2. The spill area will be kept well ventilated and personnel will wear appropriate protective clothing to prevent injury from contact with the hazardous substances.

3. The Owner and Property Manager will be notified immediately.

4. Spills of toxic or hazardous materials will be reported to the appropriate federal, state, and/or local government agency, regardless of the size of the spill.

5. If the spilt material enters the drainage system, the catch basin or other structure acting as the inlet shall be cleaned via a vac truck as soon as possible and before the next rainfall event to the extent practicable.

The Property Manager will be the spill prevention and response coordinator. He will designate the individuals who will receive spill prevention and response training. These individuals will each become responsible for a particular phase of prevention and response. The names of these personnel will be posted in the material storage area and other applicable areas onsite.

Section 2 Stormwater Management System – Operation and Maintenance

1. Paved Areas – Paved areas should be swept as part of the routine site maintenance. Pavement sweeping is an excellent source control for sedimentation to the existing drainage system and should be performed on a quarterly basis (four times a year).

2. Salt for de-icing on the paved areas during the winter months shall be limited to the minimum amount practicable. Sand containing the minimum amount of calcium chloride (or approved equivalent) needed for handling may be applied as part of the routine winter maintenance activities.

3. Deep Sump Catch Basins – Sumps shall be inspected quarterly during the first year to determine sediment collection. Sumps shall be cleaned annually at a minimum, and when sediment and debris are within 2-feet of the outlet pipe.

4. The StormTech Infiltration System: Inspect and maintain according to the StormTech Inspection and Maintenance Manual.

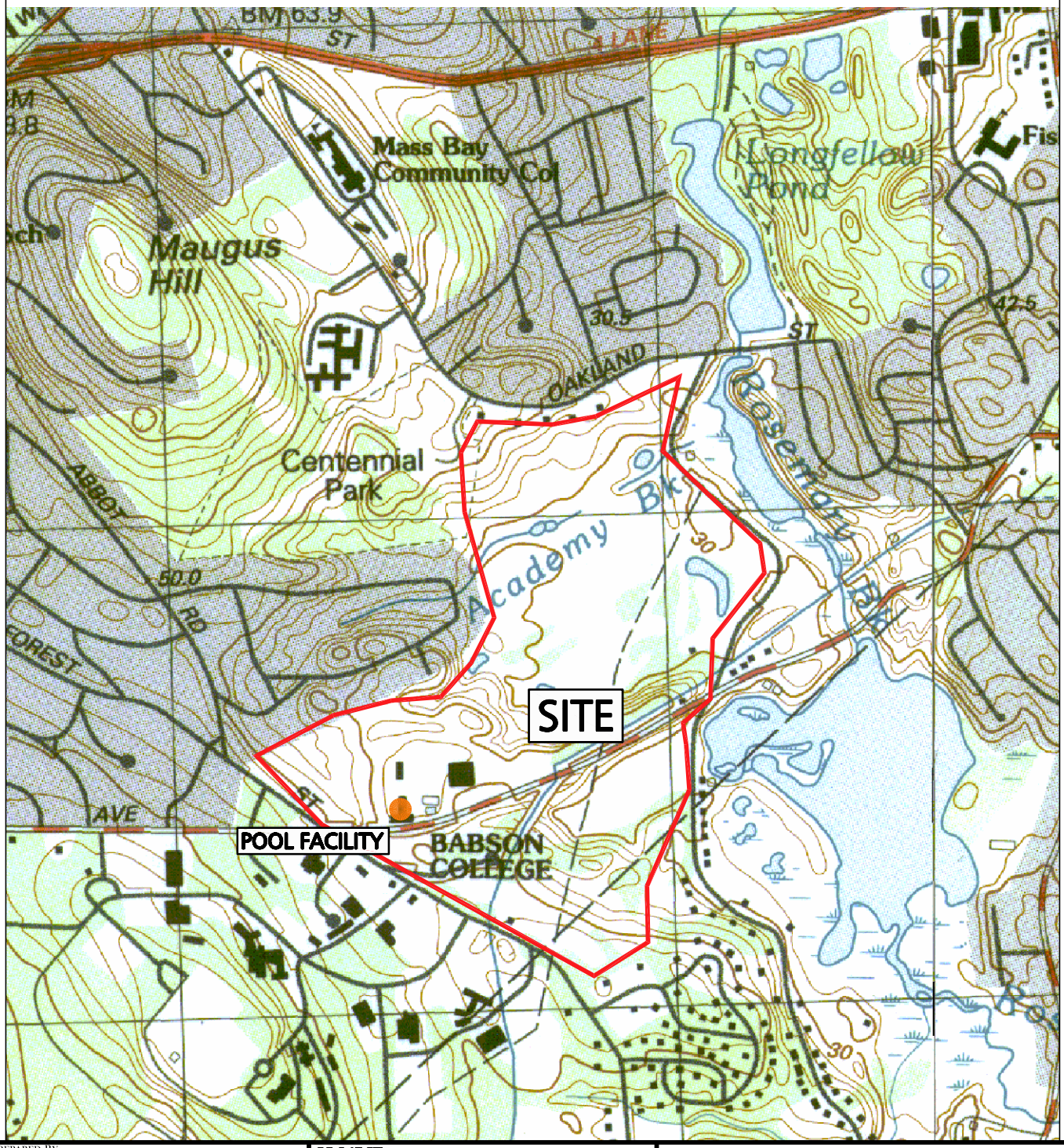
4. All sediments removed from the infiltration systems and catch basin sumps shall be disposed of properly, and in accordance with applicable local and state regulations.

5. All vegetated areas on the site shall be stabilized and maintained to control erosion. Any disturbed areas shall be re-seeded as soon as practicable. Trash and debris should be removed on a regular basis.

6. Work within any drainage structures shall performed in accordance with the latest OSHA regulations, and only by individuals with appropriate OSHA certification.

Maintenance Responsibilities **-** All post-construction maintenance activities shall be documented and kept on file for up to 3 years. Copies of said document shall be submitted to the Zoning Board of Appeals and the Town Engineer.

3 Exhibits



PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.

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WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

PROJECT:

WELLESLEY COUNTRY CLUB
300 WELLESLEY AVENUE
WELLESLEY, MA

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USGS MAP

PROJECT NO.	1828-02	DATE:	12/4/12
SCALE:	1"=1000'	DWG. NAME:	EXHIBITS
DESIGNED BY:	PLC	CHECKED BY:	PLC

APPLICANT/OWNER: WELLESLEY COUNTRY CLUB

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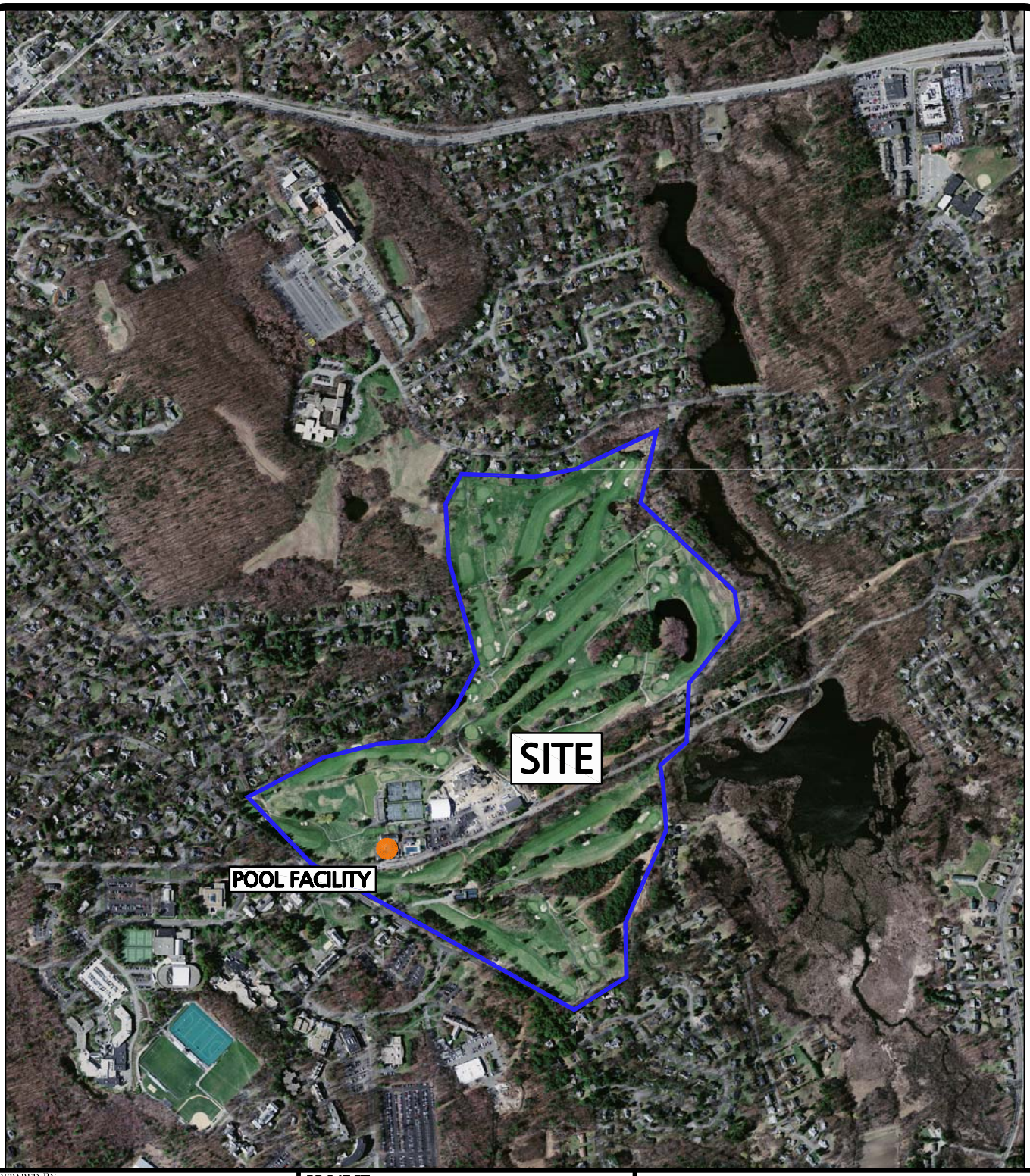
SHEET No.

FIG-1



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PROJECT:

WELLESLEY COUNTRY CLUB
300 WELLESLEY AVE
WELLESLEY, MA, MA

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AERIAL PHOTO

PROJECT NO.	1917-01	DATE:	12/4/12
SCALE:	1"=1000'	DWG. NAME:	EXHIBITS
DESIGNED BY:	PLC	CHECKED BY:	PLC

APPLICANT/OWNER: WELLESLEY COUNTRY CLUB

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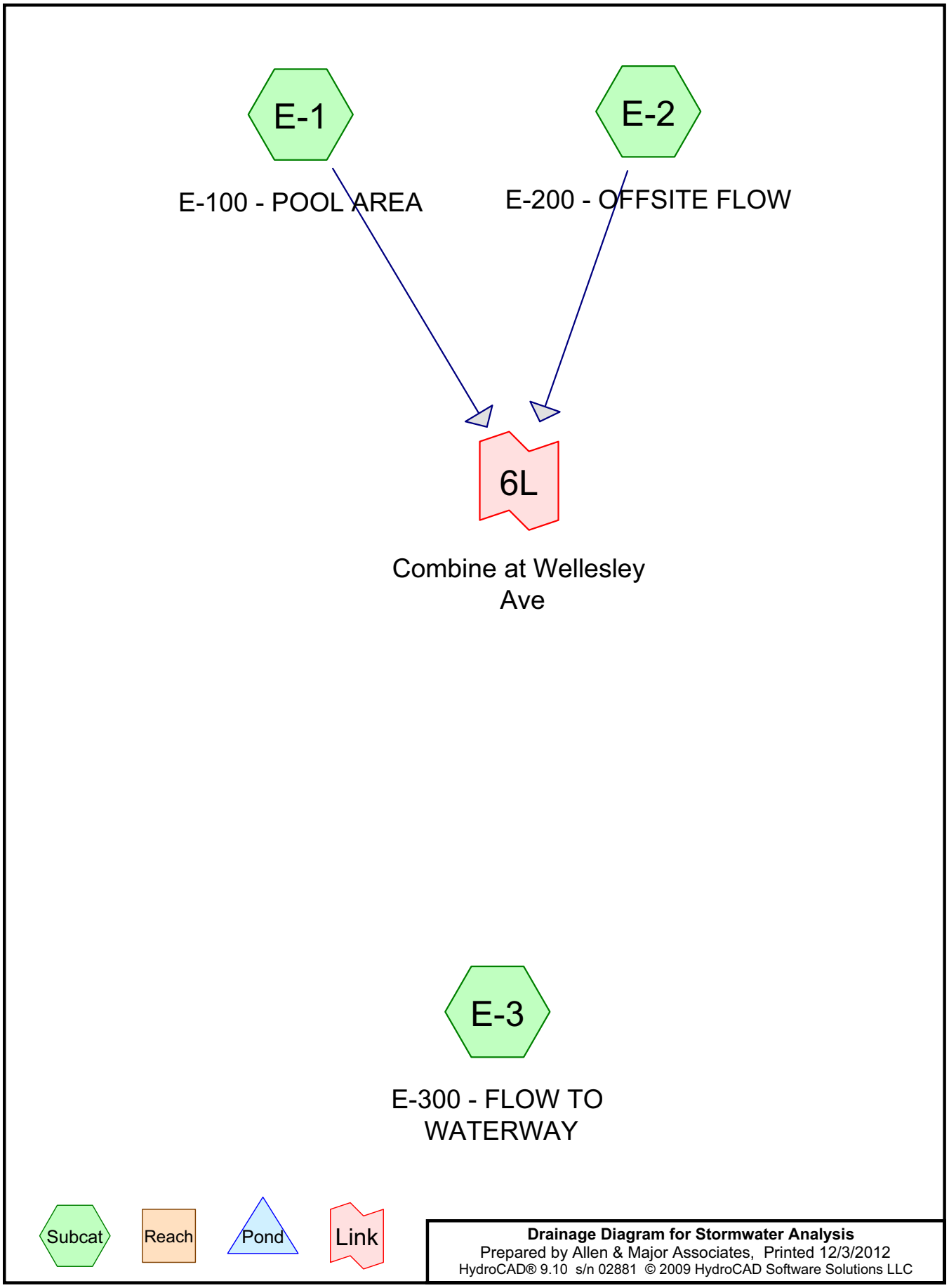
SHEET No.

FIG-2

4 HydroCad Worksheets

PROPOSED POOL RENOVATION AND REPLACEMENT - WELLESLEY, MA
Closed Drainage

CLIENT:	Wellesley Country Club																DESIGN YEAR:	25						
																	K=	230	B=	30				
Title	*Stormwater Conveyance Sizing (25 YEAR STORM)*								Minimum Slope:	0.50%														
Project	***Pool Renovation, Wellesley, MA***								Minimum Size:	12	inch													
Date	12-4-1211-21-12								Rainfall Intensity (	5.45	(25 year storm)													
A&M Project Number: 1917-01									Manning's n:	0.012	HDPE													
									Manning's n:	0.010	RCP													
									Min. Velocity	2.500	fps													
									Max. Velocity	10.000	fps													
Capacity (Q_d) and Velocity (V_{full}) calculations performed using Manning's Steady State Open Channel Flo																								
										-cell shading denotes input required; all other cells are calculated														
LOCATION			LAND USE						FLOW TIME (MIN)				FLOW						PIPE DESIGN					
Description	From	To	Cover	Increm.	Total	C	CA	Total CA	To Inlet	In Pipe	Tc	I (iph)	Q (cfs)	Pipe	Sz (in)	L (ft)	Slope	n	Q(f) (cfs)	V(f) (fps)	Q/Q(f)	V/V(f)	V (fps)	L/V (min)
CLOSED DRAINAGE SYSTEM																								
Drain Series 100																								
	Area YD#3		Grass	0.07		0.40																		
			Pave	0.03		0.90																		
	YD#3				0.10	0.55	0.06		10		10	5.75	0.32											
	YD#3	YD#2												HDPE	8	30	0.0100	0.012	1.31	3.75	0.24	0.69	2.60	0.19
	Area YD#2		Grass	0.02		0.40																		
			Pave	0.01		0.90																		
	YD#2				0.03	0.63	0.02		10		10	5.75	0.11											
	YD#2	YD#1												HDPE	8	90	0.0100	0.012	1.31	3.75	0.08	0.51	1.91	0.78
	Area YD#1		Grass	0.03		0.40																		
			Pave	0.01		0.90																		
	YD#1				0.04	0.54	0.02		10		10	5.75	0.12											
	YD#1	PDMH#1												HDPE	8	47	0.0600	0.012	3.21	9.19	0.04	0.41	3.74	0.21
	Area Bldg & Pool De		Grass	0.00		0.40																		
			Pave	0.69		0.90																		
	Pool Deck				0.69	0.90	0.62		10		10	5.75	3.56											
	Pool Deck	PDMH 2												RCP	12	12	0.0100	0.010	4.63	5.90	0.77	0.97	5.72	0.03
	PDMH 2				0.69			0.62	10.00	0.03	10.03	5.74	3.55											
	PDMH 2	PDMH 2A												RCP	12	43	0.0550	0.010	10.86	13.83	0.33	0.76	10.47	0.07
	PDMH 2A				0.69			0.62	10.00	0.07	10.07	5.74	3.55											
	PDMH 2A	PDMH 1												RCP	12	22	0.0200	0.010	6.55	8.34	0.54	0.88	7.31	0.05
	PDMH 1				0.86			0.71	10.00	0.05	10.05	5.74	4.10											
	PDMH 1	EDMH												RCP	12	110	0.0500	0.010	10.36	13.19	0.40	0.80	10.55	0.17
	Area PCB#1		Grass	0.00		0.40																		
			Pave	0.27		0.90																		
	PCB#1				0.27	0.90	0.24		10		10	5.75	1.40											
	PCB#1	EDMH												RCP	12	24	0.0100	0.010	4.63	5.90	0.30	0.74	4.36	0.09
	Area PCB#2		Grass	0.00		0.40																		
			Pave	0.10		0.90																		
	PCB#2				0.10	0.90	0.09		10		10	5.75	0.52											
	PCB#2	EDMH												RCP	12	8	0.0100	0.010	4.63	5.90	0.11	0.55	3.27	0.04
	EDMH				1.23			1.05	10.00	0.17	10.17	5.73	5.99											
	EDMH	ECB												RCP	15	166	0.0100	0.010	8.40	6.84	0.71	0.95	6.50	0.43


E-1
E-100 - POOL AREA
E-2
E-200 - OFFSITE FLOW
6L
Combine at Wellesley Ave
E-3
E-300 - FLOW TO WATERWAY
Subcat
Reach
Pond
Link
Drainage Diagram for Stormwater Analysis
Prepared by Allen & Major Associates, Printed 12/3/2012
HydroCAD® 9.10 s/n 02881 © 2009 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.579	39	>75% Grass cover, Good, HSG A (E-1, E-2, E-3)
0.051	76	Gravel roads, HSG A (E-1)
1.834	98	Paved parking, HSG A (E-1, E-2, E-3)
4.464		**TOTAL AREA**

Soil Listing (selected nodes)

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

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: E-100 - POOL AREA Runoff Area=98,446 sf 72.32% Impervious Runoff Depth=1.53"
Tc=6.0 min CN=83 Runoff=4.04 cfs 0.288 af

Subcatchment E-2: E-200 - OFFSITE FLOW Runoff Area=1,492 sf 59.65% Impervious Runoff Depth=0.97"
Tc=6.0 min CN=74 Runoff=0.04 cfs 0.003 af

Subcatchment E-3: E-300 - FLOW TO Runoff Area=94,525 sf 8.26% Impervious Runoff Depth=0.02"
Flow Length=356' Tc=23.0 min CN=44 Runoff=0.01 cfs 0.004 af

Link 6L: Combine at Wellesley Ave Inflow=4.08 cfs 0.290 af
Primary=4.08 cfs 0.290 af

Total Runoff Area = 4.464 ac Runoff Volume = 0.295 af Average Runoff Depth = 0.79"
58.92% Pervious = 2.630 ac 41.08% Impervious = 1.834 ac

Summary for Subcatchment E-1: E-100 - POOL AREA

Existing watershed at Equipment Service station

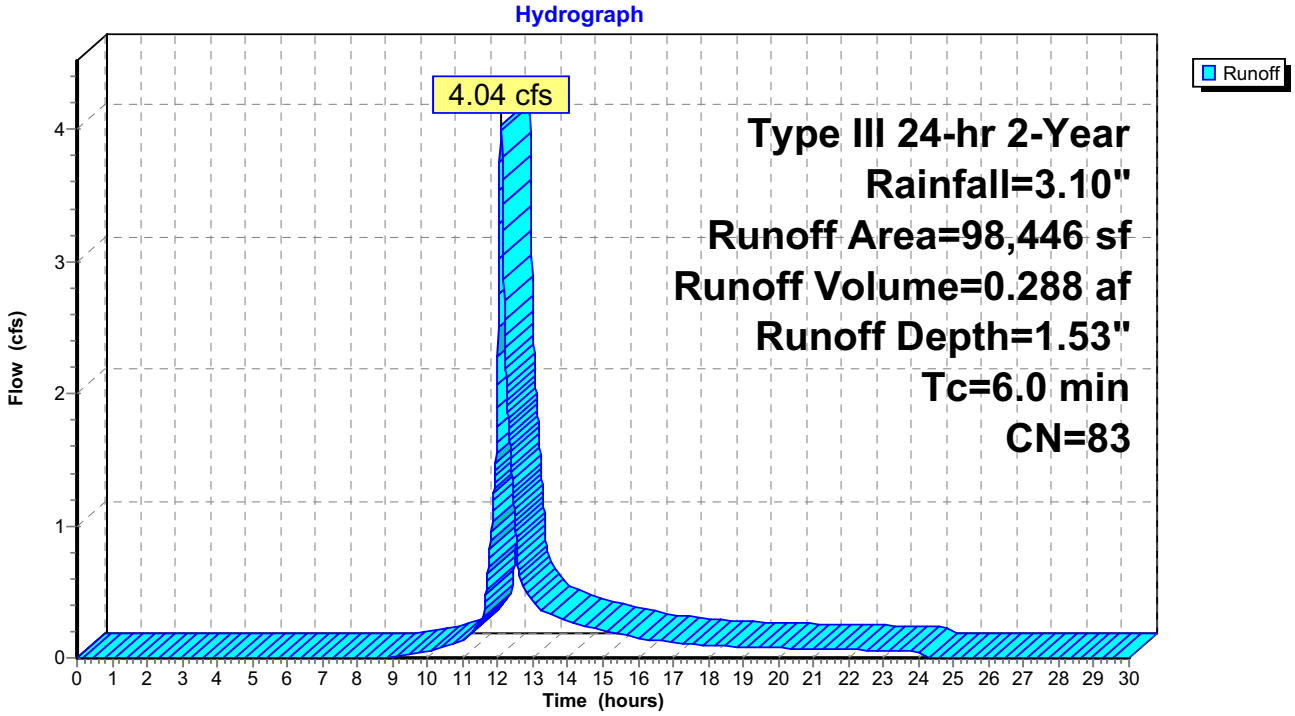
Runoff = 4.04 cfs @ 12.09 hrs, Volume= 0.288 af, Depth= 1.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	25,023	39	>75% Grass cover, Good, HSG A
*	2,229	76	Gravel roads, HSG A
	71,194	98	Paved parking, HSG A
	98,446	83	Weighted Average
	27,252		27.68% Pervious Area
	71,194		72.32% Impervious Area

