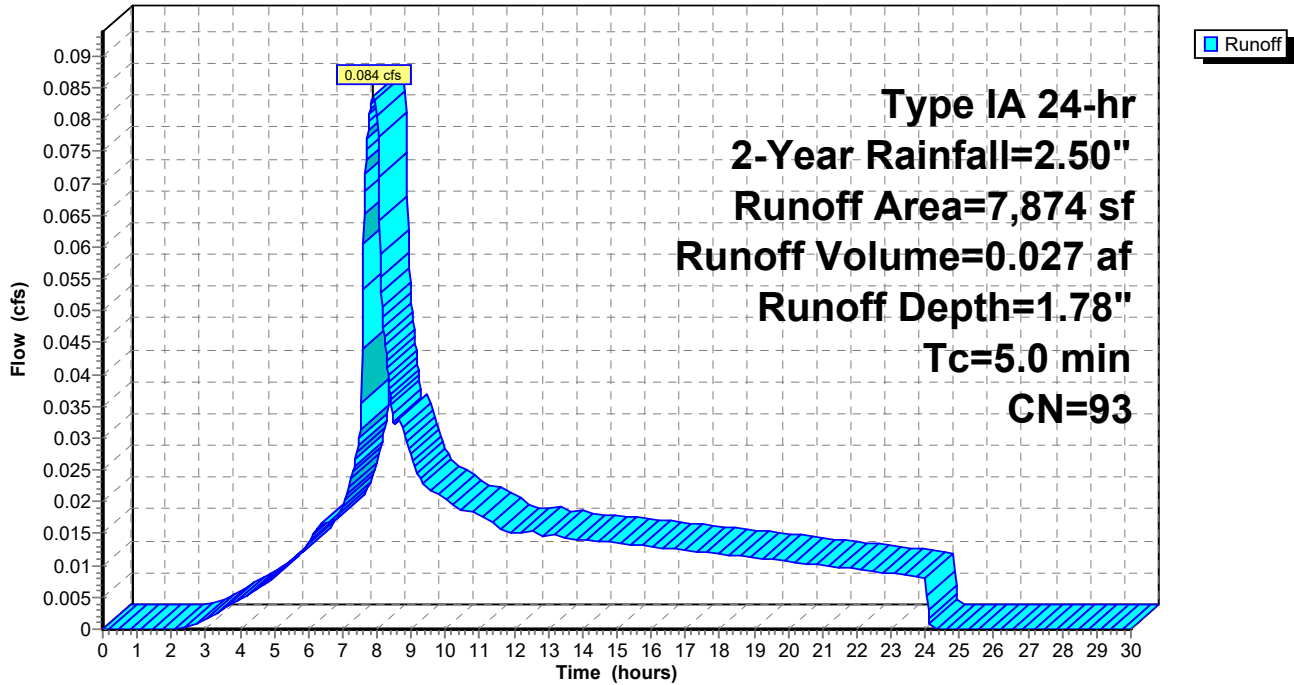
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
1,709	74	>75% Grass cover, Good, HSG C
6,165	98	Paved parking, HSG C
7,874	93	Weighted Average
1,709		21.70% Pervious Area
6,165		78.30% Impervious Area

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

**Subcatchment 6S: W-5**

Hydrograph



**Summary for Subcatchment 7S: W-6**

Runoff = 0.028 cfs @ 7.86 hrs, Volume= 0.009 af, Depth= 2.27"  
 Routed to Pond 10P : Detention - 1

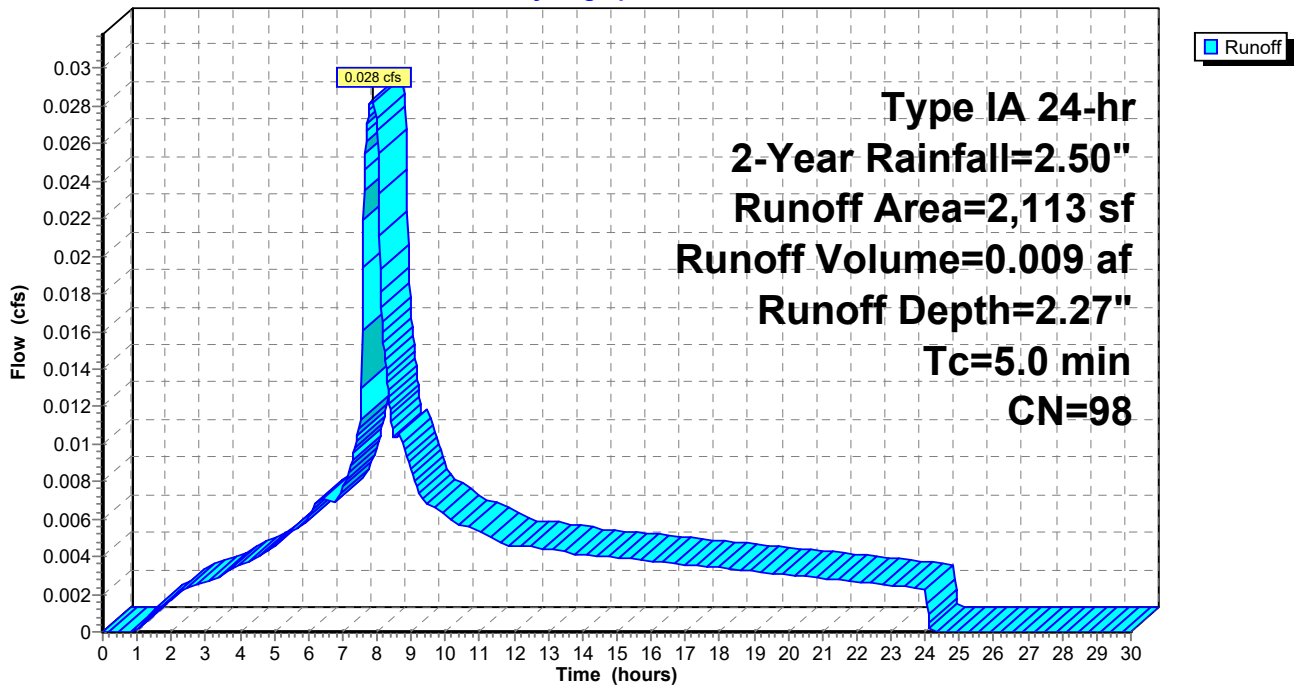
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
2,113	98	Paved parking, HSG C
2,113		100.00% Impervious Area

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

**Subcatchment 7S: W-6**

Hydrograph



**Summary for Subcatchment 8S: W-8**

Runoff = 0.009 cfs @ 8.01 hrs, Volume= 0.004 af, Depth= 0.74"  
 Routed to Pond 10P : Detention - 1

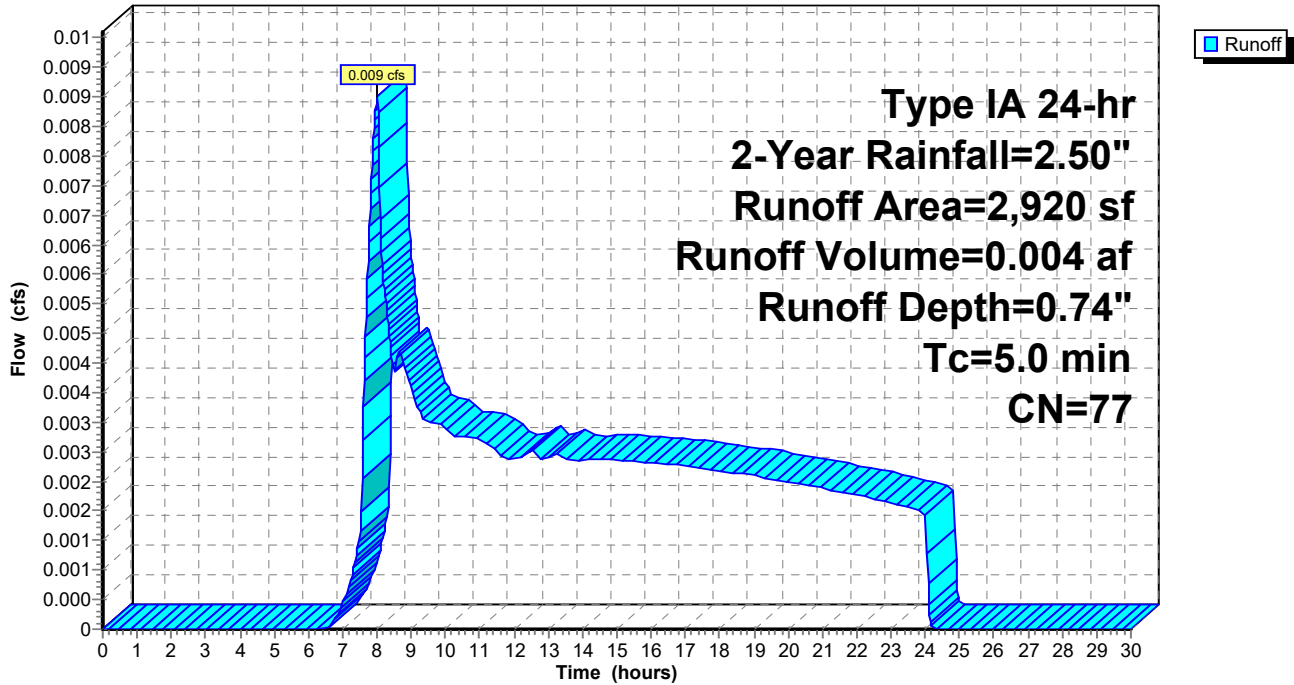
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
2,539	74	>75% Grass cover, Good, HSG C
381	98	Paved parking, HSG C
2,920	77	Weighted Average
2,539		86.95% Pervious Area
381		13.05% Impervious Area

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

**Subcatchment 8S: W-8**

Hydrograph



**Summary for Subcatchment 9S: W-9**

Runoff = 0.093 cfs @ 7.86 hrs, Volume= 0.030 af, Depth= 2.27"  
 Routed to Pond 10P : Detention - 1

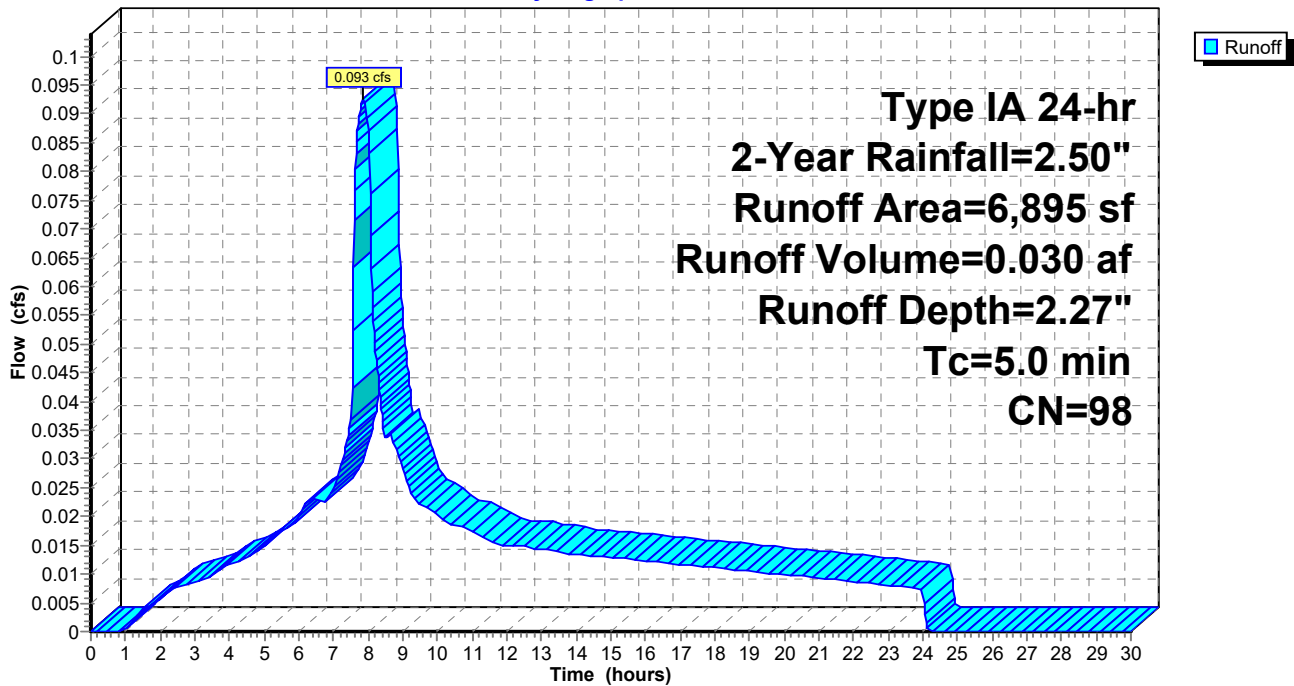
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 2-Year Rainfall=2.50"

Area (sf)	CN	Description
7	74	>75% Grass cover, Good, HSG C
517	98	Paved parking, HSG C
6,371	98	Paved parking, HSG C
6,895	98	Weighted Average
7		0.10% Pervious Area
6,888		99.90% Impervious Area

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

**Subcatchment 9S: W-9**

Hydrograph



**Summary for Pond 10P: Detention - 1**

Inflow Area = 1.806 ac, 92.33% Impervious, Inflow Depth = 2.12" for 2-Year event  
 Inflow = 0.987 cfs @ 7.87 hrs, Volume= 0.319 af  
 Outflow = 0.093 cfs @ 22.59 hrs, Volume= 0.167 af, Atten= 91%, Lag= 882.9 min  
 Primary = 0.093 cfs @ 22.59 hrs, Volume= 0.167 af  
 Routed to Pond 12P : Discharge

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Peak Elev= 3.26' @ 22.59 hrs Surf.Area= 0.094 ac Storage= 0.193 af

Plug-Flow detention time= 644.6 min calculated for 0.167 af (52% of inflow)  
 Center-of-Mass det. time= 386.7 min ( 1,073.2 - 686.5 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.084 af	<b>39.50"W x 103.30'L x 3.50'H Field A</b> 0.328 af Overall - 0.118 af Embedded = 0.210 af x 40.0% Voids
#2A	0.50'	0.118 af	<b>ADS_StormTech SC-740 +Cap</b> x 112 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 112 Chambers in 8 Rows
		0.202 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>1.375" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#2	Primary	3.25'	<b>8.000" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.093 cfs @ 22.59 hrs HW=3.26' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 0.090 cfs @ 8.688 fps)  
 2=Orifice/Grate (Weir Controls 0.003 cfs @ 0.247 fps)

**Pond 10P: Detention - 1 - Chamber Wizard Field A**

**Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

14 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 101.30' Row Length +12.0" End Stone x 2 = 103.30' Base Length

8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

112 Chambers x 45.9 cf = 5,145.3 cf Chamber Storage

14,280.8 cf Field - 5,145.3 cf Chambers = 9,135.5 cf Stone x 40.0% Voids = 3,654.2 cf Stone Storage

Chamber Storage + Stone Storage = 8,799.5 cf = 0.202 af

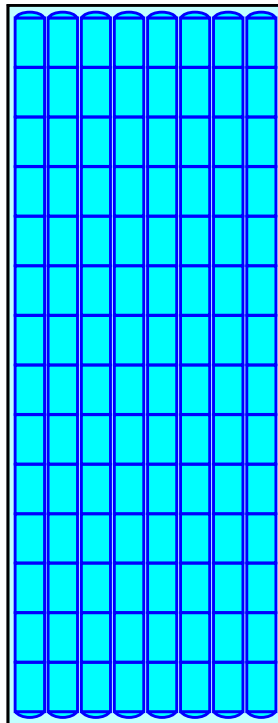
Overall Storage Efficiency = 61.6%

Overall System Size = 103.30' x 39.50' x 3.50'

112 Chambers

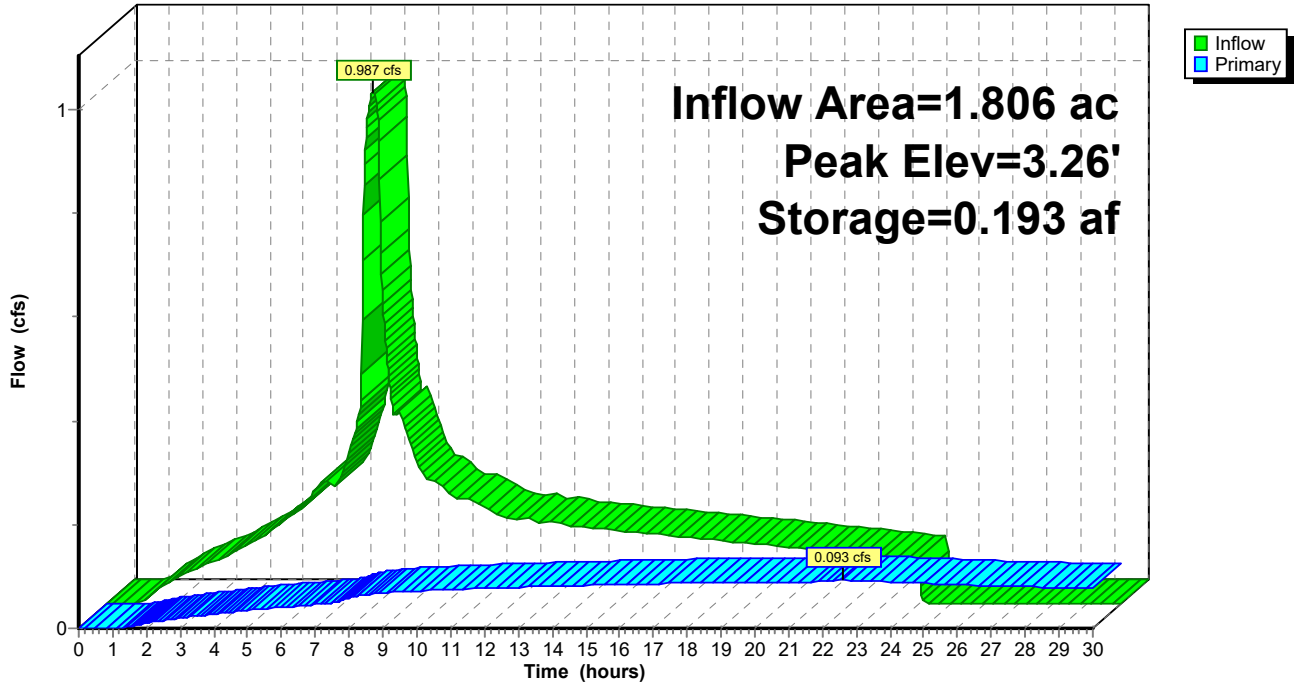
528.9 cy Field

338.4 cy Stone



### Pond 10P: Detention - 1

Hydrograph







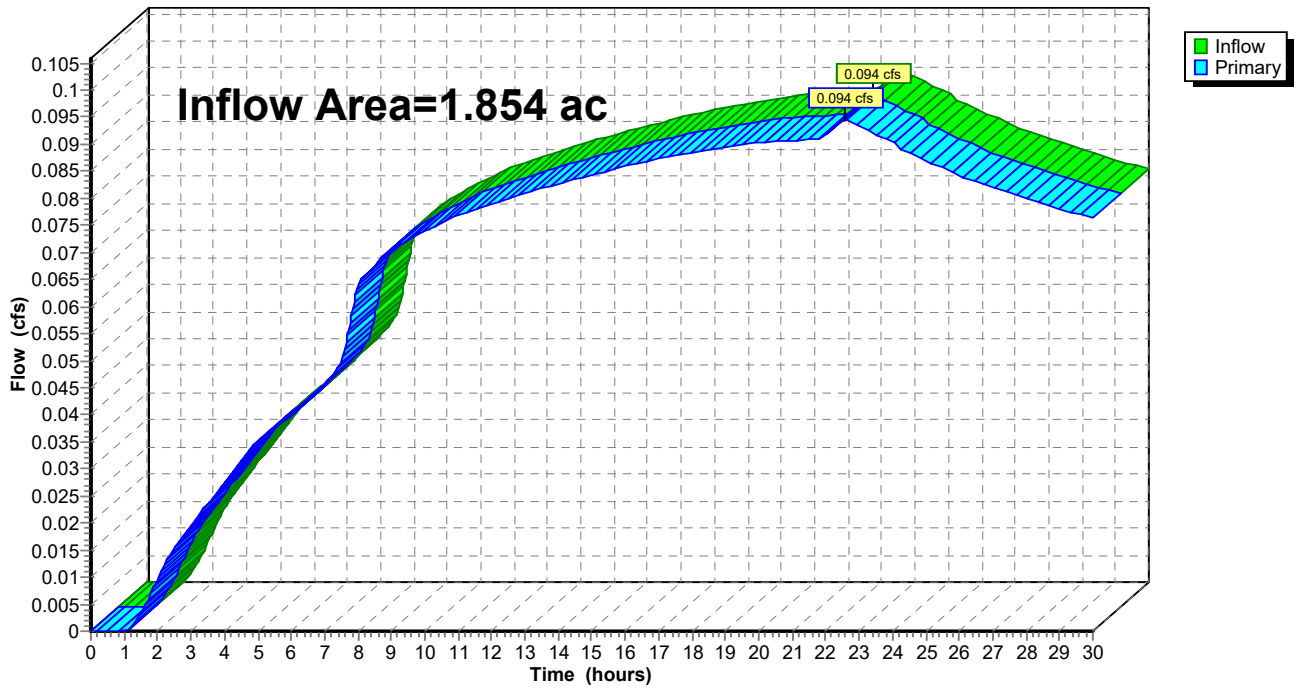
### Summary for Pond 12P: Discharge

Inflow Area = 1.854 ac, 89.95% Impervious, Inflow Depth > 1.09" for 2-Year event  
Inflow = 0.094 cfs @ 22.58 hrs, Volume= 0.169 af  
Primary = 0.094 cfs @ 22.58 hrs, Volume= 0.169 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

### Pond 12P: Discharge

Hydrograph



**Peterkort - Starbucks - HydroCAD - West**

Type IA 24-hr 5-Year Rainfall=3.10"

Prepared by Froelich Engineers

Printed 7/1/2022

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Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment1S: Basin C</b>	Runoff Area=76,016 sf 0.00% Impervious Runoff Depth=1.03" Tc=5.0 min CN=75 Runoff=0.350 cfs 0.149 af
<b>Subcatchment2S: W-1</b>	Runoff Area=32,056 sf 100.00% Impervious Runoff Depth=2.87" Tc=5.0 min CN=98 Runoff=0.540 cfs 0.176 af
<b>Subcatchment3S: W-2</b>	Runoff Area=2,281 sf 98.77% Impervious Runoff Depth=2.87" Tc=5.0 min CN=98 Runoff=0.038 cfs 0.013 af
<b>Subcatchment4S: W-3</b>	Runoff Area=9,969 sf 90.99% Impervious Runoff Depth=2.65" Tc=5.0 min CN=96 Runoff=0.159 cfs 0.051 af
<b>Subcatchment5S: W-4</b>	Runoff Area=14,557 sf 94.13% Impervious Runoff Depth=2.76" Tc=5.0 min CN=97 Runoff=0.239 cfs 0.077 af
<b>Subcatchment6S: W-5</b>	Runoff Area=7,874 sf 78.30% Impervious Runoff Depth=2.35" Tc=5.0 min CN=93 Runoff=0.111 cfs 0.035 af
<b>Subcatchment7S: W-6</b>	Runoff Area=2,113 sf 100.00% Impervious Runoff Depth=2.87" Tc=5.0 min CN=98 Runoff=0.036 cfs 0.012 af
<b>Subcatchment8S: W-8</b>	Runoff Area=2,920 sf 13.05% Impervious Runoff Depth=1.14" Tc=5.0 min CN=77 Runoff=0.016 cfs 0.006 af
<b>Subcatchment9S: W-9</b>	Runoff Area=6,895 sf 99.90% Impervious Runoff Depth=2.87" Tc=5.0 min CN=98 Runoff=0.116 cfs 0.038 af
<b>Pond 10P: Detention - 1</b>	Peak Elev=3.32' Storage=0.195 af Inflow=1.255 cfs 0.407 af Outflow=0.223 cfs 0.254 af
<b>Subcatchment11S: W-7</b>	Runoff Area=2,084 sf 0.00% Impervious Runoff Depth=0.97" Tc=5.0 min CN=74 Runoff=0.009 cfs 0.004 af
<b>Pond 12P: Discharge</b>	Inflow=0.226 cfs 0.258 af Primary=0.226 cfs 0.258 af

**Total Runoff Area = 3.599 ac Runoff Volume = 0.560 af Average Runoff Depth = 1.87"**  
**53.67% Pervious = 1.931 ac 46.33% Impervious = 1.667 ac**

**Summary for Subcatchment 1S: Basin C**

Runoff = 0.350 cfs @ 8.01 hrs, Volume= 0.149 af, Depth= 1.03"  
 Routed to nonexistent node 21P

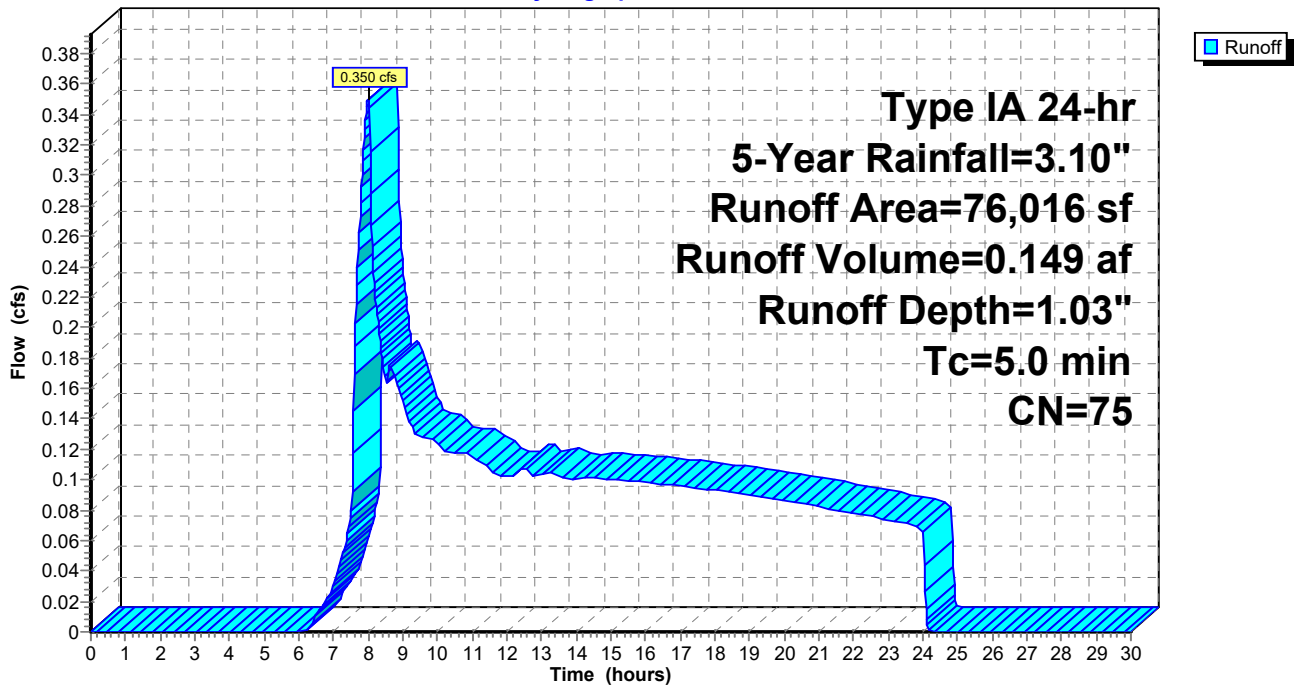
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
* 76,016	75	
76,016		100.00% Pervious Area

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

**Subcatchment 1S: Basin C**

Hydrograph



**Summary for Subcatchment 2S: W-1**

Runoff = 0.540 cfs @ 7.86 hrs, Volume= 0.176 af, Depth= 2.87"  
 Routed to Pond 10P : Detention - 1

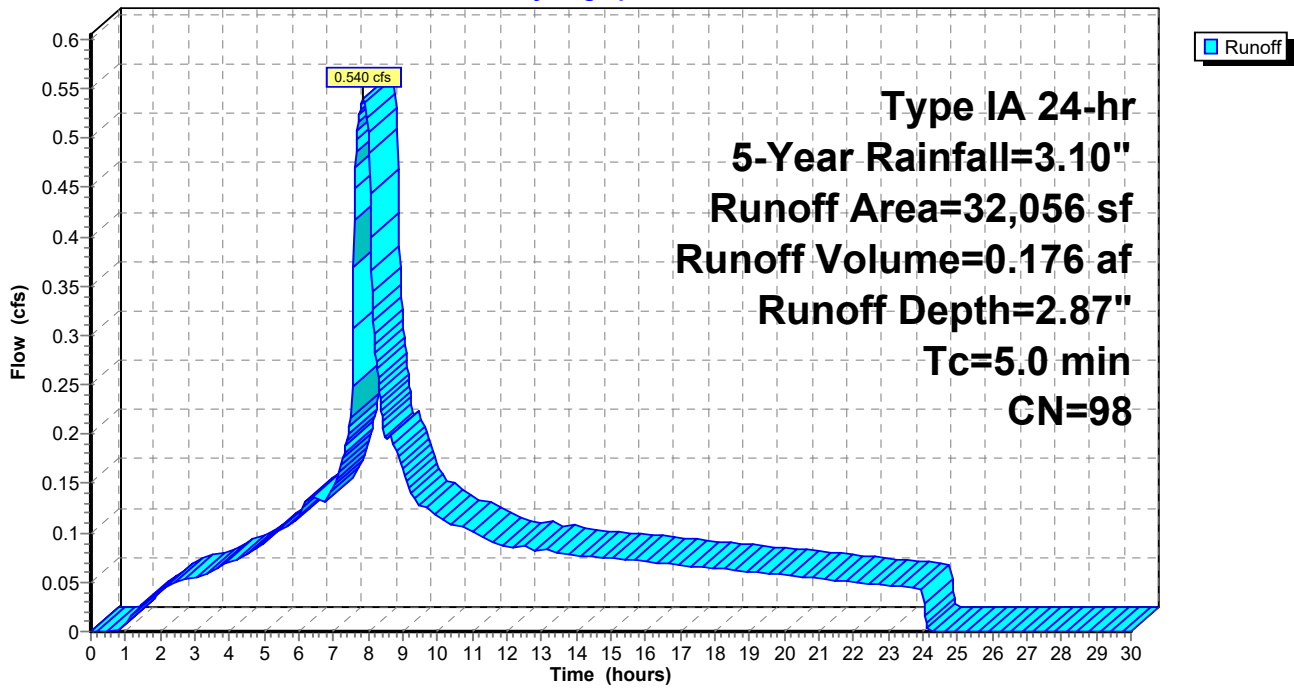
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
444	98	Paved parking, HSG C
31,612	98	Paved parking, HSG C
32,056	98	Weighted Average
32,056		100.00% Impervious Area

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

**Subcatchment 2S: W-1**

Hydrograph



**Summary for Subcatchment 3S: W-2**

Runoff = 0.038 cfs @ 7.86 hrs, Volume= 0.013 af, Depth= 2.87"  
 Routed to Pond 10P : Detention - 1

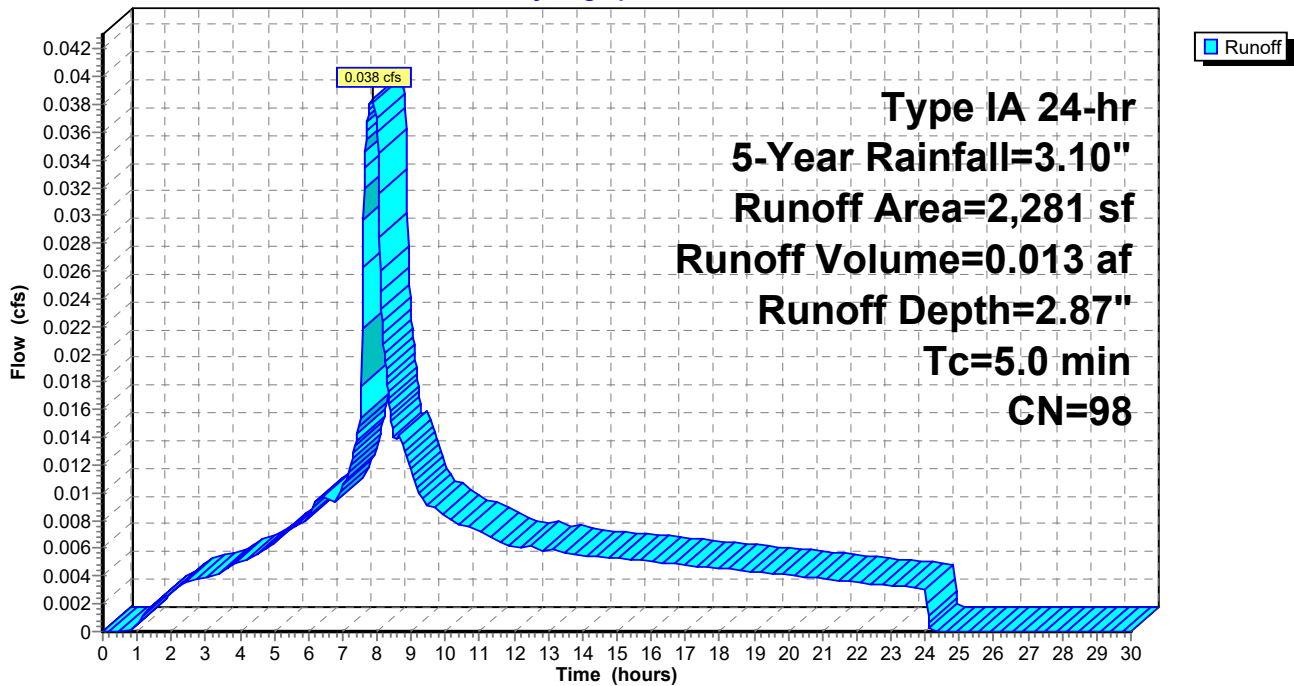
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
28	74	>75% Grass cover, Good, HSG C
316	98	Paved parking, HSG C
1,937	98	Paved parking, HSG C
2,281	98	Weighted Average
28		1.23% Pervious Area
2,253		98.77% Impervious Area

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

**Subcatchment 3S: W-2**

Hydrograph



**Summary for Subcatchment 4S: W-3**

Runoff = 0.159 cfs @ 7.87 hrs, Volume= 0.051 af, Depth= 2.65"  
 Routed to Pond 10P : Detention - 1

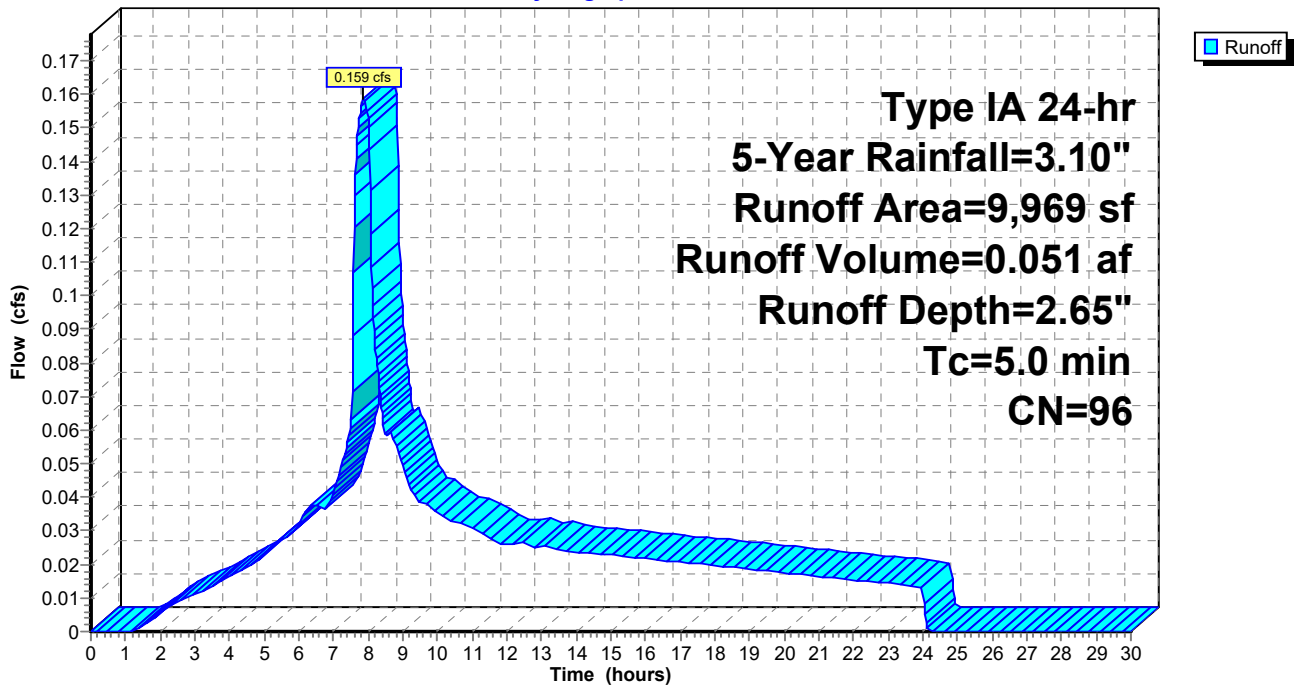
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
898	74	>75% Grass cover, Good, HSG C
4,462	98	Paved parking, HSG C
4,609	98	Paved parking, HSG C
9,969	96	Weighted Average
898		9.01% Pervious Area
9,071		90.99% Impervious Area

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

**Subcatchment 4S: W-3**

Hydrograph



**Summary for Subcatchment 5S: W-4**

Runoff = 0.239 cfs @ 7.86 hrs, Volume= 0.077 af, Depth= 2.76"  
 Routed to Pond 10P : Detention - 1

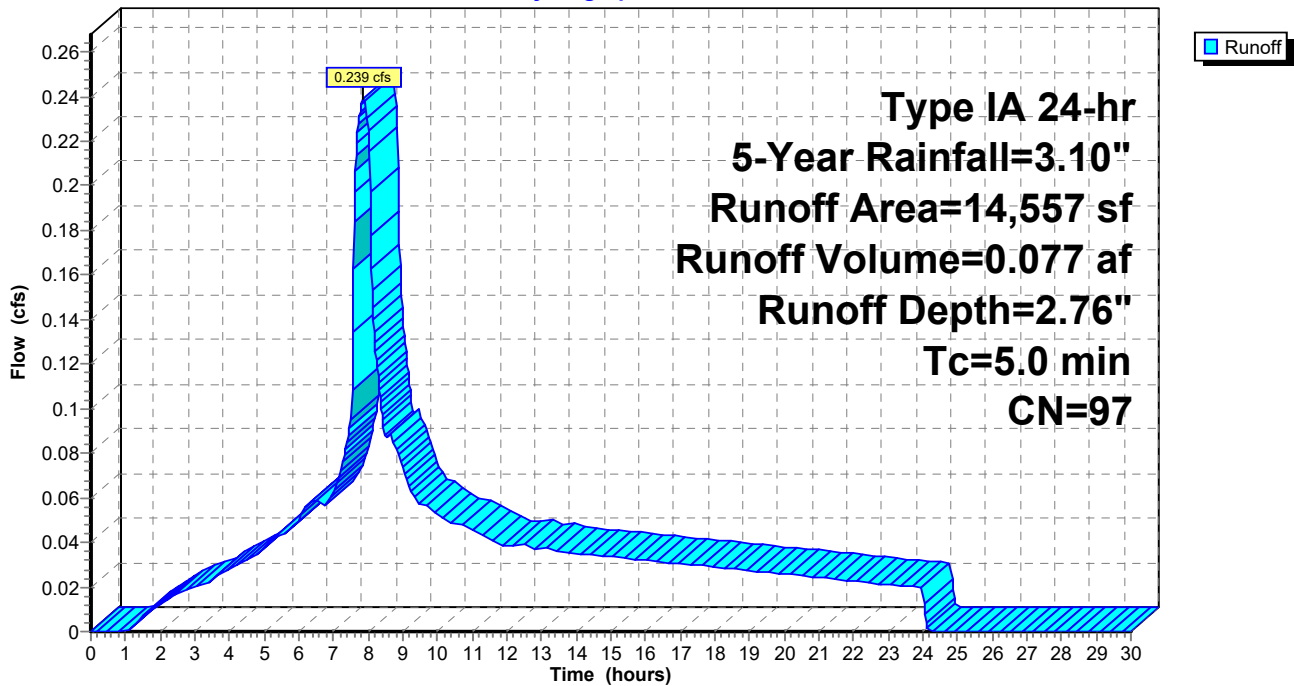
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
854	74	>75% Grass cover, Good, HSG C
4,220	98	Paved parking, HSG C
9,483	98	Paved parking, HSG C
14,557	97	Weighted Average
854		5.87% Pervious Area
13,703		94.13% Impervious Area

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

**Subcatchment 5S: W-4**

Hydrograph



**Summary for Subcatchment 6S: W-5**

Runoff = 0.111 cfs @ 7.89 hrs, Volume= 0.035 af, Depth= 2.35"  
 Routed to Pond 10P : Detention - 1

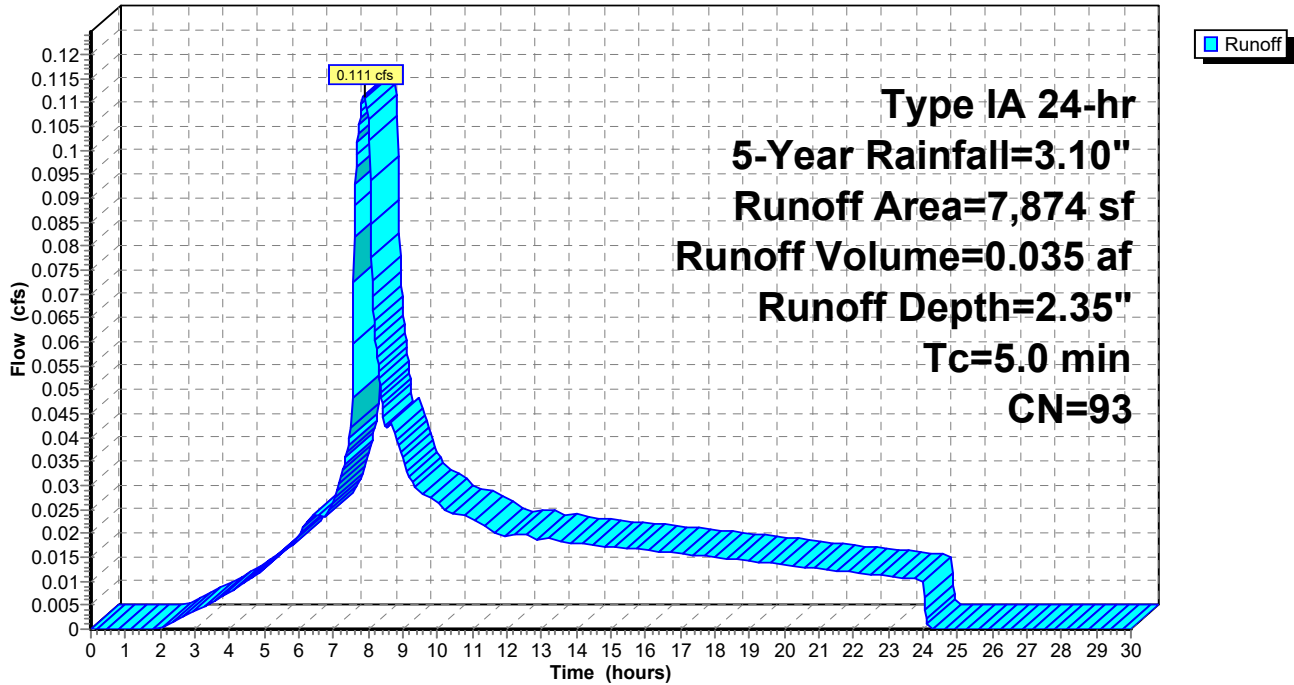
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
1,709	74	>75% Grass cover, Good, HSG C
6,165	98	Paved parking, HSG C
7,874	93	Weighted Average
1,709		21.70% Pervious Area
6,165		78.30% Impervious Area

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

**Subcatchment 6S: W-5**

Hydrograph





**Summary for Subcatchment 7S: W-6**

Runoff = 0.036 cfs @ 7.86 hrs, Volume= 0.012 af, Depth= 2.87"  
 Routed to Pond 10P : Detention - 1

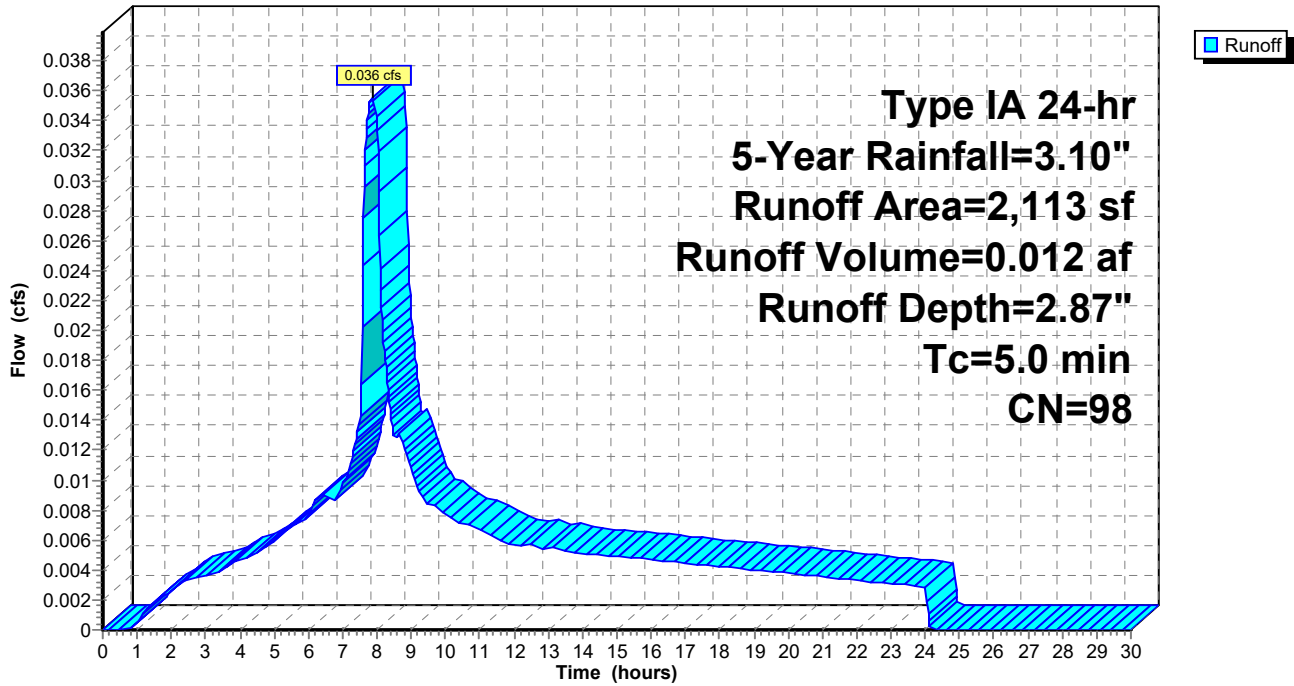
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
2,113	98	Paved parking, HSG C
2,113		100.00% Impervious Area

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

**Subcatchment 7S: W-6**

Hydrograph



**Summary for Subcatchment 8S: W-8**

Runoff = 0.016 cfs @ 8.00 hrs, Volume= 0.006 af, Depth= 1.14"  
 Routed to Pond 10P : Detention - 1

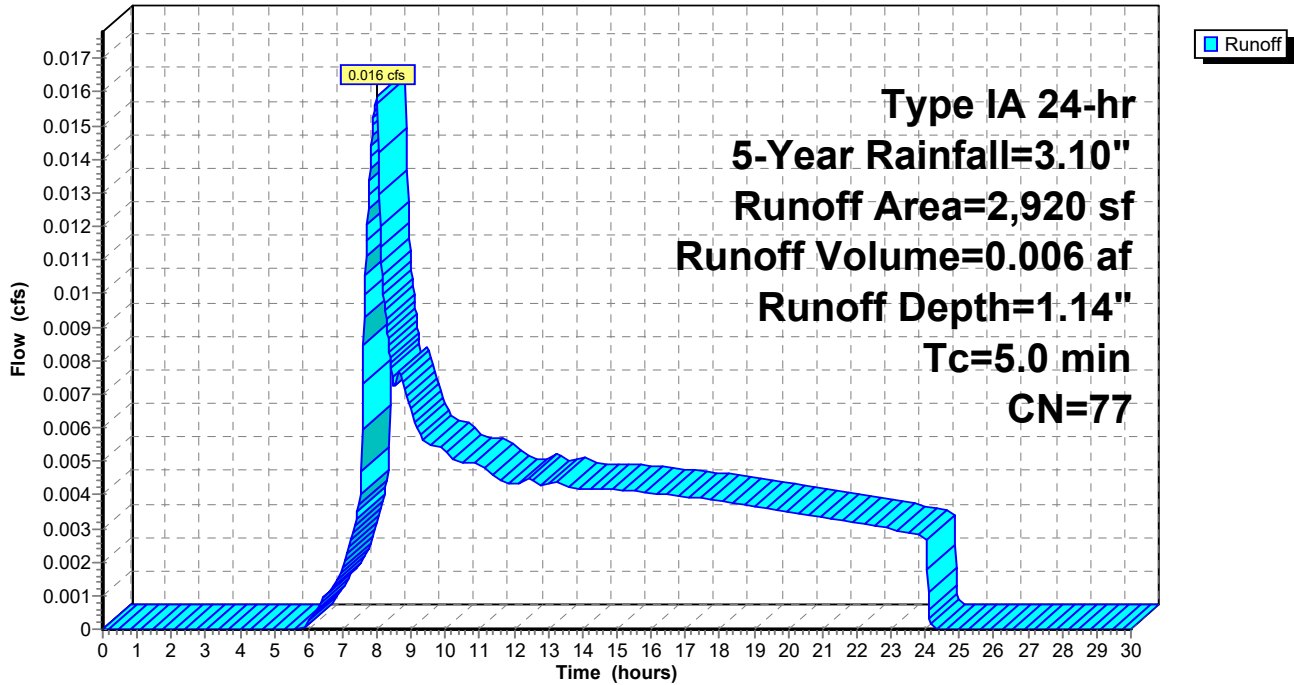
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
2,539	74	>75% Grass cover, Good, HSG C
381	98	Paved parking, HSG C
2,920	77	Weighted Average
2,539		86.95% Pervious Area
381		13.05% Impervious Area

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

**Subcatchment 8S: W-8**

Hydrograph



**Summary for Subcatchment 9S: W-9**

Runoff = 0.116 cfs @ 7.86 hrs, Volume= 0.038 af, Depth= 2.87"  
 Routed to Pond 10P : Detention - 1

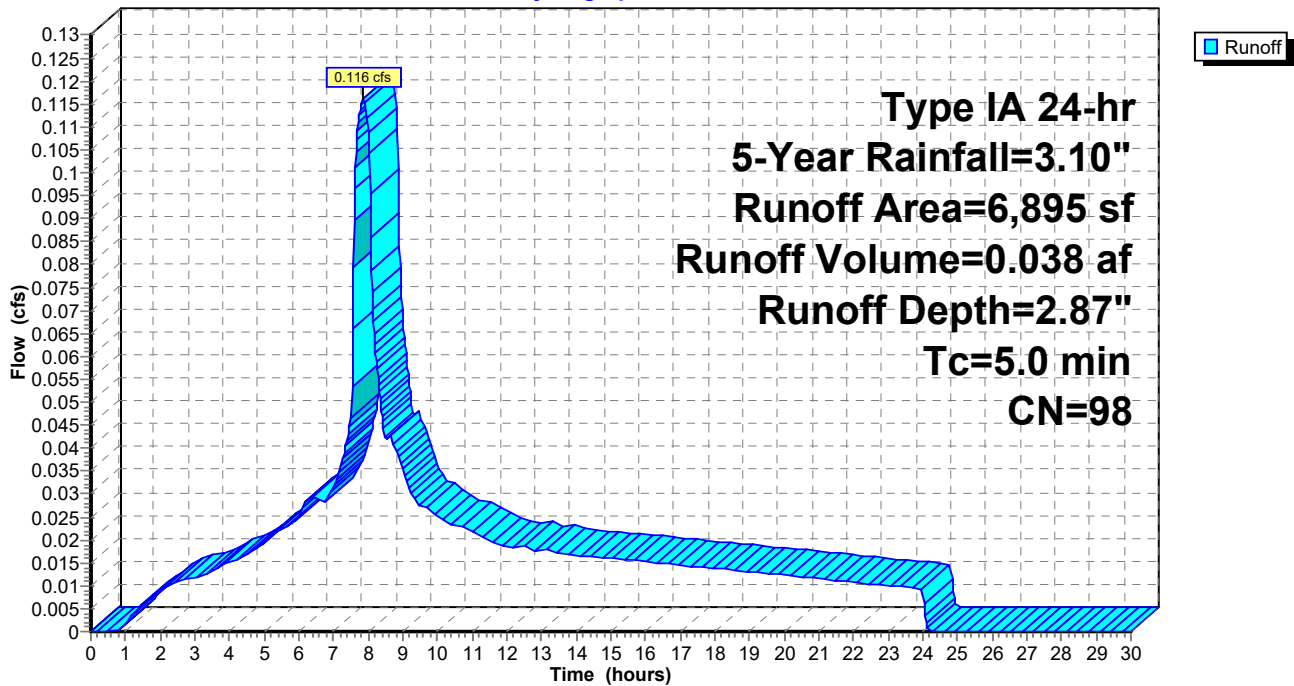
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
7	74	>75% Grass cover, Good, HSG C
517	98	Paved parking, HSG C
6,371	98	Paved parking, HSG C
6,895	98	Weighted Average
7		0.10% Pervious Area
6,888		99.90% Impervious Area

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

**Subcatchment 9S: W-9**

Hydrograph



**Summary for Pond 10P: Detention - 1**

Inflow Area = 1.806 ac, 92.33% Impervious, Inflow Depth = 2.70" for 5-Year event  
 Inflow = 1.255 cfs @ 7.87 hrs, Volume= 0.407 af  
 Outflow = 0.223 cfs @ 11.44 hrs, Volume= 0.254 af, Atten= 82%, Lag= 214.7 min  
 Primary = 0.223 cfs @ 11.44 hrs, Volume= 0.254 af  
 Routed to Pond 12P : Discharge

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Peak Elev= 3.32' @ 11.44 hrs Surf.Area= 0.094 ac Storage= 0.195 af

Plug-Flow detention time= 557.6 min calculated for 0.254 af (62% of inflow)  
 Center-of-Mass det. time= 337.6 min ( 1,016.6 - 678.9 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.084 af	<b>39.50"W x 103.30'L x 3.50'H Field A</b> 0.328 af Overall - 0.118 af Embedded = 0.210 af x 40.0% Voids
#2A	0.50'	0.118 af	<b>ADS_StormTech SC-740 +Cap</b> x 112 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 112 Chambers in 8 Rows
		0.202 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>1.375" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#2	Primary	3.25'	<b>8.000" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.222 cfs @ 11.44 hrs HW=3.32' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 0.090 cfs @ 8.775 fps)  
 2=Orifice/Grate (Weir Controls 0.131 cfs @ 0.875 fps)

**Pond 10P: Detention - 1 - Chamber Wizard Field A**

**Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

14 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 101.30' Row Length +12.0" End Stone x 2 = 103.30' Base Length

8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

112 Chambers x 45.9 cf = 5,145.3 cf Chamber Storage

14,280.8 cf Field - 5,145.3 cf Chambers = 9,135.5 cf Stone x 40.0% Voids = 3,654.2 cf Stone Storage

Chamber Storage + Stone Storage = 8,799.5 cf = 0.202 af

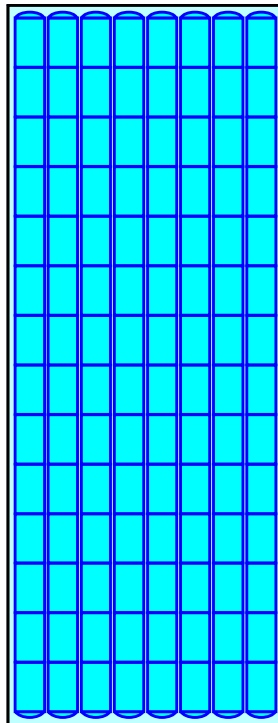
Overall Storage Efficiency = 61.6%

Overall System Size = 103.30' x 39.50' x 3.50'

112 Chambers

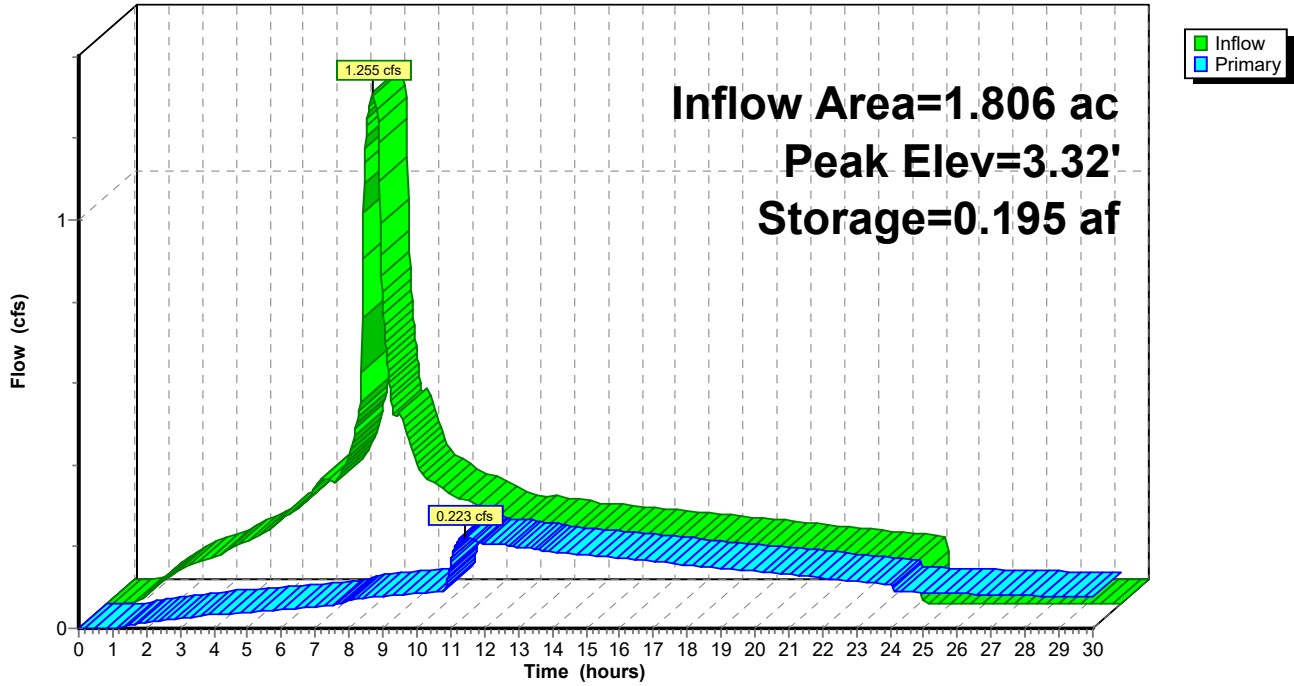
528.9 cy Field

338.4 cy Stone



Pond 10P: Detention - 1

Hydrograph



**Summary for Subcatchment 11S: W-7**

Runoff = 0.009 cfs @ 8.01 hrs, Volume= 0.004 af, Depth= 0.97"  
 Routed to Pond 12P : Discharge

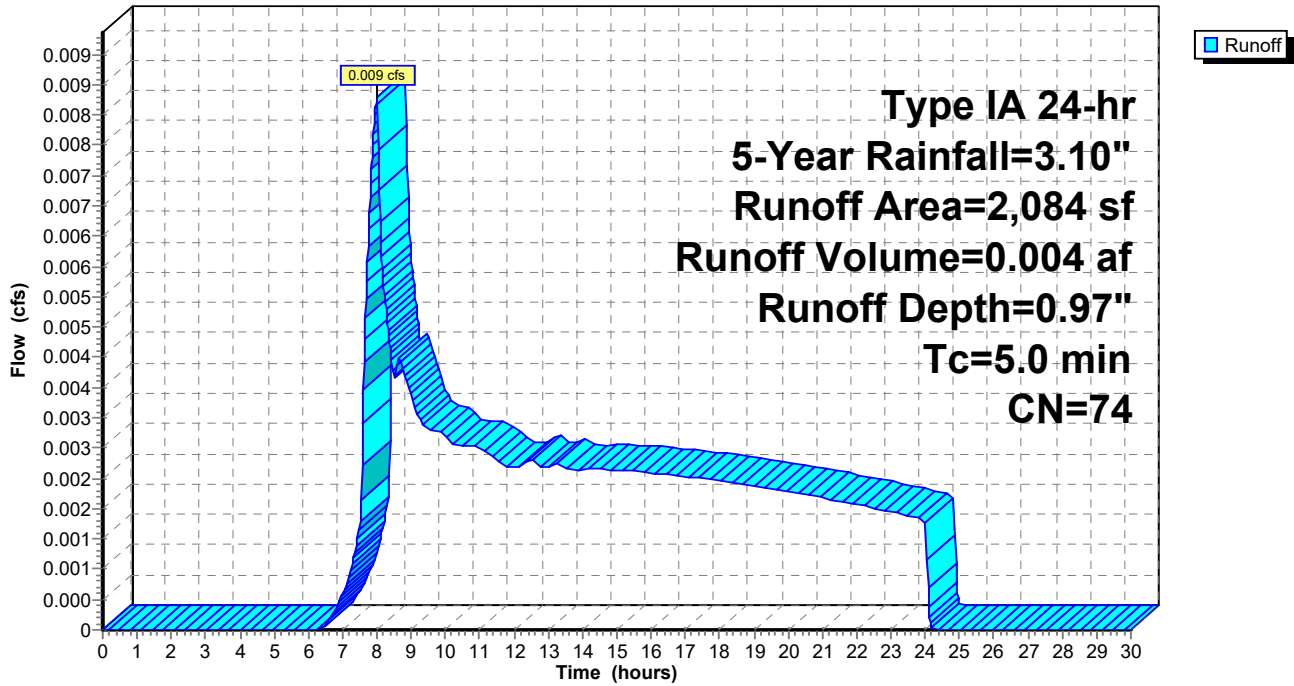
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 5-Year Rainfall=3.10"