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

Subcatchment E-1: E-100 - POOL AREA



Summary for Subcatchment E-2: E-200 - OFFSITE FLOW

Existing watershed at Equipment Service station

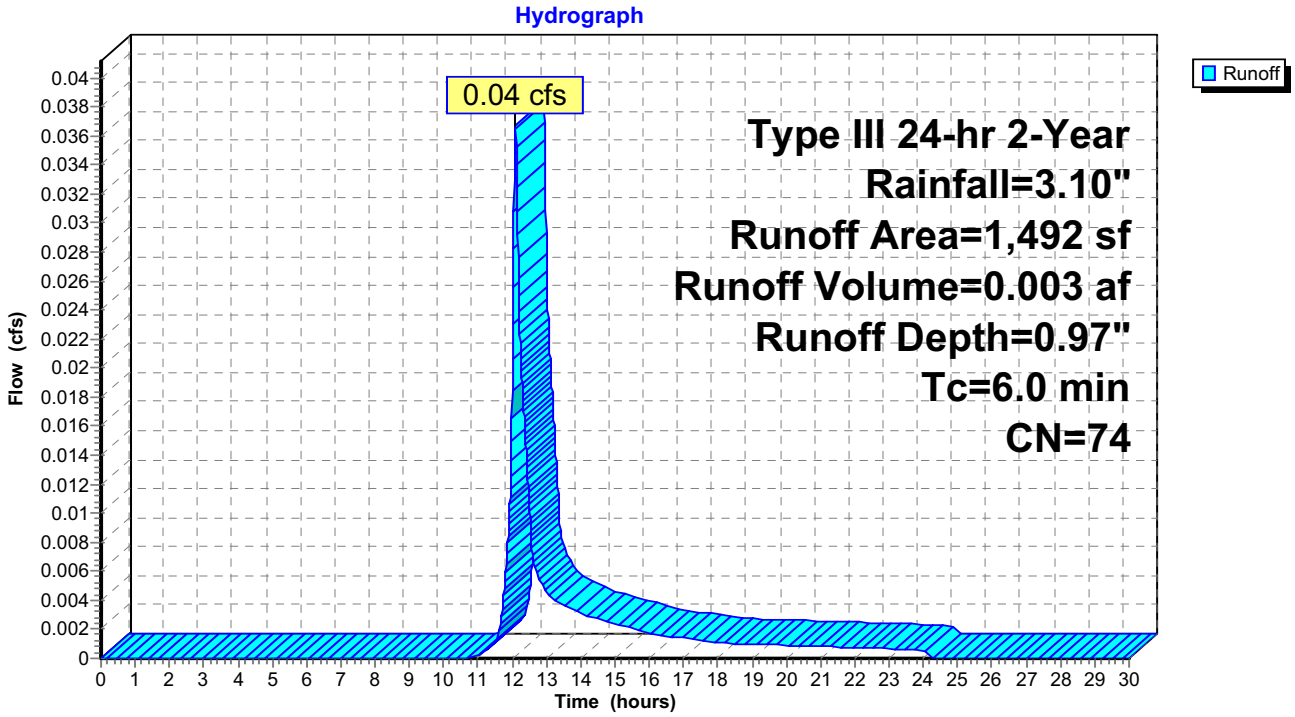
Runoff = 0.04 cfs @ 12.10 hrs, Volume= 0.003 af, Depth= 0.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	602	39	>75% Grass cover, Good, HSG A
	890	98	Paved parking, HSG A
	1,492	74	Weighted Average
	602		40.35% Pervious Area
	890		59.65% Impervious Area

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

Subcatchment E-2: E-200 - OFFSITE FLOW



Summary for Subcatchment E-3: E-300 - FLOW TO WATERWAY

Existing watershed at Equipment Service station

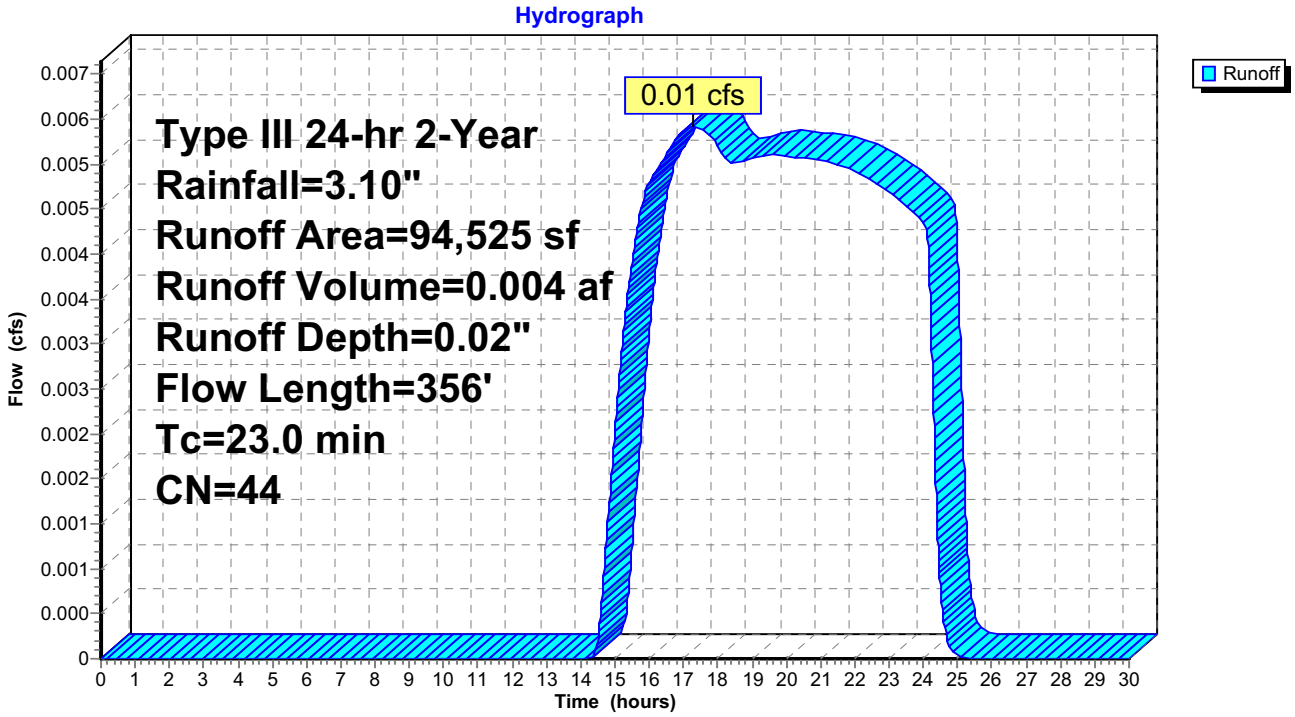
Runoff = 0.01 cfs @ 17.30 hrs, Volume= 0.004 af, Depth= 0.02"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	86,718	39	>75% Grass cover, Good, HSG A
	7,807	98	Paved parking, HSG A
	94,525	44	Weighted Average
	86,718		91.74% Pervious Area
	7,807		8.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	155	0.0194	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
8.7	201	0.1144	0.39		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.10"
23.0	356	Total			

Subcatchment E-3: E-300 - FLOW TO WATERWAY

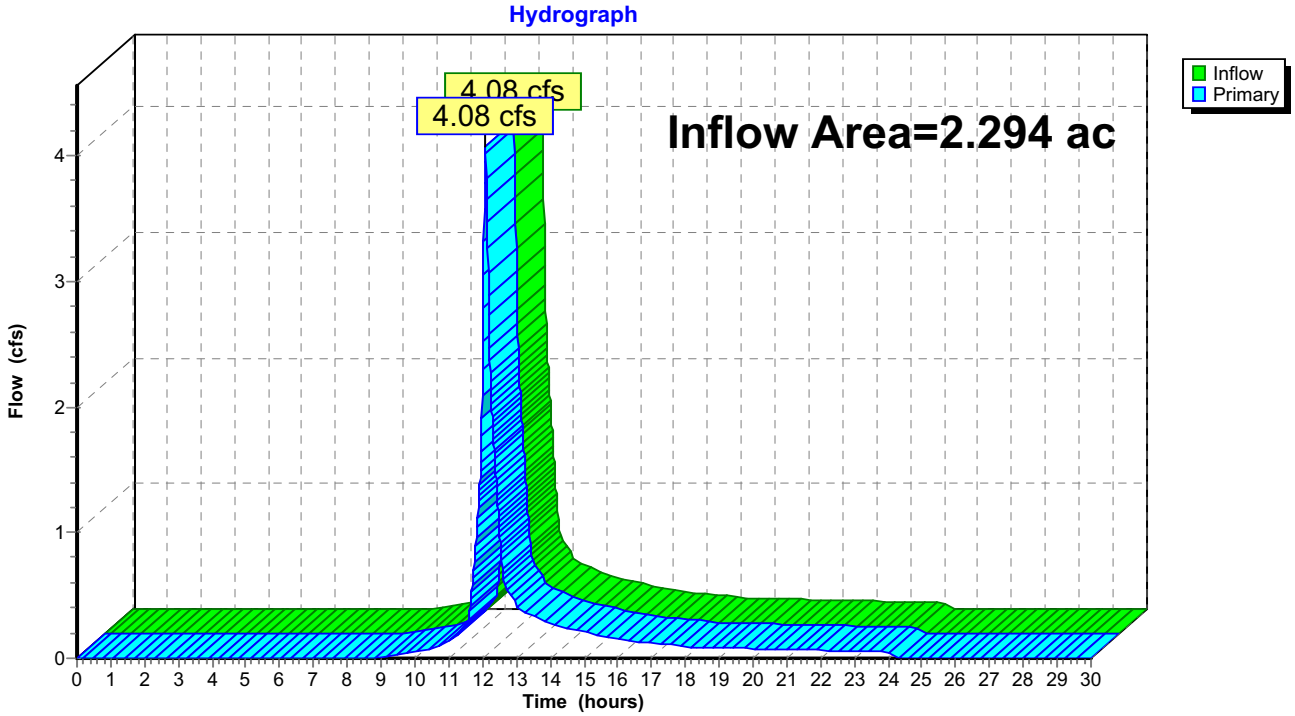


Summary for Link 6L: Combine at Wellesley Ave

Inflow Area = 2.294 ac, 72.13% Impervious, Inflow Depth = 1.52" for 2-Year event
Inflow = 4.08 cfs @ 12.09 hrs, Volume= 0.290 af
Primary = 4.08 cfs @ 12.09 hrs, Volume= 0.290 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 6L: Combine at Wellesley Ave



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: E-100 - POOL AREA Runoff Area=98,446 sf 72.32% Impervious Runoff Depth=2.81"
Tc=6.0 min CN=83 Runoff=7.44 cfs 0.530 af

Subcatchment E-2: E-200 - OFFSITE FLOW Runoff Area=1,492 sf 59.65% Impervious Runoff Depth=2.05"
Tc=6.0 min CN=74 Runoff=0.08 cfs 0.006 af

Subcatchment E-3: E-300 - FLOW TO Runoff Area=94,525 sf 8.26% Impervious Runoff Depth=0.29"
Flow Length=356' Tc=23.0 min CN=44 Runoff=0.16 cfs 0.052 af

Link 6L: Combine at Wellesley Ave Inflow=7.52 cfs 0.536 af
Primary=7.52 cfs 0.536 af

Total Runoff Area = 4.464 ac Runoff Volume = 0.588 af Average Runoff Depth = 1.58"
58.92% Pervious = 2.630 ac 41.08% Impervious = 1.834 ac

Summary for Subcatchment E-1: E-100 - POOL AREA

Existing watershed at Equipment Service station

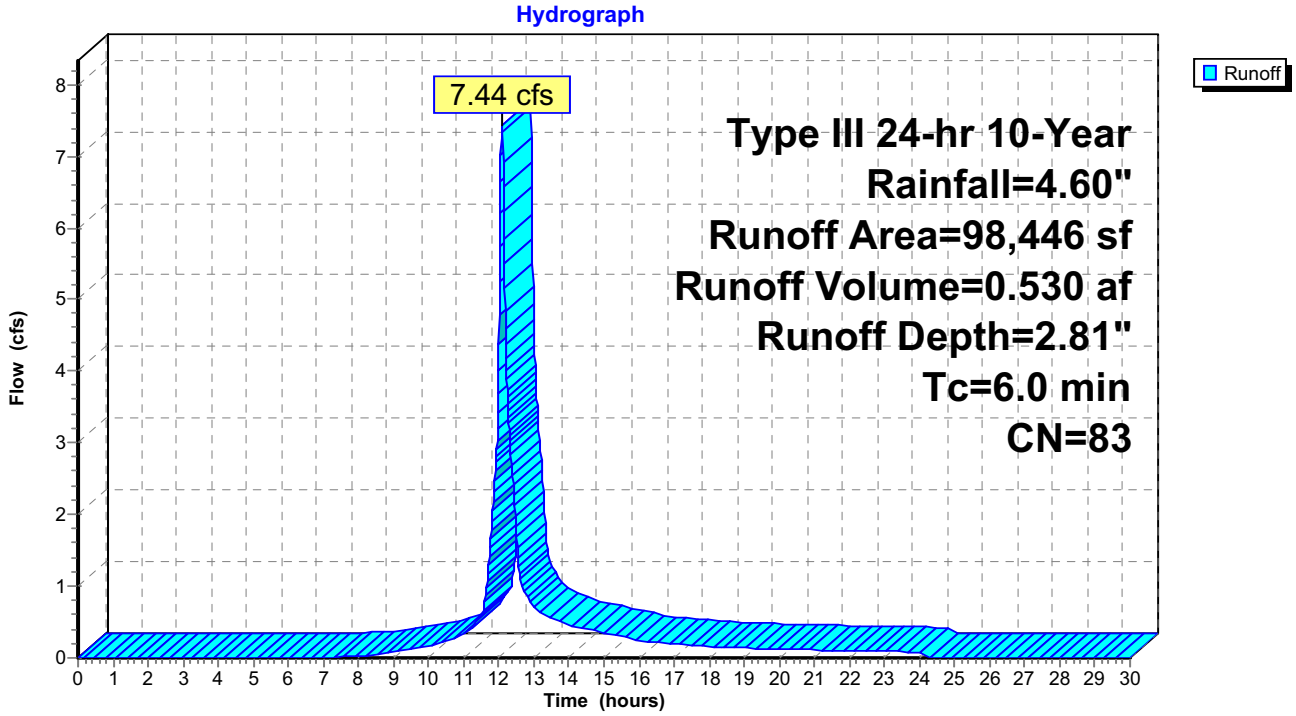
Runoff = 7.44 cfs @ 12.09 hrs, Volume= 0.530 af, Depth= 2.81"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	25,023	39	>75% Grass cover, Good, HSG A
*	2,229	76	Gravel roads, HSG A
	71,194	98	Paved parking, HSG A
	98,446	83	Weighted Average
	27,252		27.68% Pervious Area
	71,194		72.32% Impervious Area

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

Subcatchment E-1: E-100 - POOL AREA



Summary for Subcatchment E-2: E-200 - OFFSITE FLOW

Existing watershed at Equipment Service station

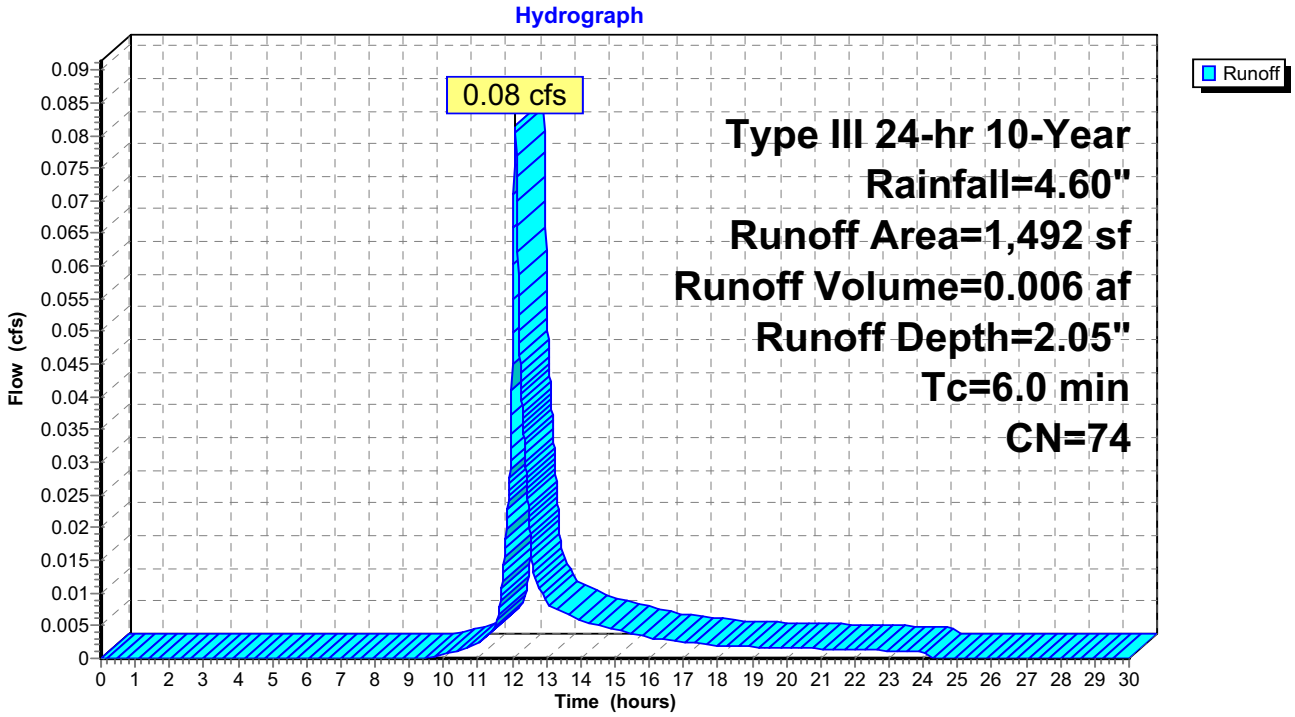
Runoff = 0.08 cfs @ 12.09 hrs, Volume= 0.006 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	602	39	>75% Grass cover, Good, HSG A
	890	98	Paved parking, HSG A
	1,492	74	Weighted Average
	602		40.35% Pervious Area
	890		59.65% Impervious Area

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

Subcatchment E-2: E-200 - OFFSITE FLOW



Summary for Subcatchment E-3: E-300 - FLOW TO WATERWAY

Existing watershed at Equipment Service station

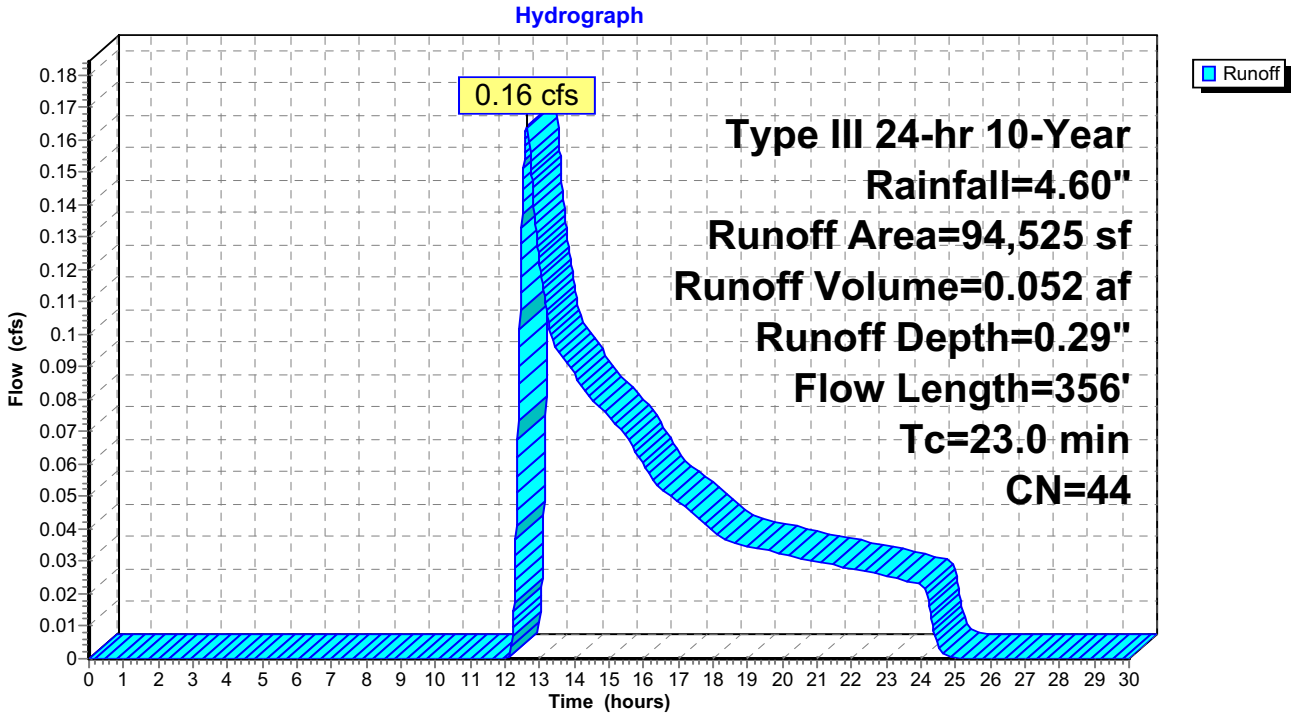
Runoff = 0.16 cfs @ 12.64 hrs, Volume= 0.052 af, Depth= 0.29"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	86,718	39	>75% Grass cover, Good, HSG A
	7,807	98	Paved parking, HSG A
	94,525	44	Weighted Average
	86,718		91.74% Pervious Area
	7,807		8.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	155	0.0194	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
8.7	201	0.1144	0.39		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.10"
23.0	356	Total			

Subcatchment E-3: E-300 - FLOW TO WATERWAY

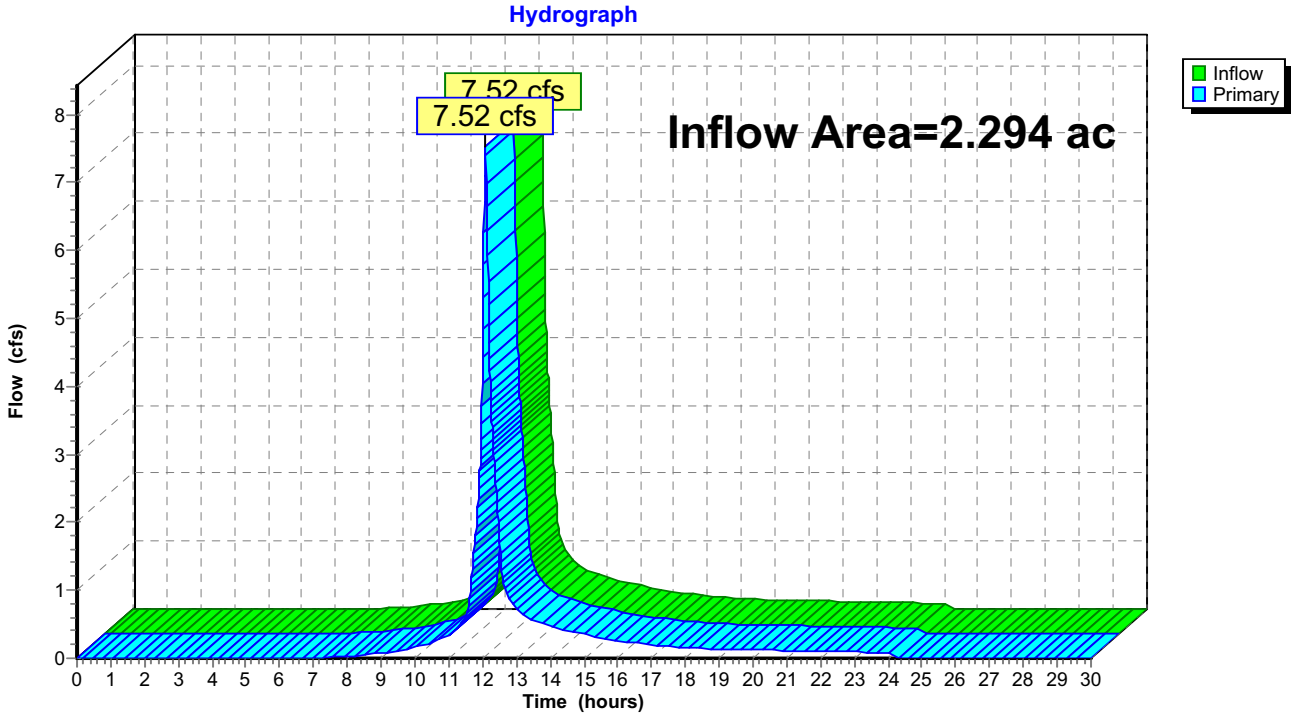


Summary for Link 6L: Combine at Wellesley Ave

Inflow Area = 2.294 ac, 72.13% Impervious, Inflow Depth = 2.80" for 10-Year event
Inflow = 7.52 cfs @ 12.09 hrs, Volume= 0.536 af
Primary = 7.52 cfs @ 12.09 hrs, Volume= 0.536 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 6L: Combine at Wellesley Ave



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: E-100 - POOL AREA Runoff Area=98,446 sf 72.32% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=83 Runoff=9.43 cfs 0.675 af

Subcatchment E-2: E-200 - OFFSITE FLOW Runoff Area=1,492 sf 59.65% Impervious Runoff Depth=2.73"
Tc=6.0 min CN=74 Runoff=0.11 cfs 0.008 af

Subcatchment E-3: E-300 - FLOW TO Runoff Area=94,525 sf 8.26% Impervious Runoff Depth=0.54"
Flow Length=356' Tc=23.0 min CN=44 Runoff=0.47 cfs 0.098 af

Link 6L: Combine at Wellesley Ave Inflow=9.54 cfs 0.683 af
Primary=9.54 cfs 0.683 af

Total Runoff Area = 4.464 ac Runoff Volume = 0.780 af Average Runoff Depth = 2.10"
58.92% Pervious = 2.630 ac 41.08% Impervious = 1.834 ac