Area (sf)	CN	Description
2,084	74	>75% Grass cover, Good, HSG C
2,084		100.00% Pervious Area

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

**Subcatchment 11S: W-7**

Hydrograph



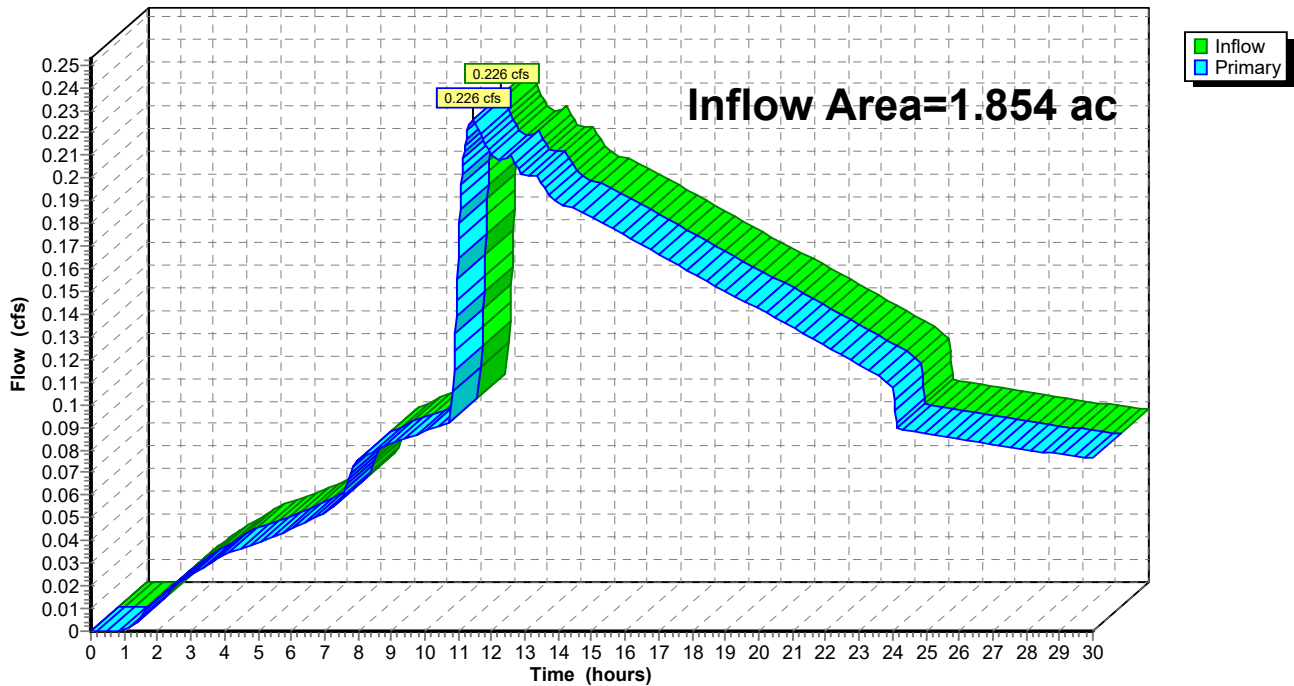
### Summary for Pond 12P: Discharge

Inflow Area = 1.854 ac, 89.95% Impervious, Inflow Depth > 1.67" for 5-Year event  
Inflow = 0.226 cfs @ 11.44 hrs, Volume= 0.258 af  
Primary = 0.226 cfs @ 11.44 hrs, Volume= 0.258 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

### Pond 12P: Discharge

Hydrograph





**Peterkort - Starbucks - HydroCAD - West**

Type IA 24-hr 10-Year Rainfall=3.45"

Prepared by Froelich Engineers

Printed 7/1/2022

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Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points  
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
 Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment1S: Basin C</b>	Runoff Area=76,016 sf 0.00% Impervious Runoff Depth=1.27" Tc=5.0 min CN=75 Runoff=0.459 cfs 0.184 af
<b>Subcatchment2S: W-1</b>	Runoff Area=32,056 sf 100.00% Impervious Runoff Depth=3.22" Tc=5.0 min CN=98 Runoff=0.604 cfs 0.197 af
<b>Subcatchment3S: W-2</b>	Runoff Area=2,281 sf 98.77% Impervious Runoff Depth=3.22" Tc=5.0 min CN=98 Runoff=0.043 cfs 0.014 af
<b>Subcatchment4S: W-3</b>	Runoff Area=9,969 sf 90.99% Impervious Runoff Depth=3.00" Tc=5.0 min CN=96 Runoff=0.179 cfs 0.057 af
<b>Subcatchment5S: W-4</b>	Runoff Area=14,557 sf 94.13% Impervious Runoff Depth=3.10" Tc=5.0 min CN=97 Runoff=0.268 cfs 0.086 af
<b>Subcatchment6S: W-5</b>	Runoff Area=7,874 sf 78.30% Impervious Runoff Depth=2.69" Tc=5.0 min CN=93 Runoff=0.128 cfs 0.040 af
<b>Subcatchment7S: W-6</b>	Runoff Area=2,113 sf 100.00% Impervious Runoff Depth=3.22" Tc=5.0 min CN=98 Runoff=0.040 cfs 0.013 af
<b>Subcatchment8S: W-8</b>	Runoff Area=2,920 sf 13.05% Impervious Runoff Depth=1.39" Tc=5.0 min CN=77 Runoff=0.020 cfs 0.008 af
<b>Subcatchment9S: W-9</b>	Runoff Area=6,895 sf 99.90% Impervious Runoff Depth=3.22" Tc=5.0 min CN=98 Runoff=0.130 cfs 0.042 af
<b>Pond 10P: Detention - 1</b>	Peak Elev=3.35' Storage=0.197 af Inflow=1.411 cfs 0.459 af Outflow=0.324 cfs 0.306 af
<b>Subcatchment11S: W-7</b>	Runoff Area=2,084 sf 0.00% Impervious Runoff Depth=1.21" Tc=5.0 min CN=74 Runoff=0.012 cfs 0.005 af
<b>Pond 12P: Discharge</b>	Inflow=0.328 cfs 0.310 af Primary=0.328 cfs 0.310 af

**Total Runoff Area = 3.599 ac Runoff Volume = 0.648 af Average Runoff Depth = 2.16"**  
**53.67% Pervious = 1.931 ac 46.33% Impervious = 1.667 ac**

**Summary for Subcatchment 1S: Basin C**

Runoff = 0.459 cfs @ 8.00 hrs, Volume= 0.184 af, Depth= 1.27"  
 Routed to nonexistent node 21P

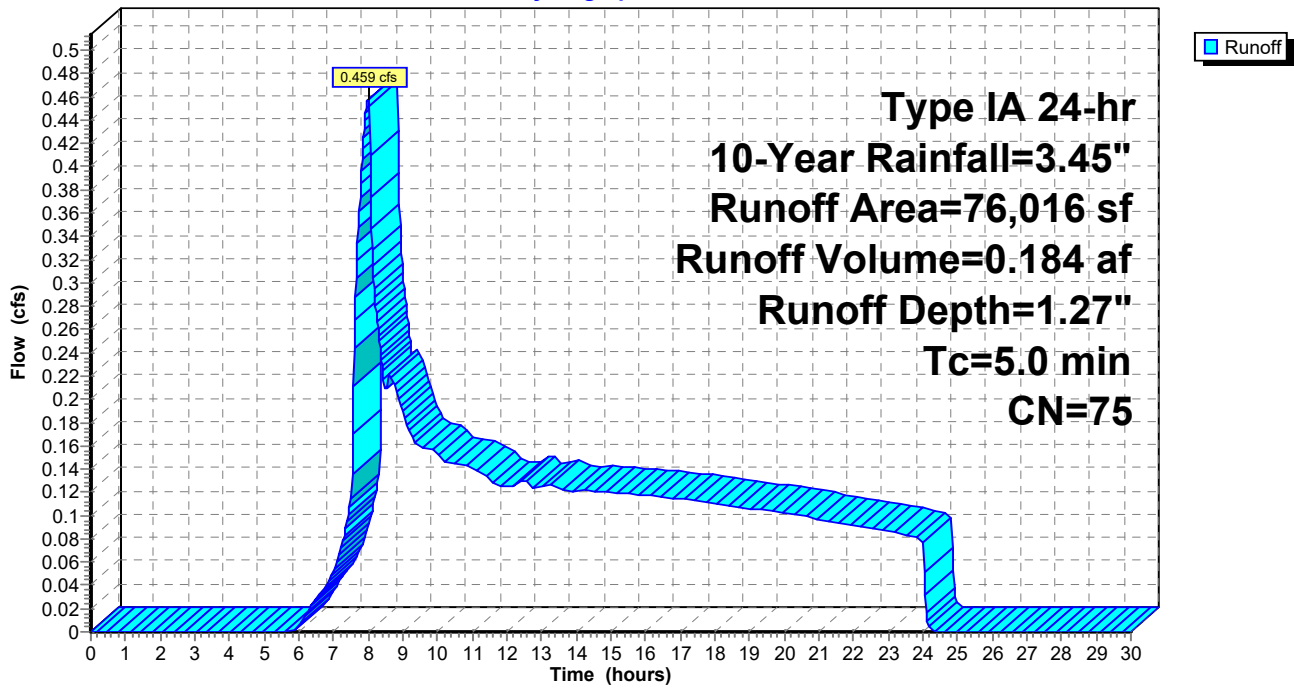
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
* 76,016	75	
76,016		100.00% Pervious Area

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

**Subcatchment 1S: Basin C**

Hydrograph



**Summary for Subcatchment 2S: W-1**

Runoff = 0.604 cfs @ 7.86 hrs, Volume= 0.197 af, Depth= 3.22"  
 Routed to Pond 10P : Detention - 1

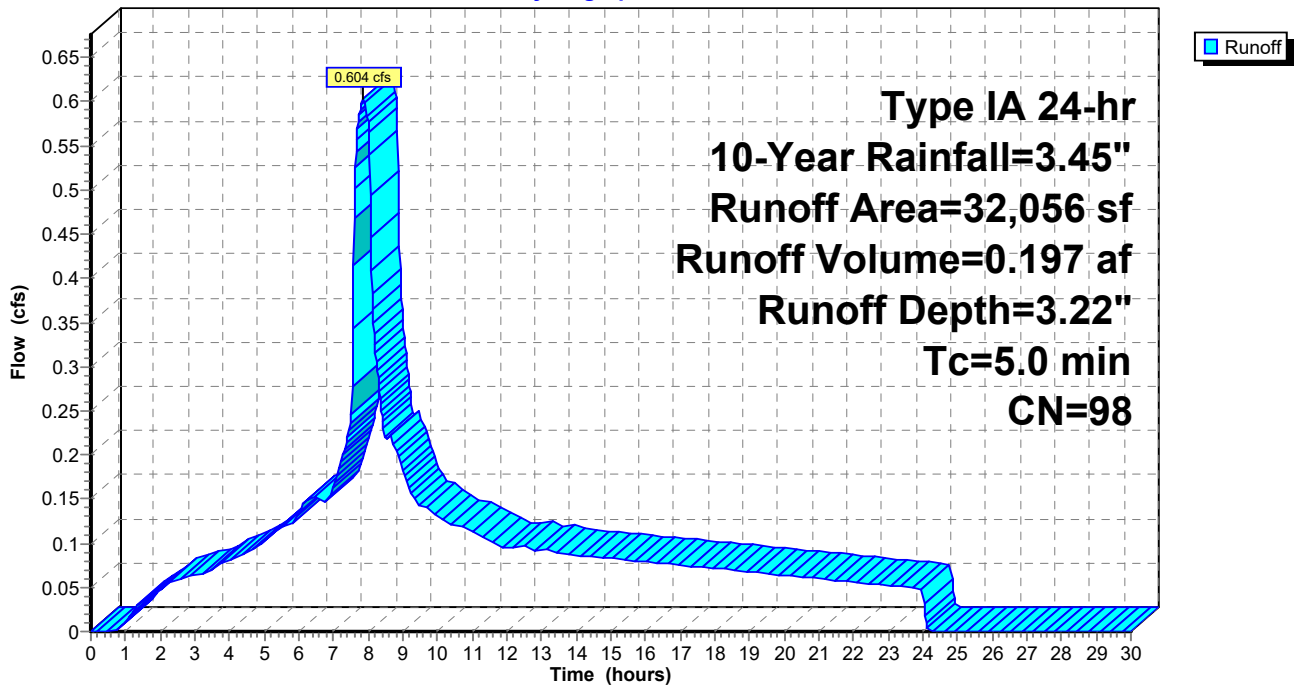
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
444	98	Paved parking, HSG C
31,612	98	Paved parking, HSG C
32,056	98	Weighted Average
32,056		100.00% Impervious Area

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

**Subcatchment 2S: W-1**

Hydrograph



**Summary for Subcatchment 3S: W-2**

Runoff = 0.043 cfs @ 7.86 hrs, Volume= 0.014 af, Depth= 3.22"  
 Routed to Pond 10P : Detention - 1

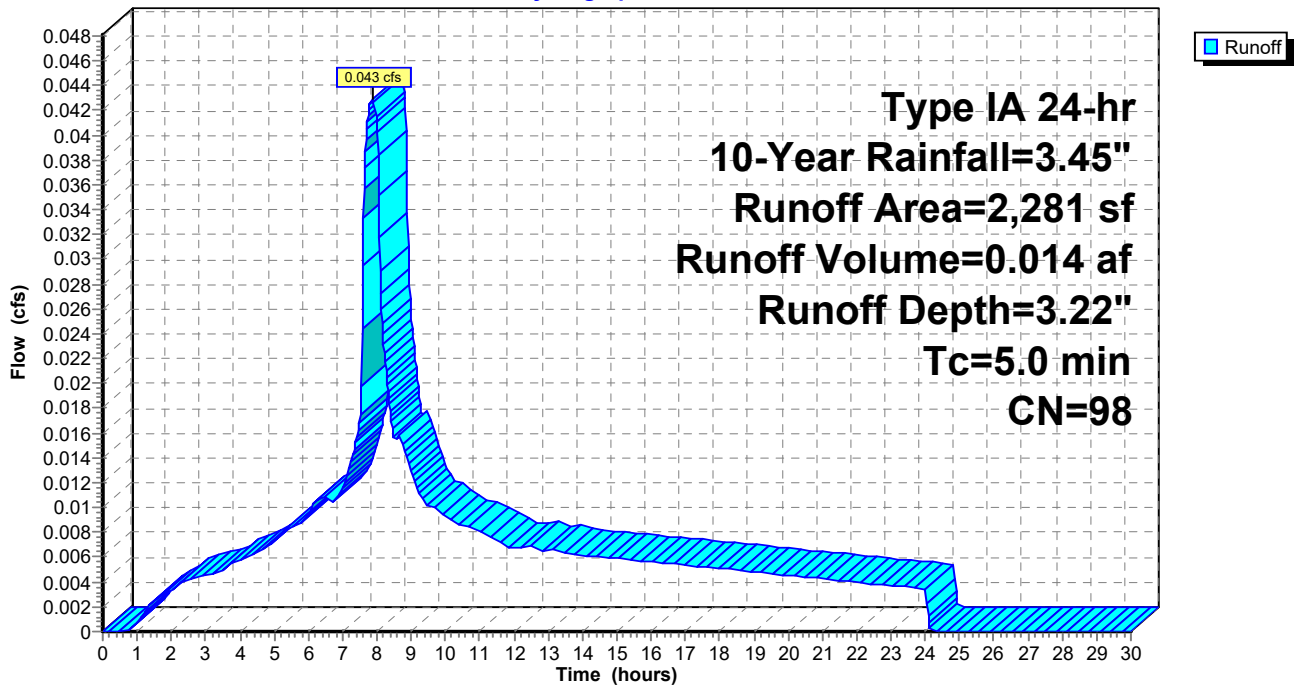
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
28	74	>75% Grass cover, Good, HSG C
316	98	Paved parking, HSG C
1,937	98	Paved parking, HSG C
2,281	98	Weighted Average
28		1.23% Pervious Area
2,253		98.77% Impervious Area

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

**Subcatchment 3S: W-2**

Hydrograph



**Summary for Subcatchment 4S: W-3**

Runoff = 0.179 cfs @ 7.87 hrs, Volume= 0.057 af, Depth= 3.00"  
 Routed to Pond 10P : Detention - 1

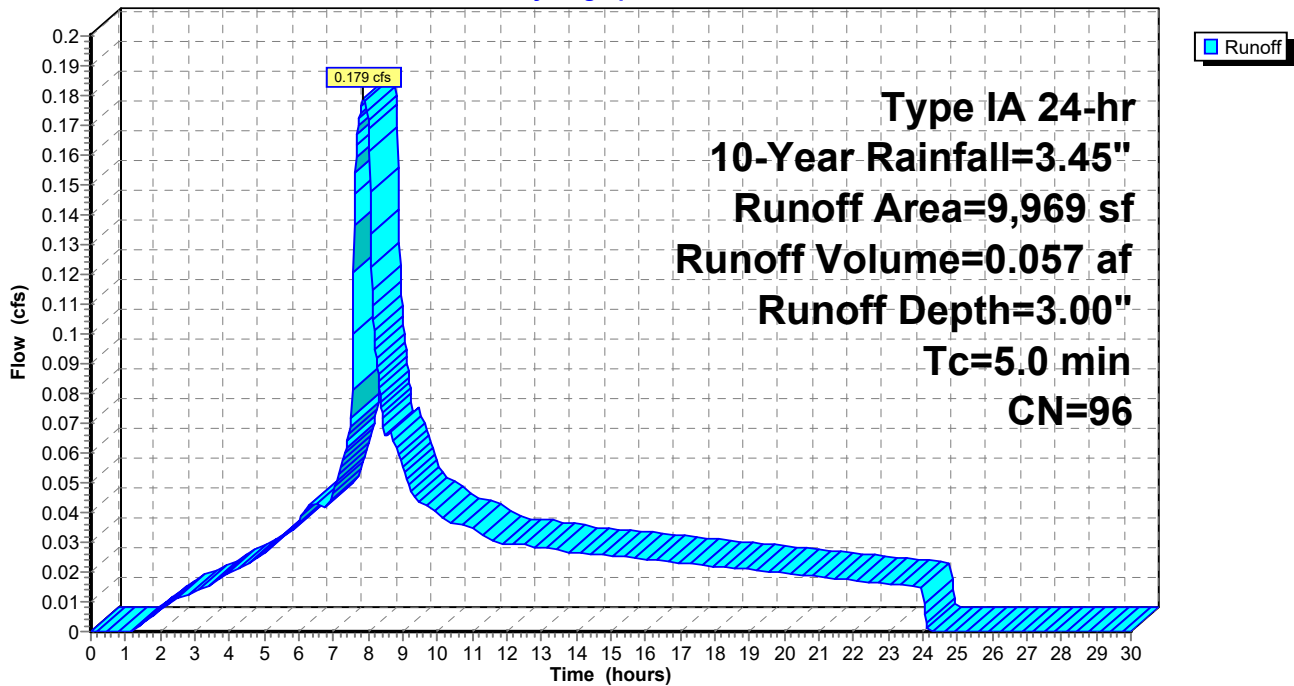
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
898	74	>75% Grass cover, Good, HSG C
4,462	98	Paved parking, HSG C
4,609	98	Paved parking, HSG C
9,969	96	Weighted Average
898		9.01% Pervious Area
9,071		90.99% Impervious Area

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

**Subcatchment 4S: W-3**

Hydrograph



**Summary for Subcatchment 5S: W-4**

Runoff = 0.268 cfs @ 7.86 hrs, Volume= 0.086 af, Depth= 3.10"  
 Routed to Pond 10P : Detention - 1

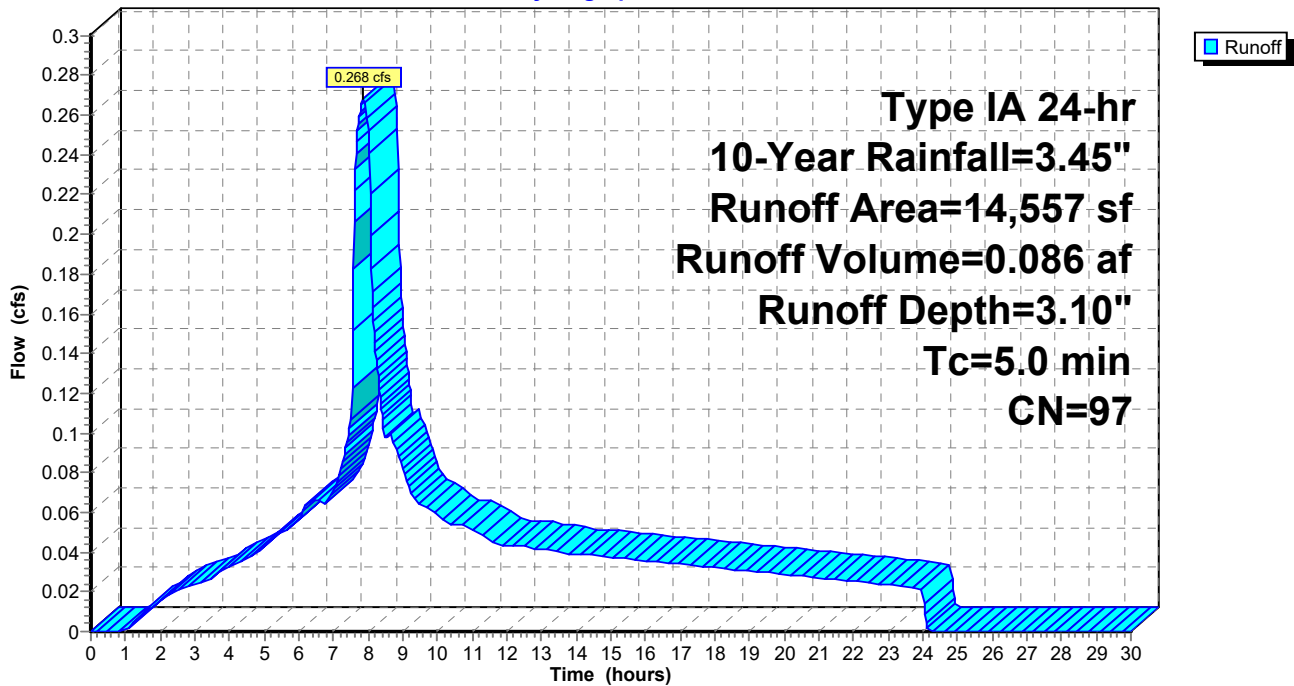
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
854	74	>75% Grass cover, Good, HSG C
4,220	98	Paved parking, HSG C
9,483	98	Paved parking, HSG C
14,557	97	Weighted Average
854		5.87% Pervious Area
13,703		94.13% Impervious Area

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

**Subcatchment 5S: W-4**

Hydrograph



**Summary for Subcatchment 6S: W-5**

Runoff = 0.128 cfs @ 7.89 hrs, Volume= 0.040 af, Depth= 2.69"  
 Routed to Pond 10P : Detention - 1

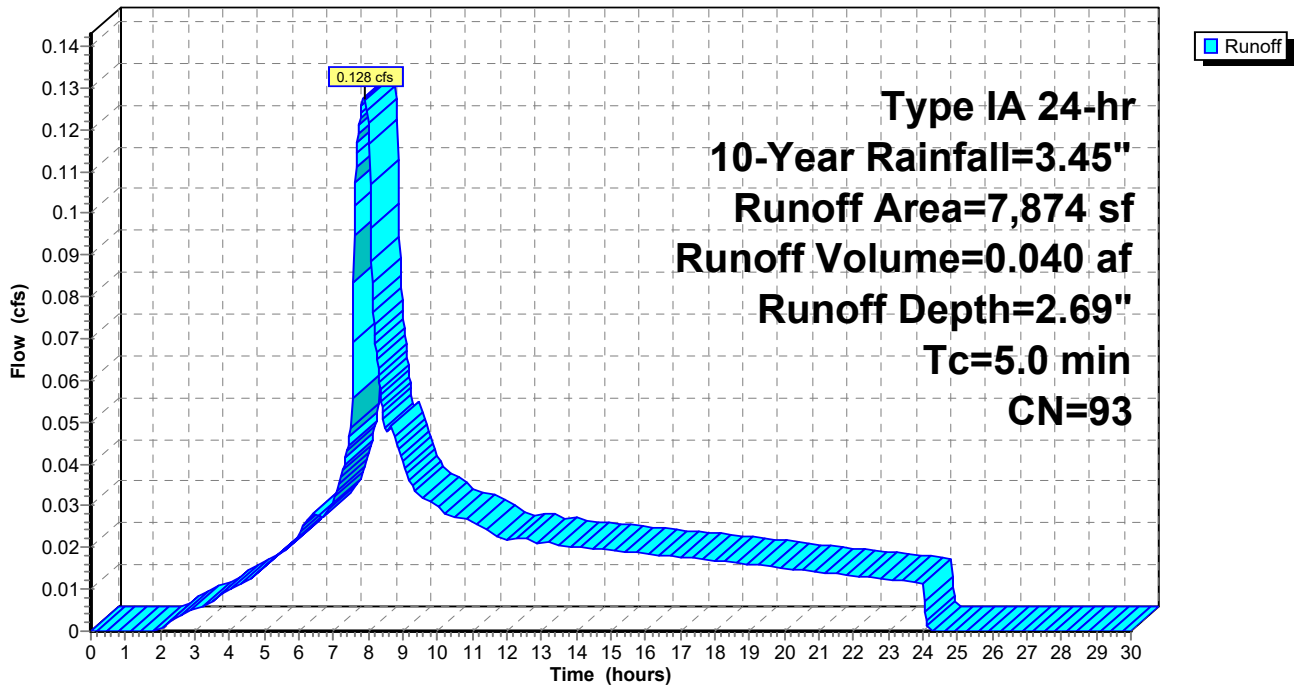
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
1,709	74	>75% Grass cover, Good, HSG C
6,165	98	Paved parking, HSG C
7,874	93	Weighted Average
1,709		21.70% Pervious Area
6,165		78.30% Impervious Area

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

**Subcatchment 6S: W-5**

Hydrograph



**Summary for Subcatchment 7S: W-6**

Runoff = 0.040 cfs @ 7.86 hrs, Volume= 0.013 af, Depth= 3.22"  
 Routed to Pond 10P : Detention - 1

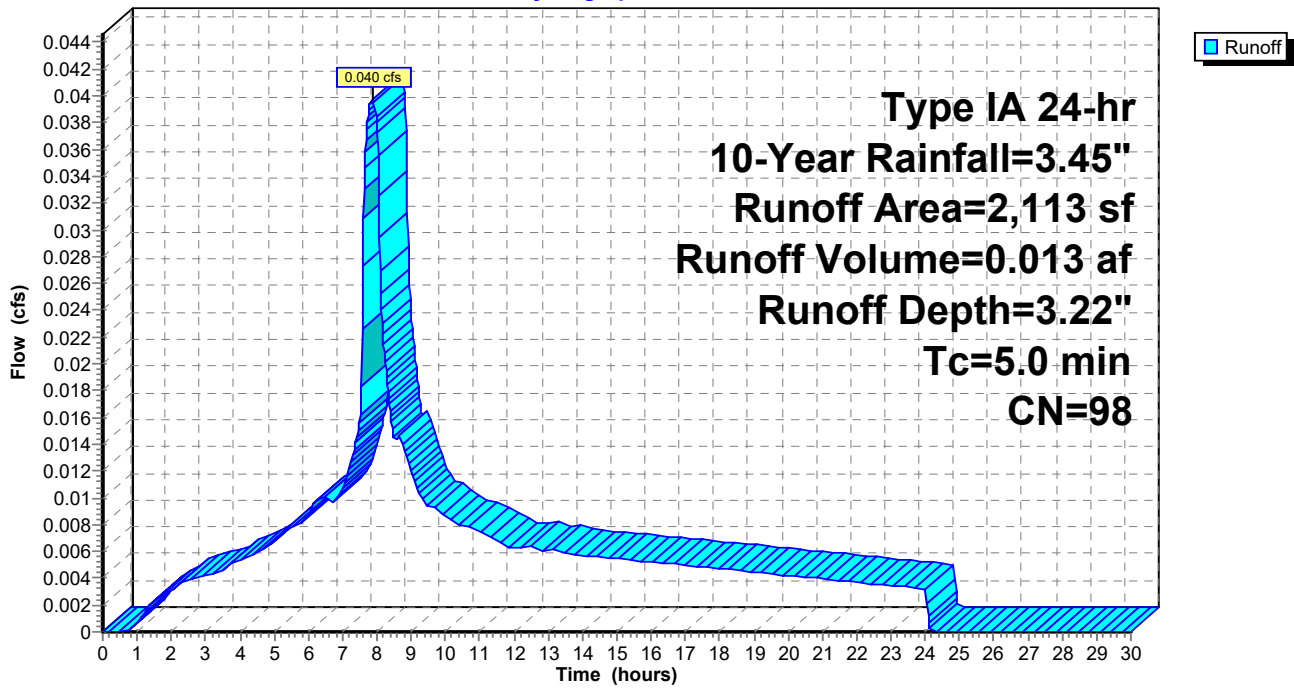
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
2,113	98	Paved parking, HSG C
2,113		100.00% Impervious Area

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

**Subcatchment 7S: W-6**

Hydrograph





**Summary for Subcatchment 8S: W-8**

Runoff = 0.020 cfs @ 7.99 hrs, Volume= 0.008 af, Depth= 1.39"  
 Routed to Pond 10P : Detention - 1