Summary for Subcatchment E-1: E-100 - POOL AREA

Existing watershed at Equipment Service station

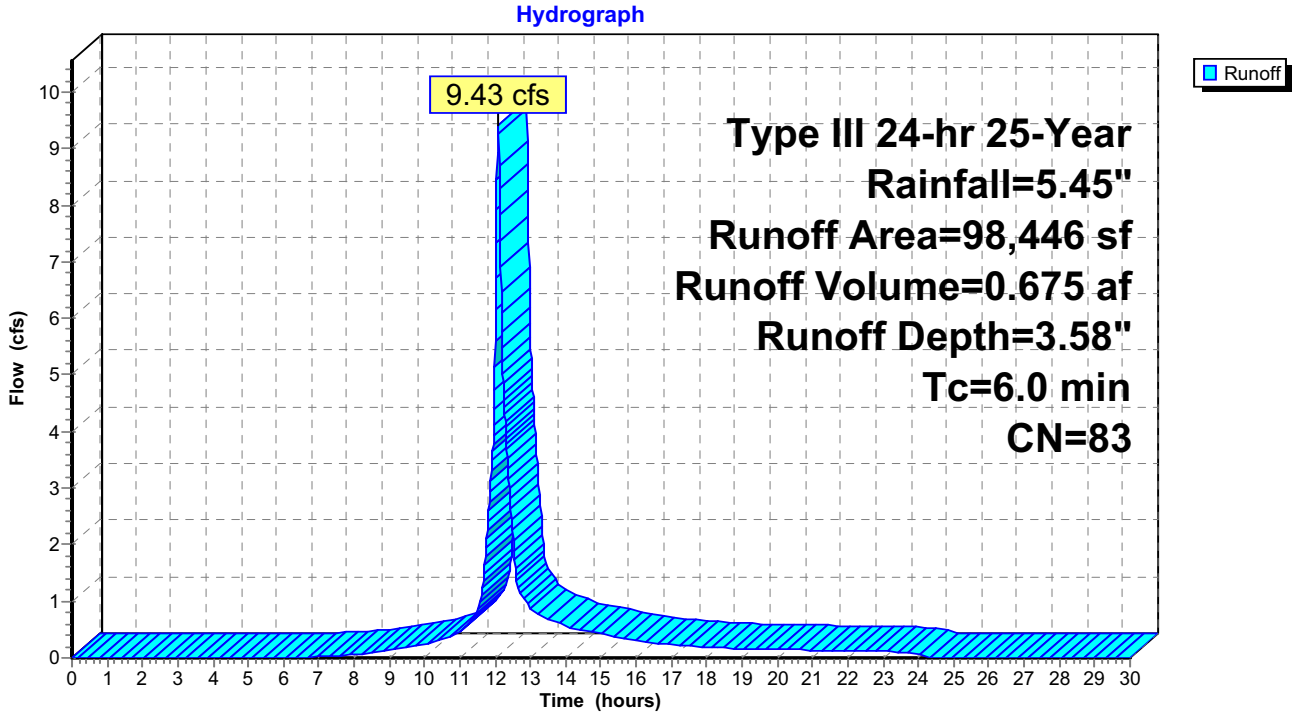
Runoff = 9.43 cfs @ 12.09 hrs, Volume= 0.675 af, Depth= 3.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

	Area (sf)	CN	Description
*	25,023	39	>75% Grass cover, Good, HSG A
*	2,229	76	Gravel roads, HSG A
	71,194	98	Paved parking, HSG A
	98,446	83	Weighted Average
	27,252		27.68% Pervious Area
	71,194		72.32% Impervious Area

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

Subcatchment E-1: E-100 - POOL AREA



Summary for Subcatchment E-2: E-200 - OFFSITE FLOW

Existing watershed at Equipment Service station

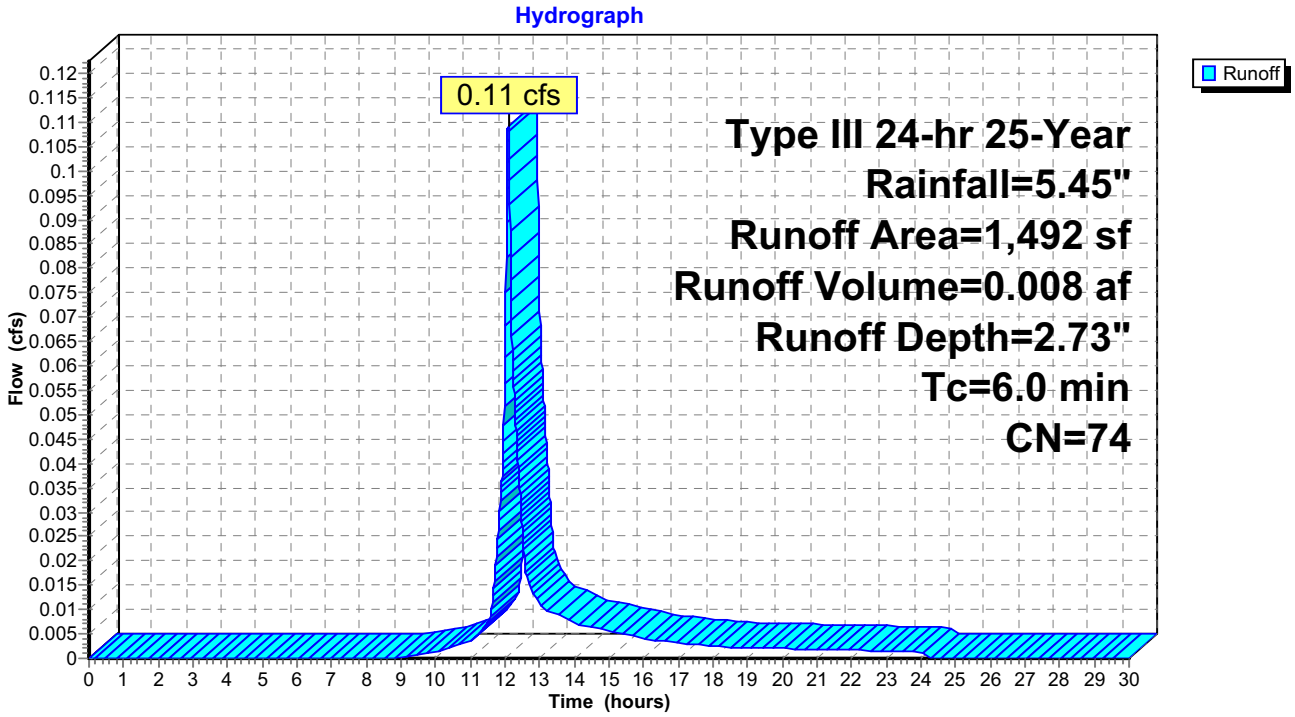
Runoff = 0.11 cfs @ 12.09 hrs, Volume= 0.008 af, Depth= 2.73"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

	Area (sf)	CN	Description
*	602	39	>75% Grass cover, Good, HSG A
	890	98	Paved parking, HSG A
	1,492	74	Weighted Average
	602		40.35% Pervious Area
	890		59.65% Impervious Area

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

Subcatchment E-2: E-200 - OFFSITE FLOW



Summary for Subcatchment E-3: E-300 - FLOW TO WATERWAY

Existing watershed at Equipment Service station

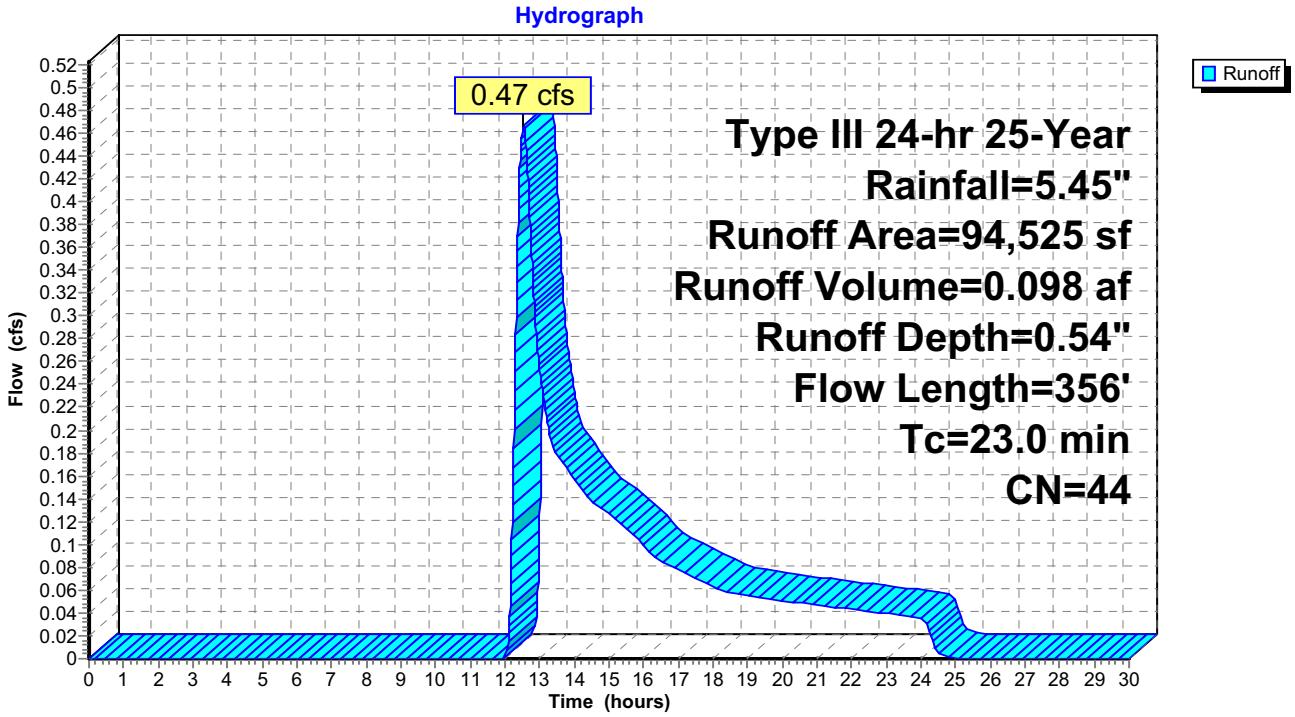
Runoff = 0.47 cfs @ 12.54 hrs, Volume= 0.098 af, Depth= 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

	Area (sf)	CN	Description
*	86,718	39	>75% Grass cover, Good, HSG A
	7,807	98	Paved parking, HSG A
	94,525	44	Weighted Average
	86,718		91.74% Pervious Area
	7,807		8.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	155	0.0194	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
8.7	201	0.1144	0.39		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.10"
23.0	356	Total			

Subcatchment E-3: E-300 - FLOW TO WATERWAY

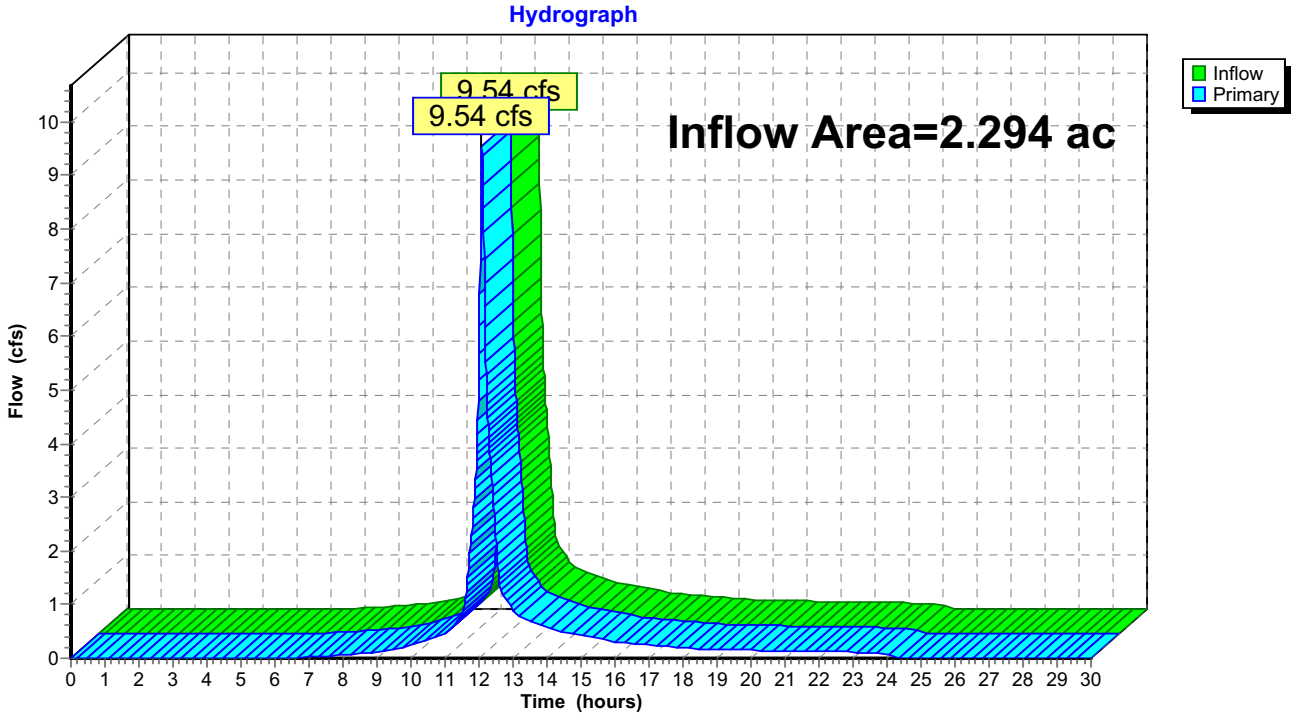


Summary for Link 6L: Combine at Wellesley Ave

Inflow Area = 2.294 ac, 72.13% Impervious, Inflow Depth = 3.57" for 25-Year event
Inflow = 9.54 cfs @ 12.09 hrs, Volume= 0.683 af
Primary = 9.54 cfs @ 12.09 hrs, Volume= 0.683 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 6L: Combine at Wellesley Ave



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: E-100 - POOL AREA Runoff Area=98,446 sf 72.32% Impervious Runoff Depth=4.65"
Tc=6.0 min CN=83 Runoff=12.13 cfs 0.876 af

Subcatchment E-2: E-200 - OFFSITE FLOW Runoff Area=1,492 sf 59.65% Impervious Runoff Depth=3.70"
Tc=6.0 min CN=74 Runoff=0.15 cfs 0.011 af

Subcatchment E-3: E-300 - FLOW TO Runoff Area=94,525 sf 8.26% Impervious Runoff Depth=0.98"
Flow Length=356' Tc=23.0 min CN=44 Runoff=1.10 cfs 0.177 af

Link 6L: Combine at Wellesley Ave Inflow=12.27 cfs 0.887 af
Primary=12.27 cfs 0.887 af

Total Runoff Area = 4.464 ac Runoff Volume = 1.064 af Average Runoff Depth = 2.86"
58.92% Pervious = 2.630 ac 41.08% Impervious = 1.834 ac

Summary for Subcatchment E-1: E-100 - POOL AREA

Existing watershed at Equipment Service station

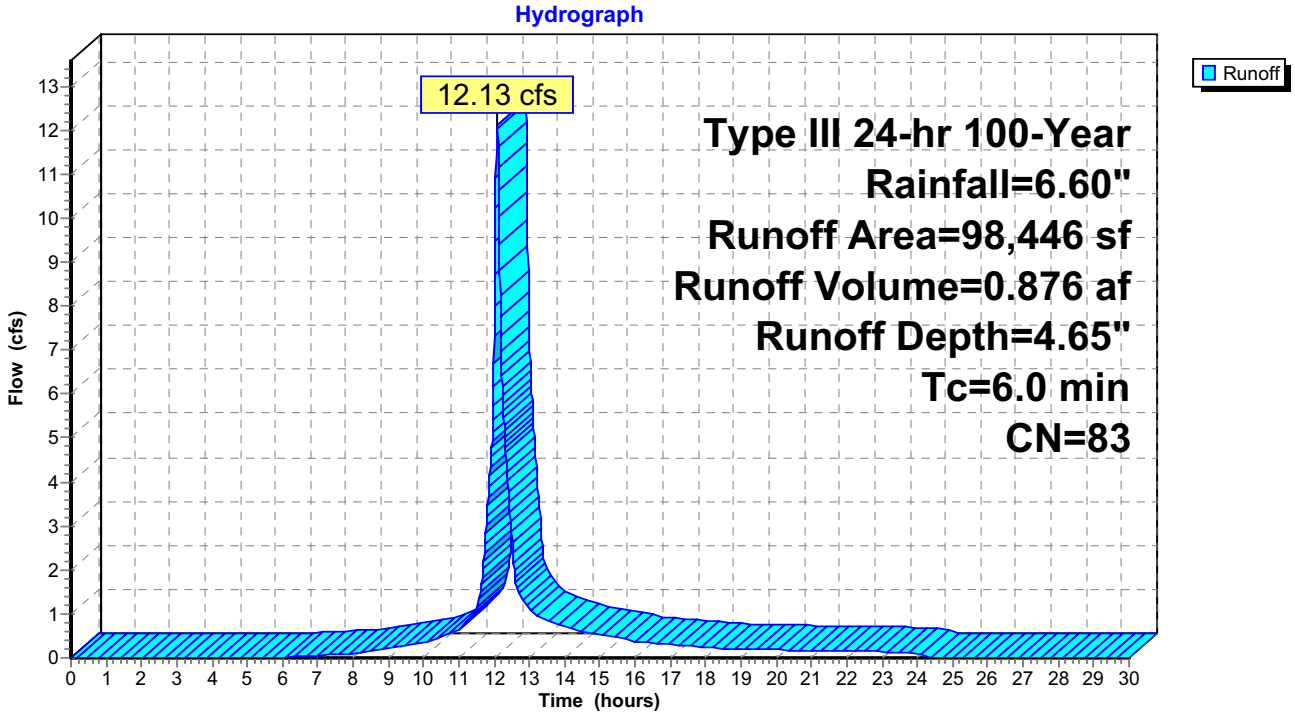
Runoff = 12.13 cfs @ 12.09 hrs, Volume= 0.876 af, Depth= 4.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

	Area (sf)	CN	Description
*	25,023	39	>75% Grass cover, Good, HSG A
*	2,229	76	Gravel roads, HSG A
	71,194	98	Paved parking, HSG A
	98,446	83	Weighted Average
	27,252		27.68% Pervious Area
	71,194		72.32% Impervious Area

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

Subcatchment E-1: E-100 - POOL AREA



Summary for Subcatchment E-2: E-200 - OFFSITE FLOW

Existing watershed at Equipment Service station

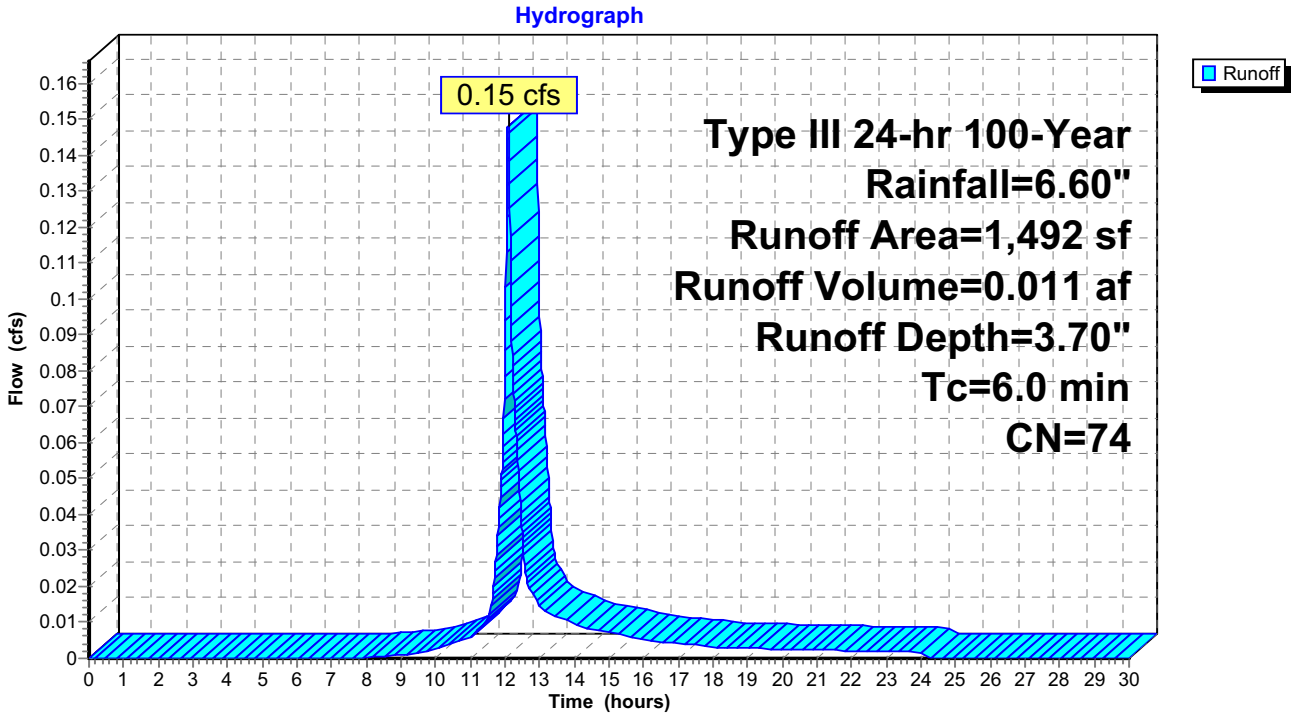
Runoff = 0.15 cfs @ 12.09 hrs, Volume= 0.011 af, Depth= 3.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

	Area (sf)	CN	Description
*	602	39	>75% Grass cover, Good, HSG A
	890	98	Paved parking, HSG A
	1,492	74	Weighted Average
	602		40.35% Pervious Area
	890		59.65% Impervious Area

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

Subcatchment E-2: E-200 - OFFSITE FLOW



Summary for Subcatchment E-3: E-300 - FLOW TO WATERWAY

Existing watershed at Equipment Service station

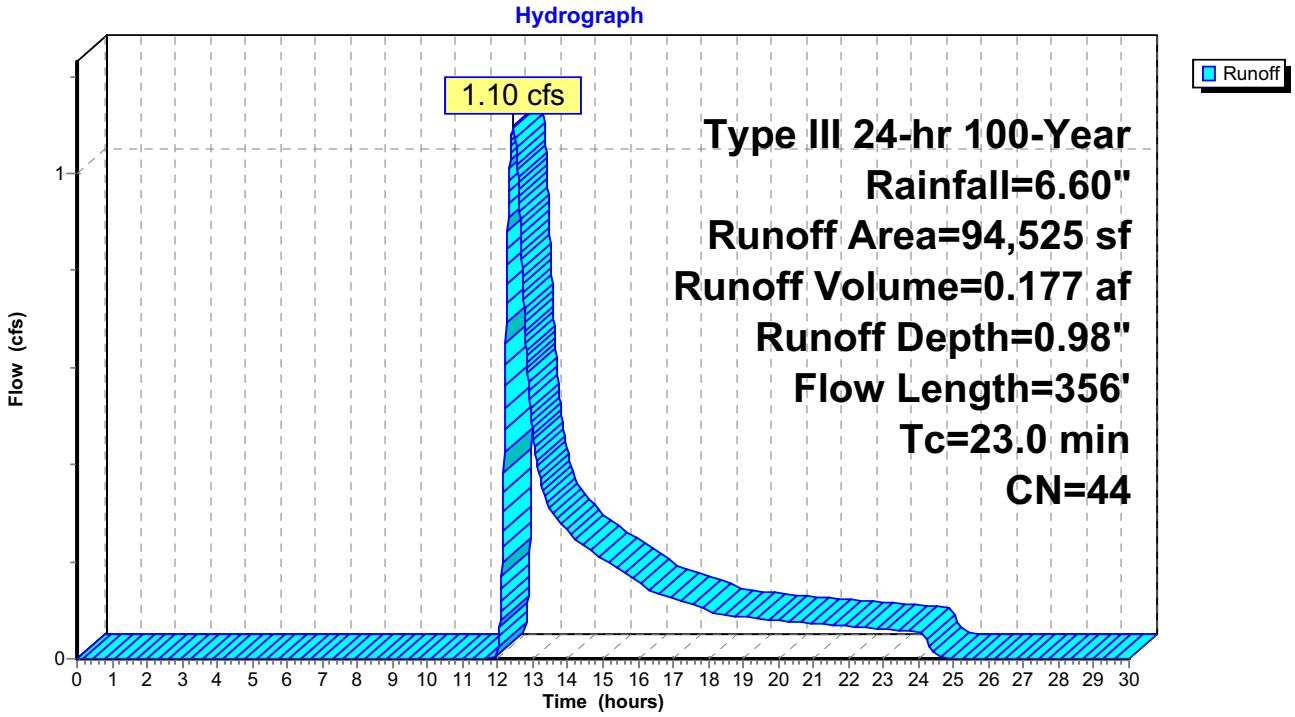
Runoff = 1.10 cfs @ 12.44 hrs, Volume= 0.177 af, Depth= 0.98"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

	Area (sf)	CN	Description
*	86,718	39	>75% Grass cover, Good, HSG A
	7,807	98	Paved parking, HSG A
	94,525	44	Weighted Average
	86,718		91.74% Pervious Area
	7,807		8.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	155	0.0194	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
8.7	201	0.1144	0.39		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.10"
23.0	356	Total			

Subcatchment E-3: E-300 - FLOW TO WATERWAY

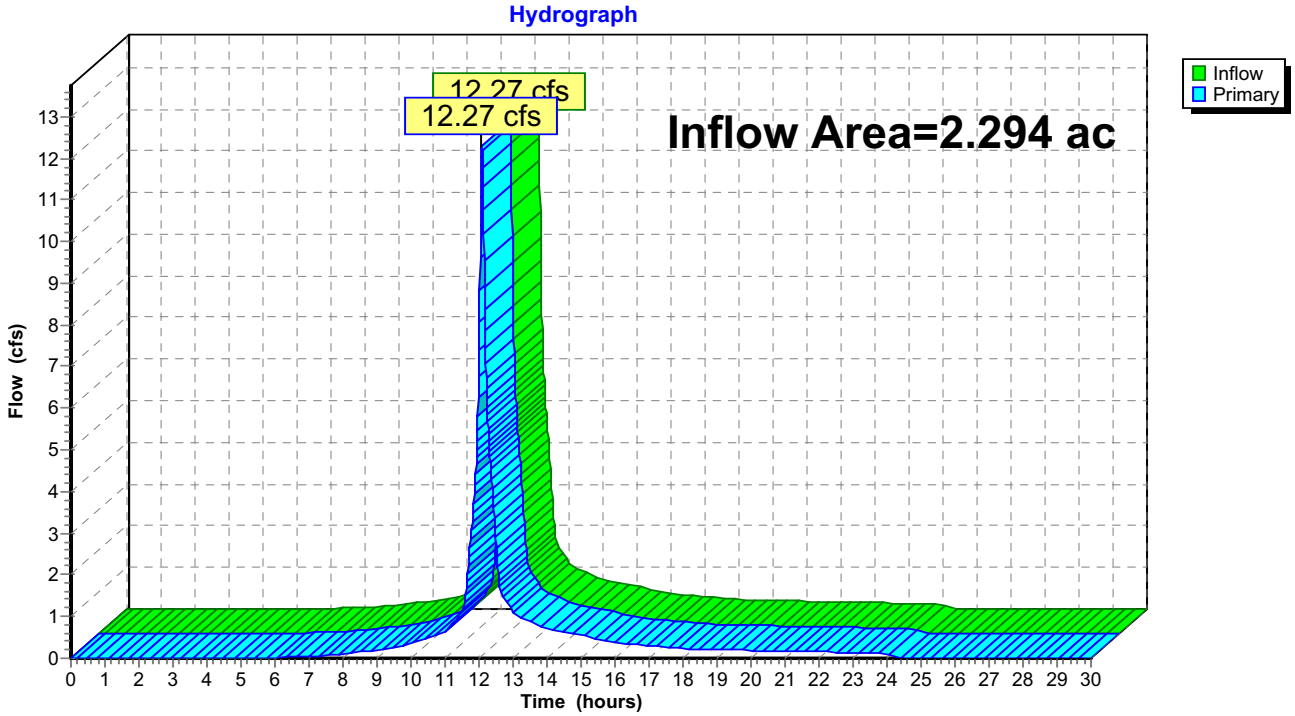


Summary for Link 6L: Combine at Wellesley Ave

Inflow Area = 2.294 ac, 72.13% Impervious, Inflow Depth = 4.64" for 100-Year event
Inflow = 12.27 cfs @ 12.09 hrs, Volume= 0.887 af
Primary = 12.27 cfs @ 12.09 hrs, Volume= 0.887 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 6L: Combine at Wellesley Ave



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment E-1: E-100 - POOL AREA Runoff Area=98,446 sf 72.32% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=83 Runoff=0.00 cfs 0.001 af

Subcatchment E-2: E-200 - OFFSITE FLOW Runoff Area=1,492 sf 59.65% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=74 Runoff=0.00 cfs 0.000 af

Subcatchment E-3: E-300 - FLOW TO Runoff Area=94,525 sf 8.26% Impervious Runoff Depth=0.00"
Flow Length=356' Tc=23.0 min CN=44 Runoff=0.00 cfs 0.000 af

Link 6L: Combine at Wellesley Ave Inflow=0.00 cfs 0.001 af
Primary=0.00 cfs 0.001 af

Total Runoff Area = 4.464 ac Runoff Volume = 0.001 af Average Runoff Depth = 0.00"
58.92% Pervious = 2.630 ac 41.08% Impervious = 1.834 ac

Summary for Subcatchment E-1: E-100 - POOL AREA

Existing watershed at Equipment Service station

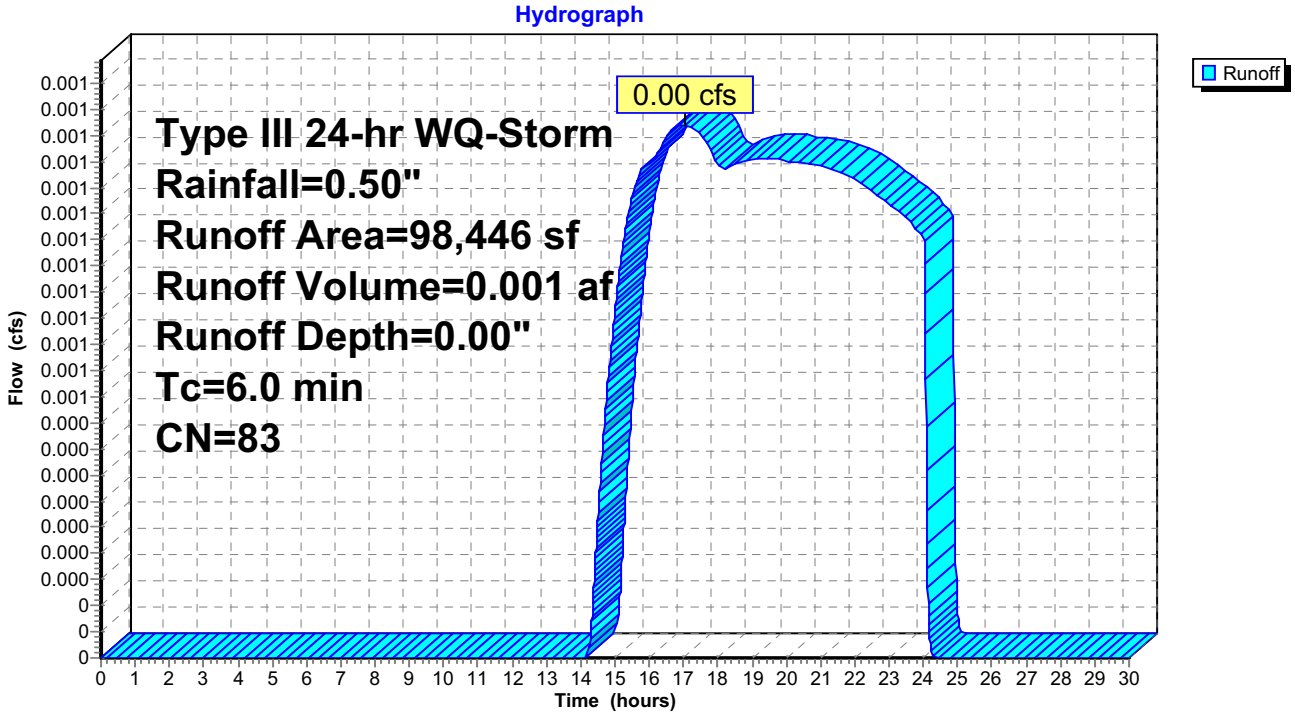
Runoff = 0.00 cfs @ 17.02 hrs, Volume= 0.001 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ-Storm Rainfall=0.50"

	Area (sf)	CN	Description
*	25,023	39	>75% Grass cover, Good, HSG A
*	2,229	76	Gravel roads, HSG A
	71,194	98	Paved parking, HSG A
	98,446	83	Weighted Average
	27,252		27.68% Pervious Area
	71,194		72.32% Impervious Area

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

Subcatchment E-1: E-100 - POOL AREA



Summary for Subcatchment E-2: E-200 - OFFSITE FLOW

Existing watershed at Equipment Service station

[45] Hint: Runoff=Zero

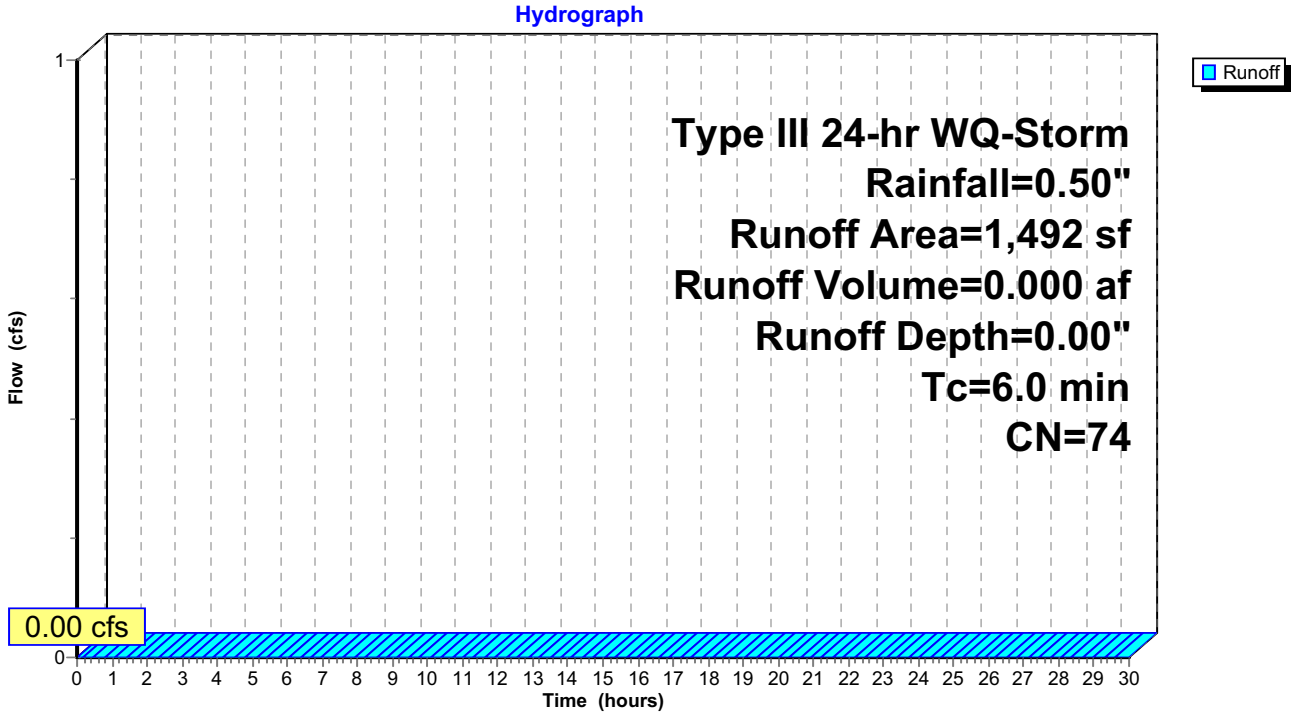
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ-Storm Rainfall=0.50"

	Area (sf)	CN	Description
*	602	39	>75% Grass cover, Good, HSG A
	890	98	Paved parking, HSG A
	1,492	74	Weighted Average
	602		40.35% Pervious Area
	890		59.65% Impervious Area

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

Subcatchment E-2: E-200 - OFFSITE FLOW



Summary for Subcatchment E-3: E-300 - FLOW TO WATERWAY

Existing watershed at Equipment Service station

[45] Hint: Runoff=Zero

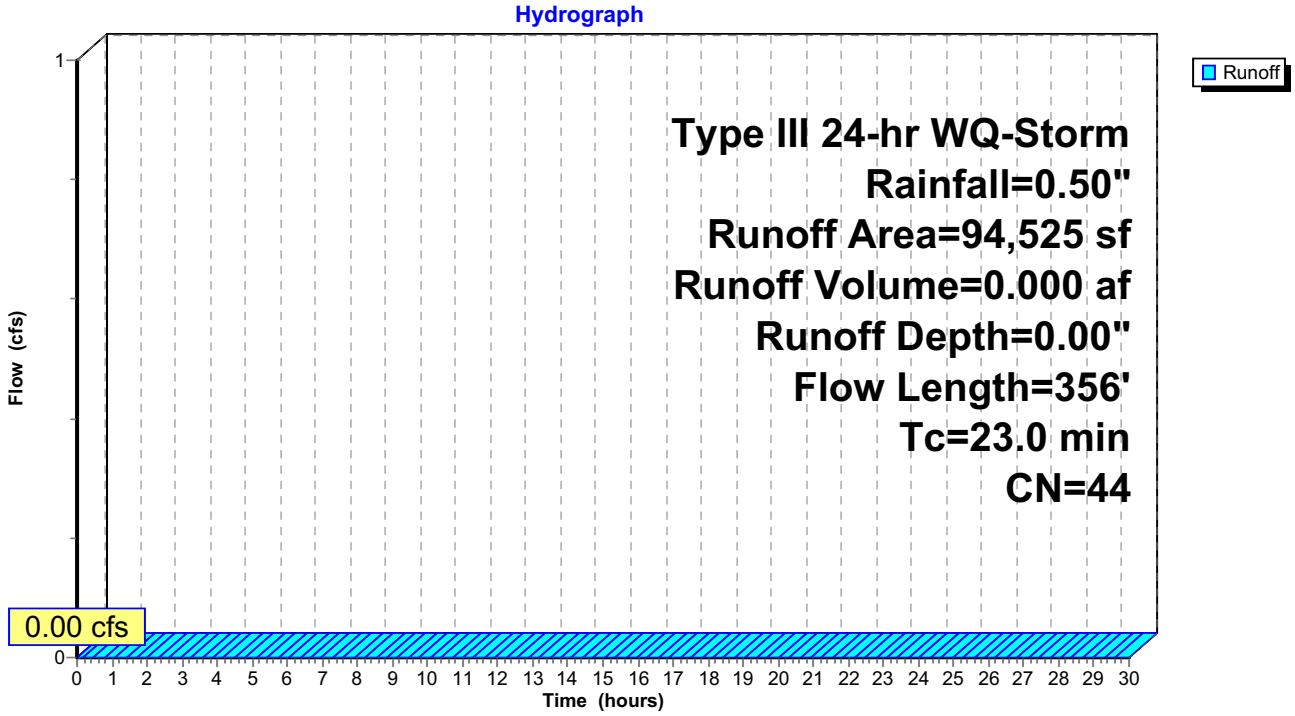
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr WQ-Storm Rainfall=0.50"

	Area (sf)	CN	Description
*	86,718	39	>75% Grass cover, Good, HSG A
	7,807	98	Paved parking, HSG A
	94,525	44	Weighted Average
	86,718		91.74% Pervious Area
	7,807		8.26% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	155	0.0194	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
8.7	201	0.1144	0.39		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.10"
23.0	356	Total			

Subcatchment E-3: E-300 - FLOW TO WATERWAY

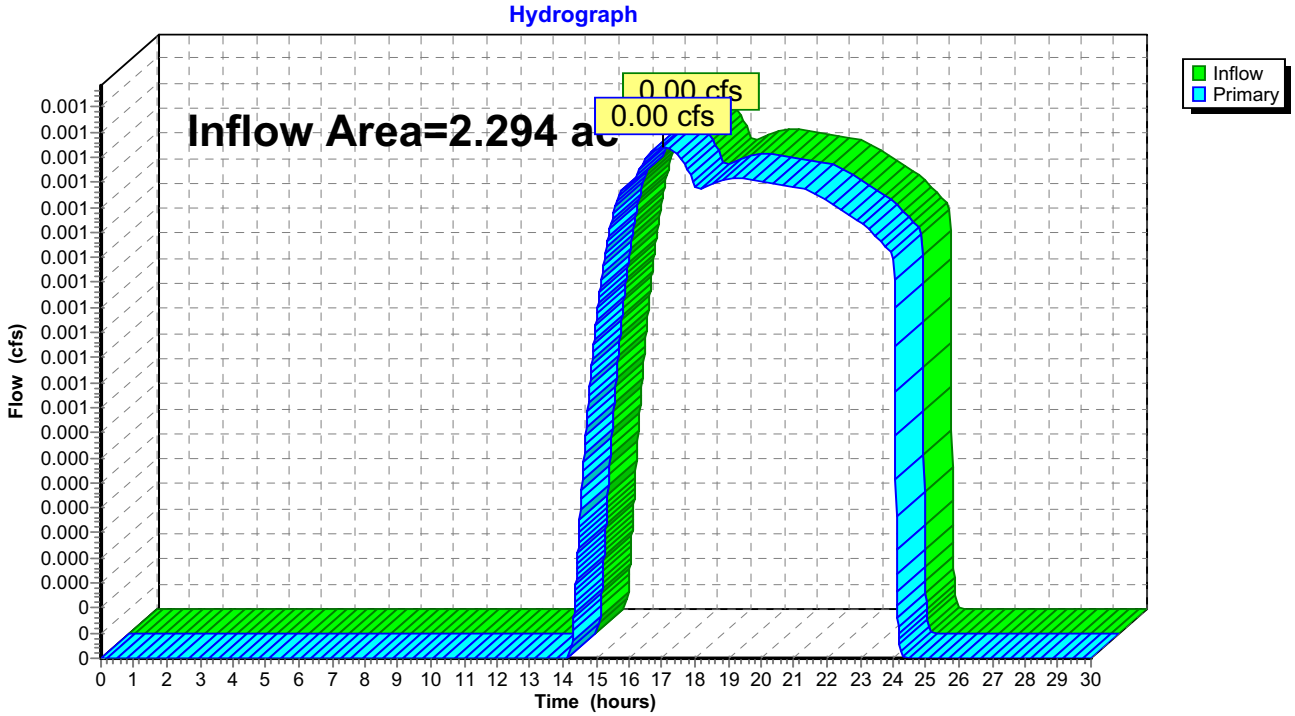


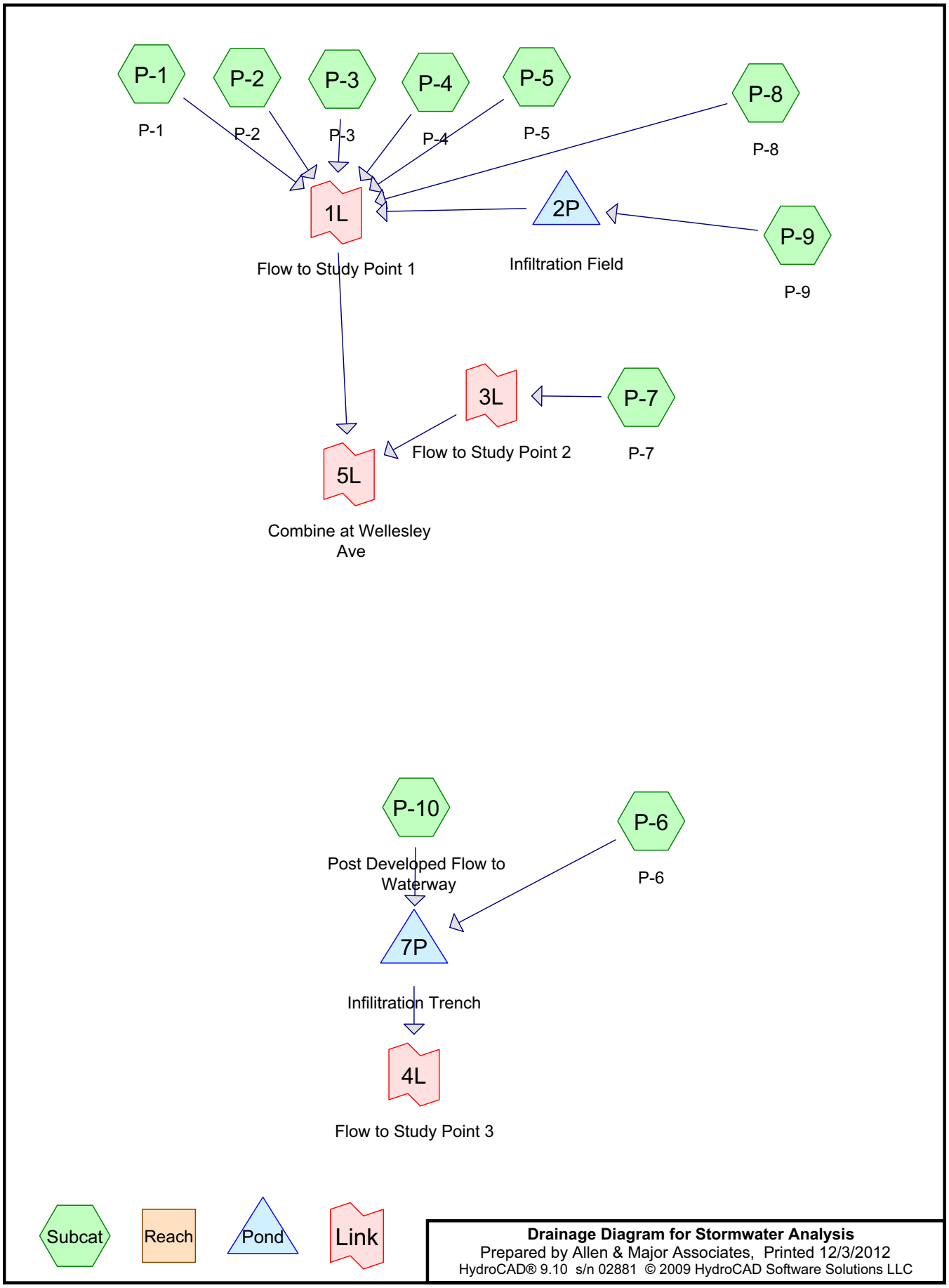
Summary for Link 6L: Combine at Wellesley Ave

Inflow Area = 2.294 ac, 72.13% Impervious, Inflow Depth = 0.00" for WQ-Storm event
Inflow = 0.00 cfs @ 17.02 hrs, Volume= 0.001 af
Primary = 0.00 cfs @ 17.02 hrs, Volume= 0.001 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 6L: Combine at Wellesley Ave





Drainage Diagram for Stormwater Analysis
Prepared by Allen & Major Associates, Printed 12/3/2012
HydroCAD® 9.10 s/n 02881 © 2009 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.741	39	>75% Grass cover, Good, HSG A (P-1, P-10, P-2, P-3, P-4, P-5, P-6, P-7, P-8)
1.039	98	Paved parking, HSG A (P-1, P-10, P-2, P-3, P-4, P-5, P-7, P-8)
0.687	98	Roofs, HSG A (P-9)
4.467		**TOTAL AREA**

Soil Listing (selected nodes)

Area (acres)	Soil Group	Subcatchment Numbers
4.467	HSG A	P-1, P-10, P-2, P-3, P-4, P-5, P-6, P-7, P-8, P-9
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
0.000	Other	
4.467		**TOTAL AREA**

Pipe Listing (selected nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Fill (inches)
1	2P	153.20	153.00	20.0	0.0100	0.013	12.0	0.0	0.0

Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: P-1 Runoff Area=7,405 sf 54.40% Impervious Runoff Depth=0.82"
Tc=6.0 min CN=71 Runoff=0.15 cfs 0.012 af

Subcatchment P-10: Post Developed Flow Runoff Area=86,249 sf 12.63% Impervious Runoff Depth=0.05"
Flow Length=353' Tc=22.8 min CN=46 Runoff=0.01 cfs 0.007 af

Subcatchment P-2: P-2 Runoff Area=14,375 sf 33.85% Impervious Runoff Depth=0.34"
Tc=6.0 min CN=59 Runoff=0.06 cfs 0.009 af

Subcatchment P-3: P-3 Runoff Area=1,742 sf 28.01% Impervious Runoff Depth=0.25"
Tc=6.0 min CN=56 Runoff=0.00 cfs 0.001 af

Subcatchment P-4: P-4 Runoff Area=1,307 sf 45.45% Impervious Runoff Depth=0.59"
Tc=6.0 min CN=66 Runoff=0.02 cfs 0.001 af

Subcatchment P-5: P-5 Runoff Area=4,356 sf 29.55% Impervious Runoff Depth=0.25"
Tc=6.0 min CN=56 Runoff=0.01 cfs 0.002 af

Subcatchment P-6: P-6 Runoff Area=7,405 sf 0.00% Impervious Runoff Depth=0.00"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.000 af

Subcatchment P-7: P-7 Runoff Area=4,356 sf 30.00% Impervious Runoff Depth=0.28"
Tc=6.0 min CN=57 Runoff=0.01 cfs 0.002 af

Subcatchment P-8: P-8 Runoff Area=37,462 sf 58.23% Impervious Runoff Depth=0.92"
Tc=6.0 min CN=73 Runoff=0.86 cfs 0.066 af

Subcatchment P-9: P-9 Runoff Area=29,934 sf 100.00% Impervious Runoff Depth=2.87"
Tc=6.0 min CN=98 Runoff=2.07 cfs 0.164 af