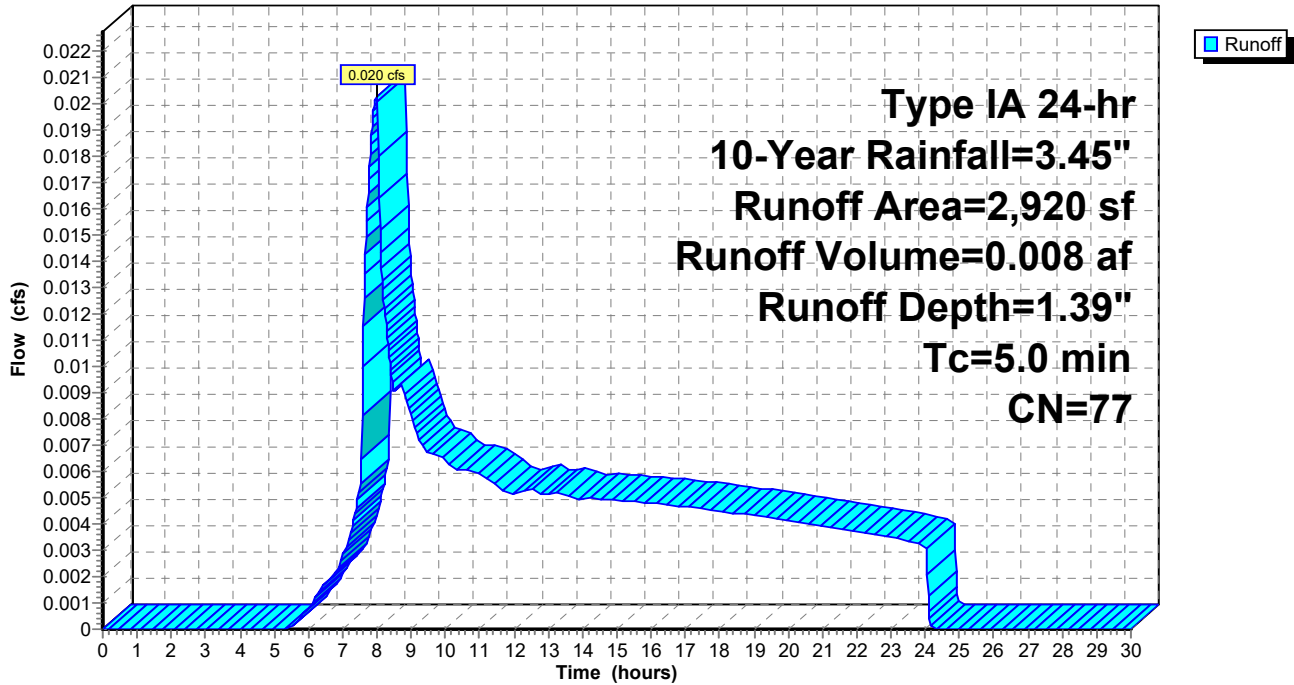
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
2,539	74	>75% Grass cover, Good, HSG C
381	98	Paved parking, HSG C
2,920	77	Weighted Average
2,539		86.95% Pervious Area
381		13.05% Impervious Area

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

**Subcatchment 8S: W-8**

Hydrograph



**Summary for Subcatchment 9S: W-9**

Runoff = 0.130 cfs @ 7.86 hrs, Volume= 0.042 af, Depth= 3.22"  
 Routed to Pond 10P : Detention - 1

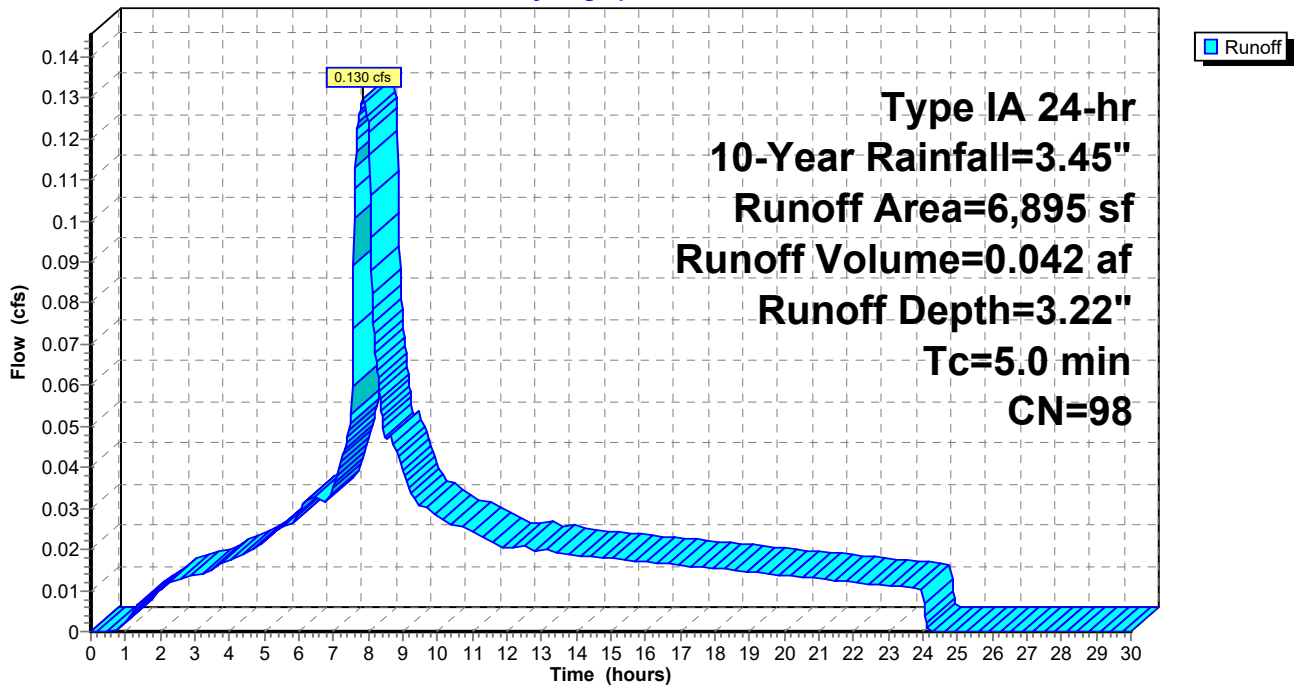
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
7	74	>75% Grass cover, Good, HSG C
517	98	Paved parking, HSG C
6,371	98	Paved parking, HSG C
6,895	98	Weighted Average
7		0.10% Pervious Area
6,888		99.90% Impervious Area

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

**Subcatchment 9S: W-9**

Hydrograph



**Summary for Pond 10P: Detention - 1**

Inflow Area = 1.806 ac, 92.33% Impervious, Inflow Depth = 3.05" for 10-Year event  
 Inflow = 1.411 cfs @ 7.87 hrs, Volume= 0.459 af  
 Outflow = 0.324 cfs @ 9.85 hrs, Volume= 0.306 af, Atten= 77%, Lag= 119.0 min  
 Primary = 0.324 cfs @ 9.85 hrs, Volume= 0.306 af  
 Routed to Pond 12P : Discharge

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Peak Elev= 3.35' @ 9.85 hrs Surf.Area= 0.094 ac Storage= 0.197 af

Plug-Flow detention time= 499.2 min calculated for 0.306 af (67% of inflow)  
 Center-of-Mass det. time= 297.4 min ( 972.9 - 675.5 )

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.084 af	<b>39.50"W x 103.30"L x 3.50"H Field A</b> 0.328 af Overall - 0.118 af Embedded = 0.210 af x 40.0% Voids
#2A	0.50'	0.118 af	<b>ADS_StormTech SC-740 +Cap</b> x 112 Inside #1 Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap 112 Chambers in 8 Rows
		0.202 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	0.00'	<b>1.375" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads
#2	Primary	3.25'	<b>8.000" Horiz. Orifice/Grate</b> C= 0.600 Limited to weir flow at low heads

**Primary OutFlow** Max=0.323 cfs @ 9.85 hrs HW=3.35' (Free Discharge)  
 1=Orifice/Grate (Orifice Controls 0.091 cfs @ 8.819 fps)  
 2=Orifice/Grate (Weir Controls 0.232 cfs @ 1.058 fps)

**Pond 10P: Detention - 1 - Chamber Wizard Field A**

**Chamber Model = ADS\_StormTechSC-740 +Cap (ADS StormTech®SC-740 with cap length)**

Effective Size= 44.6"W x 30.0"H => 6.45 sf x 7.12'L = 45.9 cf

Overall Size= 51.0"W x 30.0"H x 7.56'L with 0.44' Overlap

51.0" Wide + 6.0" Spacing = 57.0" C-C Row Spacing

14 Chambers/Row x 7.12' Long +0.81' Cap Length x 2 = 101.30' Row Length +12.0" End Stone x 2 = 103.30' Base Length

8 Rows x 51.0" Wide + 6.0" Spacing x 7 + 12.0" Side Stone x 2 = 39.50' Base Width

6.0" Stone Base + 30.0" Chamber Height + 6.0" Stone Cover = 3.50' Field Height

112 Chambers x 45.9 cf = 5,145.3 cf Chamber Storage

14,280.8 cf Field - 5,145.3 cf Chambers = 9,135.5 cf Stone x 40.0% Voids = 3,654.2 cf Stone Storage

Chamber Storage + Stone Storage = 8,799.5 cf = 0.202 af

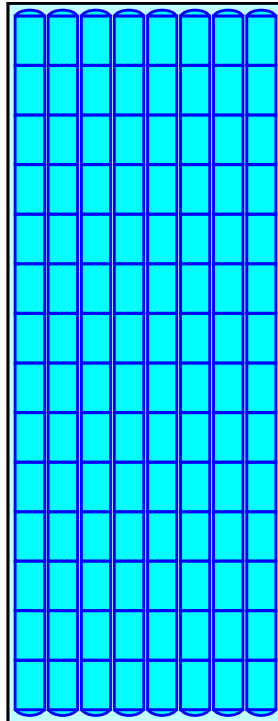
Overall Storage Efficiency = 61.6%

Overall System Size = 103.30' x 39.50' x 3.50'

112 Chambers

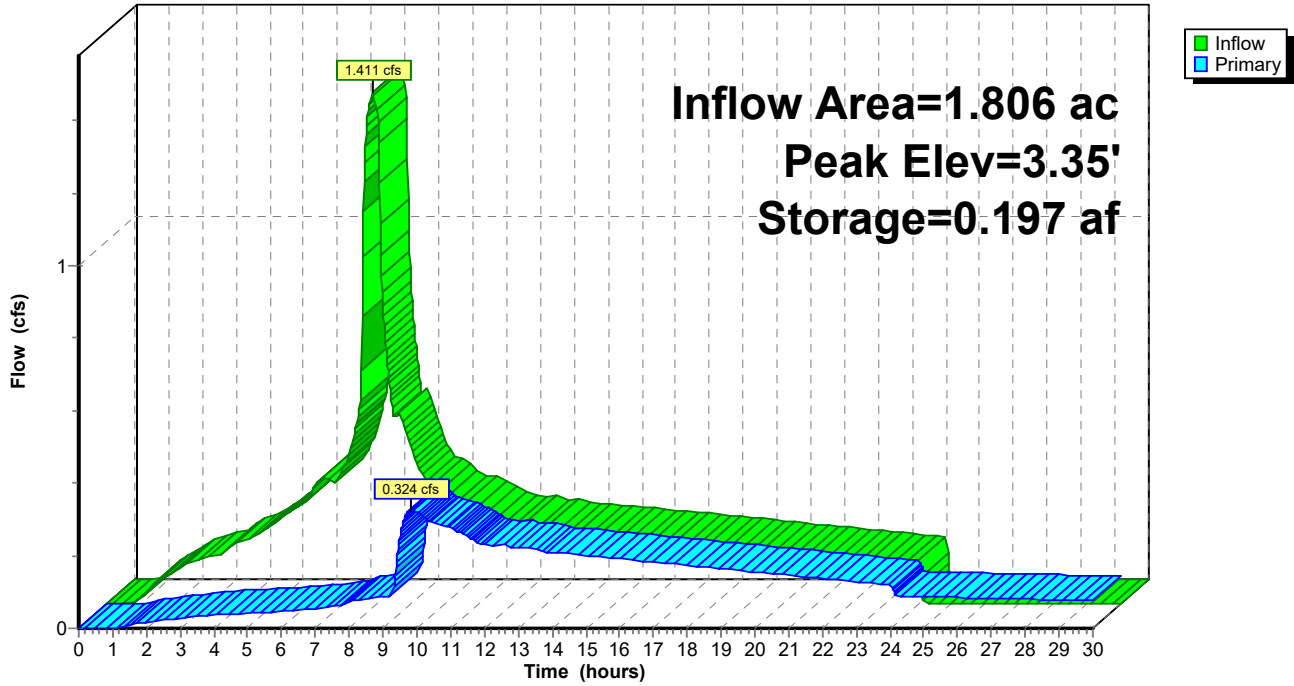
528.9 cy Field

338.4 cy Stone



Pond 10P: Detention - 1

Hydrograph



**Summary for Subcatchment 11S: W-7**

Runoff = 0.012 cfs @ 8.00 hrs, Volume= 0.005 af, Depth= 1.21"

Routed to Pond 12P : Discharge

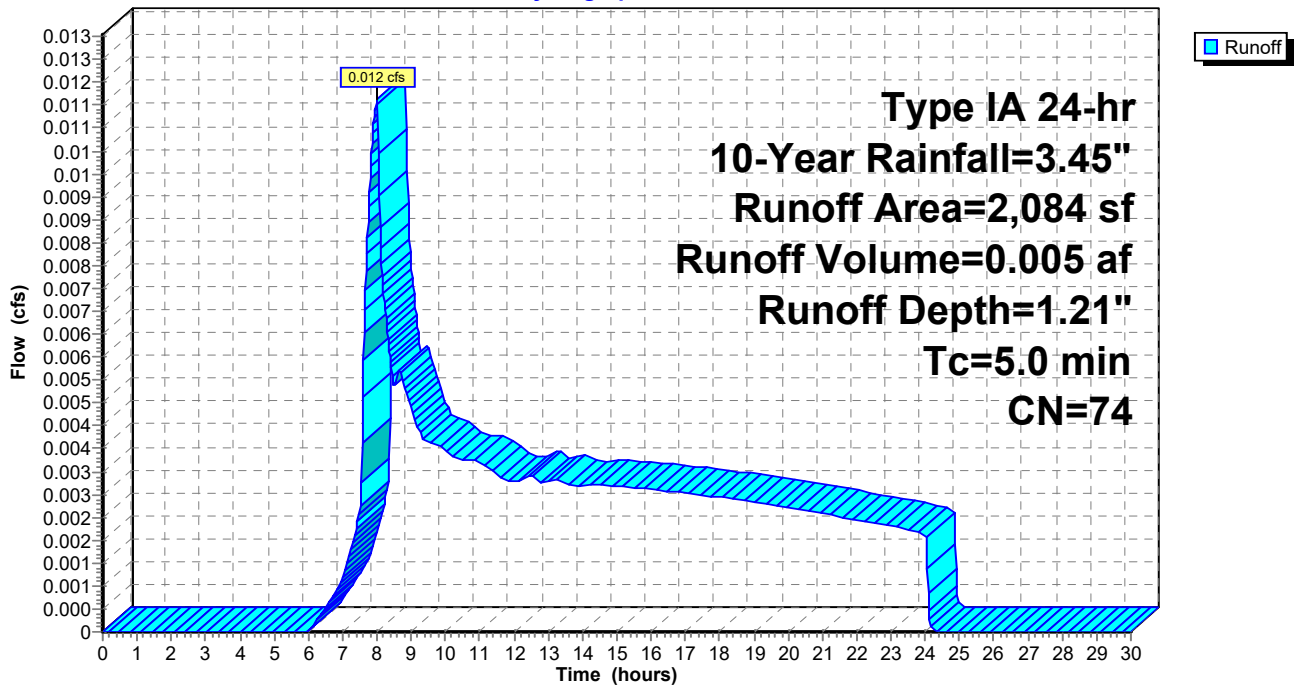
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 10-Year Rainfall=3.45"

Area (sf)	CN	Description
2,084	74	>75% Grass cover, Good, HSG C
2,084		100.00% Pervious Area

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

**Subcatchment 11S: W-7**

Hydrograph



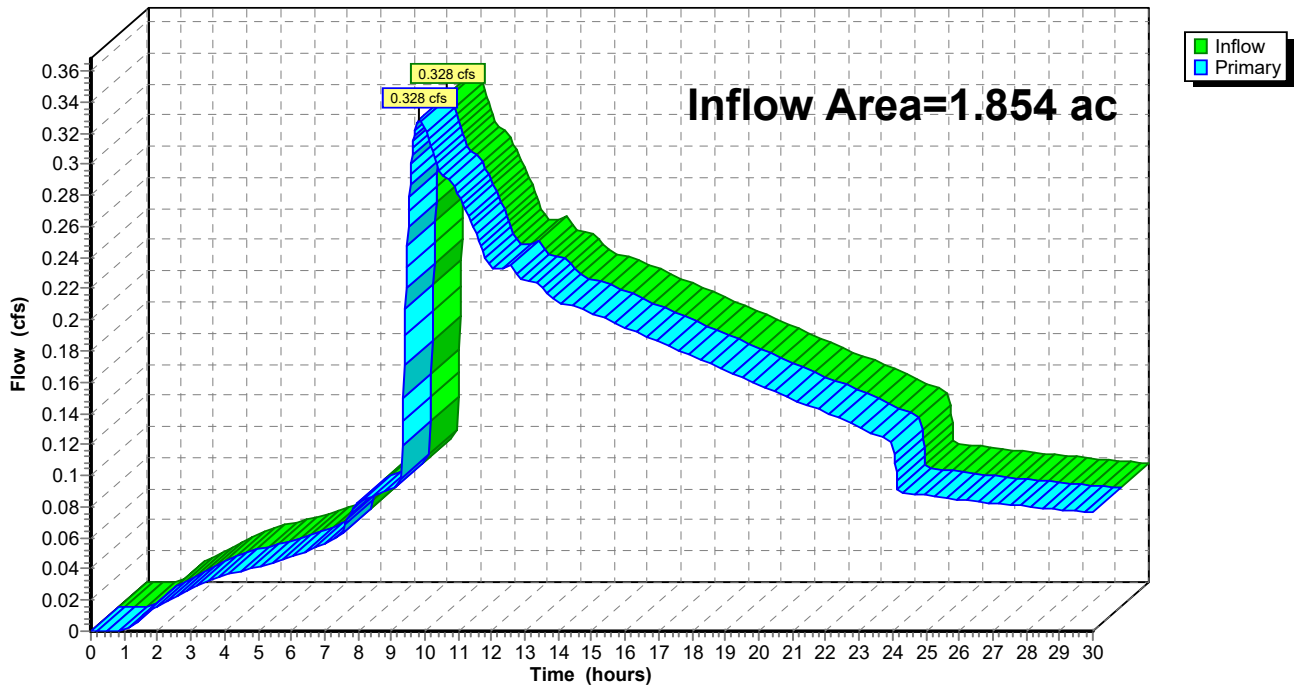
### Summary for Pond 12P: Discharge

Inflow Area = 1.854 ac, 89.95% Impervious, Inflow Depth > 2.01" for 10-Year event  
Inflow = 0.328 cfs @ 9.85 hrs, Volume= 0.310 af  
Primary = 0.328 cfs @ 9.85 hrs, Volume= 0.310 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs

### Pond 12P: Discharge

Hydrograph



**Events for Subcatchment 1S: Basin C**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.185	0.095	0.65
5-Year	3.10	0.350	0.149	1.03
10-Year	<b>3.45</b>	<b>0.459</b>	<b>0.184</b>	<b>1.27</b>



**Events for Subcatchment 2S: W-1**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.431	0.139	2.27
5-Year	3.10	0.540	0.176	2.87
10-Year	<b>3.45</b>	<b>0.604</b>	<b>0.197</b>	<b>3.22</b>

**Events for Subcatchment 3S: W-2**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.031	0.010	2.27
5-Year	3.10	0.038	0.013	2.87
10-Year	<b>3.45</b>	<b>0.043</b>	<b>0.014</b>	<b>3.22</b>

**Events for Subcatchment 4S: W-3**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.124	0.039	2.06
5-Year	3.10	0.159	0.051	2.65
10-Year	<b>3.45</b>	<b>0.179</b>	<b>0.057</b>	<b>3.00</b>

**Events for Subcatchment 5S: W-4**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.189	0.060	2.16
5-Year	3.10	0.239	0.077	2.76
10-Year	<b>3.45</b>	<b>0.268</b>	<b>0.086</b>	<b>3.10</b>

**Events for Subcatchment 6S: W-5**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.084	0.027	1.78
5-Year	3.10	0.111	0.035	2.35
10-Year	<b>3.45</b>	<b>0.128</b>	<b>0.040</b>	<b>2.69</b>

**Events for Subcatchment 7S: W-6**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.028	0.009	2.27
5-Year	3.10	0.036	0.012	2.87
10-Year	<b>3.45</b>	<b>0.040</b>	<b>0.013</b>	<b>3.22</b>

**Events for Subcatchment 8S: W-8**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.009	0.004	0.74
5-Year	3.10	0.016	0.006	1.14
10-Year	<b>3.45</b>	<b>0.020</b>	<b>0.008</b>	<b>1.39</b>

**Events for Subcatchment 9S: W-9**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.093	0.030	2.27
5-Year	3.10	0.116	0.038	2.87
10-Year	<b>3.45</b>	<b>0.130</b>	<b>0.042</b>	<b>3.22</b>



**Events for Pond 10P: Detention - 1**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.987	0.093	3.26	0.193
5-Year	1.255	0.223	3.32	0.195
10-Year	<b>1.411</b>	<b>0.324</b>	<b>3.35</b>	<b>0.197</b>

**Events for Subcatchment 11S: W-7**

Event	Rainfall (inches)	Runoff (cfs)	Volume (acre-feet)	Depth (inches)
2-Year	2.50	0.004	0.002	0.61
5-Year	3.10	0.009	0.004	0.97
10-Year	<b>3.45</b>	<b>0.012</b>	<b>0.005</b>	<b>1.21</b>

**Events for Pond 12P: Discharge**

Event	Inflow (cfs)	Primary (cfs)	Elevation (feet)	Storage (acre-feet)
2-Year	0.094	0.094	<b>0.00</b>	<b>0.000</b>
5-Year	0.226	0.226	0.00	0.000
10-Year	<b>0.328</b>	<b>0.328</b>	0.00	0.000

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	



# 21-C023 (PETERKORT - STARBUCKS)

## BEAVERTON, OR

### SC-740 STORMTECH CHAMBER SPECIFICATIONS

1. CHAMBERS SHALL BE STORMTECH SC-740.
2. CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
3. CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
4. CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
5. THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
6. CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
7. REQUIREMENTS FOR HANDLING AND INSTALLATION:
  - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
  - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
  - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 550 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
8. ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
  - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
  - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
  - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
9. CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.

### IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF THE SC-740 SYSTEM

1. STORMTECH SC-740 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
2. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
  - STONESHOOTER LOCATED OFF THE CHAMBER BED.
  - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
  - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
4. THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
5. JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
6. MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
7. EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE 3/4-2" (20-50 mm).
8. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
9. ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

### NOTES FOR CONSTRUCTION EQUIPMENT

1. STORMTECH SC-740 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
2. THE USE OF CONSTRUCTION EQUIPMENT OVER SC-740 CHAMBERS IS LIMITED:
  - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
  - NO RUBBER Tired LOADERS, DUMP TRUCKS, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
  - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH SC-310/SC-740/DC-780 CONSTRUCTION GUIDE".
3. FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

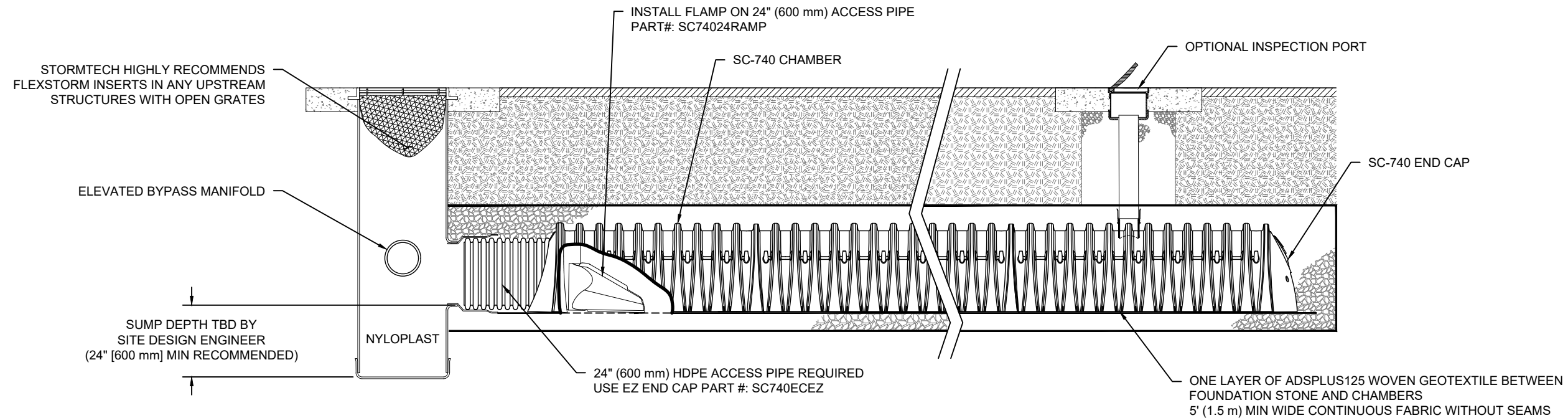
**USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO THE CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.**

CONTACT STORMTECH AT 1-888-892-2694 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.









**SC-740 ISOLATOR ROW PLUS DETAIL**

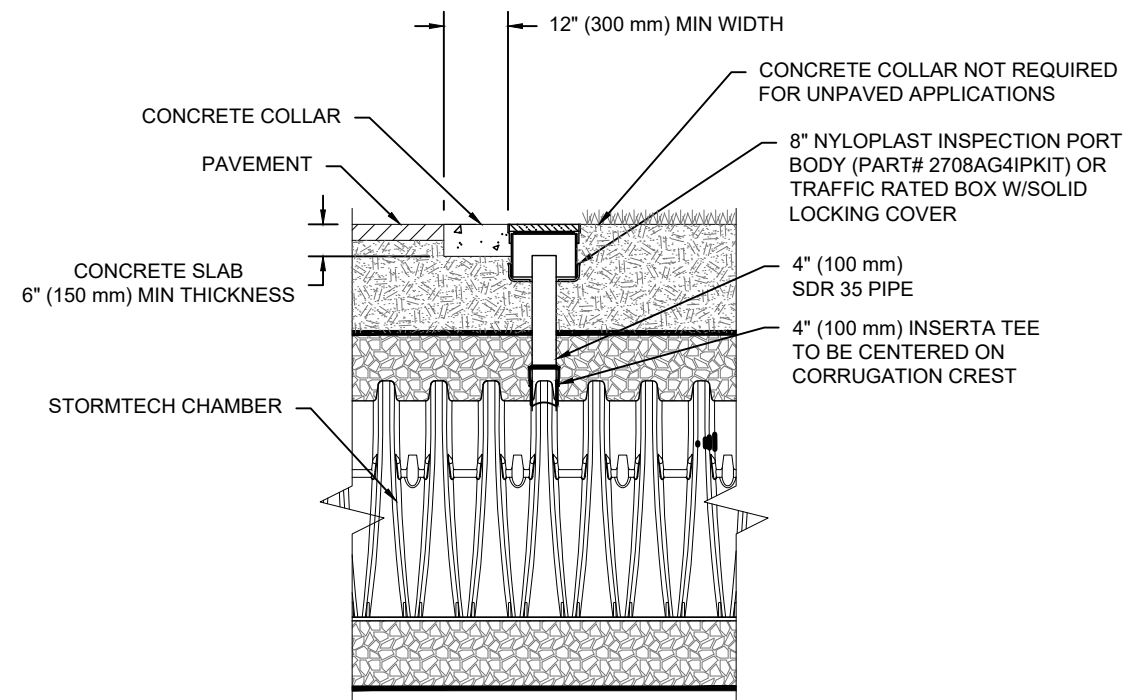
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**INSPECTION & MAINTENANCE**

- STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
    - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
    - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
    - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
    - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
    - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
  - B. ALL ISOLATOR PLUS ROWS
    - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
    - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
      - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
      - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
    - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
  - B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
  - C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

**NOTES**

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



NOTE:  
INSPECTION PORTS MAY BE CONNECTED THROUGH ANY CHAMBER CORRUGATION CREST.