Pond 2P: Infiltration Field Peak Elev=153.63' Storage=0.037 af Inflow=2.07 cfs 0.164 af
Discarded=0.25 cfs 0.148 af Primary=0.62 cfs 0.017 af Outflow=0.88 cfs 0.164 af

Pond 7P: Infilitration Trench Peak Elev=158.00' Storage=0.000 af Inflow=0.01 cfs 0.007 af
Discarded=0.01 cfs 0.007 af Primary=0.00 cfs 0.000 af Outflow=0.01 cfs 0.007 af

Link 1L: Flow to Study Point 1 Inflow=1.27 cfs 0.108 af
Primary=1.27 cfs 0.108 af

Link 3L: Flow to Study Point 2 Inflow=0.01 cfs 0.002 af
Primary=0.01 cfs 0.002 af

Link 4L: Flow to Study Point 3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 5L: Combine at Wellesley Ave Inflow=1.28 cfs 0.110 af
Primary=1.28 cfs 0.110 af

Total Runoff Area = 4.467 ac Runoff Volume = 0.265 af Average Runoff Depth = 0.71"
61.35% Pervious = 2.741 ac 38.65% Impervious = 1.727 ac

Summary for Subcatchment P-1: P-1

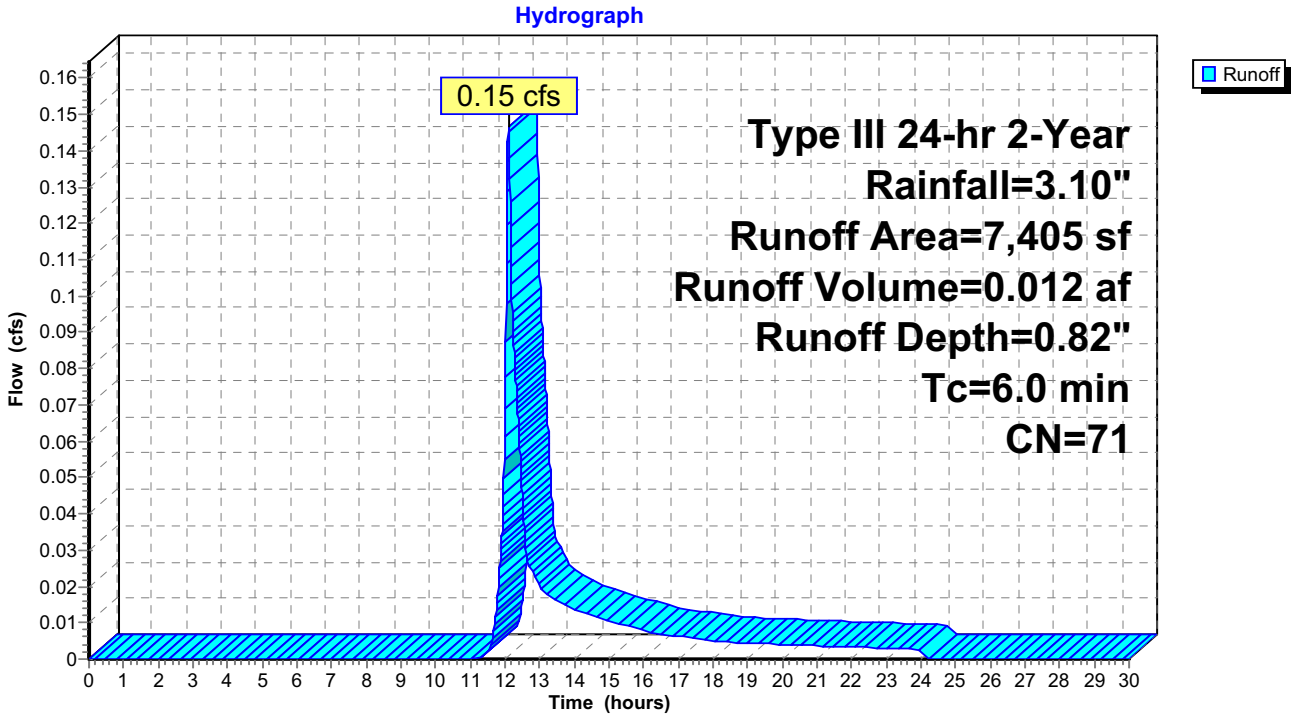
Runoff = 0.15 cfs @ 12.10 hrs, Volume= 0.012 af, Depth= 0.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
4,028	98	Paved parking, HSG A
3,377	39	>75% Grass cover, Good, HSG A
7,405	71	Weighted Average
3,377		45.60% Pervious Area
4,028		54.40% Impervious Area

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

Subcatchment P-1: P-1



Summary for Subcatchment P-10: Post Developed Flow to Waterway

Existing watershed at Equipment Service station

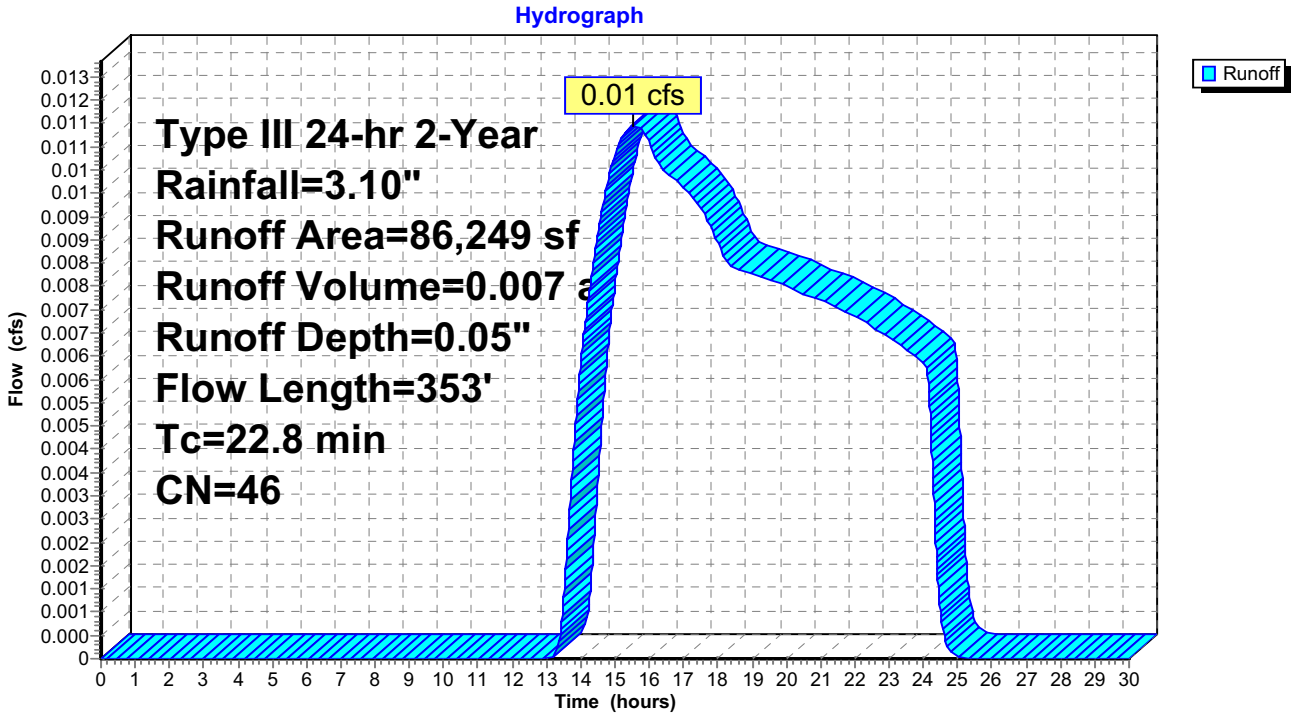
Runoff = 0.01 cfs @ 15.53 hrs, Volume= 0.007 af, Depth= 0.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	75,359	39	>75% Grass cover, Good, HSG A
	10,890	98	Paved parking, HSG A
	86,249	46	Weighted Average
	75,359		87.37% Pervious Area
	10,890		12.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	152	0.0194	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
8.7	201	0.1144	0.39		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.10"
22.8	353	Total			

Subcatchment P-10: Post Developed Flow to Waterway



Summary for Subcatchment P-2: P-2

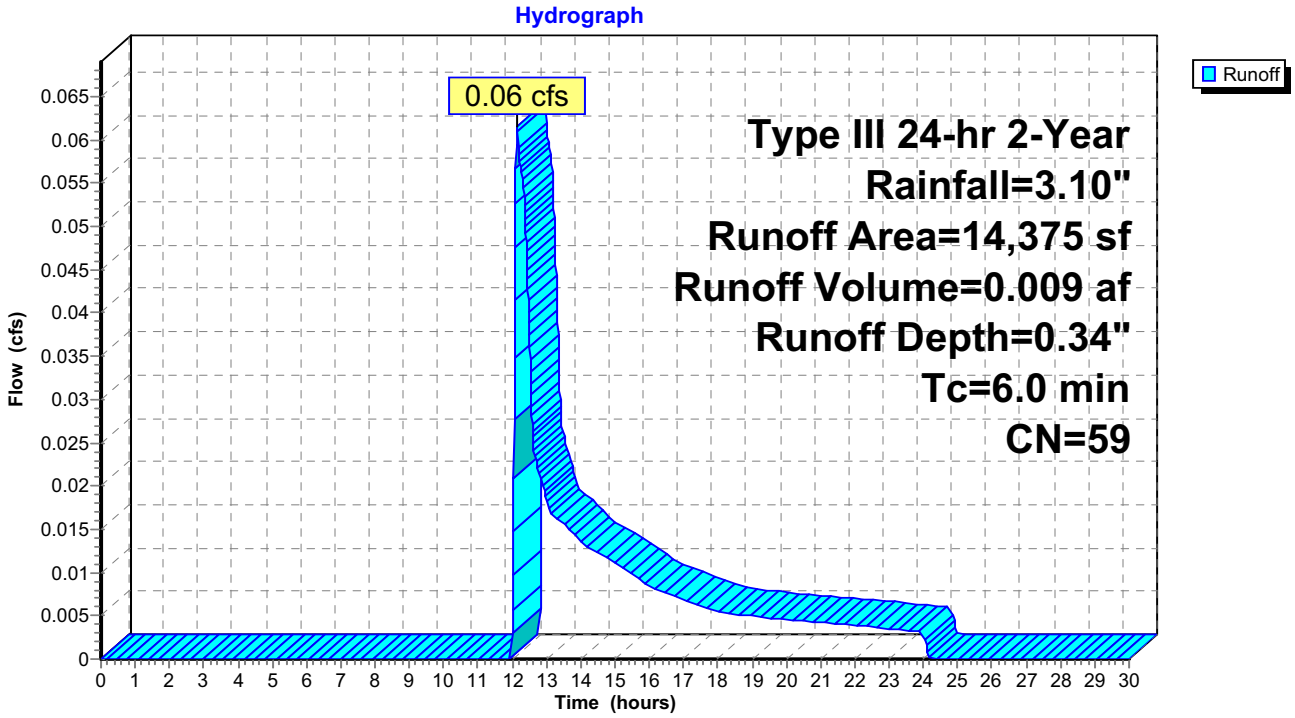
Runoff = 0.06 cfs @ 12.14 hrs, Volume= 0.009 af, Depth= 0.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
4,866	98	Paved parking, HSG A
9,509	39	>75% Grass cover, Good, HSG A
14,375	59	Weighted Average
9,509		66.15% Pervious Area
4,866		33.85% Impervious Area

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

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

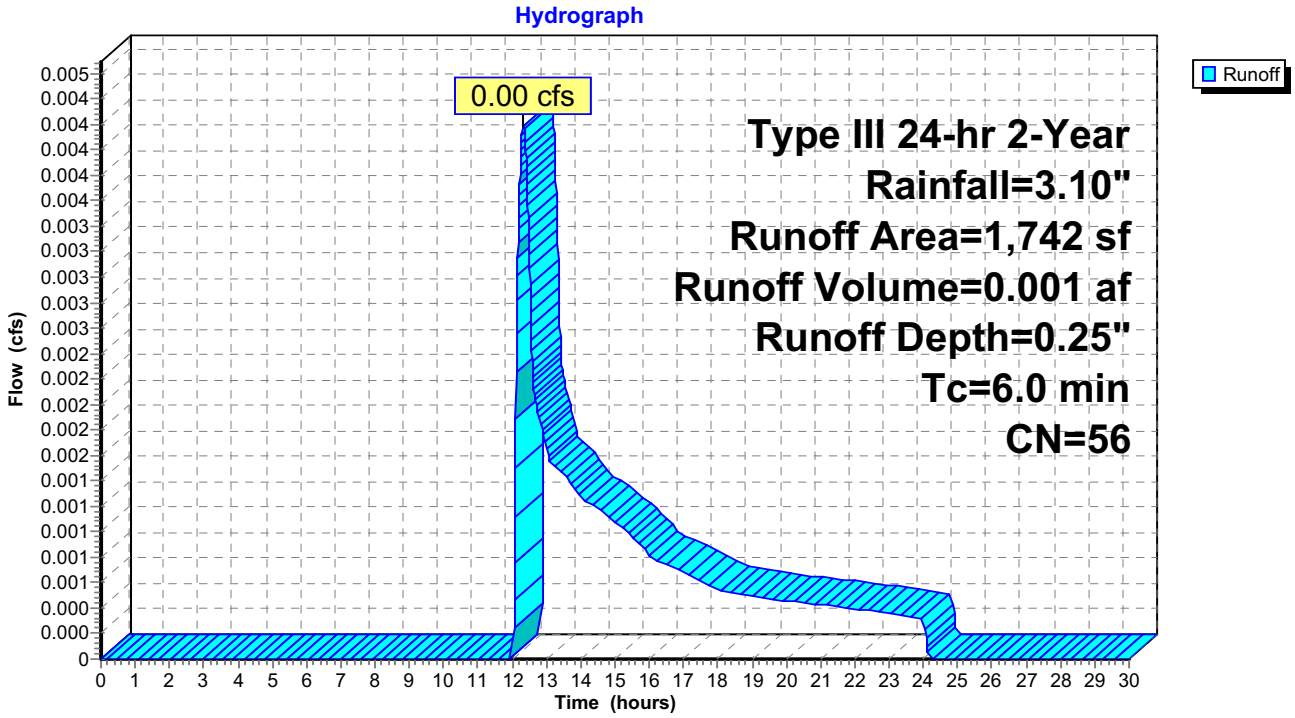
Runoff = 0.00 cfs @ 12.33 hrs, Volume= 0.001 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
488	98	Paved parking, HSG A
1,254	39	>75% Grass cover, Good, HSG A
1,742	56	Weighted Average
1,254		71.99% Pervious Area
488		28.01% Impervious Area

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

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

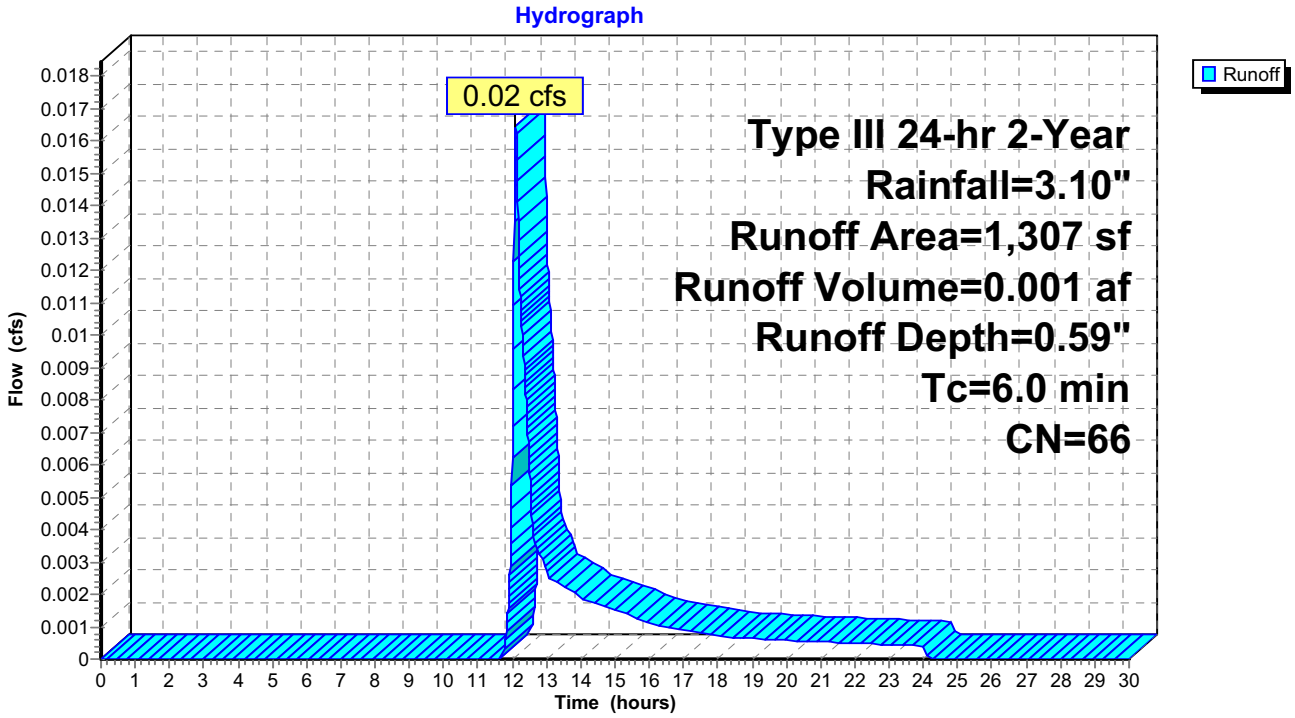
Runoff = 0.02 cfs @ 12.11 hrs, Volume= 0.001 af, Depth= 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
594	98	Paved parking, HSG A
713	39	>75% Grass cover, Good, HSG A
1,307	66	Weighted Average
713		54.55% Pervious Area
594		45.45% Impervious Area

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

Subcatchment P-4: P-4



Summary for Subcatchment P-5: P-5

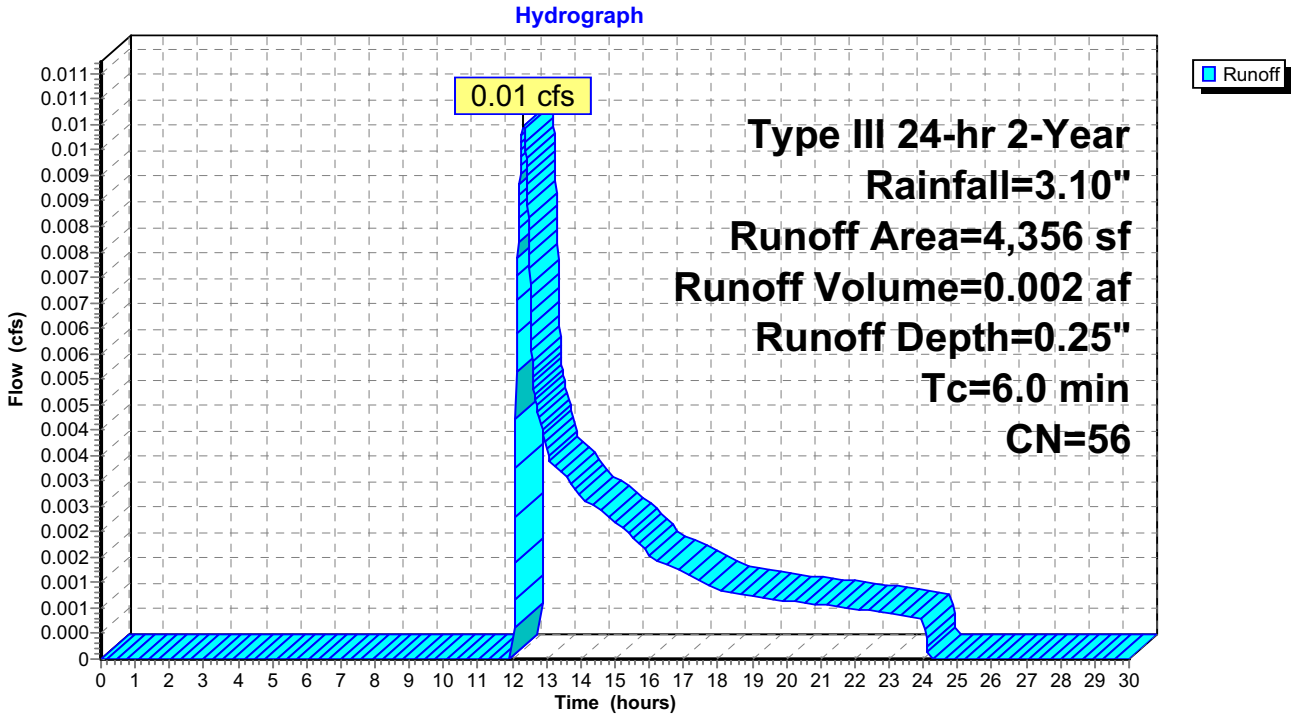
Runoff = 0.01 cfs @ 12.33 hrs, Volume= 0.002 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
1,287	98	Paved parking, HSG A
3,069	39	>75% Grass cover, Good, HSG A
4,356	56	Weighted Average
3,069		70.45% Pervious Area
1,287		29.55% Impervious Area

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

Subcatchment P-5: P-5



Summary for Subcatchment P-6: P-6

[45] Hint: Runoff=Zero

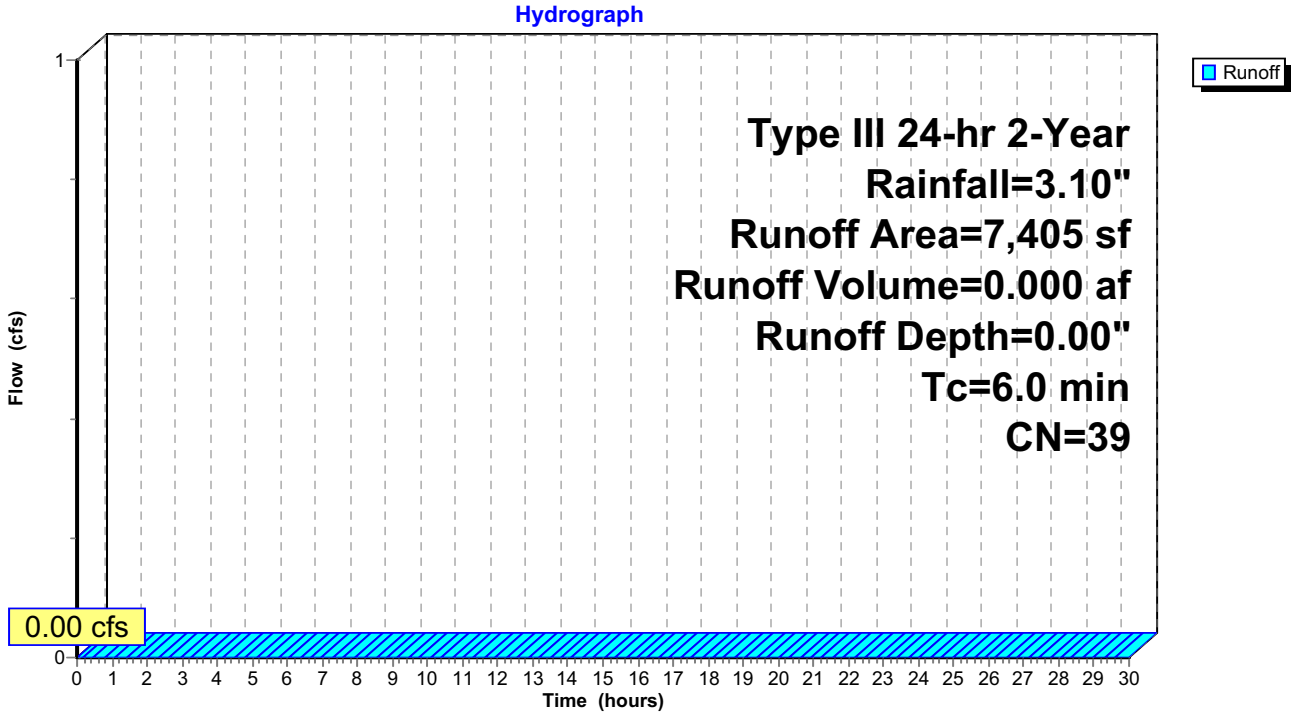
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
7,405	39	>75% Grass cover, Good, HSG A
7,405		100.00% Pervious Area

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

Subcatchment P-6: P-6



Summary for Subcatchment P-7: P-7

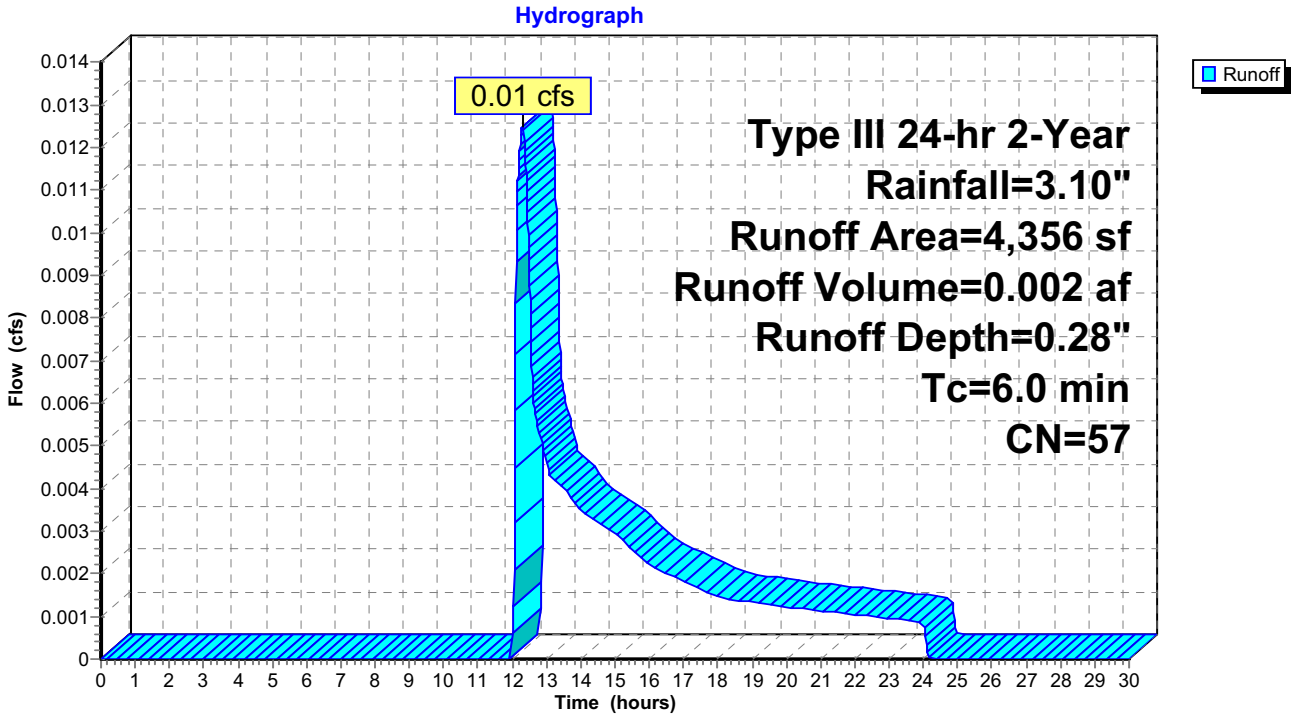
Runoff = 0.01 cfs @ 12.30 hrs, Volume= 0.002 af, Depth= 0.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
1,307	98	Paved parking, HSG A
3,049	39	>75% Grass cover, Good, HSG A
4,356	57	Weighted Average
3,049		70.00% Pervious Area
1,307		30.00% Impervious Area

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

Subcatchment P-7: P-7



Summary for Subcatchment P-8: P-8

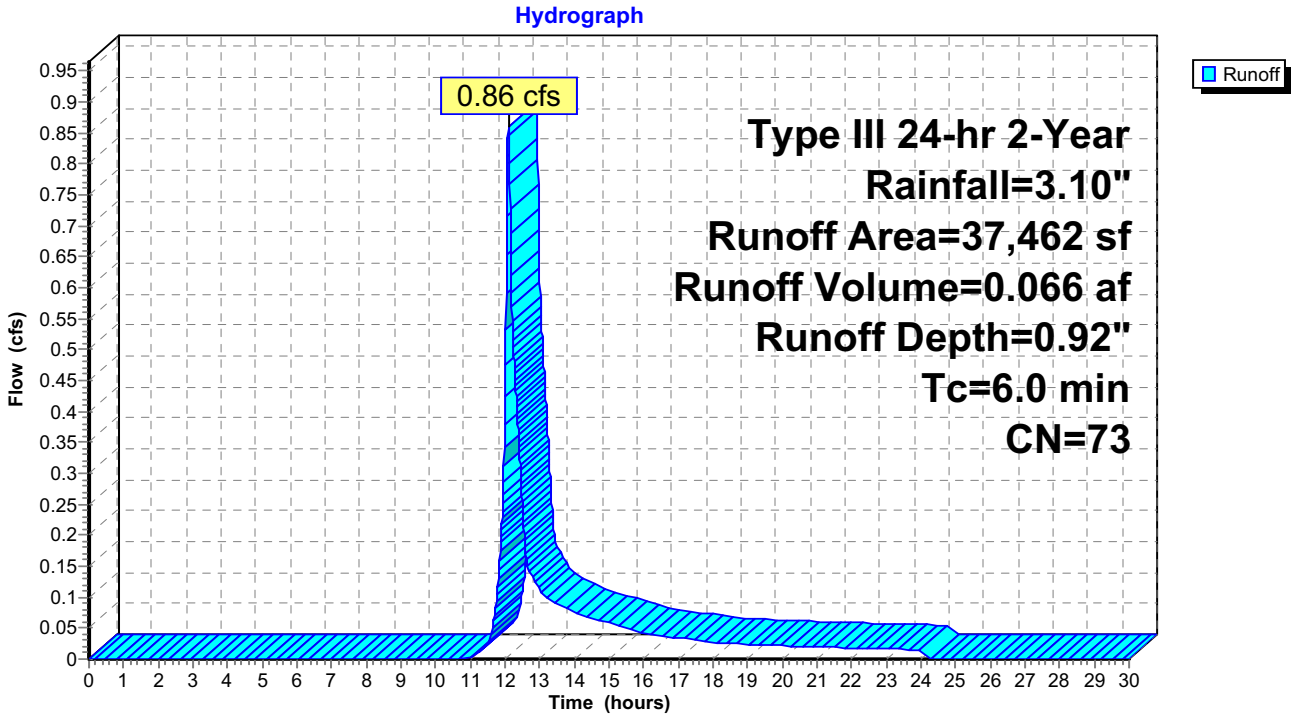
Runoff = 0.86 cfs @ 12.10 hrs, Volume= 0.066 af, Depth= 0.92"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
21,813	98	Paved parking, HSG A
15,649	39	>75% Grass cover, Good, HSG A
37,462	73	Weighted Average
15,649		41.77% Pervious Area
21,813		58.23% Impervious Area

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

Subcatchment P-8: P-8



Summary for Subcatchment P-9: P-9

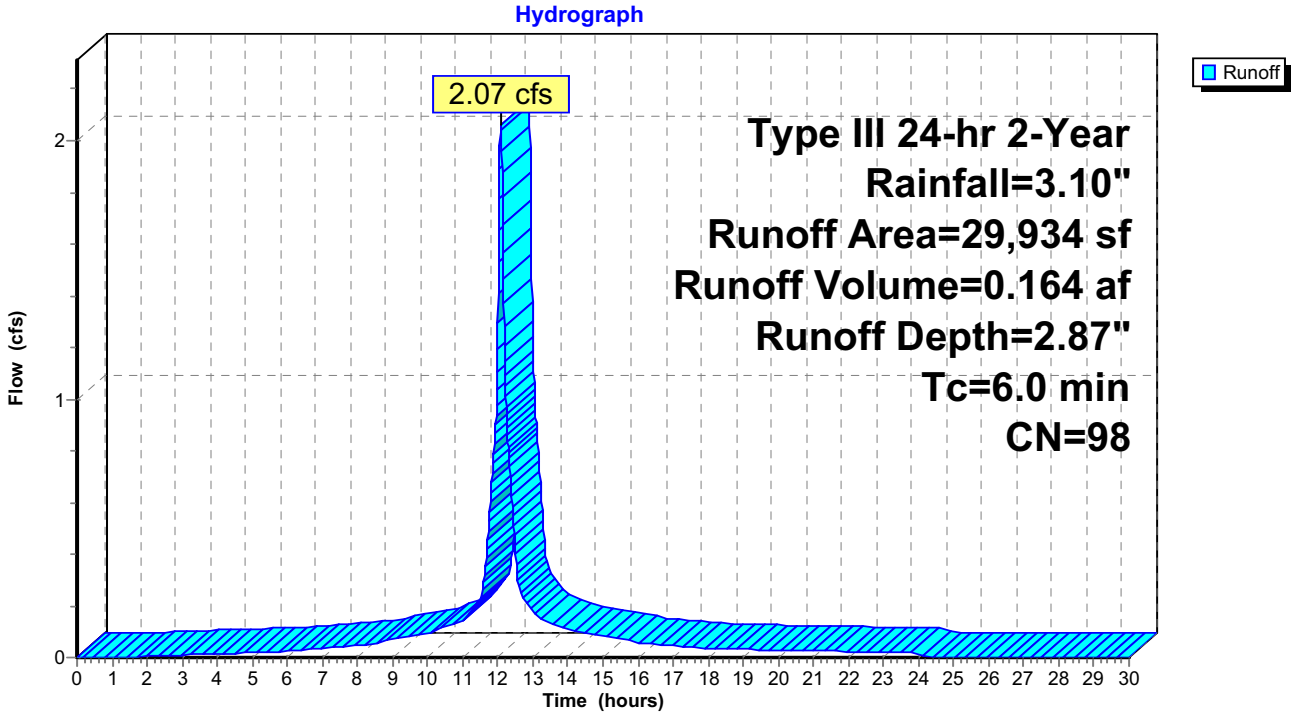
Runoff = 2.07 cfs @ 12.08 hrs, Volume= 0.164 af, Depth= 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (sf)	CN	Description
29,934	98	Roofs, HSG A
29,934		100.00% Impervious Area

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

Subcatchment P-9: P-9



Summary for Pond 2P: Infiltration Field

Inflow Area = 0.687 ac,100.00% Impervious, Inflow Depth = 2.87" for 2-Year event
Inflow = 2.07 cfs @ 12.08 hrs, Volume= 0.164 af
Outflow = 0.88 cfs @ 12.27 hrs, Volume= 0.164 af, Atten= 57%, Lag= 11.4 min
Discarded = 0.25 cfs @ 11.59 hrs, Volume= 0.148 af
Primary = 0.62 cfs @ 12.27 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 153.63' @ 12.27 hrs Surf.Area= 0.031 ac Storage= 0.037 af

Plug-Flow detention time= 29.5 min calculated for 0.164 af (100% of inflow)
Center-of-Mass det. time= 29.5 min (786.6 - 757.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	151.67'	0.026 af	**17.00'W x 78.32'L x 2.83'H Field A** 0.087 af Overall - 0.022 af Embedded = 0.064 af x 40.0% Voids
#2A	152.17'	0.022 af	**StormTech SC-310** x 66 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.048 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	151.67'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	153.20'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 153.20' / 153.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Discarded OutFlow Max=0.25 cfs @ 11.59 hrs HW=151.70' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Primary OutFlow Max=0.62 cfs @ 12.27 hrs HW=153.63' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.62 cfs @ 2.84 fps)

Pond 2P: Infiltration Field - Chamber Wizard Field A

Chamber Model = StormTech SC-310
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 0.0" Spacing = 34.0" C-C

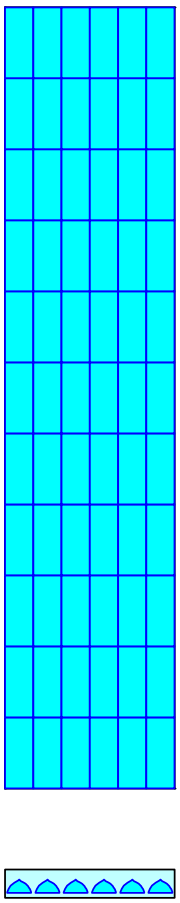
11 Chambers/Row x 7.12' Long = 78.32' Base Length
6 Rows x 34.0" Wide = 17.00' Base Width
6.0" Base + 16.0" Chamber Height + 12.0" Cover = 2.83' Field Height

66 Chambers x 14.7 cf = 973.0 cf Chamber Storage

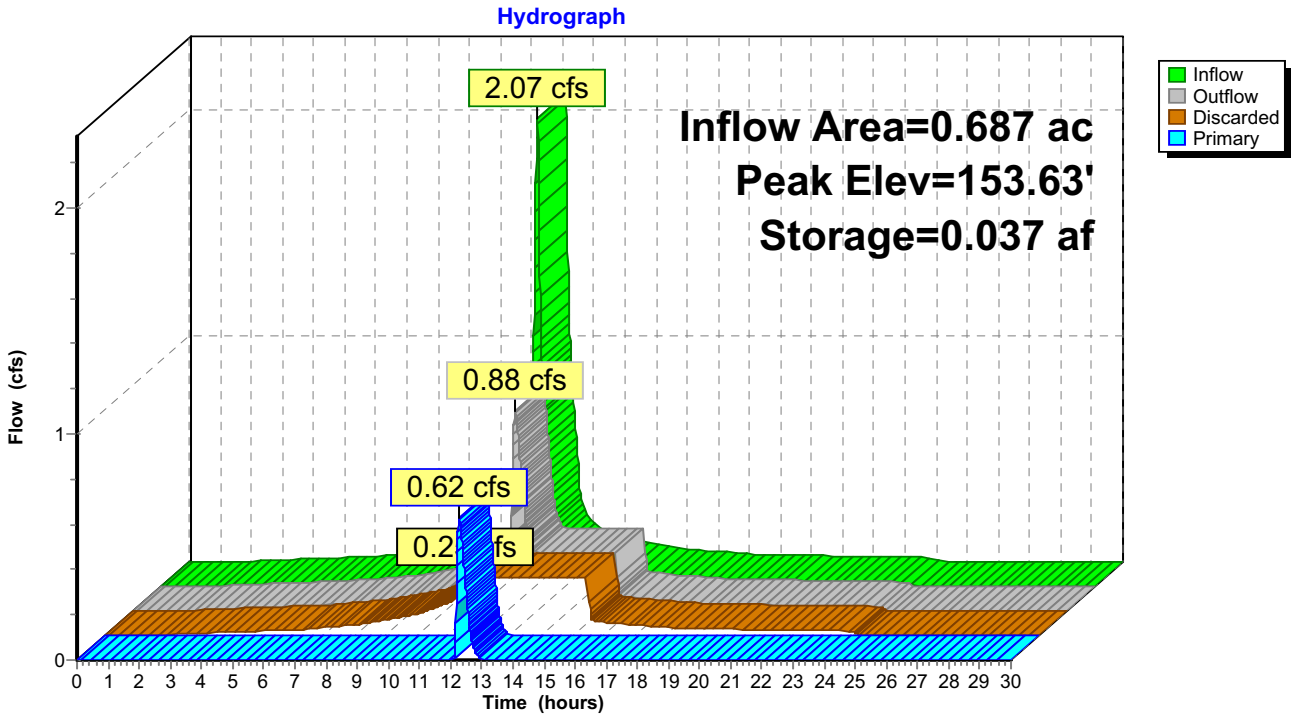
3,772.4 cf Field - 973.0 cf Chambers = 2,799.4 cf Stone x 40.0% Voids = 1,119.8 cf Stone Storage

Stone + Chamber Storage = 2,092.7 cf = 0.048 af

66 Chambers
139.7 cy Field
103.7 cy Stone



Pond 2P: Infiltration Field



Summary for Pond 7P: Infilitration Trench

Inflow Area =	2.150 ac, 11.63% Impervious, Inflow Depth = 0.04" for 2-Year event				
Inflow =	0.01 cfs @	15.53 hrs, Volume=	0.007 af		
Outflow =	0.01 cfs @	15.59 hrs, Volume=	0.007 af, Atten= 0%, Lag= 3.5 min		
Discarded =	0.01 cfs @	15.59 hrs, Volume=	0.007 af		
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 158.00' @ 15.59 hrs Surf.Area= 0.018 ac Storage= 0.000 af

Plug-Flow detention time= 1.7 min calculated for 0.007 af (100% of inflow)
Center-of-Mass det. time= 1.7 min (1,118.7 - 1,117.1)

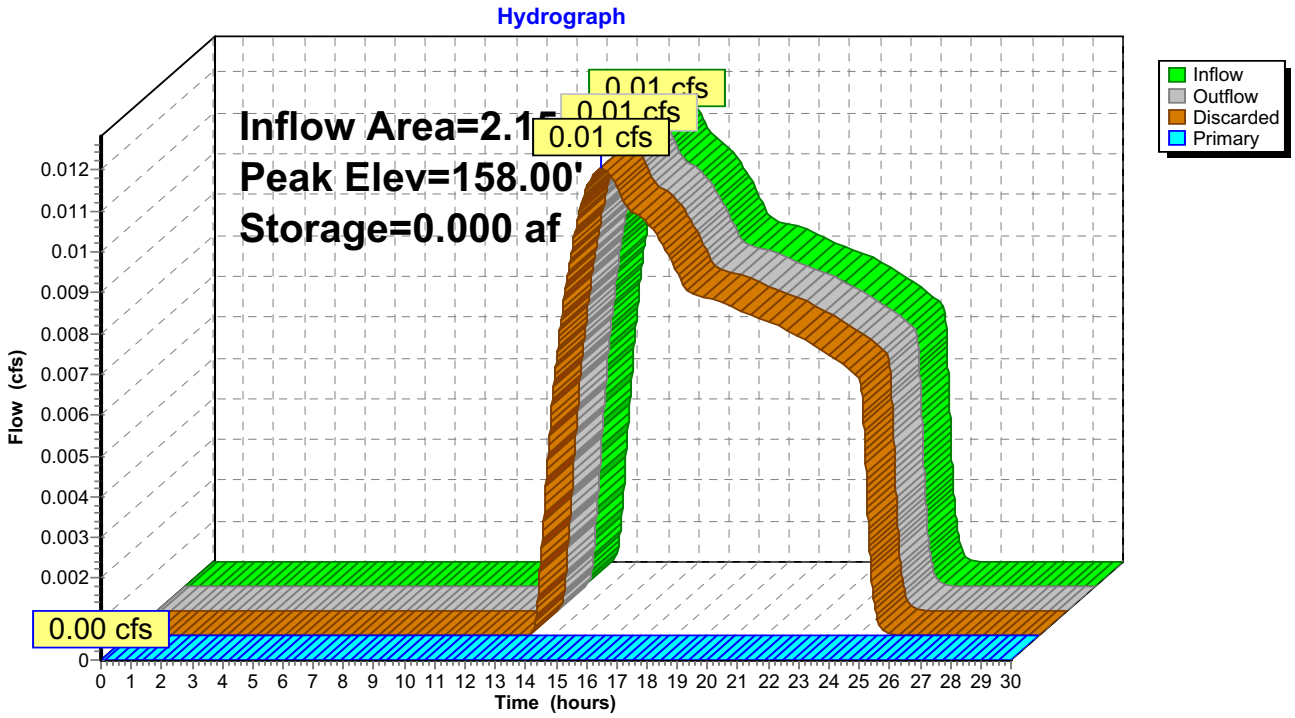
Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	0.038 af	**3.00'W x 260.00'L x 2.00'H Prismatoid Z=0.1**

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**8.710 in/hr Exfiltration over Surface area**
#2	Primary	160.00'	**6.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.16 cfs @ 15.59 hrs HW=158.00' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=158.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Infilitration Trench

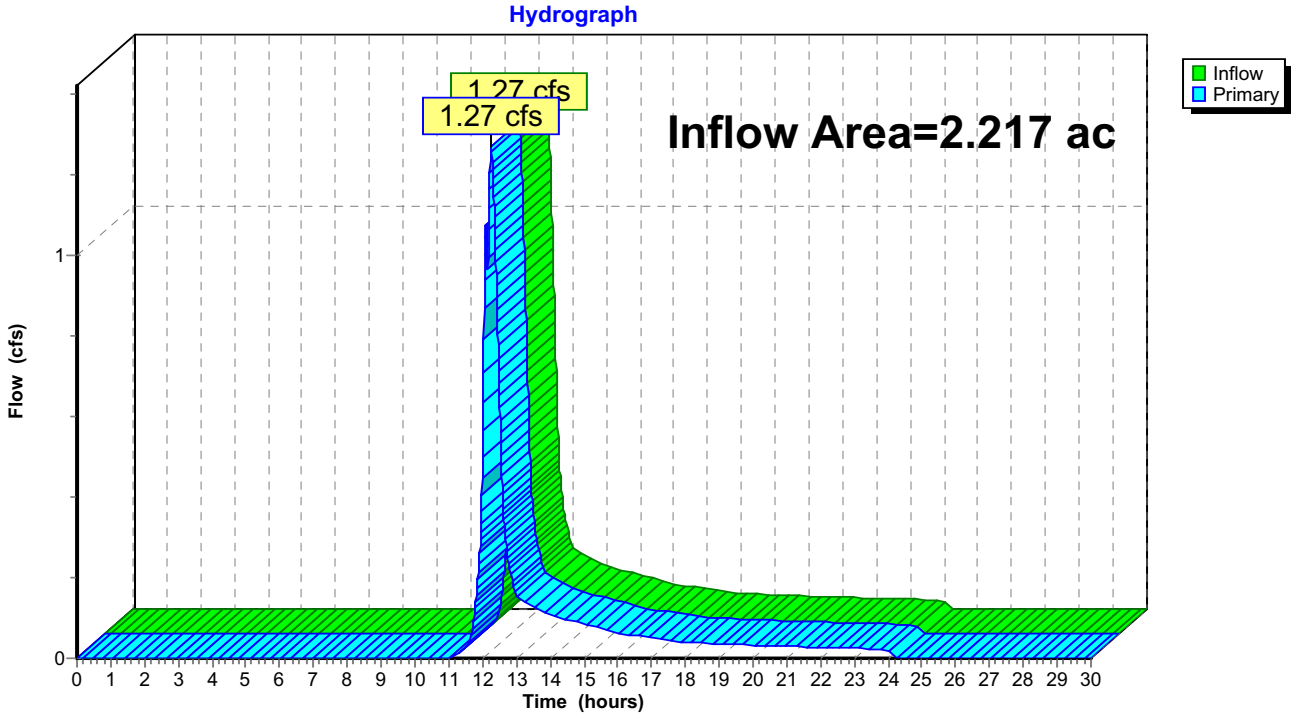


Summary for Link 1L: Flow to Study Point 1

Inflow Area = 2.217 ac, 65.24% Impervious, Inflow Depth = 0.58" for 2-Year event
Inflow = 1.27 cfs @ 12.25 hrs, Volume= 0.108 af
Primary = 1.27 cfs @ 12.25 hrs, Volume= 0.108 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 1L: Flow to Study Point 1

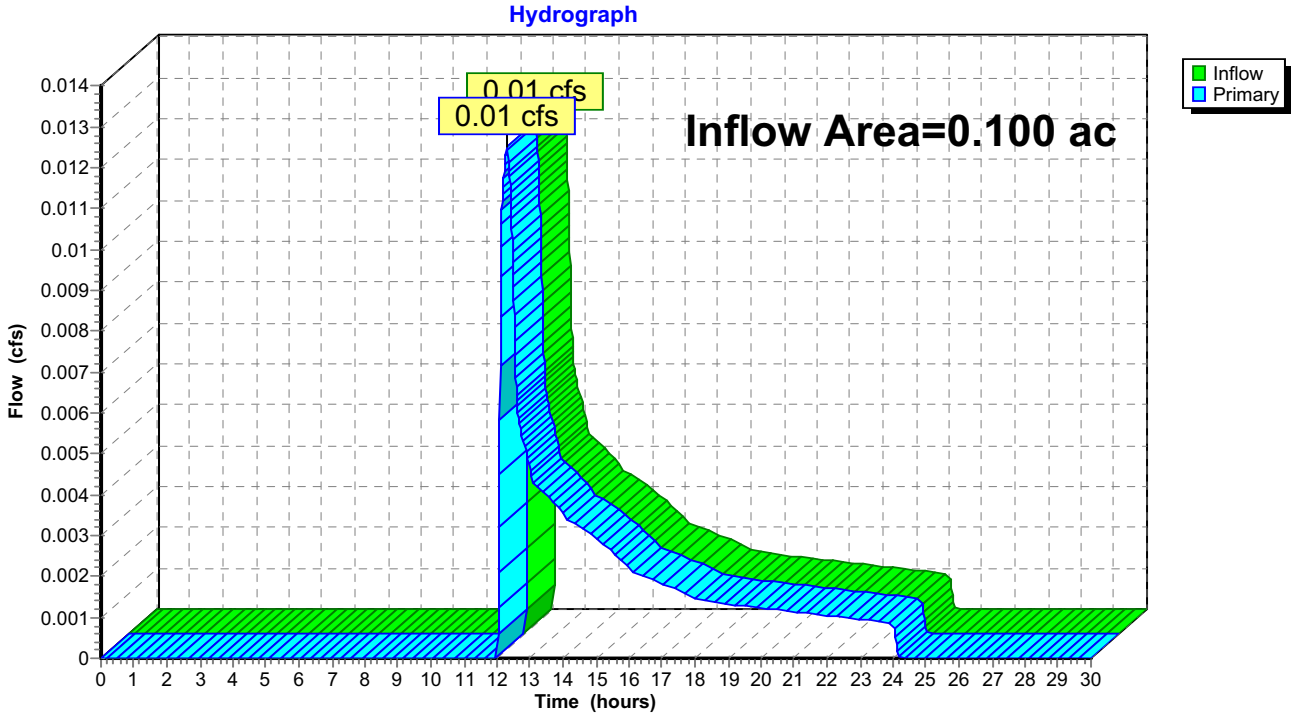


Summary for Link 3L: Flow to Study Point 2

Inflow Area = 0.100 ac, 30.00% Impervious, Inflow Depth = 0.28" for 2-Year event
Inflow = 0.01 cfs @ 12.30 hrs, Volume= 0.002 af
Primary = 0.01 cfs @ 12.30 hrs, Volume= 0.002 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 3L: Flow to Study Point 2