**4" PVC INSPECTION PORT DETAIL  
(SC SERIES CHAMBER)**

NTS

21-C023 (PETERKORT -  
STARBUCKS)  
BEAVERTON, OR

DATE: DRAWN: CC  
PROJECT #: CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

**StormTech®**  
Chamber System

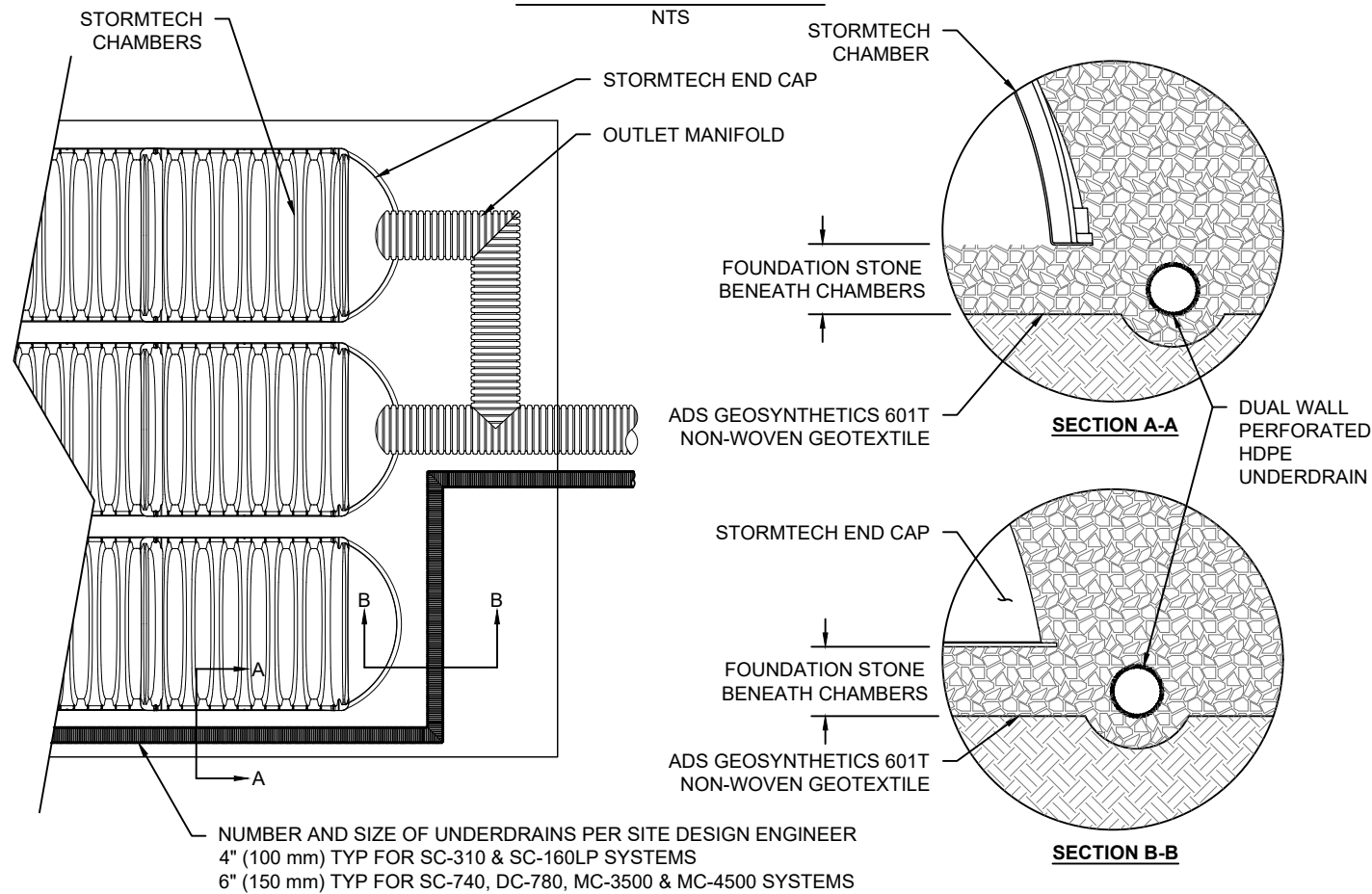
888-892-2694 | WWW.STORMTECH.COM

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HILLIARD, OH 43026  
1-800-733-7473

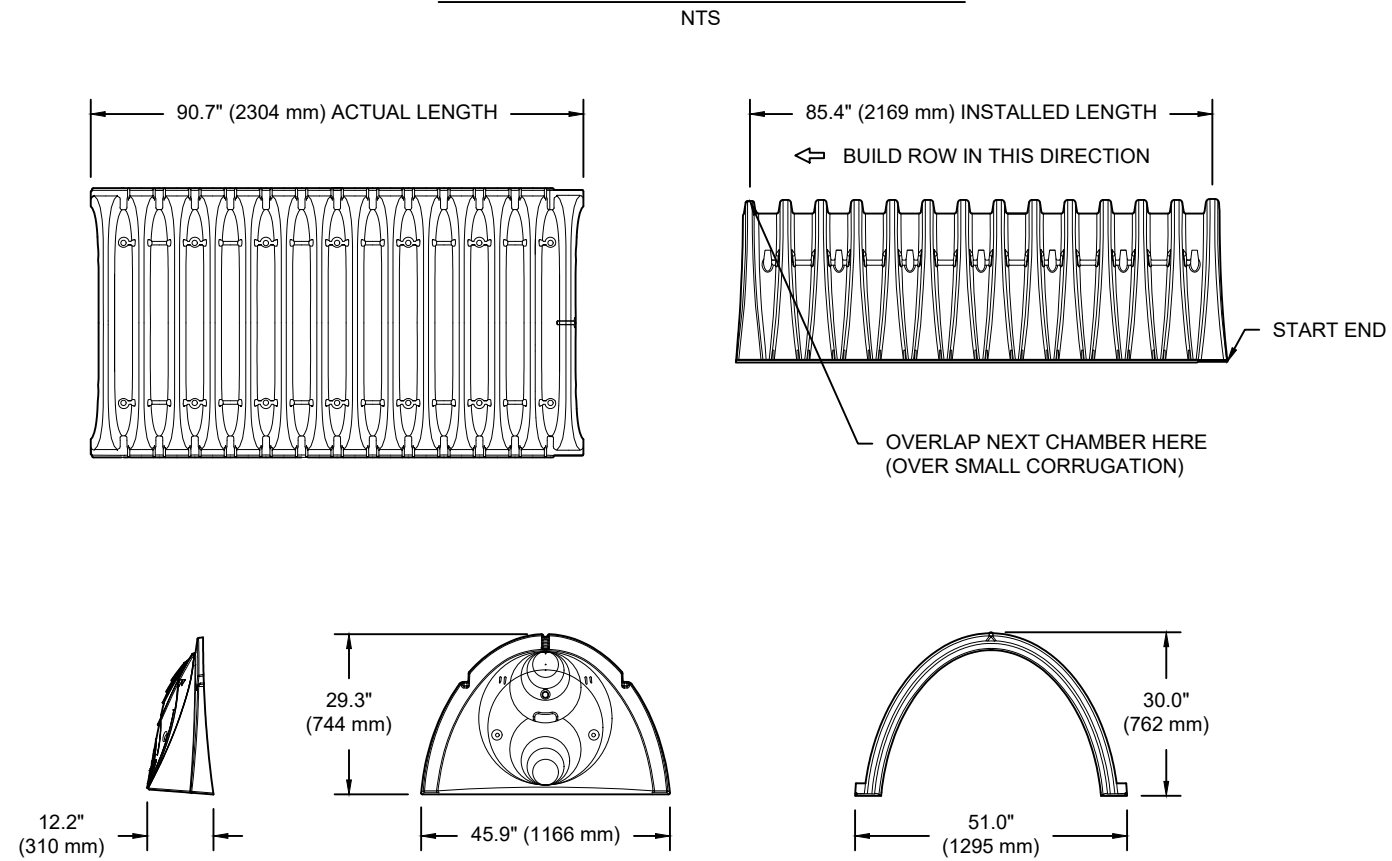


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**UNDERDRAIN DETAIL**



**SC-740 TECHNICAL SPECIFICATION**

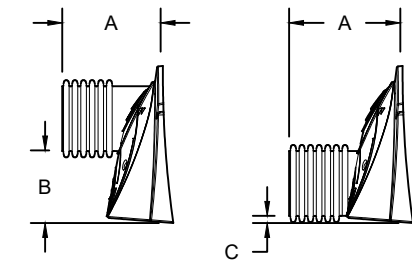


**NOMINAL CHAMBER SPECIFICATIONS**

SIZE (W X H X INSTALLED LENGTH)	51.0" X 30.0" X 85.4"	(1295 mm X 762 mm X 2169 mm)
CHAMBER STORAGE	45.9 CUBIC FEET	(1.30 m <sup>3</sup> )
MINIMUM INSTALLED STORAGE*	74.9 CUBIC FEET	(2.12 m <sup>3</sup> )
WEIGHT	75.0 lbs.	(33.6 kg)

\*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS

PRE-FAB STUB AT BOTTOM OF END CAP WITH FLAMP END WITH "BR"  
 PRE-FAB STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"  
 PRE-FAB STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"  
 PRE-CORED END CAPS END WITH "PC"



PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	---
SC740EPE06B / SC740EPE06BPC	---	---	---	0.5" (13 mm)
SC740EPE08T / SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	---
SC740EPE08B / SC740EPE08BPC	---	---	---	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	---
SC740EPE10B / SC740EPE10BPC	---	---	---	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	---
SC740EPE12B / SC740EPE12BPC	---	---	---	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	---
SC740EPE15B / SC740EPE15BPC	---	---	---	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	---
SC740EPE18B / SC740EPE18BPC	---	---	---	1.6" (41 mm)
SC740ECEZ*	24" (600 mm)	18.5" (470 mm)	---	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740ECEZ ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

\* FOR THE SC740ECEZ THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

21-C023 (PETERKORT - STARBUCKS)  
 BEAVERTON, OR

DATE:	DRAWN: CC
PROJECT #:	CHECKED: N/A

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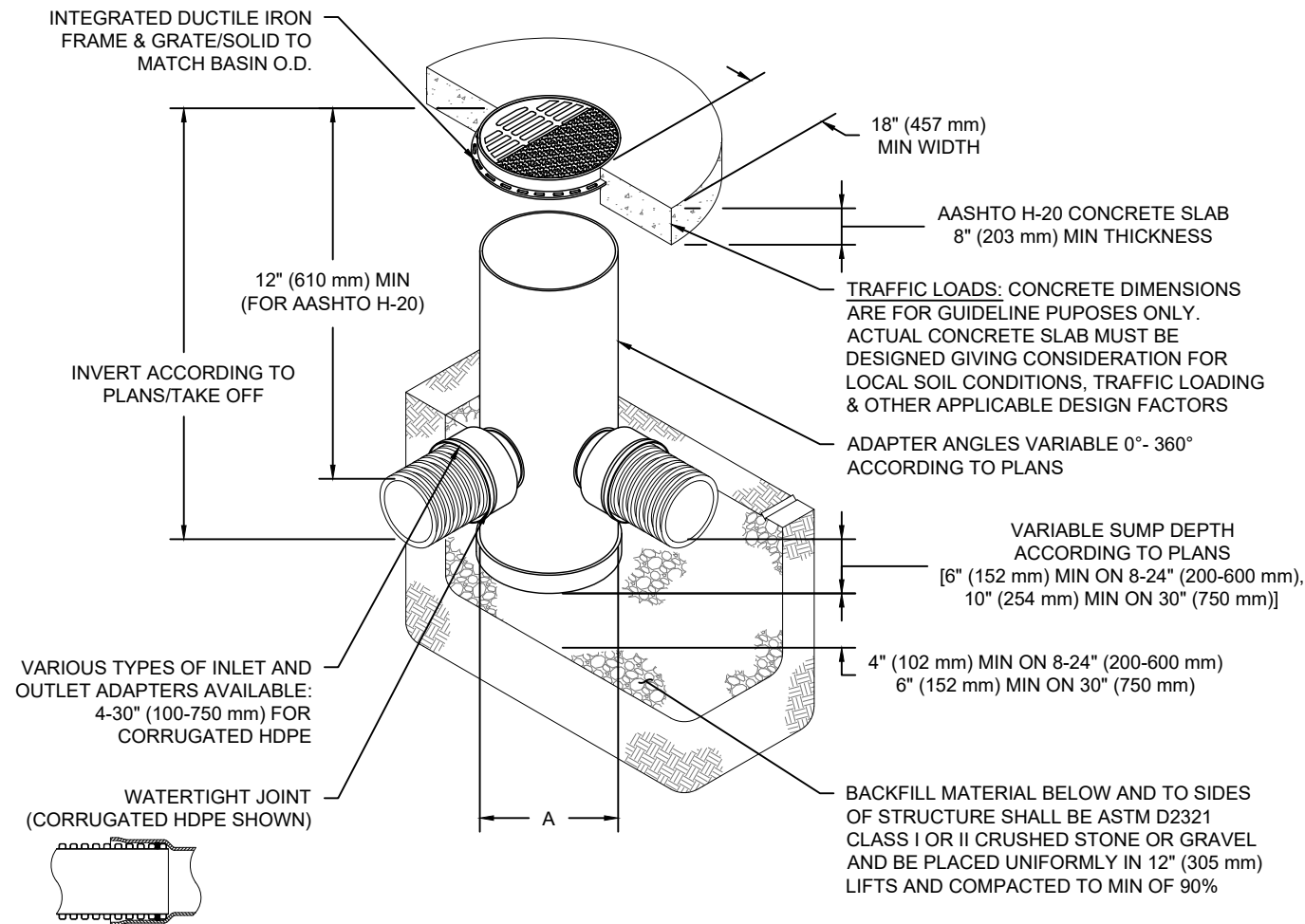
4640 TRUEMAN BLVD  
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# NYLOPLAST DRAIN BASIN

NTS



## NOTES

- 8-30" (200-750 mm) GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- 12-30" (300-750 mm) FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS
- DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
- FOR COMPLETE DESIGN AND PRODUCT INFORMATION: [WWW.NYLOPLAST-US.COM](http://WWW.NYLOPLAST-US.COM)
- TO ORDER CALL: 800-821-6710

A	PART #	GRATE/SOLID COVER OPTIONS		
8" (200 mm)	2808AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
10" (250 mm)	2810AG	PEDESTRIAN LIGHT DUTY	STANDARD LIGHT DUTY	SOLID LIGHT DUTY
12" (300 mm)	2812AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
15" (375 mm)	2815AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
18" (450 mm)	2818AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
24" (600 mm)	2824AG	PEDESTRIAN AASHTO H-10	STANDARD AASHTO H-20	SOLID AASHTO H-20
30" (750 mm)	2830AG	PEDESTRIAN AASHTO H-20	STANDARD AASHTO H-20	SOLID AASHTO H-20

21-C023 (PETERKORT - STARBUCKS)  
BEAVERTON, OR

DATE: DRAWN: CC  
PROJECT #: CHECKED: N/A

DATE	DRW	CHK	DESCRIPTION

**Nyloplast**<sup>®</sup>  
770-932-2443 | [WWW.NYLOPLAST-US.COM](http://WWW.NYLOPLAST-US.COM)

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**ADS**

SHEET  
6 OF 6

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## **Appendix F: Conveyance Calculations**

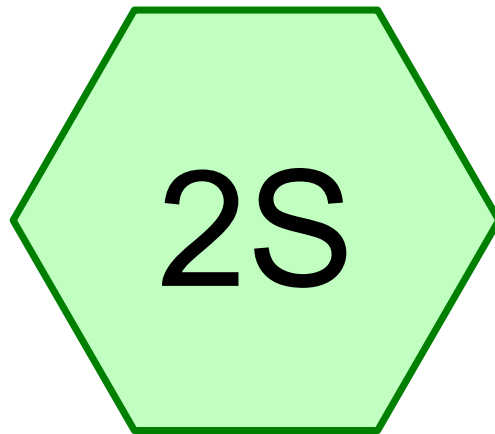


## Conveyance Calculations

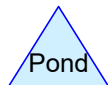
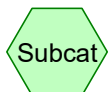
Peterkort - Starbucks  
Project #21-C023

### CONVEYANCE CALCULATIONS

DESIGN SECTION		DESIGN CALCULATIONS		Detail						
		RUNOFF	TOTAL	SLOPE	DIA	CAPACITY	VEL.	RUNOFF	VEL.	CAPACITY
PIPE	CONTRIBUTING BASIN/PIPE	Q CFS	Q CFS	%	IN.	Qf CFS	Vf FT/S	RATIO Q/Qf	AT Q/QF	Q VS. Qf
1	W-1	0.69	0.69	2	6	0.79	4.04	0.86	4.55	OK
2	W-2, PIPE 1	0.05	0.73	1	8	1.21	3.46	0.61	3.63	OK
3	W-3, W-4, W-5, W-6, W-8, W-9, PIPE 2	0.88	1.61	1	10	2.19	4.02	0.74	4.38	OK
4	E-3	0.30	0.30	1	6	0.56	2.86	0.54	2.91	OK
5	E-1, E-2, E-7, PIPE4	0.12	0.42	1	8	1.21	3.46	0.35	3.15	OK
6	E-4, E-5, E-6	0.32	0.32	1	8	1.21	3.46	0.27	2.91	OK
7	PIPE 5, PIPE 6	0.00	0.75	1	8	1.21	3.46	0.62	3.63	OK



N-1



# Peterkort - Starbucks - HydroCAD - North and East

Prepared by Froelich Engineers

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## Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-Year	Type IA 24-hr		Default	24.00	1	3.90	2

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

**Subcatchment2S: N-1**

Runoff Area=4,678 sf 59.15% Impervious Runoff Depth=2.64"  
Tc=5.0 min CN=88 Runoff=0.073 cfs 0.024 af

**Total Runoff Area = 0.107 ac Runoff Volume = 0.024 af Average Runoff Depth = 2.64"**  
**40.85% Pervious = 0.044 ac 59.15% Impervious = 0.064 ac**

**Summary for Subcatchment 2S: N-1**

Runoff = 0.073 cfs @ 7.91 hrs, Volume= 0.024 af, Depth= 2.64"

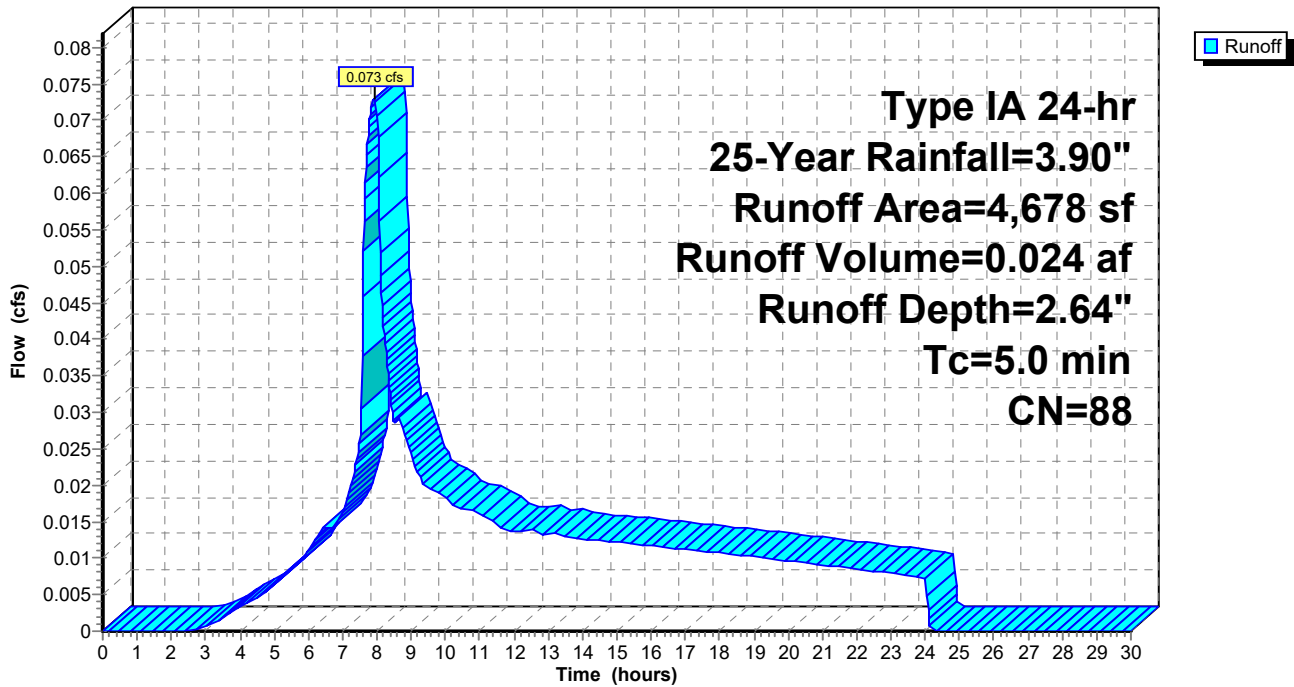
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

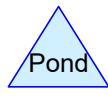
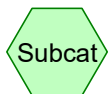
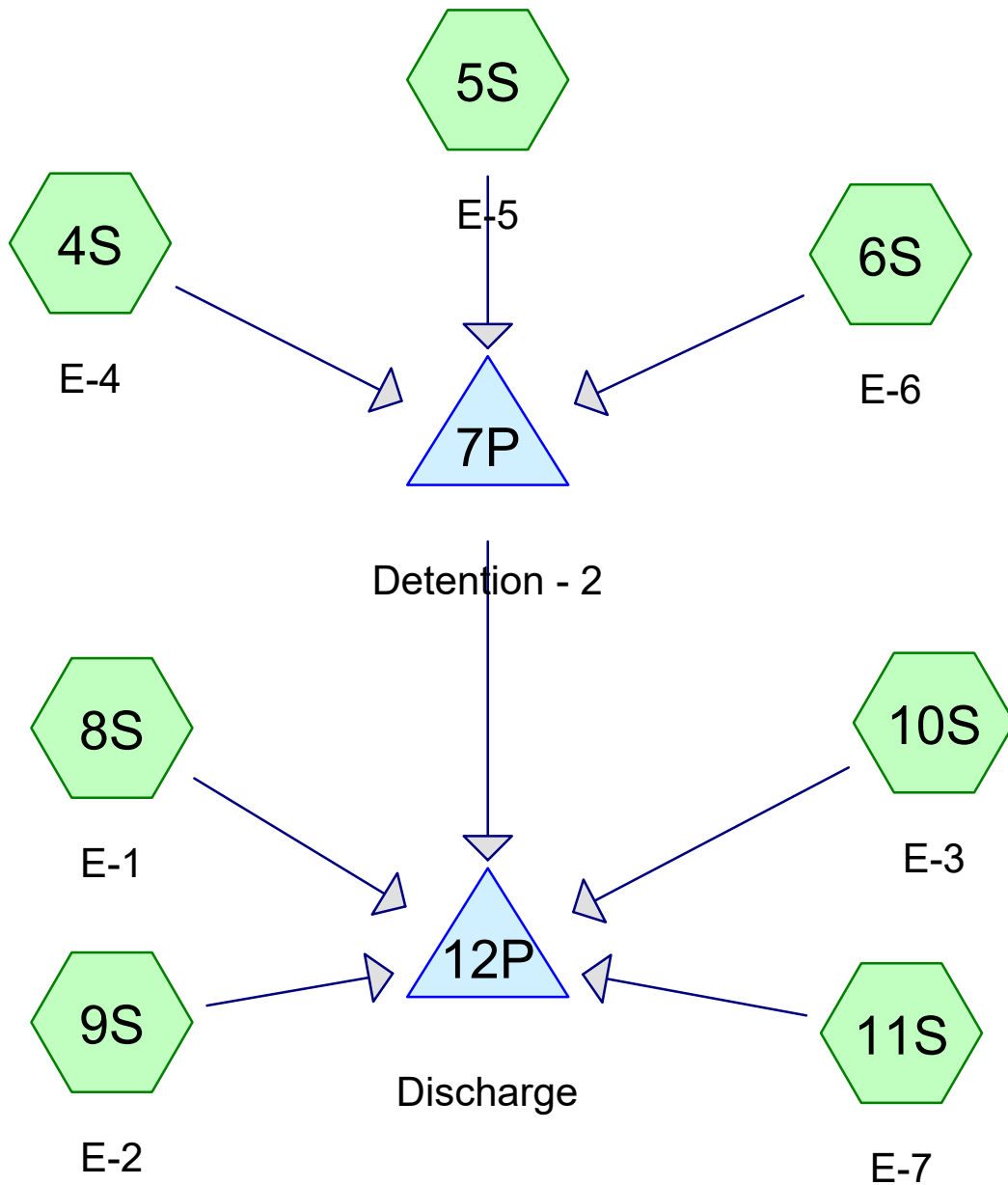
Area (sf)	CN	Description
1,911	74	>75% Grass cover, Good, HSG C
2,767	98	Unconnected pavement, HSG C
4,678	88	Weighted Average
1,911		40.85% Pervious Area
2,767		59.15% Impervious Area
2,767		100.00% Unconnected

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

**Subcatchment 2S: N-1**

Hydrograph







# Peterkort - Starbucks - HydroCAD - North and East

Prepared by Froelich Engineers

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Page 2

## Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
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Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment4S: E-4</b>	Runoff Area=7,500 sf 88.11% Impervious Runoff Depth=3.33" Tc=5.0 min CN=95 Runoff=0.150 cfs 0.048 af
<b>Subcatchment5S: E-5</b>	Runoff Area=7,797 sf 84.43% Impervious Runoff Depth=3.23" Tc=5.0 min CN=94 Runoff=0.152 cfs 0.048 af
<b>Subcatchment6S: E-6</b>	Runoff Area=2,677 sf 0.00% Impervious Runoff Depth=1.52" Tc=5.0 min CN=74 Runoff=0.020 cfs 0.008 af
<b>Subcatchment8S: E-1</b>	Runoff Area=2,483 sf 100.00% Impervious Runoff Depth=3.67" Tc=5.0 min CN=98 Runoff=0.053 cfs 0.017 af
<b>Subcatchment9S: E-2</b>	Runoff Area=2,001 sf 100.00% Impervious Runoff Depth=3.67" Tc=5.0 min CN=98 Runoff=0.043 cfs 0.014 af
<b>Subcatchment10S: E-3</b>	Runoff Area=14,450 sf 96.24% Impervious Runoff Depth=3.55" Tc=5.0 min CN=97 Runoff=0.304 cfs 0.098 af
<b>Subcatchment11S: E-7</b>	Runoff Area=1,153 sf 90.81% Impervious Runoff Depth=3.44" Tc=5.0 min CN=96 Runoff=0.024 cfs 0.008 af

**Total Runoff Area = 0.874 ac Runoff Volume = 0.241 af Average Runoff Depth = 3.31"**  
**14.27% Pervious = 0.125 ac 85.73% Impervious = 0.749 ac**

**Summary for Subcatchment 4S: E-4**

Runoff = 0.150 cfs @ 7.87 hrs, Volume= 0.048 af, Depth= 3.33"  
 Routed to Pond 7P : Detention - 2

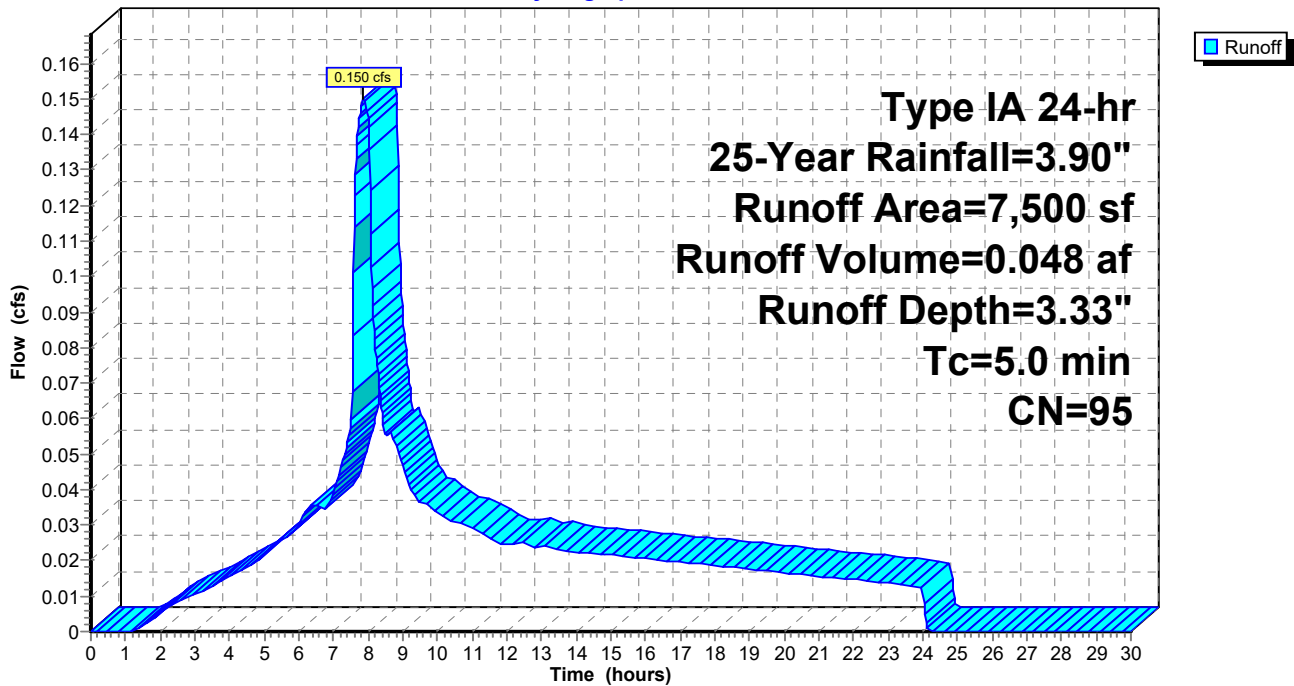
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
892	74	>75% Grass cover, Good, HSG C
2,895	98	Paved parking, HSG C
3,713	98	Paved parking, HSG C
7,500	95	Weighted Average
892		11.89% Pervious Area
6,608		88.11% Impervious Area

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

**Subcatchment 4S: E-4**

Hydrograph



**Summary for Subcatchment 5S: E-5**

Runoff = 0.152 cfs @ 7.88 hrs, Volume= 0.048 af, Depth= 3.23"  
 Routed to Pond 7P : Detention - 2

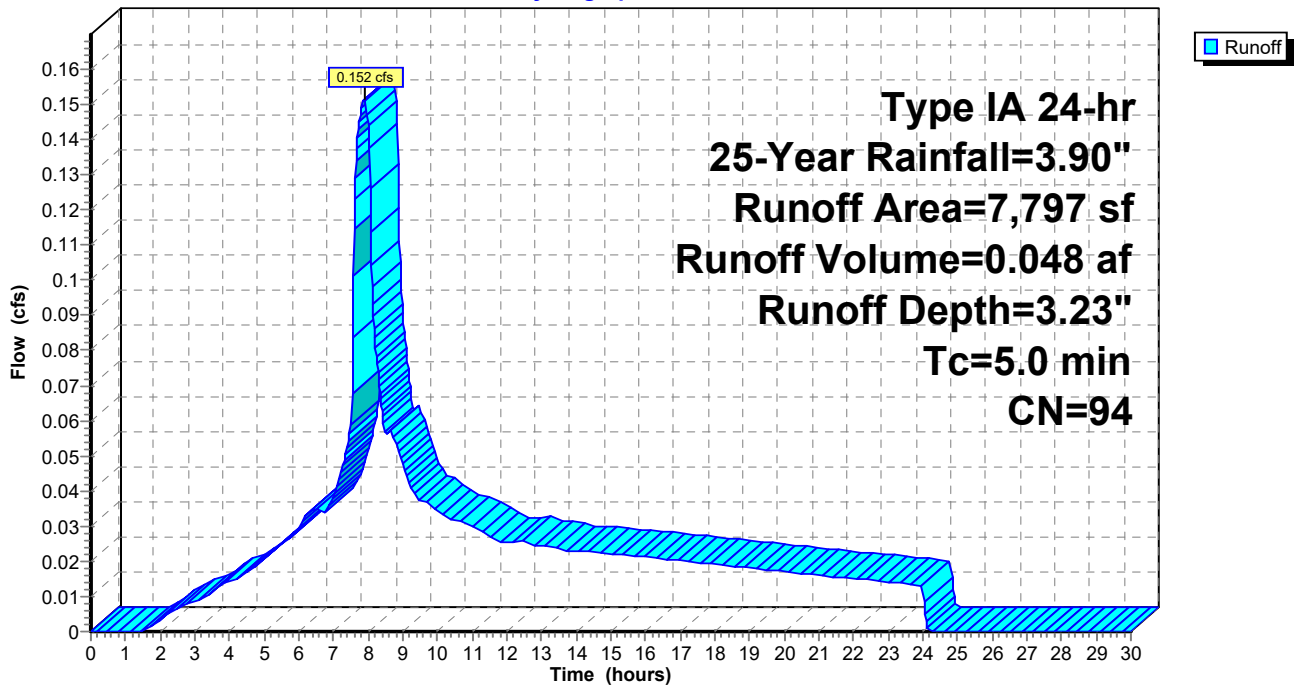
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
1,214	74	>75% Grass cover, Good, HSG C
2,605	98	Paved parking, HSG C
3,978	98	Paved parking, HSG C
7,797	94	Weighted Average
1,214		15.57% Pervious Area
6,583		84.43% Impervious Area

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

**Subcatchment 5S: E-5**

Hydrograph



**Summary for Subcatchment 6S: E-6**

Runoff = 0.020 cfs @ 8.00 hrs, Volume= 0.008 af, Depth= 1.52"  
 Routed to Pond 7P : Detention - 2