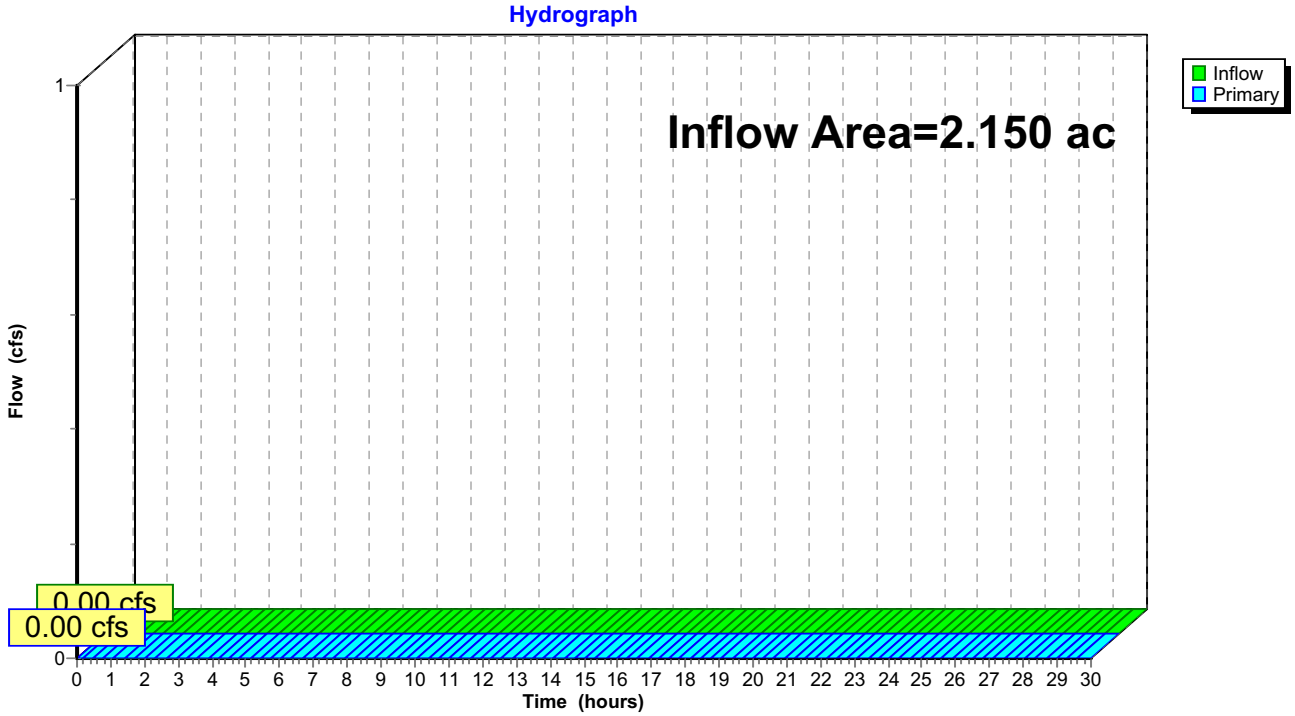


Summary for Link 4L: Flow to Study Point 3

Inflow Area = 2.150 ac, 11.63% Impervious, Inflow Depth = 0.00" for 2-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 4L: Flow to Study Point 3

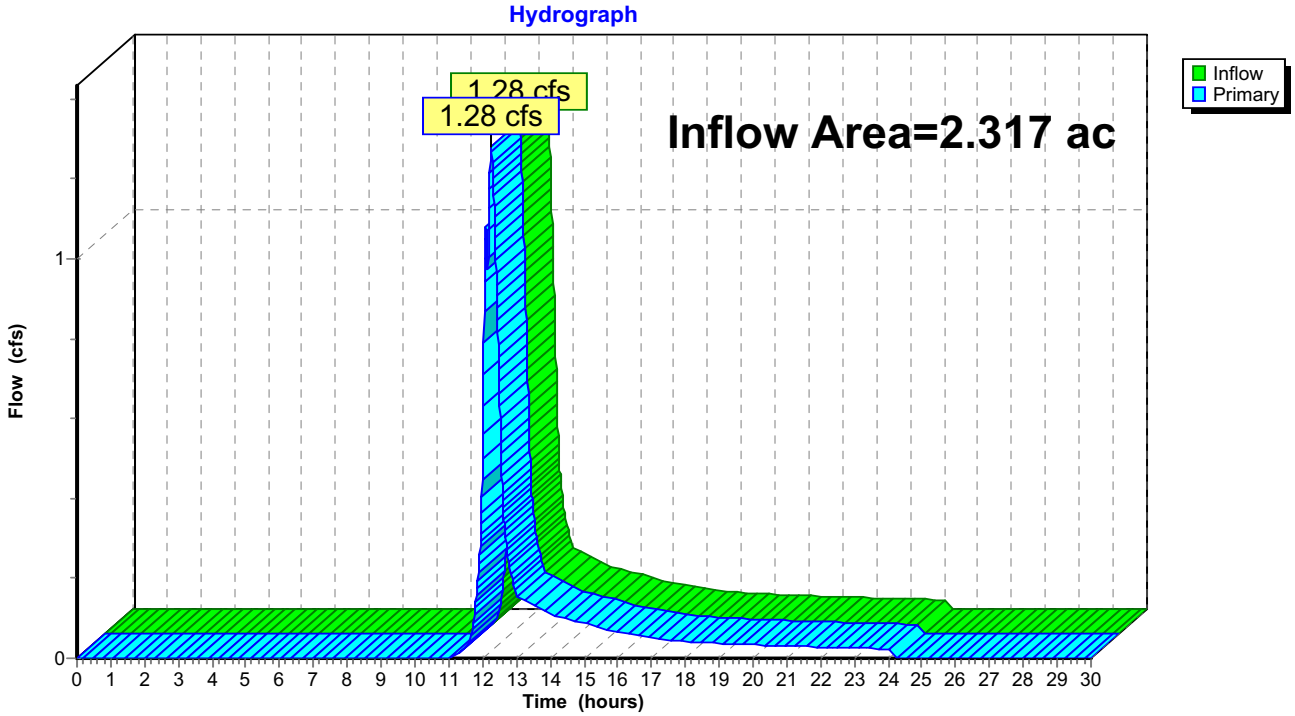


Summary for Link 5L: Combine at Wellesley Ave

Inflow Area = 2.317 ac, 63.72% Impervious, Inflow Depth = 0.57" for 2-Year event
Inflow = 1.28 cfs @ 12.25 hrs, Volume= 0.110 af
Primary = 1.28 cfs @ 12.25 hrs, Volume= 0.110 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5L: Combine at Wellesley Ave



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: P-1 Runoff Area=7,405 sf 54.40% Impervious Runoff Depth=1.82"
Tc=6.0 min CN=71 Runoff=0.36 cfs 0.026 af

Subcatchment P-10: Post Developed Flow Runoff Area=86,249 sf 12.63% Impervious Runoff Depth=0.36"
Flow Length=353' Tc=22.8 min CN=46 Runoff=0.24 cfs 0.060 af

Subcatchment P-2: P-2 Runoff Area=14,375 sf 33.85% Impervious Runoff Depth=1.01"
Tc=6.0 min CN=59 Runoff=0.33 cfs 0.028 af

Subcatchment P-3: P-3 Runoff Area=1,742 sf 28.01% Impervious Runoff Depth=0.84"
Tc=6.0 min CN=56 Runoff=0.03 cfs 0.003 af

Subcatchment P-4: P-4 Runoff Area=1,307 sf 45.45% Impervious Runoff Depth=1.46"
Tc=6.0 min CN=66 Runoff=0.05 cfs 0.004 af

Subcatchment P-5: P-5 Runoff Area=4,356 sf 29.55% Impervious Runoff Depth=0.84"
Tc=6.0 min CN=56 Runoff=0.08 cfs 0.007 af

Subcatchment P-6: P-6 Runoff Area=7,405 sf 0.00% Impervious Runoff Depth=0.13"
Tc=6.0 min CN=39 Runoff=0.00 cfs 0.002 af

Subcatchment P-7: P-7 Runoff Area=4,356 sf 30.00% Impervious Runoff Depth=0.90"
Tc=6.0 min CN=57 Runoff=0.08 cfs 0.007 af

Subcatchment P-8: P-8 Runoff Area=37,462 sf 58.23% Impervious Runoff Depth=1.97"
Tc=6.0 min CN=73 Runoff=1.96 cfs 0.141 af

Subcatchment P-9: P-9 Runoff Area=29,934 sf 100.00% Impervious Runoff Depth=4.36"
Tc=6.0 min CN=98 Runoff=3.09 cfs 0.250 af

Pond 2P: Infiltration Field Peak Elev=154.14' Storage=0.044 af Inflow=3.09 cfs 0.250 af
Discarded=0.25 cfs 0.194 af Primary=2.22 cfs 0.056 af Outflow=2.48 cfs 0.250 af

Pond 7P: Infilitration Trench Peak Elev=158.14' Storage=0.003 af Inflow=0.24 cfs 0.062 af
Discarded=0.16 cfs 0.062 af Primary=0.00 cfs 0.000 af Outflow=0.16 cfs 0.062 af

Link 1L: Flow to Study Point 1 Inflow=4.79 cfs 0.265 af
Primary=4.79 cfs 0.265 af

Link 3L: Flow to Study Point 2 Inflow=0.08 cfs 0.007 af
Primary=0.08 cfs 0.007 af

Link 4L: Flow to Study Point 3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 5L: Combine at Wellesley Ave Inflow=4.88 cfs 0.272 af
Primary=4.88 cfs 0.272 af

Total Runoff Area = 4.467 ac Runoff Volume = 0.527 af Average Runoff Depth = 1.42"
61.35% Pervious = 2.741 ac 38.65% Impervious = 1.727 ac

Summary for Subcatchment P-1: P-1

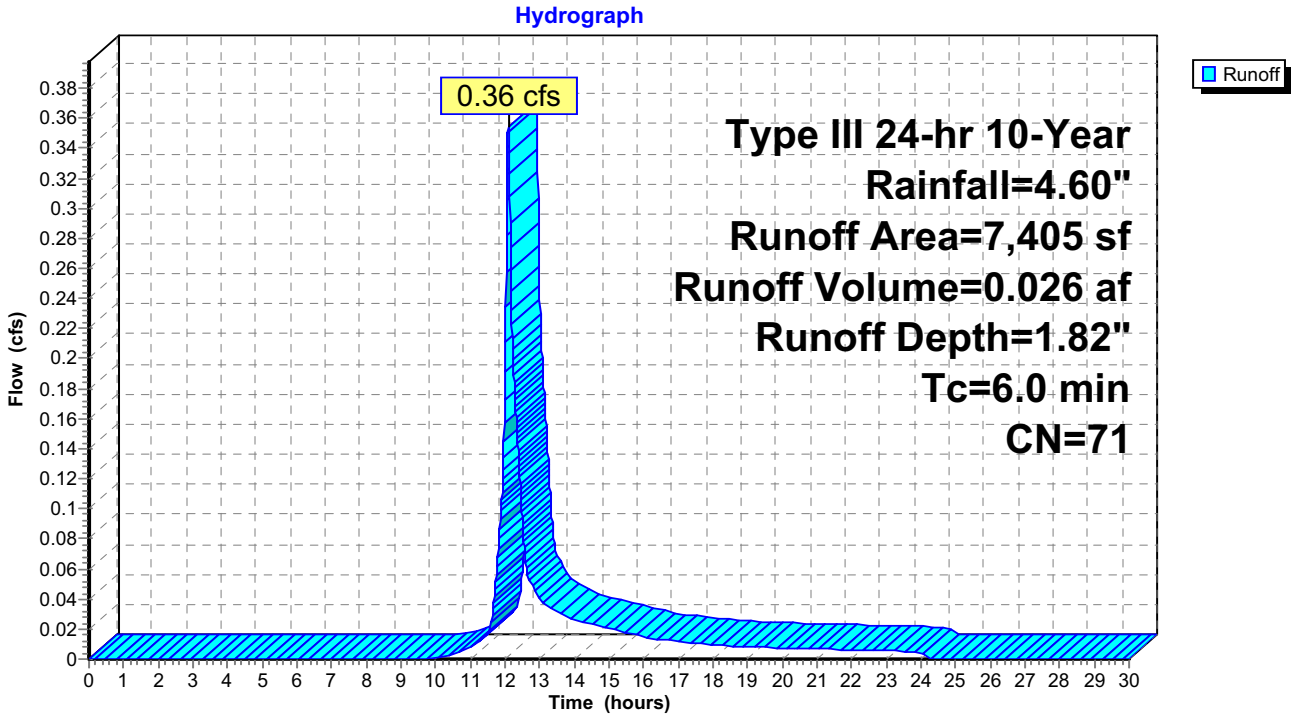
Runoff = 0.36 cfs @ 12.09 hrs, Volume= 0.026 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
4,028	98	Paved parking, HSG A
3,377	39	>75% Grass cover, Good, HSG A
7,405	71	Weighted Average
3,377		45.60% Pervious Area
4,028		54.40% Impervious Area

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

Subcatchment P-1: P-1



Summary for Subcatchment P-10: Post Developed Flow to Waterway

Existing watershed at Equipment Service station

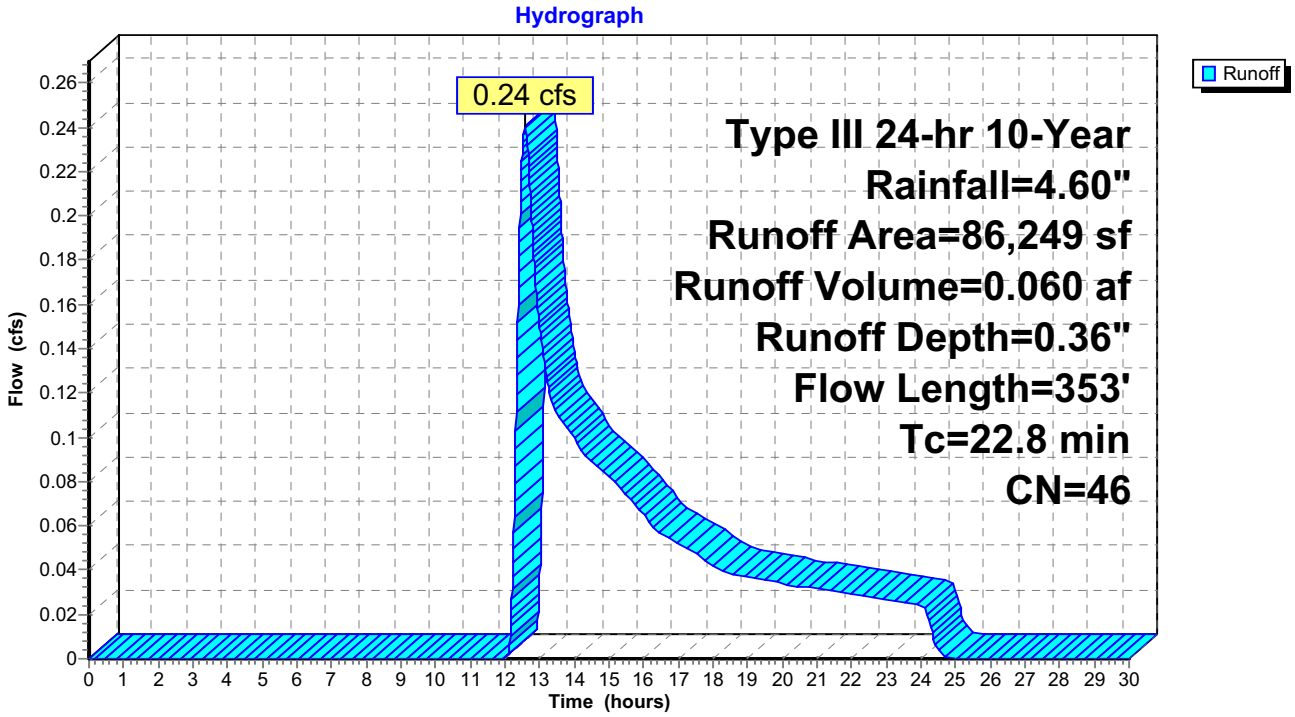
Runoff = 0.24 cfs @ 12.59 hrs, Volume= 0.060 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

	Area (sf)	CN	Description
*	75,359	39	>75% Grass cover, Good, HSG A
	10,890	98	Paved parking, HSG A
	86,249	46	Weighted Average
	75,359		87.37% Pervious Area
	10,890		12.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	152	0.0194	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
8.7	201	0.1144	0.39		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.10"
22.8	353	Total			

Subcatchment P-10: Post Developed Flow to Waterway



Summary for Subcatchment P-2: P-2

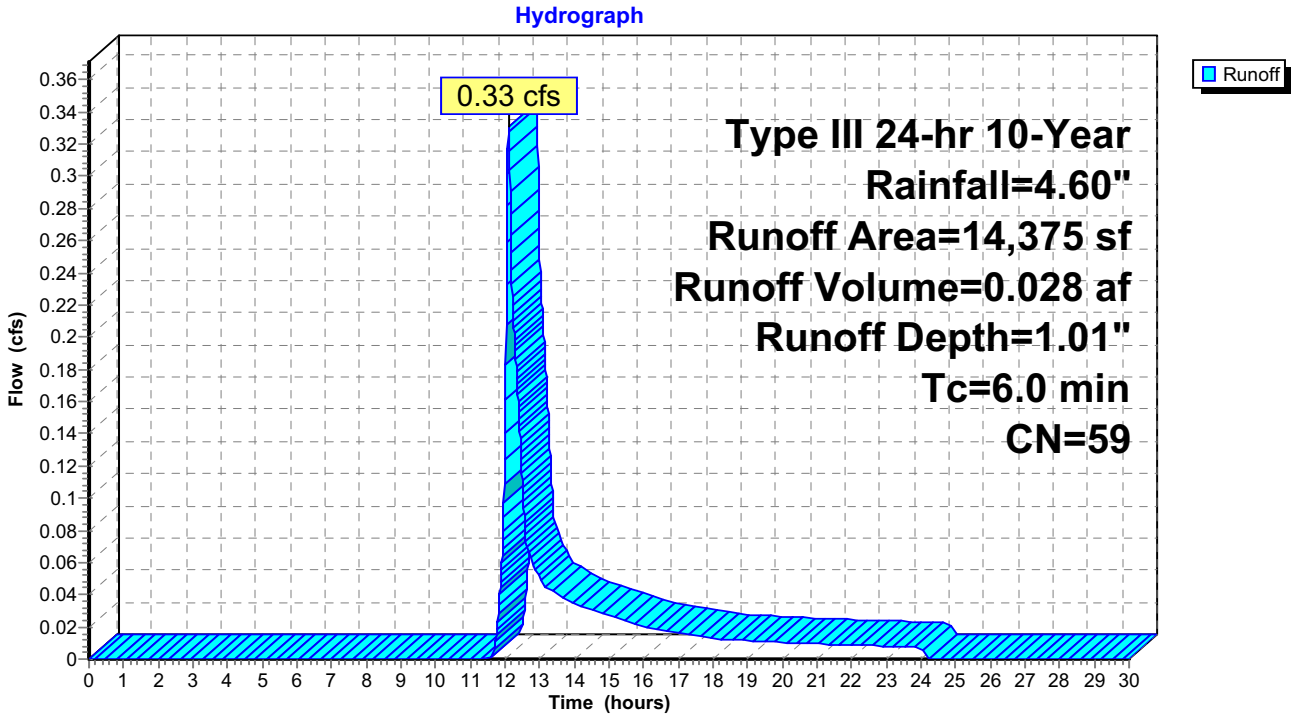
Runoff = 0.33 cfs @ 12.10 hrs, Volume= 0.028 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
4,866	98	Paved parking, HSG A
9,509	39	>75% Grass cover, Good, HSG A
14,375	59	Weighted Average
9,509		66.15% Pervious Area
4,866		33.85% Impervious Area

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

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

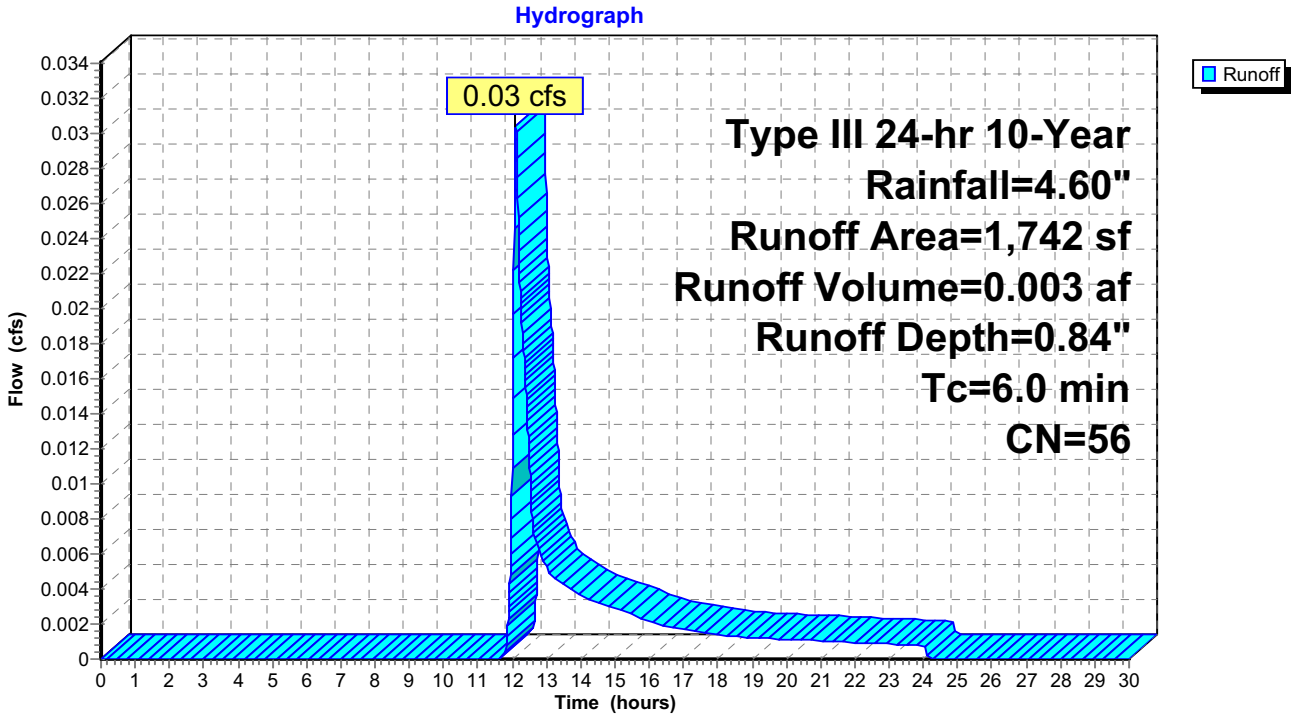
Runoff = 0.03 cfs @ 12.11 hrs, Volume= 0.003 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
488	98	Paved parking, HSG A
1,254	39	>75% Grass cover, Good, HSG A
1,742	56	Weighted Average
1,254		71.99% Pervious Area
488		28.01% Impervious Area