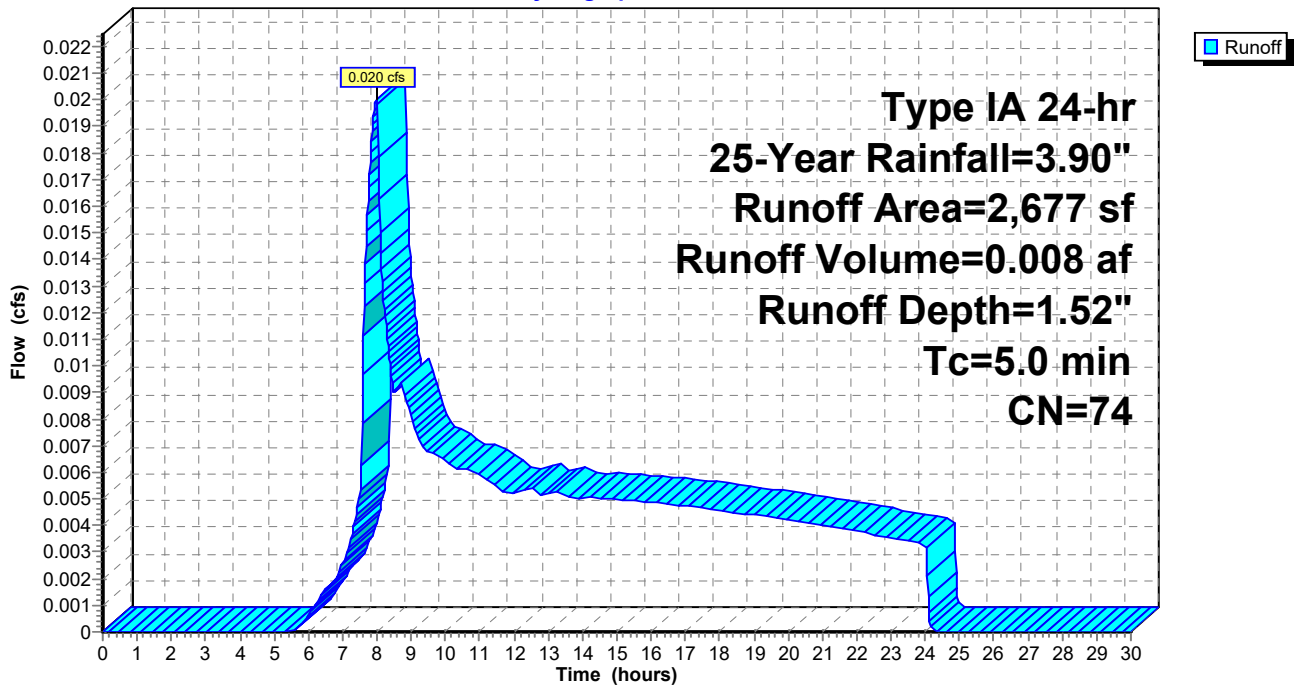
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
2,677	74	>75% Grass cover, Good, HSG C
2,677		100.00% Pervious Area

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

**Subcatchment 6S: E-6**

Hydrograph



**Summary for Subcatchment 8S: E-1**

Runoff = 0.053 cfs @ 7.86 hrs, Volume= 0.017 af, Depth= 3.67"  
 Routed to Pond 12P : Discharge

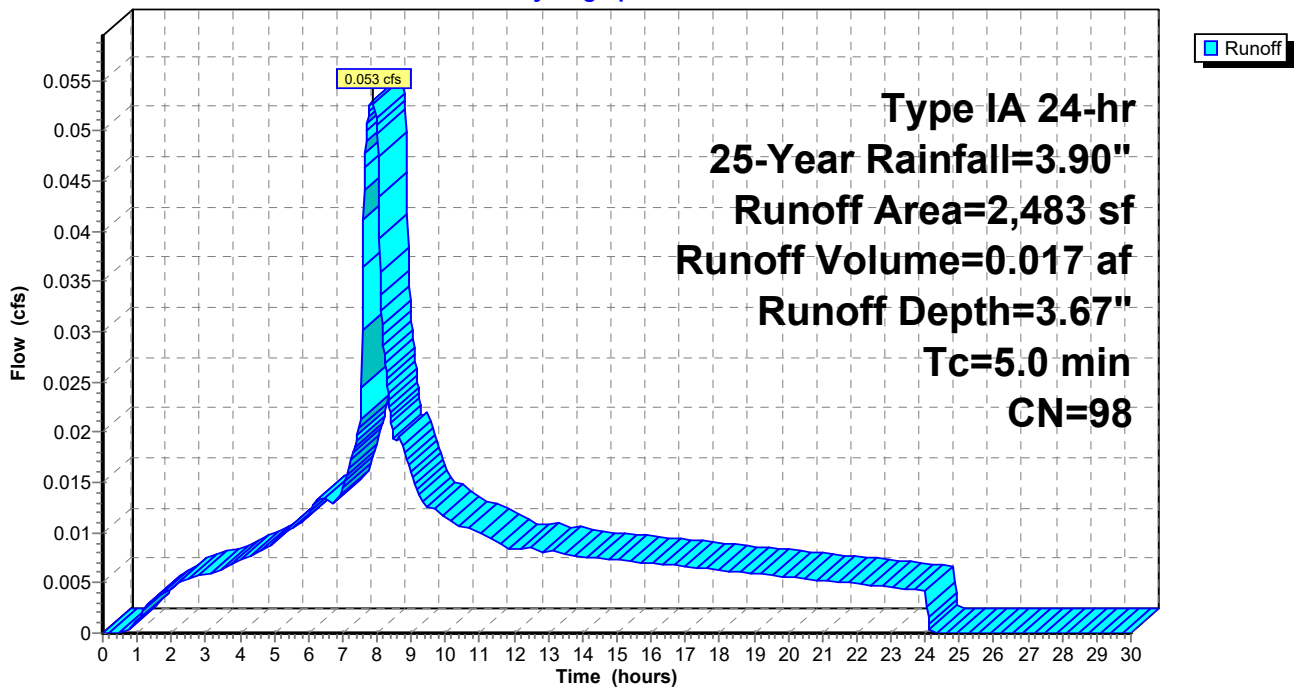
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
2,483	98	Unconnected roofs, HSG C
2,483		100.00% Impervious Area
2,483		100.00% Unconnected

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

**Subcatchment 8S: E-1**

Hydrograph



**Summary for Subcatchment 9S: E-2**

Runoff = 0.043 cfs @ 7.86 hrs, Volume= 0.014 af, Depth= 3.67"  
 Routed to Pond 12P : Discharge

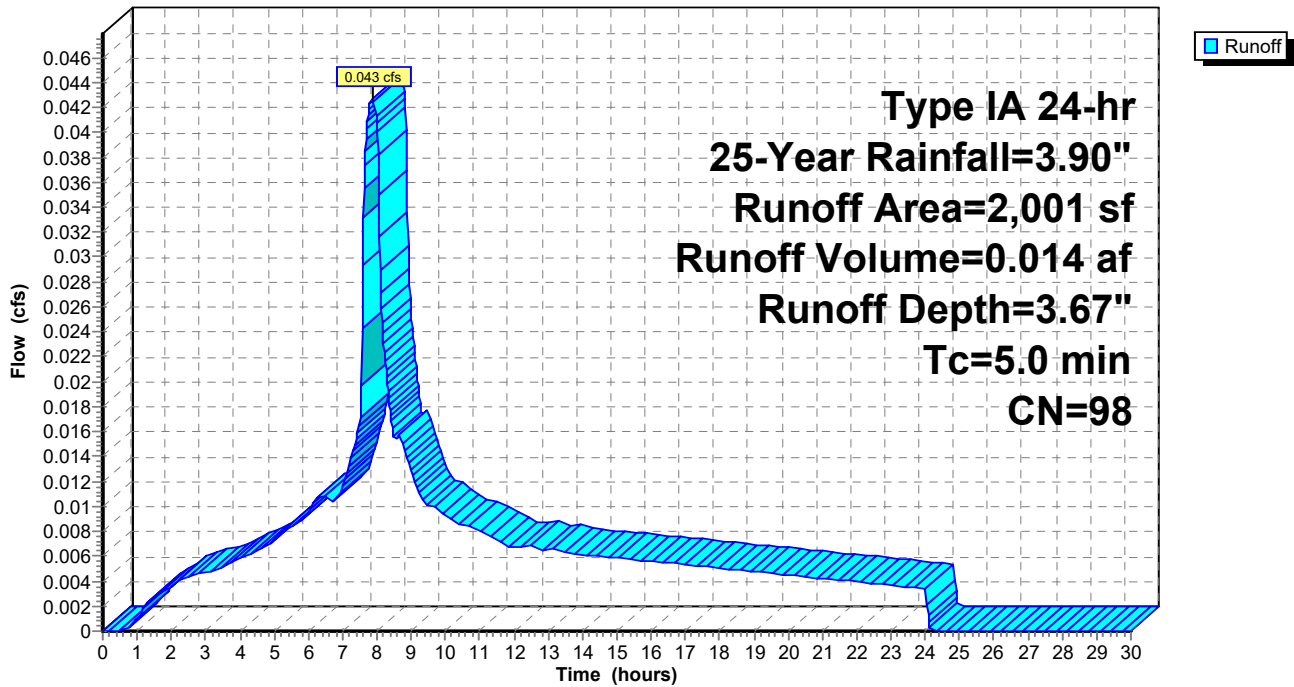
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
2,001	98	Unconnected roofs, HSG C
2,001		100.00% Impervious Area
2,001		100.00% Unconnected

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

**Subcatchment 9S: E-2**

Hydrograph



**Summary for Subcatchment 10S: E-3**

Runoff = 0.304 cfs @ 7.86 hrs, Volume= 0.098 af, Depth= 3.55"  
 Routed to Pond 12P : Discharge

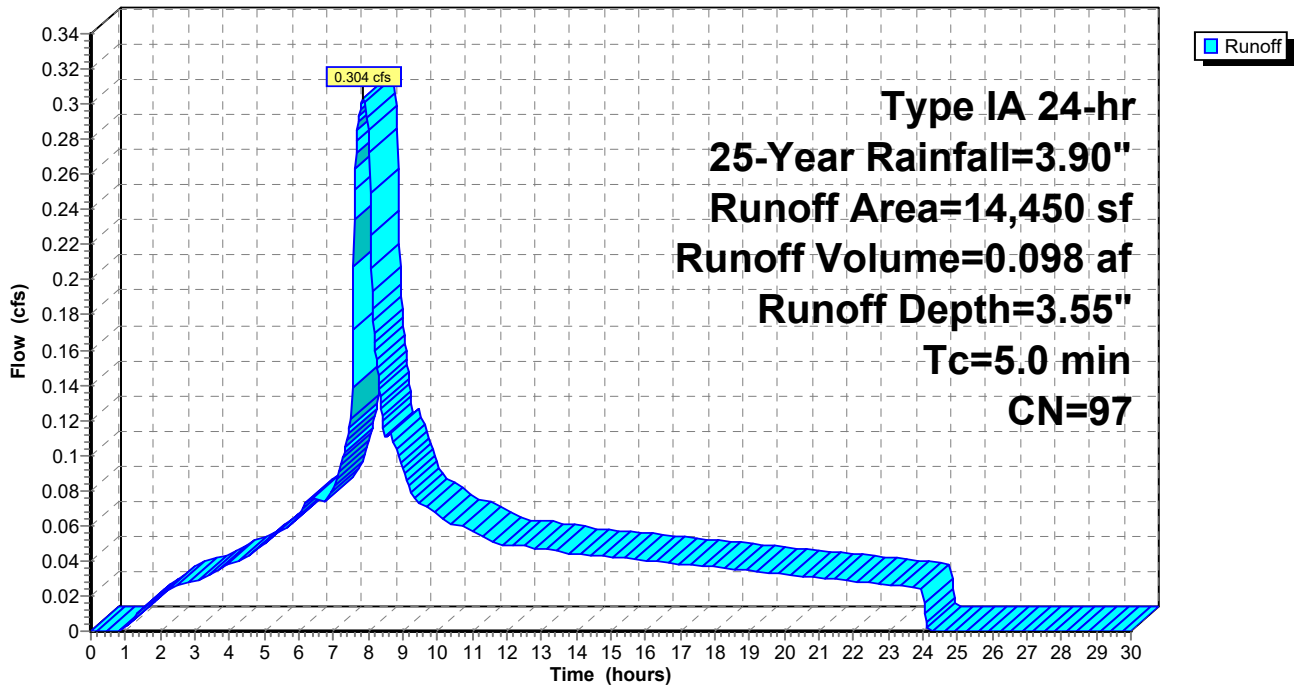
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
543	74	>75% Grass cover, Good, HSG C
13,907	98	Paved parking, HSG C
14,450	97	Weighted Average
543		3.76% Pervious Area
13,907		96.24% Impervious Area

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

**Subcatchment 10S: E-3**

Hydrograph





**Summary for Subcatchment 11S: E-7**

Runoff = 0.024 cfs @ 7.87 hrs, Volume= 0.008 af, Depth= 3.44"  
 Routed to Pond 12P : Discharge

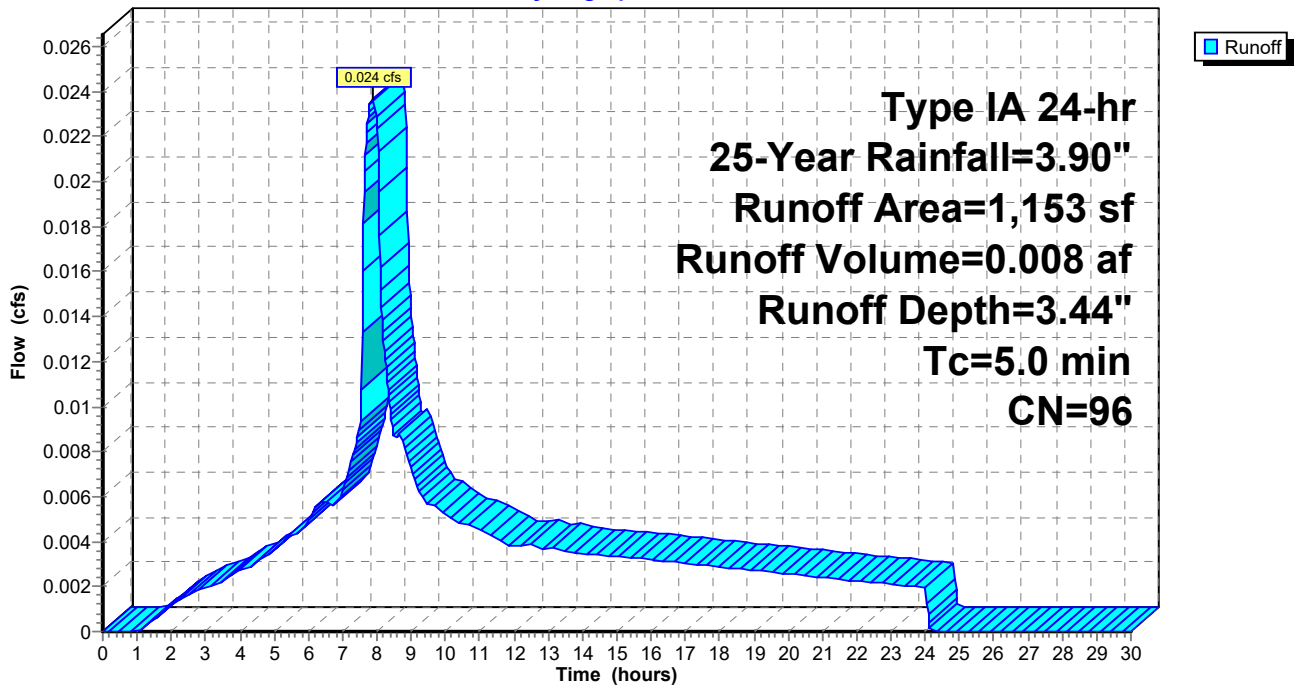
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

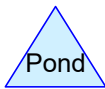
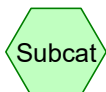
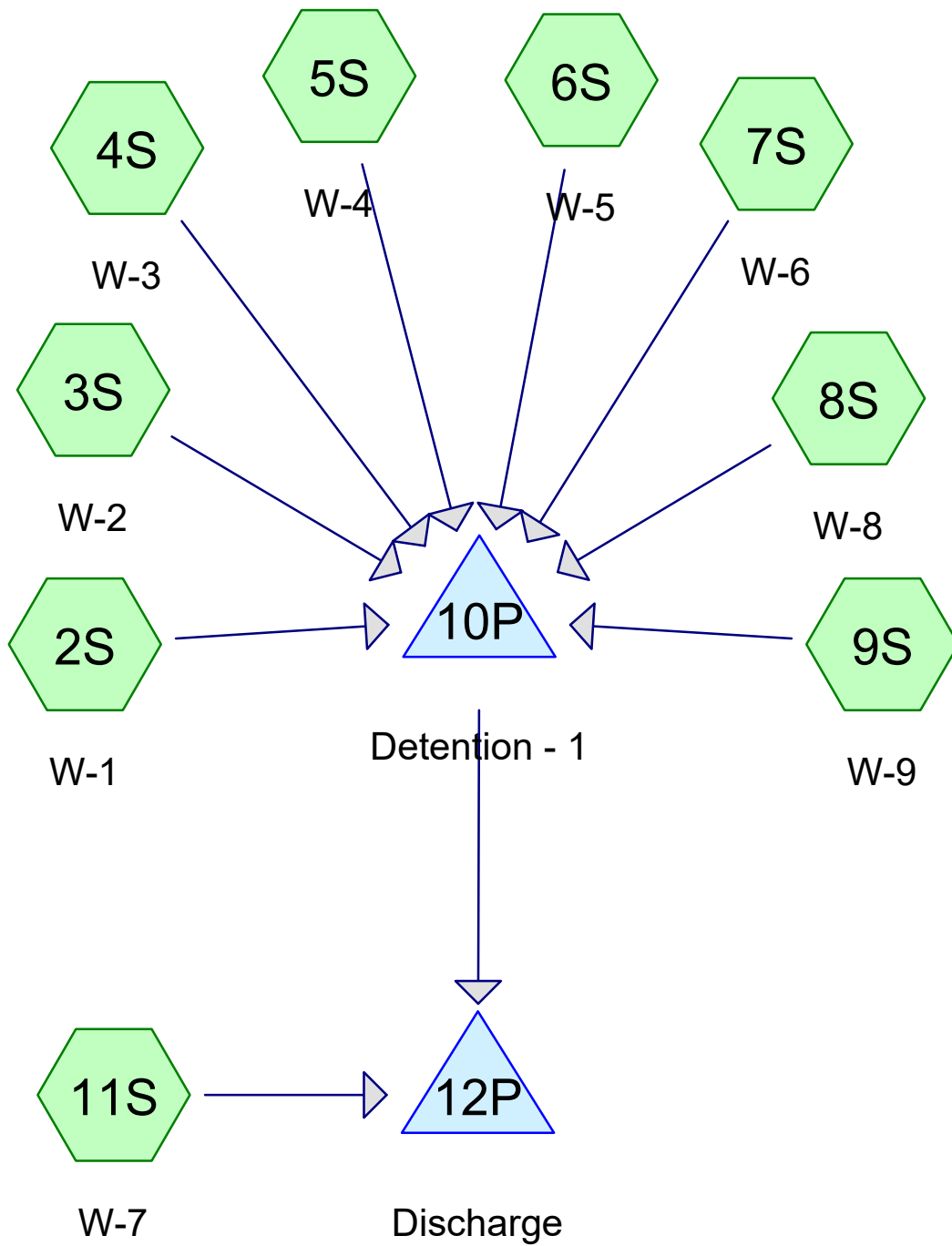
Area (sf)	CN	Description
106	74	>75% Grass cover, Good, HSG C
1,047	98	Unconnected pavement, HSG C
1,153	96	Weighted Average
106		9.19% Pervious Area
1,047		90.81% Impervious Area
1,047		100.00% Unconnected

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

**Subcatchment 11S: E-7**

Hydrograph





**Routing Diagram for Peterkort - Starbucks - HydroCAD - West**  
 Prepared by Froelich Engineers, Printed 7/1/2022  
 HydroCAD® 10.10-6a s/n 10688 © 2020 HydroCAD Software Solutions LLC

# Peterkort - Starbucks - HydroCAD - West

Prepared by Froelich Engineers

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Page 2

## Rainfall Events Listing (selected events)

Event#	Event Name	Storm Type	Curve	Mode	Duration (hours)	B/B	Depth (inches)	AMC
1	25-Year	Type IA 24-hr		Default	24.00	1	3.90	2

**Peterkort - Starbucks - HydroCAD - West**

Type IA 24-hr 25-Year Rainfall=3.90"

Prepared by Froelich Engineers

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Page 3

Time span=0.00-30.00 hrs, dt=0.02 hrs, 1501 points  
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN  
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

<b>Subcatchment2S: W-1</b>	Runoff Area=32,056 sf 100.00% Impervious Runoff Depth=3.67" Tc=5.0 min CN=98 Runoff=0.685 cfs 0.225 af
<b>Subcatchment3S: W-2</b>	Runoff Area=2,281 sf 98.77% Impervious Runoff Depth=3.67" Tc=5.0 min CN=98 Runoff=0.049 cfs 0.016 af
<b>Subcatchment4S: W-3</b>	Runoff Area=9,969 sf 90.99% Impervious Runoff Depth=3.44" Tc=5.0 min CN=96 Runoff=0.205 cfs 0.066 af
<b>Subcatchment5S: W-4</b>	Runoff Area=14,557 sf 94.13% Impervious Runoff Depth=3.55" Tc=5.0 min CN=97 Runoff=0.306 cfs 0.099 af
<b>Subcatchment6S: W-5</b>	Runoff Area=7,874 sf 78.30% Impervious Runoff Depth=3.12" Tc=5.0 min CN=93 Runoff=0.148 cfs 0.047 af
<b>Subcatchment7S: W-6</b>	Runoff Area=2,113 sf 100.00% Impervious Runoff Depth=3.67" Tc=5.0 min CN=98 Runoff=0.045 cfs 0.015 af
<b>Subcatchment8S: W-8</b>	Runoff Area=2,920 sf 13.05% Impervious Runoff Depth=1.73" Tc=5.0 min CN=77 Runoff=0.026 cfs 0.010 af
<b>Subcatchment9S: W-9</b>	Runoff Area=6,895 sf 99.90% Impervious Runoff Depth=3.67" Tc=5.0 min CN=98 Runoff=0.147 cfs 0.048 af
<b>Subcatchment11S: W-7</b>	Runoff Area=2,084 sf 0.00% Impervious Runoff Depth=1.52" Tc=5.0 min CN=74 Runoff=0.016 cfs 0.006 af

**Total Runoff Area = 1.854 ac Runoff Volume = 0.531 af Average Runoff Depth = 3.44"**  
**10.05% Pervious = 0.186 ac 89.95% Impervious = 1.667 ac**

**Summary for Subcatchment 2S: W-1**

Runoff = 0.685 cfs @ 7.86 hrs, Volume= 0.225 af, Depth= 3.67"  
 Routed to Pond 10P : Detention - 1

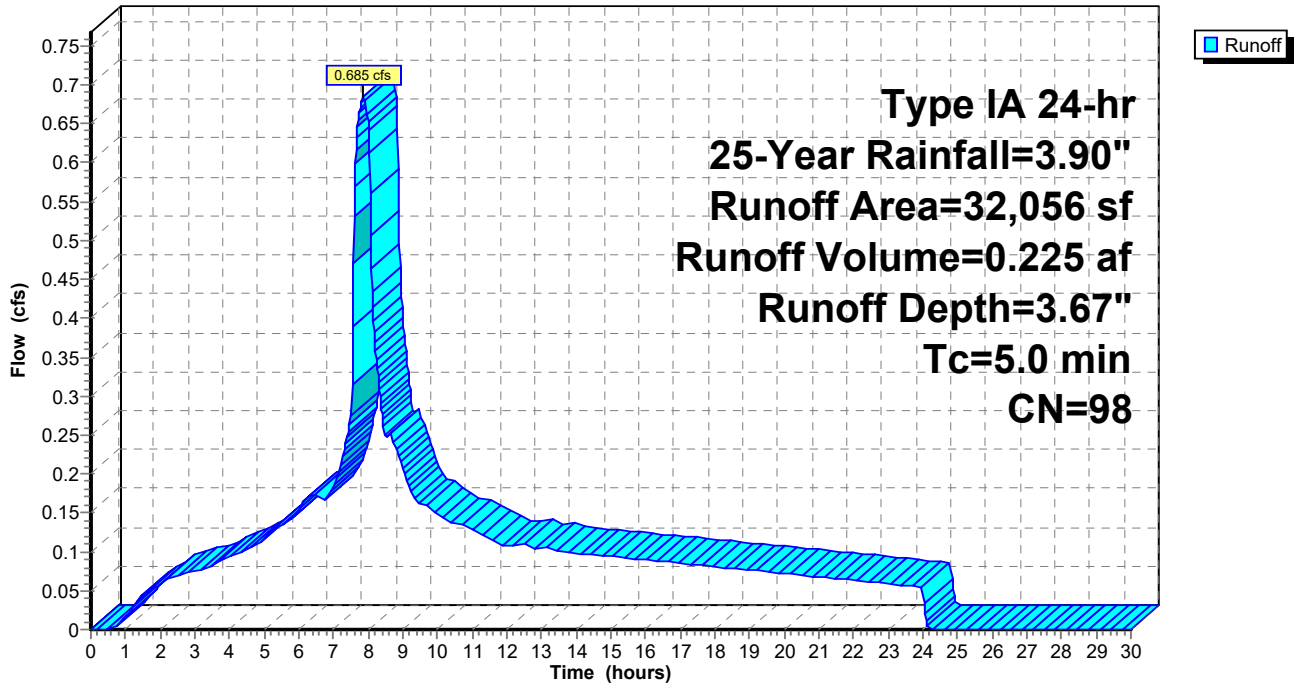
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
444	98	Paved parking, HSG C
31,612	98	Paved parking, HSG C
32,056	98	Weighted Average
32,056		100.00% Impervious Area

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

**Subcatchment 2S: W-1**

Hydrograph



**Summary for Subcatchment 3S: W-2**

Runoff = 0.049 cfs @ 7.86 hrs, Volume= 0.016 af, Depth= 3.67"  
 Routed to Pond 10P : Detention - 1

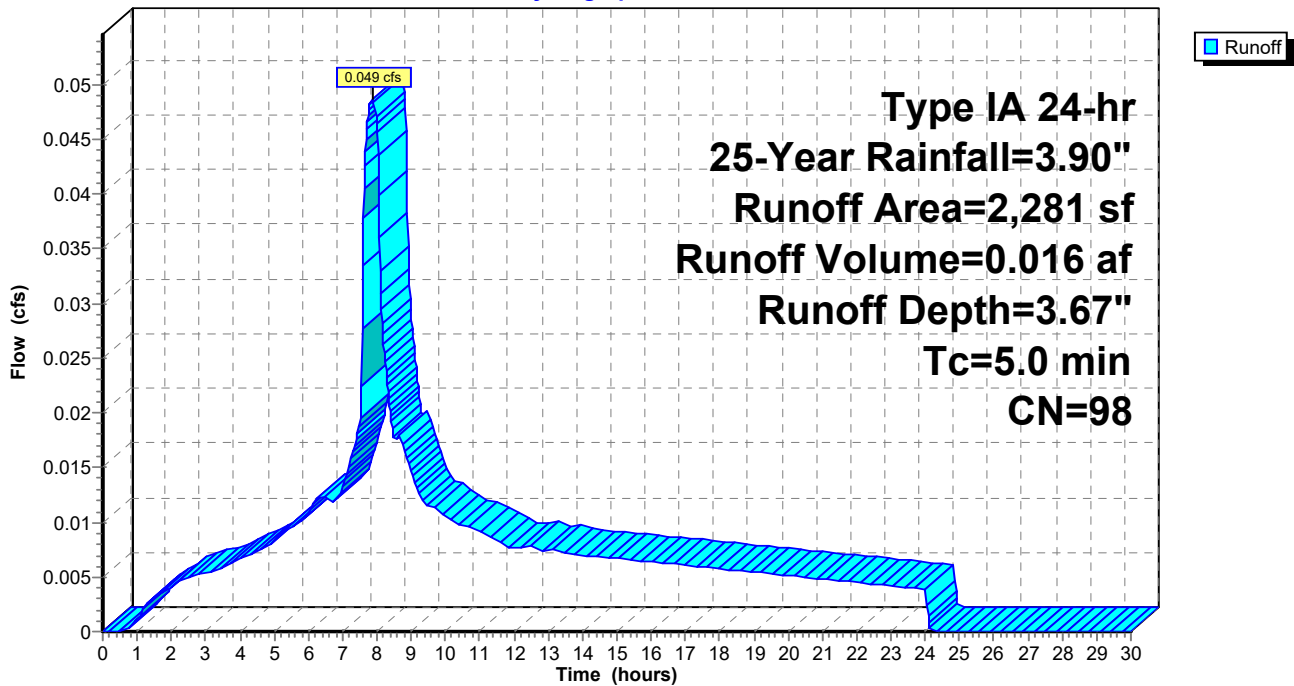
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
28	74	>75% Grass cover, Good, HSG C
316	98	Paved parking, HSG C
1,937	98	Paved parking, HSG C
2,281	98	Weighted Average
28		1.23% Pervious Area
2,253		98.77% Impervious Area

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

**Subcatchment 3S: W-2**

Hydrograph



**Summary for Subcatchment 4S: W-3**

Runoff = 0.205 cfs @ 7.87 hrs, Volume= 0.066 af, Depth= 3.44"  
 Routed to Pond 10P : Detention - 1

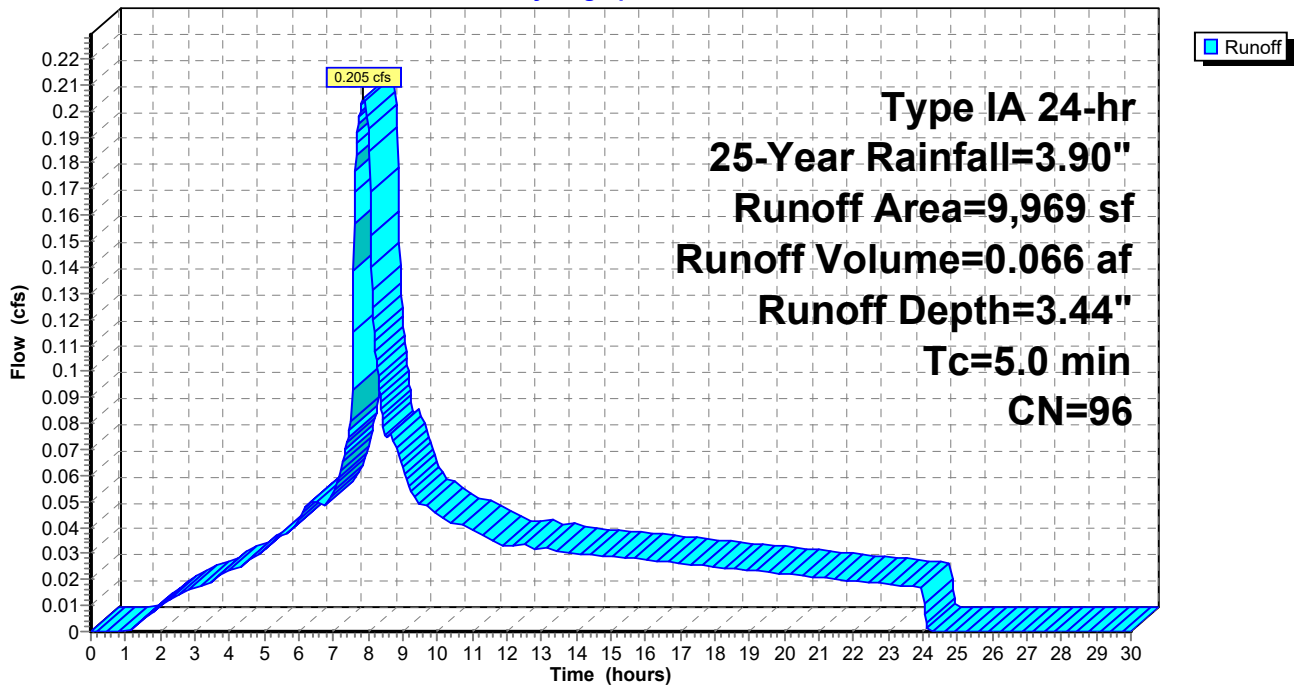
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
898	74	>75% Grass cover, Good, HSG C
4,462	98	Paved parking, HSG C
4,609	98	Paved parking, HSG C
9,969	96	Weighted Average
898		9.01% Pervious Area
9,071		90.99% Impervious Area

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

**Subcatchment 4S: W-3**

Hydrograph



**Summary for Subcatchment 5S: W-4**

Runoff = 0.306 cfs @ 7.86 hrs, Volume= 0.099 af, Depth= 3.55"  
 Routed to Pond 10P : Detention - 1

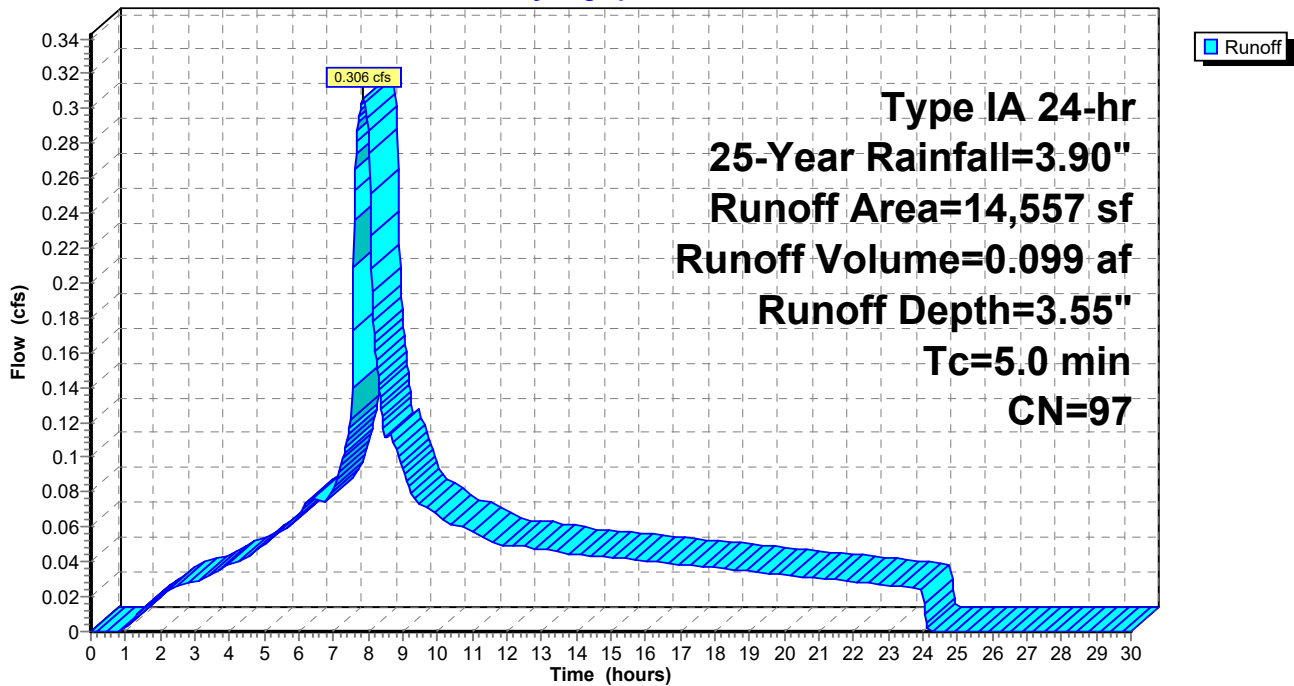
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
854	74	>75% Grass cover, Good, HSG C
4,220	98	Paved parking, HSG C
9,483	98	Paved parking, HSG C
14,557	97	Weighted Average
854		5.87% Pervious Area
13,703		94.13% Impervious Area

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

**Subcatchment 5S: W-4**

Hydrograph





**Summary for Subcatchment 6S: W-5**

Runoff = 0.148 cfs @ 7.88 hrs, Volume= 0.047 af, Depth= 3.12"  
 Routed to Pond 10P : Detention - 1

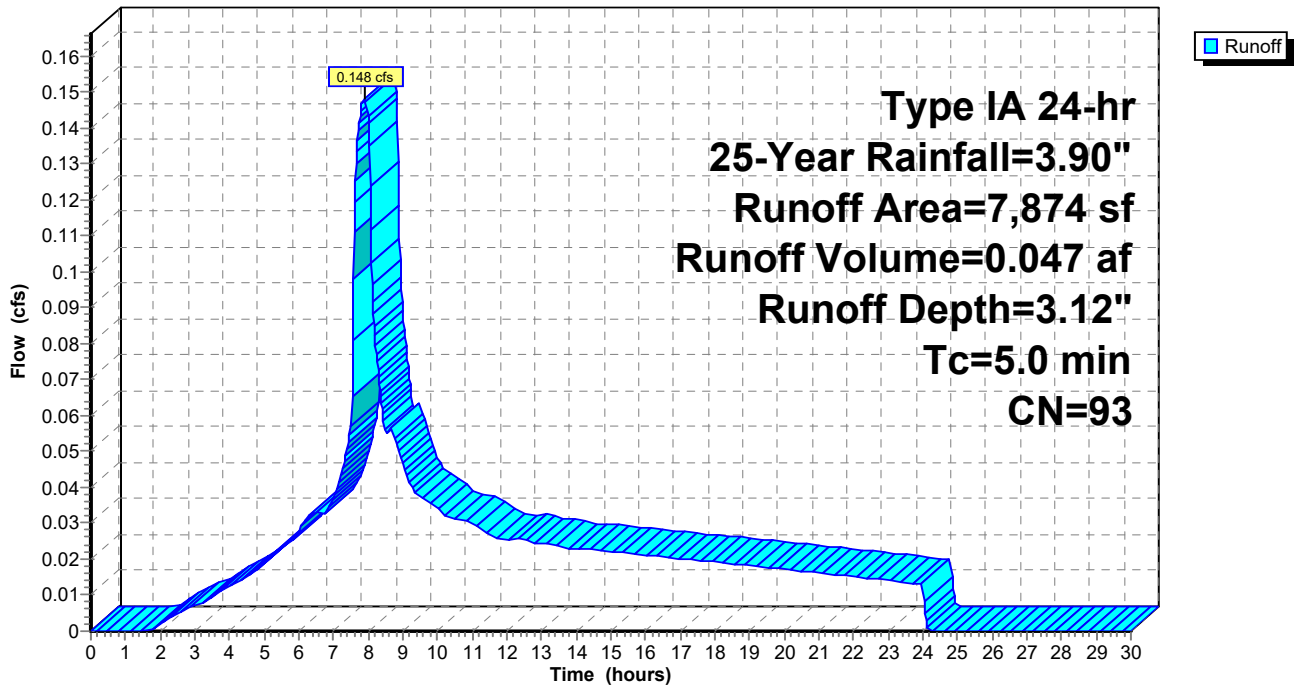
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
1,709	74	>75% Grass cover, Good, HSG C
6,165	98	Paved parking, HSG C
7,874	93	Weighted Average
1,709		21.70% Pervious Area
6,165		78.30% Impervious Area

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

**Subcatchment 6S: W-5**

Hydrograph



**Summary for Subcatchment 7S: W-6**

Runoff = 0.045 cfs @ 7.86 hrs, Volume= 0.015 af, Depth= 3.67"  
 Routed to Pond 10P : Detention - 1

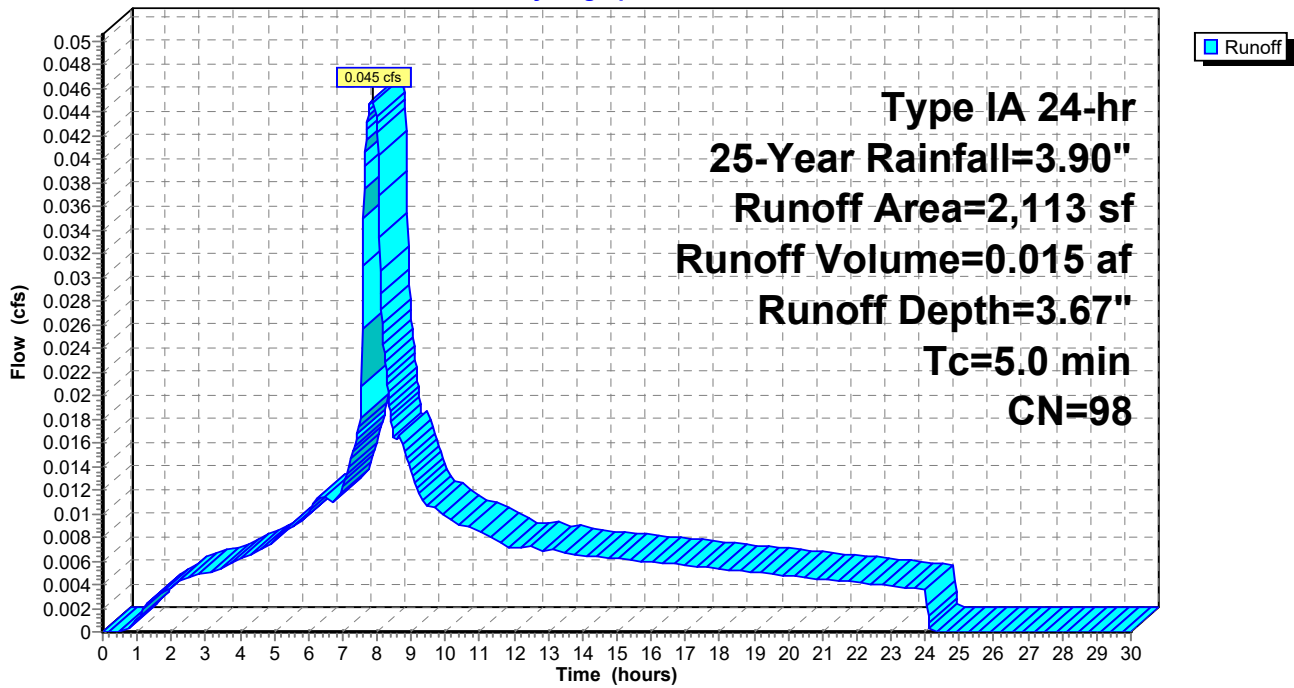
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
2,113	98	Paved parking, HSG C
2,113		100.00% Impervious Area

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

**Subcatchment 7S: W-6**

Hydrograph



**Summary for Subcatchment 8S: W-8**

Runoff = 0.026 cfs @ 7.98 hrs, Volume= 0.010 af, Depth= 1.73"  
 Routed to Pond 10P : Detention - 1

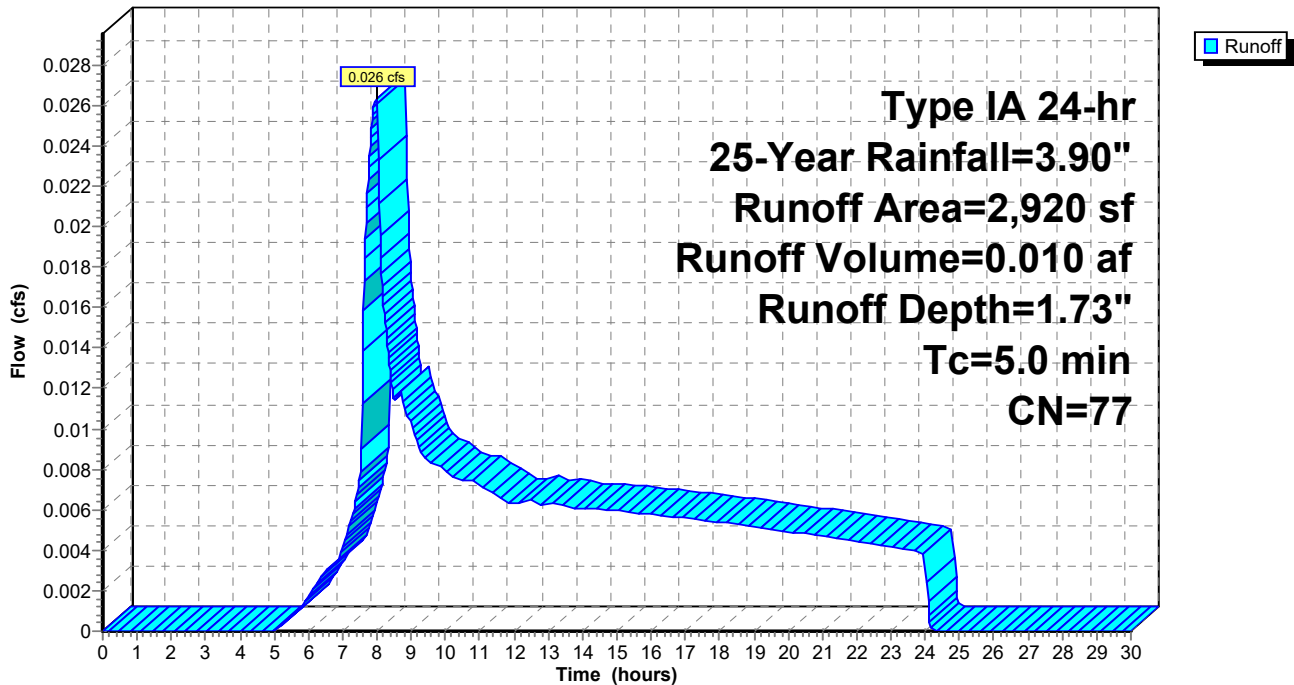
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
2,539	74	>75% Grass cover, Good, HSG C
381	98	Paved parking, HSG C
2,920	77	Weighted Average
2,539		86.95% Pervious Area
381		13.05% Impervious Area

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

**Subcatchment 8S: W-8**

Hydrograph



**Summary for Subcatchment 9S: W-9**

Runoff = 0.147 cfs @ 7.86 hrs, Volume= 0.048 af, Depth= 3.67"  
 Routed to Pond 10P : Detention - 1

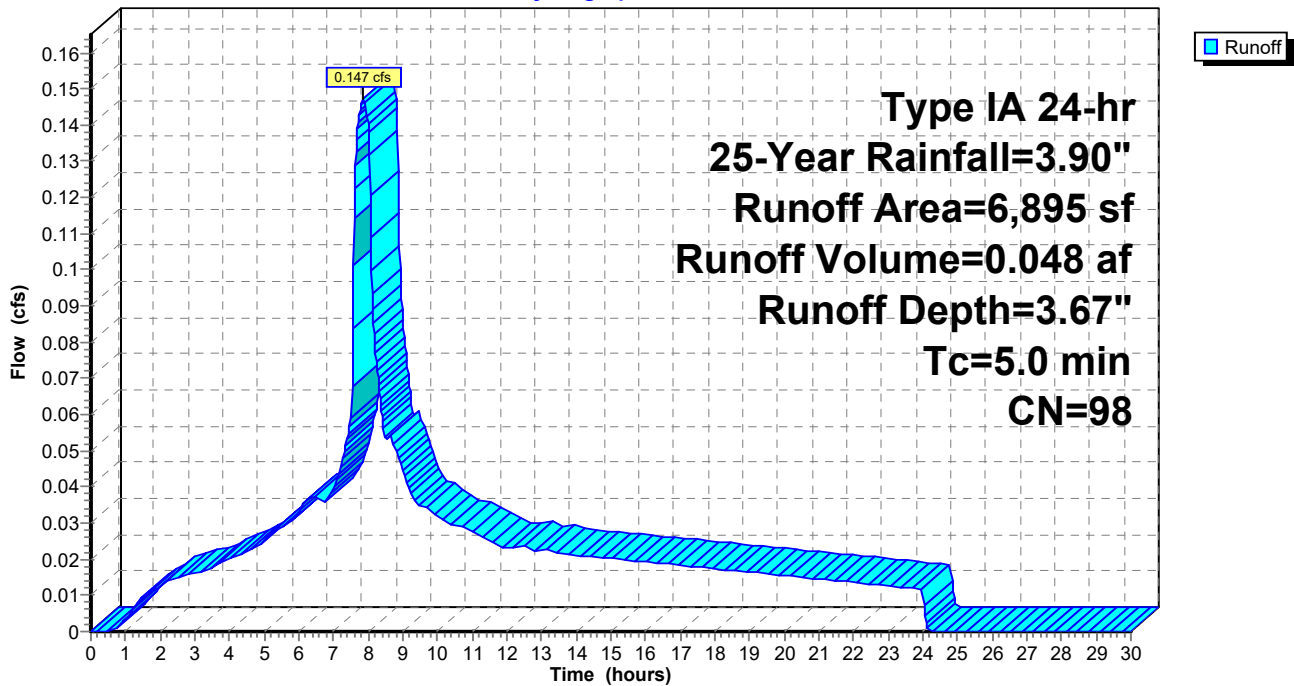
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
7	74	>75% Grass cover, Good, HSG C
517	98	Paved parking, HSG C
6,371	98	Paved parking, HSG C
6,895	98	Weighted Average
7		0.10% Pervious Area
6,888		99.90% Impervious Area

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

**Subcatchment 9S: W-9**

Hydrograph



**Summary for Subcatchment 11S: W-7**

Runoff = 0.016 cfs @ 8.00 hrs, Volume= 0.006 af, Depth= 1.52"

Routed to Pond 12P : Discharge

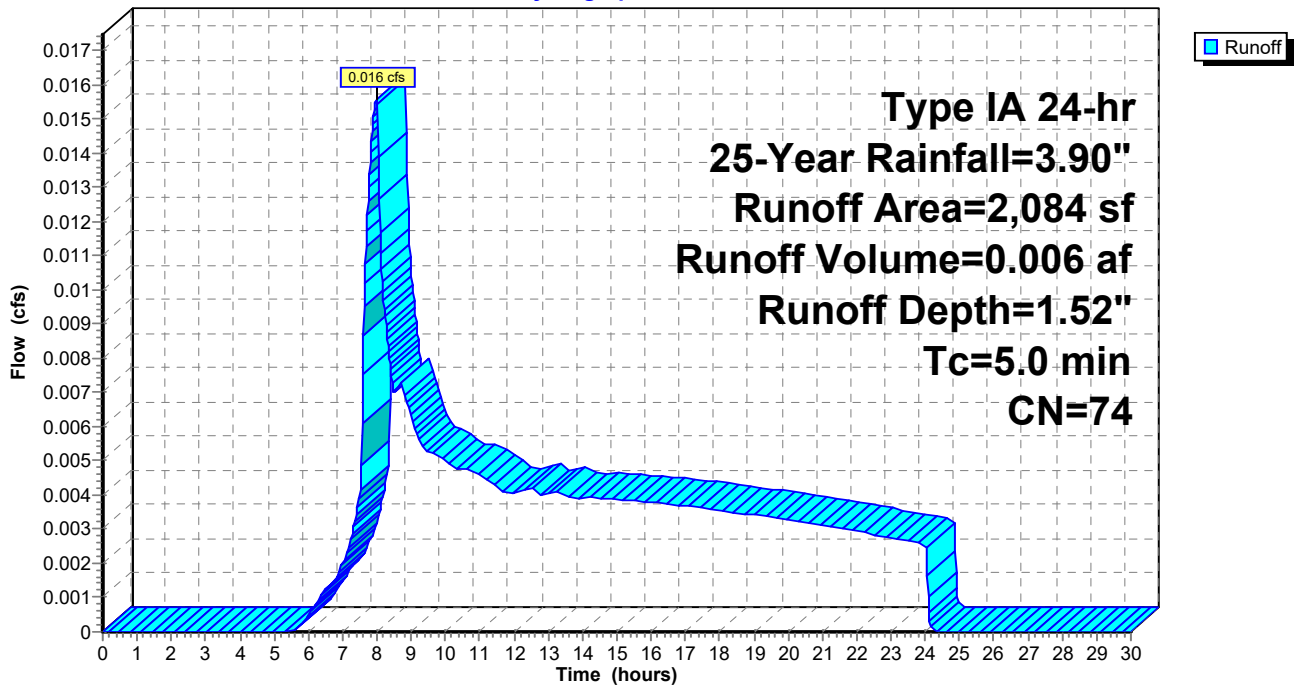
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-30.00 hrs, dt= 0.02 hrs  
 Type IA 24-hr 25-Year Rainfall=3.90"

Area (sf)	CN	Description
2,084	74	>75% Grass cover, Good, HSG C
2,084		100.00% Pervious Area

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

**Subcatchment 11S: W-7**

Hydrograph



## **Appendix G: Utility Plan / Details**

SS STRUCTURE TABLE (XX)

KEYNOTE	STRUCTURE ID	NORTHING	EASTING	RIM ELEVATION	INVERT ELEVATIONS
1	GI STUB-1	681848.34	7615415.76	309.50	IE 4"(OUT) = 308.64 (SW)
2	STUB-1	681860.14	7615409.30	309.20	IE 4"(OUT) = 308.33 (SW)
3	GI STUB-2	681957.71	7615363.60	311.57	IE 4"(OUT) = 310.78 (S)

FP STRUCTURE TABLE (XX)

KEYNOTE	STRUCTURE ID	NORTHING	EASTING
1	STUB-1	681869.18	7615404.34
2	STUB-2	681960.79	7615358.16

W STRUCTURE TABLE (XX)

KEYNOTE	STRUCTURE ID	NORTHING	EASTING
1	STUB-1	681871.81	7615402.90
2	STUB-2	681910.20	7615393.06
3	STUB-3	681958.16	7615359.60

SD STRUCTURE TABLE (XX)

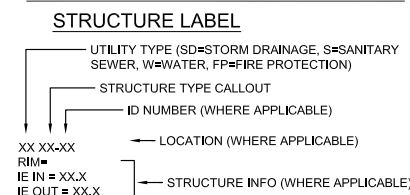
KEYNOTE	STRUCTURE ID	NORTHING	EASTING	RIM ELEVATION	INVERT ELEVATIONS
1	CONN-1	681793.94	7615410.09	--	IE 8"(IN) = 303.38 (NW)
2	FCMH-1	681836.12	7615381.98	309.54	IE 8"(IN) = 304.39 (SW) IE 8"(OUT) = 304.39 (SE)
3	OVERFLOW-1	681819.07	7615350.84	310.14	IE 4"(IN) = 307.14 (SE) IE 18"(IN) = 304.52 (NW) IE 6"(IN) = 304.39 (W) IE 8"(OUT) = 304.39 (NE)
4	OVERFLOW-2	681882.36	7615316.17	310.14	IE 4"(IN) = 307.14 (NW) IE 18"(OUT) = 304.52 (SE)
5	CONN-2	681827.53	7615416.06	--	IE 4"(IN) = 306.43 (SW)
6	CB-1	681820.44	7615403.11	308.72	IE 4"(OUT) = 306.72 (NE)
7	CONN-3	681875.84	7615389.60	--	IE 4"(IN) = 307.27 (SW)
8	CB-2	681863.47	7615367.00	309.78	IE 4"(OUT) = 307.78 (NE)
9	CONN-4	681881.09	7615386.73	--	IE 4"(IN) = 308.26 (NE)
10	STUB-1	681885.76	7615395.26	--	IE 4"(OUT) = 308.45 (SW)
11	CONN-5	681888.94	7615382.43	--	IE 10"(IN) = 312.86 (NW) IE 4"(IN) = 309.04 (NE) IE 10"(OUT) = 312.86 (SE)
12	TD-1	681896.01	7615395.35	311.34	IE 4"(OUT) = 309.34 (SW)
13	CONN-6	681939.36	7615354.82	--	IE 4"(IN) = 307.79 (SW) IE 10"(OUT) = 318.61 (SE)
14	CB-3	681926.14	7615332.67	310.31	IE 4"(OUT) = 308.30 (NE)
15	EXMH-1	682157.72	7615282.87	310.94	IE 10"(IN) = 303.98 (SE) IE 24"(IN) = 303.86 (W) IE 24"(OUT) = 303.54 (N)
16	FCMH-2	682138.59	7615293.38	310.98	IE 10"(IN) = 304.09 (SE) IE 10"(OUT) = 304.09 (NW)

KEYNOTE	STRUCTURE ID	NORTHING	EASTING	RIM ELEVATION	INVERT ELEVATIONS
17	MH-1	682132.16	7615283.72	311.15	IE 10"(IN) = 306.36 (W) IE 10"(OUT) = 304.09 (SE)
18	COTG-1	682131.20	7615262.58	--	IE 10"(IN) = 306.78 (SW) IE 10"(OUT) = 306.78 (E)
19	CONN-7	682087.31	7615182.44	--	IE 6"(IN) = 308.61 (SE) IE 6"(OUT) = 308.61 (NW) IE 10"(OUT) = 308.61 (NE)
20	CB-4	682113.99	7615248.99	311.78	IE 6"(OUT) = 309.78 (NW)
21	BEND-1	682144.25	7615318.88	--	IE 4"(IN) = 307.62 (SE) IE 4"(OUT) = 307.62 (W)
22	FD-1	682036.68	7615377.78	311.50	IE 4"(OUT) = 307.70 (NW)
23	OVERFLOW-3	682057.24	7615324.75	309.63	
24	OVERFLOW-4	682094.69	7615304.24	309.63	
25	OUTFALL-1	682045.46	7615326.89	--	IE 6"(IN) = 309.22 (S)
26	CB-5	681992.19	7615309.04	311.05	IE 6"(OUT) = 309.50 (N)
27	OUTFALL-2	682050.31	7615335.22	--	IE 4"(IN) = 309.31 (SE)
28	STUB-2	682031.10	7615368.78	--	IE 4"(OUT) = 309.50 (NW)
29	OUTFALL-3	682058.18	7615317.65	--	IE 4"(IN) = 309.40 (SW)
30	CB-6	682049.97	7615302.66	311.01	IE 4"(OUT) = 309.51 (NE)
31	OUTFALL-4	682108.41	7615296.87	--	IE 6"(IN) = 309.31 (N)
32	CB-7	682150.86	7615280.71	311.03	IE 6"(OUT) = 309.54 (S)

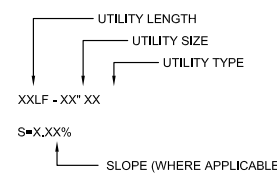
SHEET NOTES

- PIPE BEDDING AND BACKFILL FOR ALL UTILITIES SHALL BE DONE PER DETAIL X/C5.X.
  - STRUCTURES LOCATIONS ARE BASED ON CENTER OF STRUCTURE.
  - INSTALL TRUST BLOCK ON FIRE AND WATER LINES PER DETAIL X & X/C5.X.
- (X) KEY NOTES
- COORDINATE WATER SERVICE POINT OF CONNECTION TO EXISTING 8" MAIN WITH CITY OF BEAVERTON.
  - CONNECT TO EXISTING SANITARY SYSTEM. IE AS SHOWN. FIELD VERIFY.
  - CONNECT TO EXISTING STORM SYSTEM. IE AS SHOWN. FIELD VERIFY.
  - 2" VENT PIPE TO BUILDING. COORDINATE VENTING AS REQUIRED PER OREGON PLUMBING CODE.

UTILITY LABEL LEGEND



PIPE LABEL

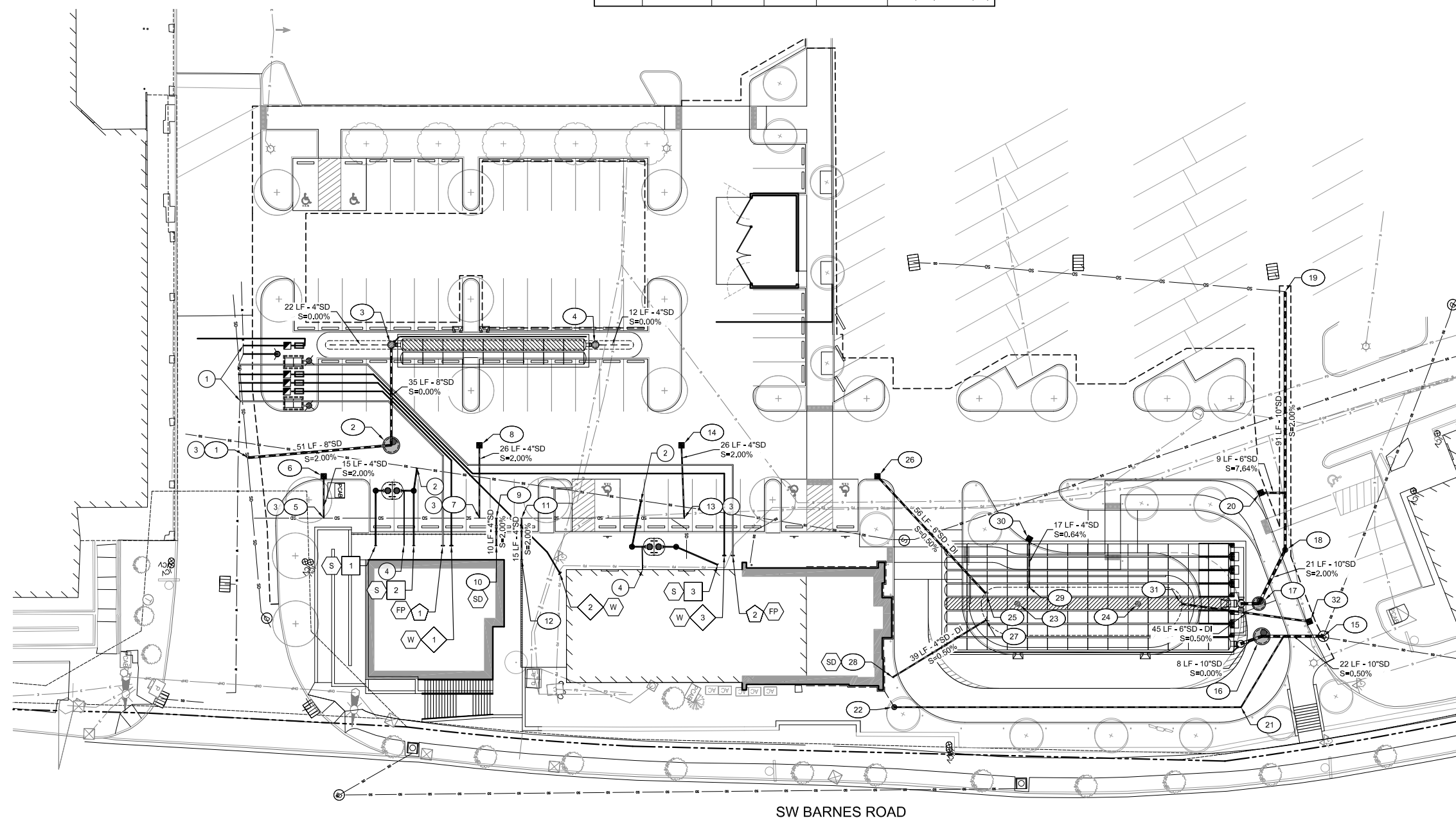
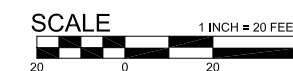


STRUCTURE TYPE

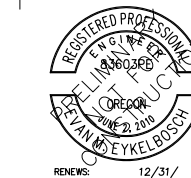
CALLOUT	DESCRIPTION	DETAIL REF.
AD	AREA DRAIN	
BEND	BEND, USE FITTING IF APPLICABLE	(X) C5.X
BWV	BACKWATER VALVE	(X) C5.X
CB	TRAPPED CATCH BASIN	
COTG	CLEANOUT TO GRADE	
CONN	CONNECTION	
FD	FOUNDATION DRAINAGE POINT OF CONN.	
FDC	FIRE DEPARTMENT CONNECTION	
GV	GATE VALVE	
SDMH	48" DIA. STORM DRAIN MH	
TD	TRENCH DRAIN	
TEE	TEE CONNECTION	
WYE	WYE CONNECTION	

SHEET LEGEND

- (DC) DOUBLE CHECK DETECTOR VAULT (X) C5.X
- (RP) REDUCED PRESSURE BACKFLOW ASSEMBLY (X) C5.X
- (S) CONNECT TO WASTE LINE. SEE PLUMBING PLANS FOR CONTINUATION. SIZE AS NOTED.
- (SD) CONNECT TO STORM DRAIN/ROOF DRAIN. SEE PLUMBING PLANS FOR CONTINUATION. SIZE AND IE AS NOTED.
- (W) CONNECT TO COLD WATER SYSTEM. SEE PLUMBING PLANS FOR CONTINUATION. SIZE AS NOTED.
- (I) UTILITY CROSSING. PROVIDE 12" MIN. CLEARANCE. U.N.O.



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STARBUCKS  
AND PAD**

Revisions

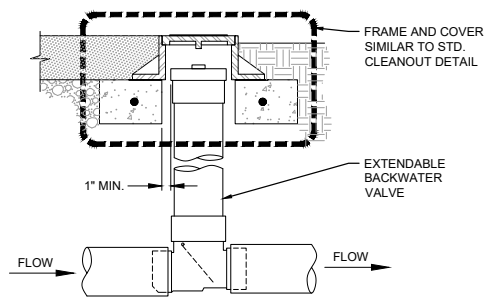
**PK 21052**  
Original Issue: 07.01.2022  
Drawn/Check By: BLU/EME

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**UTILITY PLAN**

**C4.0**  
DESIGN REVIEW





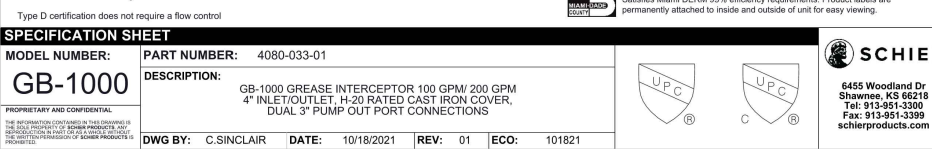


NOTES:  
1. EXTENDABLE BACKWATER VALVE TO BE MANUFACTURED BY CLEAN CHECK OR APPROVED EQUAL AND SHALL BE INSTALLED PER MANUFACTURER'S RECOMMENDATIONS.

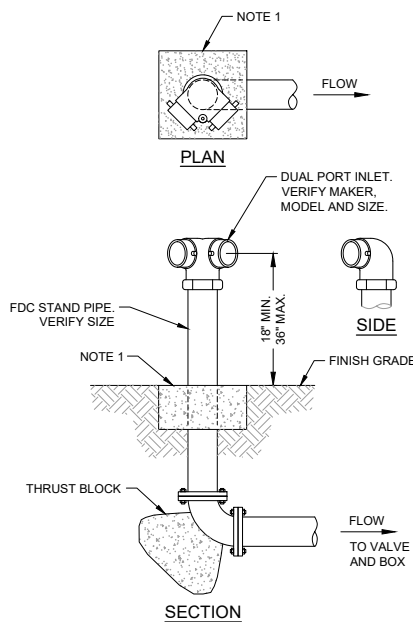
**X** EXTENDABLE BACKWATER VALVE  
SCALE: NTS

**SPECIFICATIONS**  
Notes:  
1. 4" FPT inlet/outlet with 4" plain end fittings  
2. Unit weight - w/ cast iron covers: 824 lbs. (for wet weight add 8.413 lbs.)  
3. Maximum operating temperature: 150° F continuous  
4. Capacities - Liquid: 1,000 gal.; Grease: 5,495 lbs. (753 gal.) @ 100GPM; 4,959 lbs. (679 gal.) @ 200GPM; Solids: 211 gal.  
5. Satisfies Miami DERM 99% efficiency requirements; retaining the following capacities at 99.0% efficiency: 5,272 lbs. (722 gal.) @ 100GPM; 3,127 lbs. (428 gal.) @ 200GPM  
6. For gravity drainage applications only.  
7. Do not use for pressure applications.  
8. Cover placement allows full access to tank for proper maintenance.  
9. Vent not required unless per local code.  
10. Engineered inlet and outlet diffusers with inspection ports are removable to inspect / clean piping. For series installations, the top of the inlet diffuser on the first unit in the series must be sealed.  
11. Integral air relief / Anti-siphon / Sampling access.  
12. Adjustable cover adapters provide up to 4" of additional height.  
13. Flow rates are based on 2-minute drain time.  
14. Designed for both below and above-grade installations.  
15. Safety Start®, access restrictor built into each cover adapter, prevents accidental entry to tanks (450 lb rating).  
**ENGINEER SPECIFICATION GUIDE**  
Schier Great Basin™ grease interceptor model # GB-1000 shall be lifetime guaranteed and made in USA of seamless, molded polyethylene with minimum 7/16" uniform wall thickness. Interceptor shall be furnished for above or below-grade installation with adjustable cover adapter and Safety Start® access restrictor built into each cover adapter. Interceptor shall be certified to ASME A112.14.3 (Type D) and CSA B481.1. Interceptor flow rate shall be 100 GPM or 200GPM. Interceptor grease capacity shall be 5,495 lbs. Cover shall provide water-tight seal and have minimum 16,000 lbs. load capacity.  
**CERTIFIED PERFORMANCE**  
Great Basin™ hydromechanical grease interceptors are third party performance-tested and listed by IAPMO to ASME #A112.14.3 and CSA B481.1 grease interceptor standards and greatly exceed requirements for grease separation and storage. They are compliant to the Uniform Plumbing Code and the International Plumbing Code.  
Type D certification does not require a flow control

**SPECIFICATION SHEET**  
MODEL NUMBER: **GB-1000**  
PART NUMBER: 4080-033-01  
DESCRIPTION: GB-1000 GREASE INTERCEPTOR 100 GPM/200 GPM 4" INLET/OUTLET, H-20 RATED CAST IRON COVER, DUAL 3" PUMP OUT PORT CONNECTIONS  
DWG BY: C.SINCLAIR DATE: 10/18/2021 REV: 01 ECO: 101821

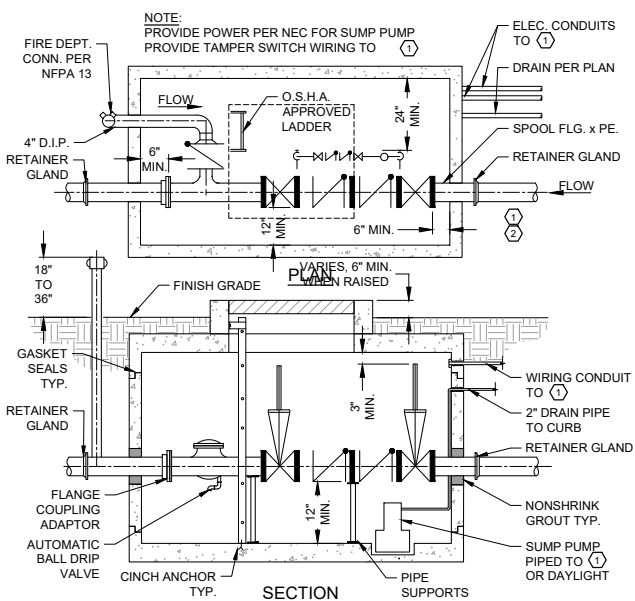


**X** GB-1000 GREASE INTERCEPTOR  
SCALE: NTS



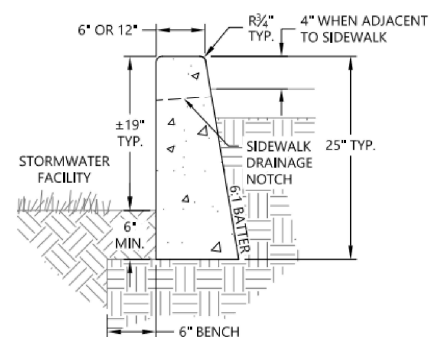
NOTES:  
1. MIN. 3000 PSI CONCRETE ANCHOR PAD TO BE 12"x12"x6" THICK, UNLESS NOTED OTHERWISE. ELIMINATE IF INSTALLED IN CONCRETE PAVED AREA.  
2. USE FLANGE OR THREADED FITTINGS.  
3. CONTRACTOR SHALL PROVIDE SINGLE CHECK VALVE AND BALL DRIP VALVE IN ACCESSIBLE LOCATION INSIDE DDCV VAULT. COORDINATE WITH PLUMBING.

**X** FIRE DEPARTMENT CONNECTION (FDC) DUAL PORT  
SCALE: NTS

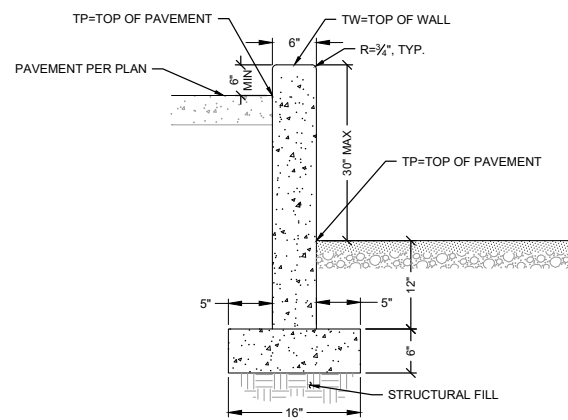


D.D.C. SIZE	UTILITY VAULT OR EQUAL	
	WITH F.D.C.	WITHOUT F.D.C.
4"	676 - WA	577 - WA

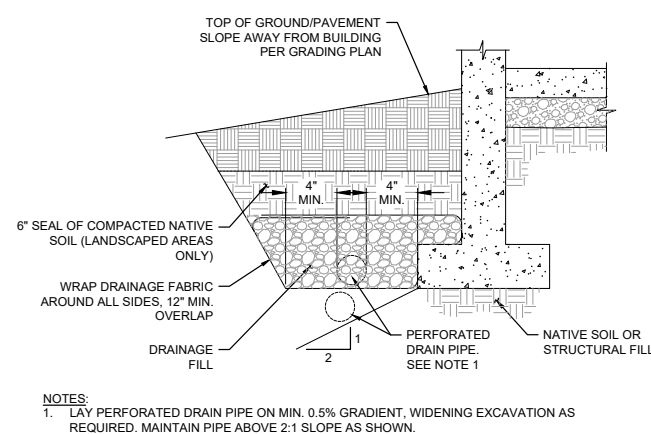
**X** DOUBLE DETECTOR CHECK FIRE SERVICE VAULT W/ SUMP PUMP  
SCALE: NTS



**X** PLANTER CURB  
SCALE: NTS

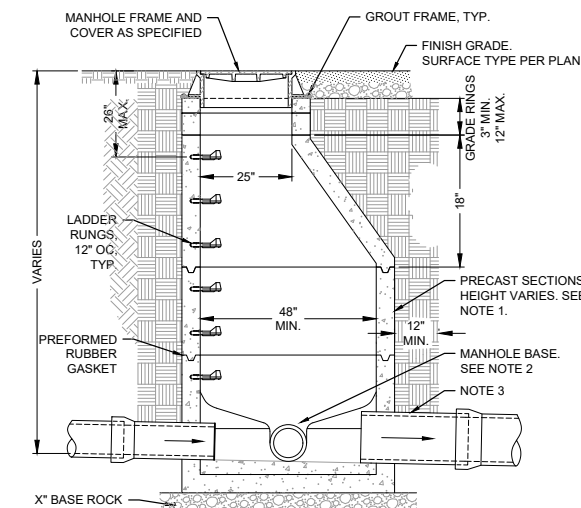


**X** CURB WALL  
SCALE: NTS



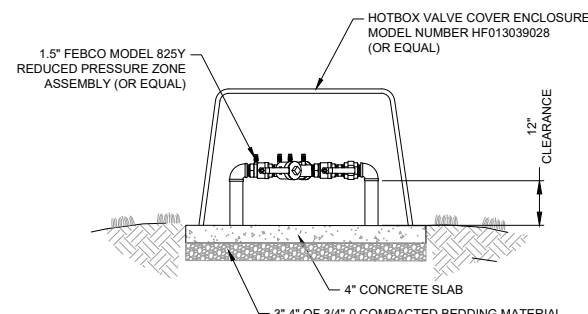
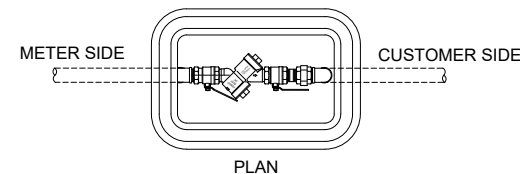
NOTES:  
1. LAY PERFORATED DRAIN PIPE ON MIN. 0.5% GRADIENT, WIDENING EXCAVATION AS REQUIRED. MAINTAIN PIPE ABOVE 2:1 SLOPE AS SHOWN.

**X** PERIMETER FOUNDATION DRAIN  
SCALE: NTS



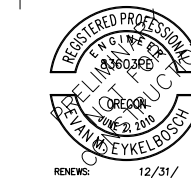
NOTES:  
1. ALL PRECAST SECTIONS SHALL CONFORM TO REQUIREMENTS OF ASTM C-478.  
2. MANHOLE BASE MAY BE PRECAST OR CAST IN PLACE. SEE STANDARD MANHOLE BASE DETAILS.  
3. ALL CONNECTING PIPES SHALL HAVE FLEXIBLE, GASKETED AND UNRESTRAINED JOINT WITHIN 18" OF MANHOLE VAULT.

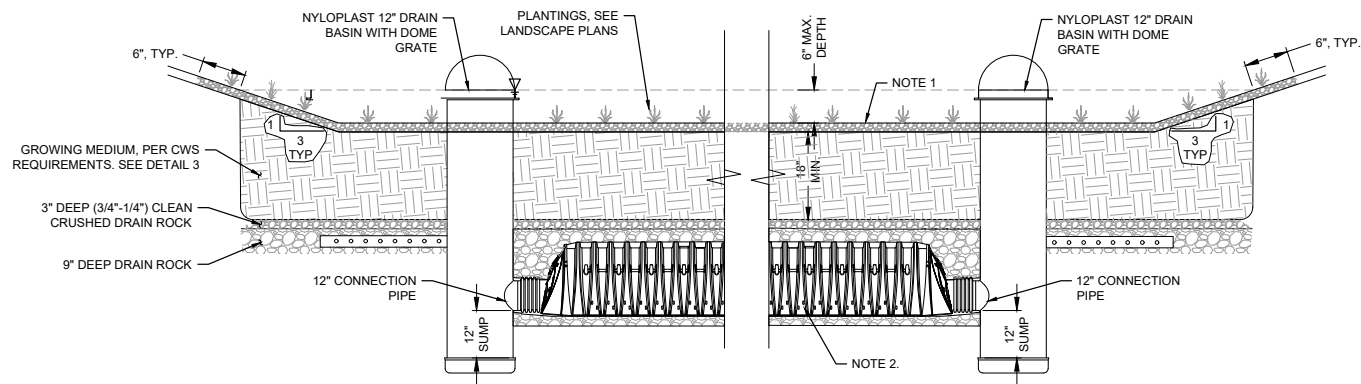
**X** STANDARD MANHOLE  
SCALE: NTS



NOTE:  
1. HOTBOX ENCLOSURE SHALL BE INSULATED. COORDINATE WITH ELECTRICAL PLANS FOR CONNECTION.  
2. RPBA SHALL BE ACCESSIBLE BY VERTICALLY LIFTING OFF ENCLOSURE. CONTRACTOR TO VERIFY ACCESSIBILITY PRIOR TO CONSTRUCTION.

**X** REDUCED PRESSURE BACKFLOW ASSEMBLY  
SCALE: NTS

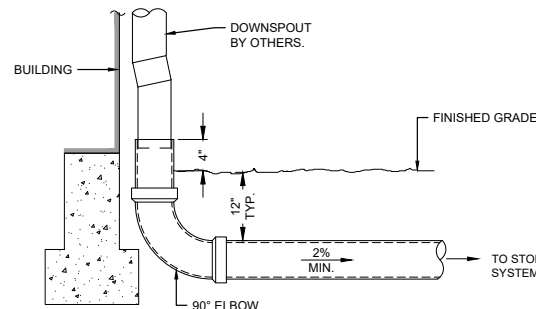




- NOTE:
1. INSTALL HIGH DENSITY JUTE OR COCONUT FIBER MATTING, AS APPROVED BY LANDSCAPE ARCHITECT.
  2. INSTALL CHAMBERS PER PLAN AND MANUFACTURER RECOMMENDATIONS

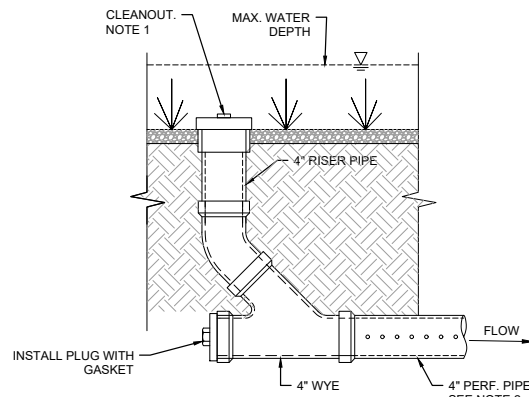
**X RAIN GARDEN-2**

SCALE: NTS



**X DOWNSPOUT/STORM DRAIN CONNECTION**

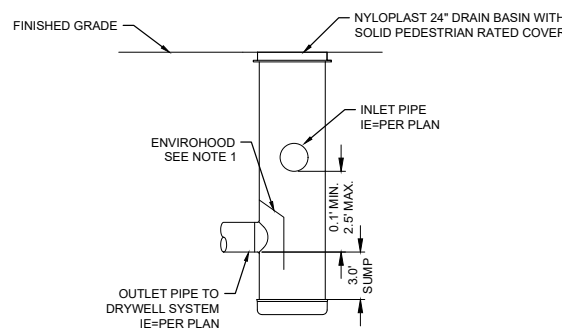
SCALE: NTS



- NOTES:
1. NYLOPLAST CLEANOUT END CAP OR APPROVED EQUAL. ADJUST TO FINISHED GRADE
  2. PERFORATED PIPE TO MEET ODOT SPECIFICATION 02415.50. LOCATE AT BOTTOM OF STORAGE SECTION WITH HOLES ON TOP HALF OF PIPE.

**X PLANTER CLEANOUT AND PERF PIPE**

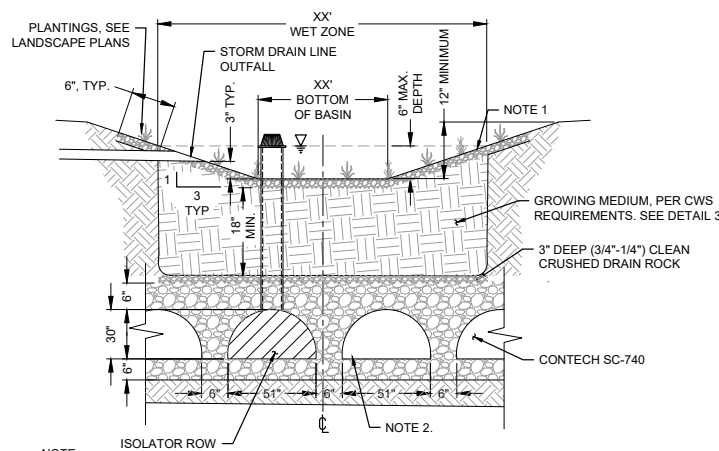
SCALE: NTS



- NOTE:
1. NYLOPLAST ENVIROHOOD. PART NUMBER 5824AG0415
  2. SEDIMENT STRUCTURE SHALL BE NYLOPLAST OR APPROVED EQUAL

**X SEDIMENTATION BASIN**

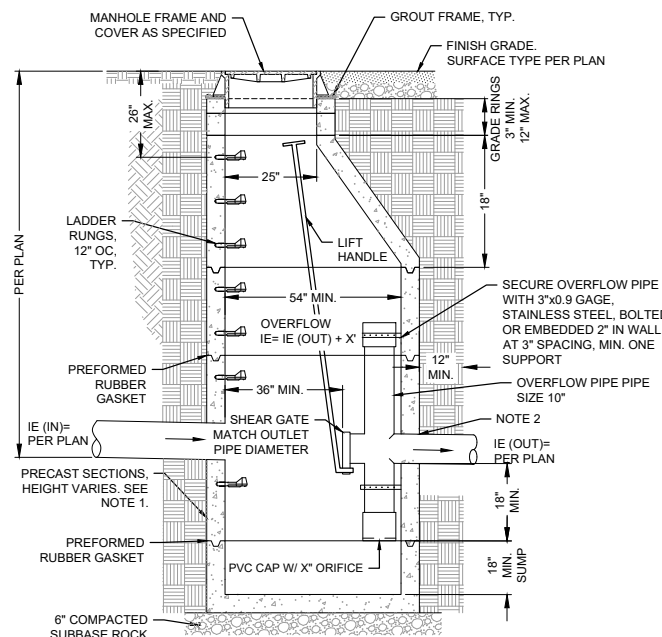
SCALE: NTS



- NOTE:
1. INSTALL HIGH DENSITY JUTE OR COCONUT FIBER MATTING, AS APPROVED BY LANDSCAPE ARCHITECT.
  2. INSTALL CHAMBERS PER PLAN AND MANUFACTURER RECOMMENDATIONS

**X RAIN GARDEN -1**

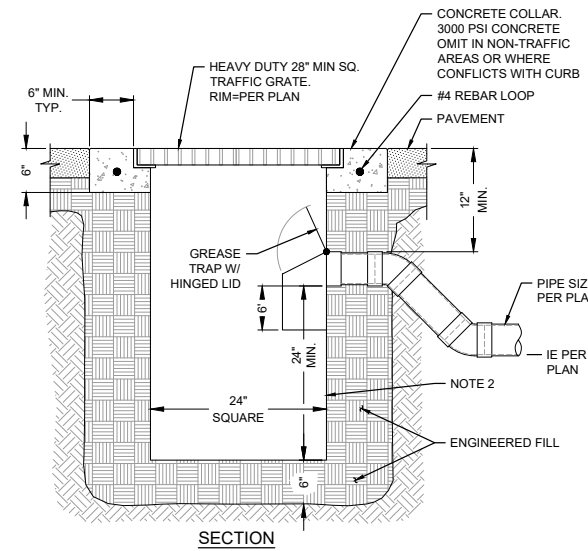
SCALE: NTS



- NOTES:
1. ALL PRECAST SECTIONS SHALL CONFORM TO REQUIREMENTS OF ASTM C-478.
  2. ALL CONNECTING PIPES SHALL HAVE FLEXIBLE, GASKETED AND UNRESTRAINED JOINT WITHIN 18\"/>

**X FLOW CONTROL MANHOLE**

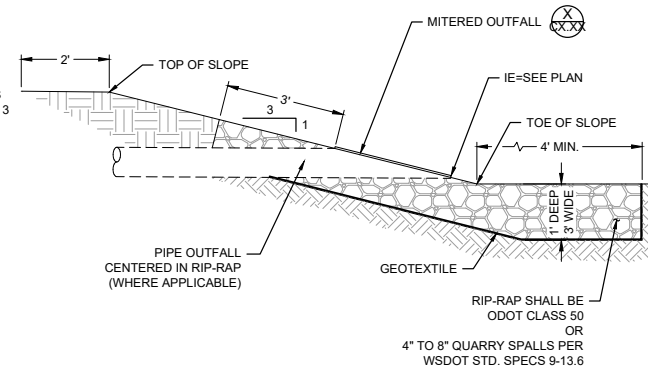
SCALE: NTS



- NOTES:
1. CONTRACTOR TO WIDEN EXCAVATION AS REQUIRED TO OBTAIN COMPACTION WITH CONTRACTORS COMPACTION EQUIPMENT.
  2. 14\"/>

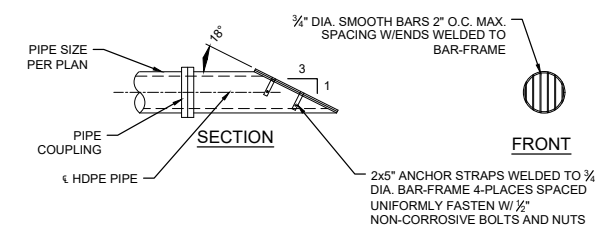
**X TRAPPED CATCH BASIN**

SCALE: NTS



**X TYPICAL OUTFALL RIP-RAP PROTECTION**

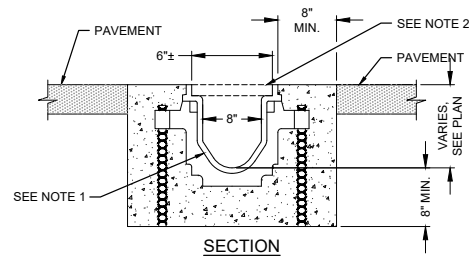
SCALE: NTS



- NOTES:
1. ALL TRASH RACK PARTS AND CONNECTORS MUST BE ALUMINUM, OR ASPHALT COATED GALVANIZED STEEL (TREATMENT 1 OR BETTER).
  2. WELD AT ALL JOINTS.
  3. SHOP DRAWINGS REQUIRED.

**X MITERED OUTFALL W/ TRASH RACK (3:1)**

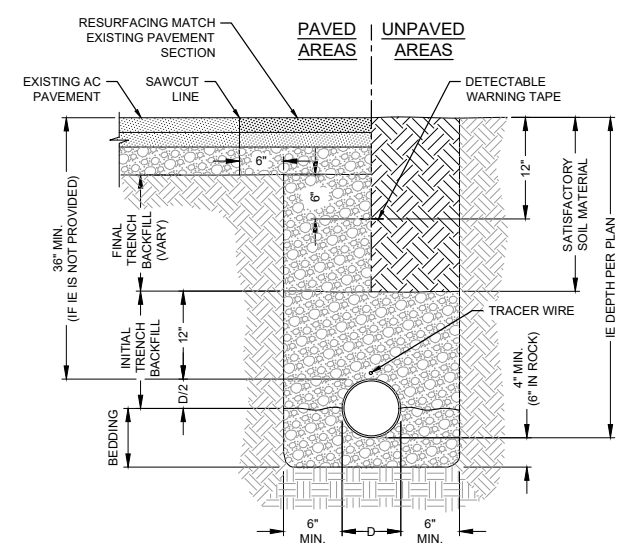
SCALE: NTS



- NOTES:
1. TRENCH DRAIN SHALL BE NEUTRAL-SLOPED 6\"/>

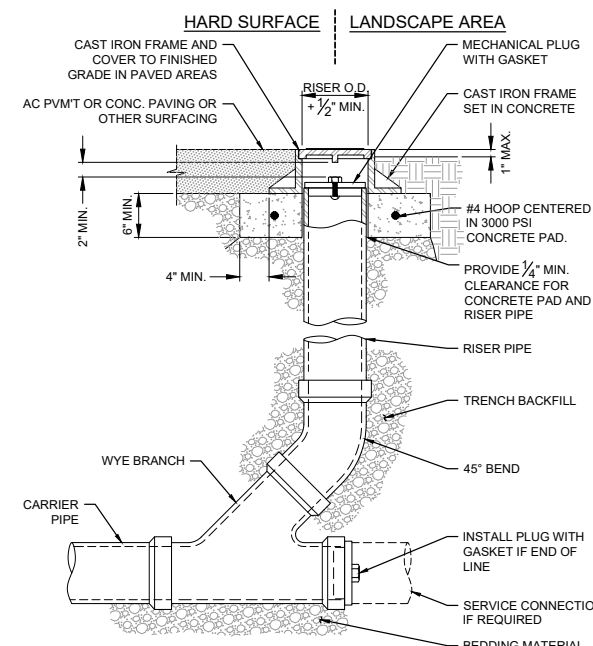
**X TRENCH DRAIN - 6 INCH WIDE**

SCALE: NTS



**X TYPICAL PIPE BEDDING AND BACKFILL**

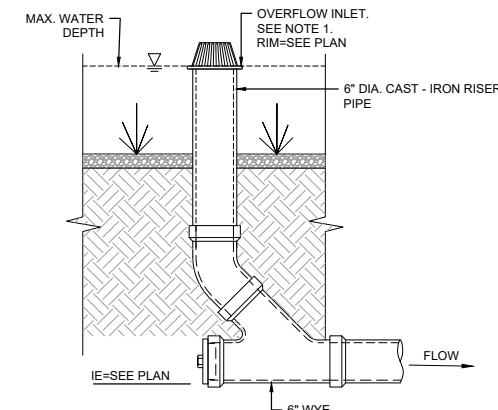
SCALE: NTS



- NOTES:
1. CAST IRON FRAME AND COVER SHALL MEET H-20 LOAD REQUIREMENT.
  2. FOR CARRIER PIPE SIZE 6\"/>

**X STANDARD CLEANOUT (COTG)**

SCALE: NTS



- NOTES:
1. OVERFLOW INLET WITH ATRIUM GRATE. ATRIUM GRATE SHALL BE 6\"/>

**X OVERFLOW INLET - TYPE 1**

SCALE: NTS











## Appendix H: Operations and Maintenance

**PROVIDED WITH FINAL REPORT**

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