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

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

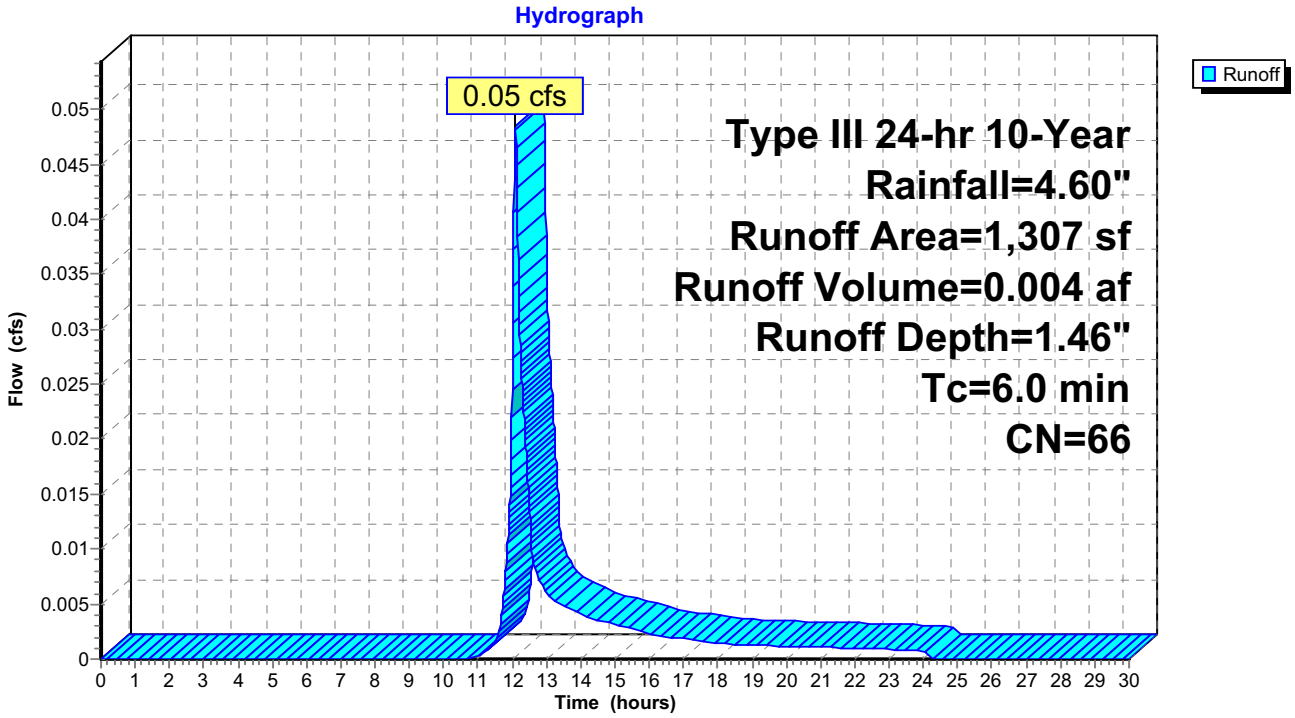
Runoff = 0.05 cfs @ 12.10 hrs, Volume= 0.004 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
594	98	Paved parking, HSG A
713	39	>75% Grass cover, Good, HSG A
1,307	66	Weighted Average
713		54.55% Pervious Area
594		45.45% Impervious Area

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

Subcatchment P-4: P-4



Summary for Subcatchment P-5: P-5

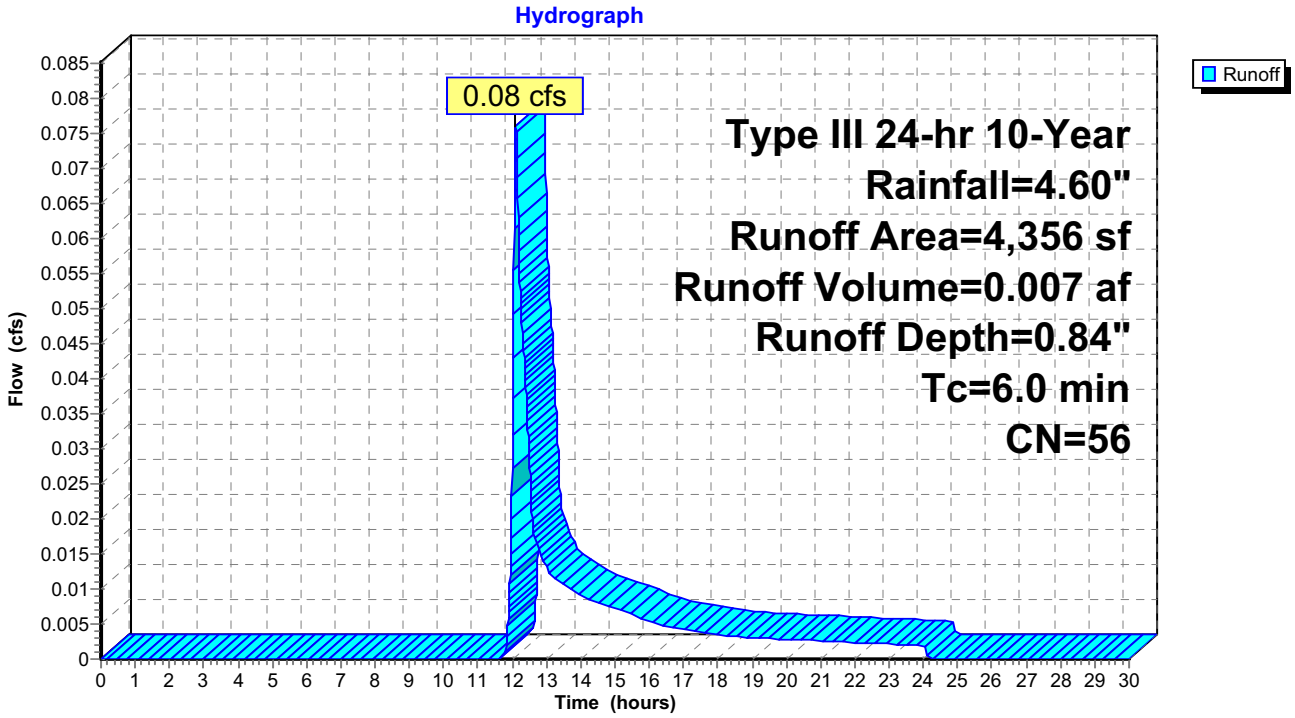
Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.007 af, Depth= 0.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
1,287	98	Paved parking, HSG A
3,069	39	>75% Grass cover, Good, HSG A
4,356	56	Weighted Average
3,069		70.45% Pervious Area
1,287		29.55% Impervious Area

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

Subcatchment P-5: P-5



Summary for Subcatchment P-6: P-6

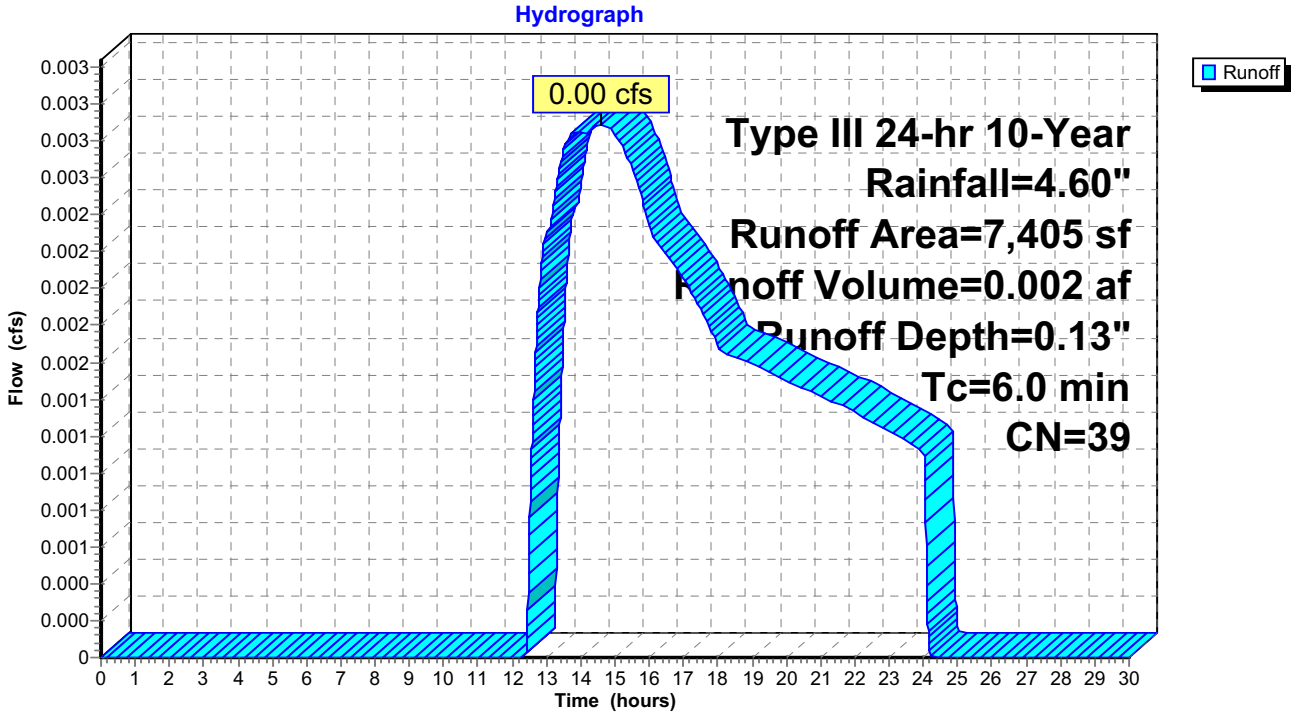
Runoff = 0.00 cfs @ 14.58 hrs, Volume= 0.002 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
7,405	39	>75% Grass cover, Good, HSG A
7,405		100.00% Pervious Area

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

Subcatchment P-6: P-6



Summary for Subcatchment P-7: P-7

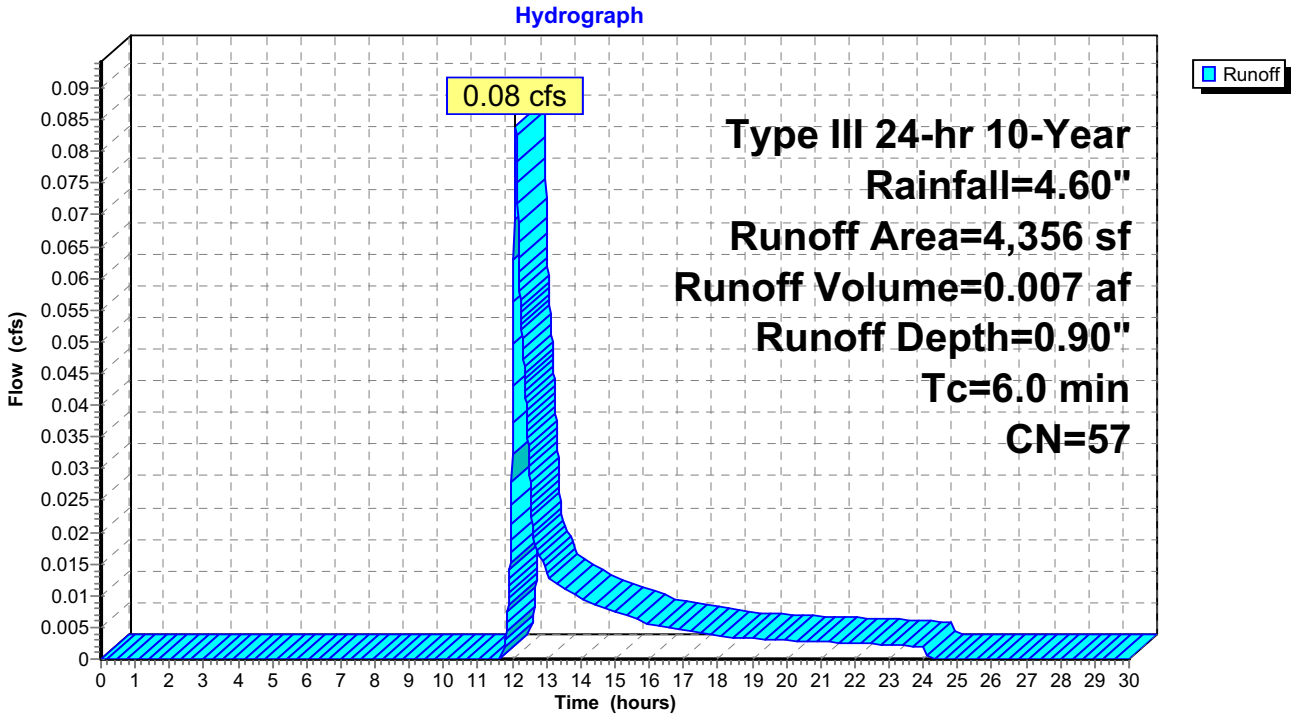
Runoff = 0.08 cfs @ 12.11 hrs, Volume= 0.007 af, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
1,307	98	Paved parking, HSG A
3,049	39	>75% Grass cover, Good, HSG A
4,356	57	Weighted Average
3,049		70.00% Pervious Area
1,307		30.00% Impervious Area

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

Subcatchment P-7: P-7



Summary for Subcatchment P-8: P-8

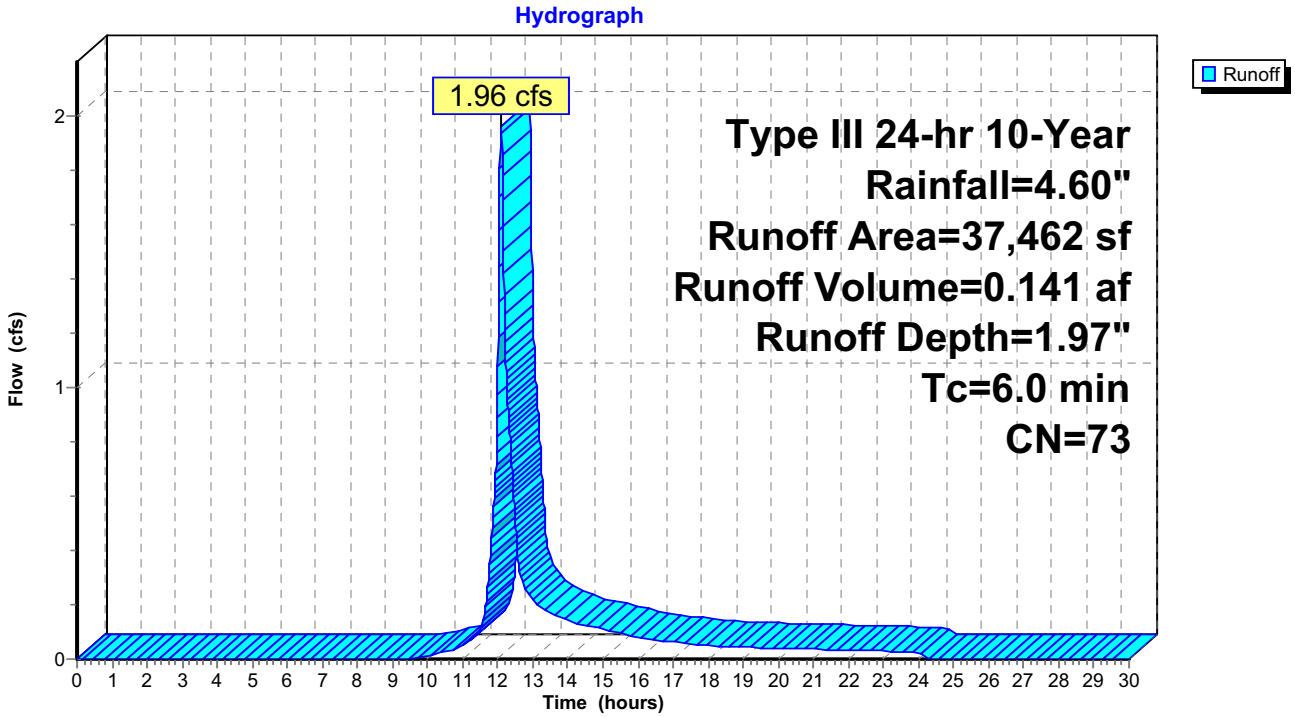
Runoff = 1.96 cfs @ 12.09 hrs, Volume= 0.141 af, Depth= 1.97"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
21,813	98	Paved parking, HSG A
15,649	39	>75% Grass cover, Good, HSG A
37,462	73	Weighted Average
15,649		41.77% Pervious Area
21,813		58.23% Impervious Area

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

Subcatchment P-8: P-8



Summary for Subcatchment P-9: P-9

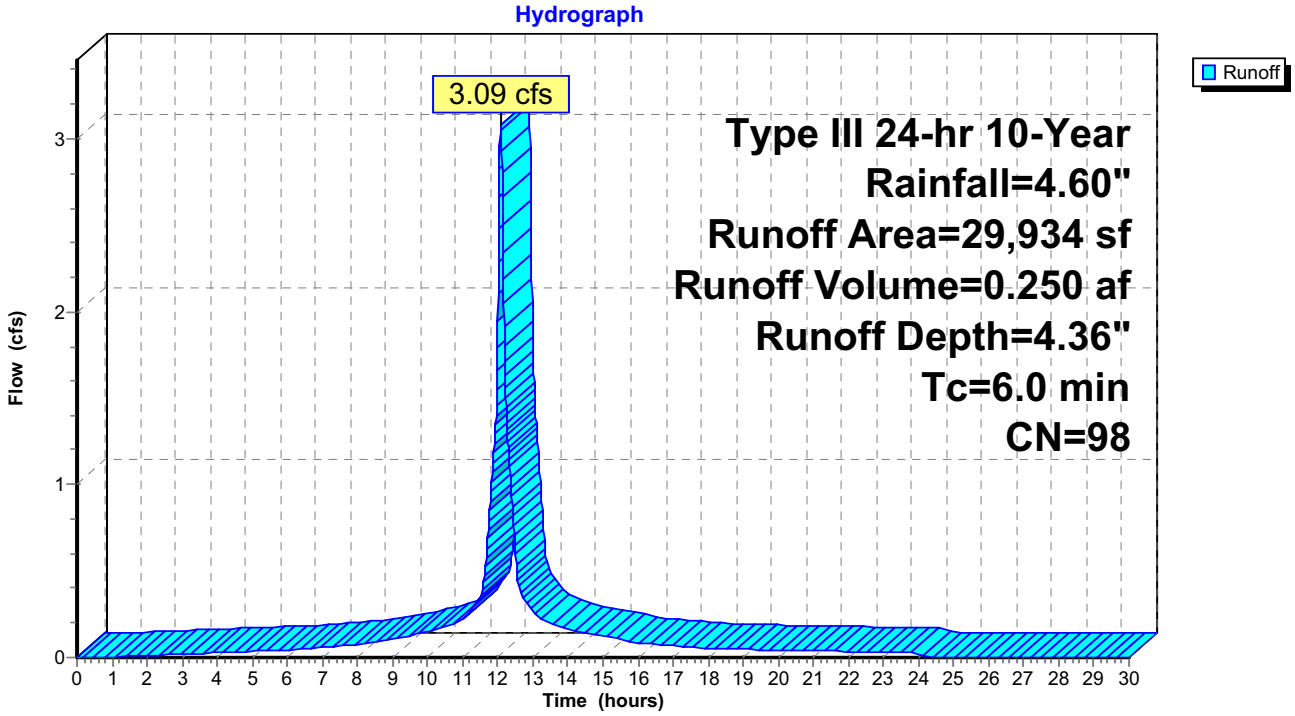
Runoff = 3.09 cfs @ 12.08 hrs, Volume= 0.250 af, Depth= 4.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 10-Year Rainfall=4.60"

Area (sf)	CN	Description
29,934	98	Roofs, HSG A
29,934		100.00% Impervious Area

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

Subcatchment P-9: P-9



Summary for Pond 2P: Infiltration Field

Inflow Area =	0.687 ac,100.00% Impervious, Inflow Depth = 4.36" for 10-Year event			
Inflow =	3.09 cfs @	12.08 hrs, Volume=	0.250 af	
Outflow =	2.48 cfs @	12.14 hrs, Volume=	0.250 af, Atten= 20%, Lag= 3.5 min	
Discarded =	0.25 cfs @	11.21 hrs, Volume=	0.194 af	
Primary =	2.22 cfs @	12.14 hrs, Volume=	0.056 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 154.14' @ 12.14 hrs Surf.Area= 0.031 ac Storage= 0.044 af

Plug-Flow detention time= 27.0 min calculated for 0.250 af (100% of inflow)
Center-of-Mass det. time= 27.0 min (776.4 - 749.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	151.67'	0.026 af	**17.00'W x 78.32'L x 2.83'H Field A** 0.087 af Overall - 0.022 af Embedded = 0.064 af x 40.0% Voids
#2A	152.17'	0.022 af	**StormTech SC-310** x 66 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.048 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	151.67'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	153.20'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 153.20' / 153.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Discarded OutFlow Max=0.25 cfs @ 11.21 hrs HW=151.70' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Primary OutFlow Max=2.22 cfs @ 12.14 hrs HW=154.14' (Free Discharge)
└─**2=Culvert** (Barrel Controls 2.22 cfs @ 3.75 fps)

Pond 2P: Infiltration Field - Chamber Wizard Field A

Chamber Model = StormTech SC-310
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 0.0" Spacing = 34.0" C-C

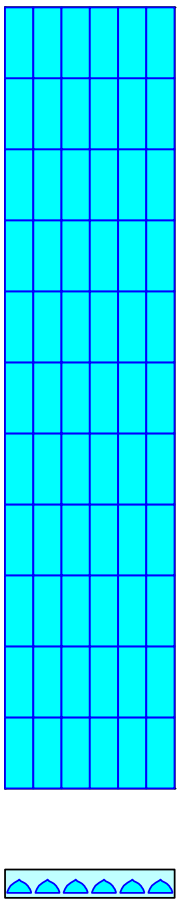
11 Chambers/Row x 7.12' Long = 78.32' Base Length
6 Rows x 34.0" Wide = 17.00' Base Width
6.0" Base + 16.0" Chamber Height + 12.0" Cover = 2.83' Field Height

66 Chambers x 14.7 cf = 973.0 cf Chamber Storage

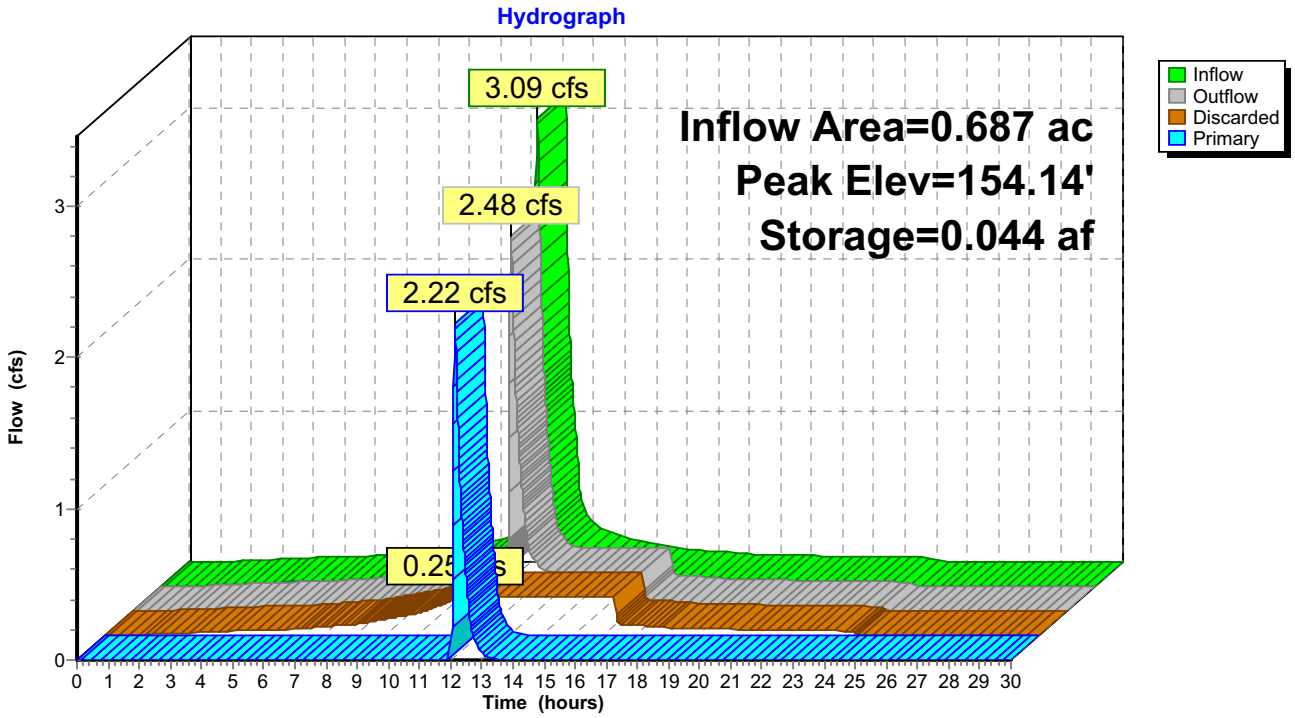
3,772.4 cf Field - 973.0 cf Chambers = 2,799.4 cf Stone x 40.0% Voids = 1,119.8 cf Stone Storage

Stone + Chamber Storage = 2,092.7 cf = 0.048 af

66 Chambers
139.7 cy Field
103.7 cy Stone



Pond 2P: Infiltration Field



Summary for Pond 7P: Infilitration Trench

Inflow Area = 2.150 ac, 11.63% Impervious, Inflow Depth = 0.34" for 10-Year event
Inflow = 0.24 cfs @ 12.59 hrs, Volume= 0.062 af
Outflow = 0.16 cfs @ 12.96 hrs, Volume= 0.062 af, Atten= 34%, Lag= 22.1 min
Discarded = 0.16 cfs @ 12.96 hrs, Volume= 0.062 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 158.14' @ 12.96 hrs Surf.Area= 0.018 ac Storage= 0.003 af

Plug-Flow detention time= 3.4 min calculated for 0.062 af (100% of inflow)
Center-of-Mass det. time= 3.4 min (976.1 - 972.7)

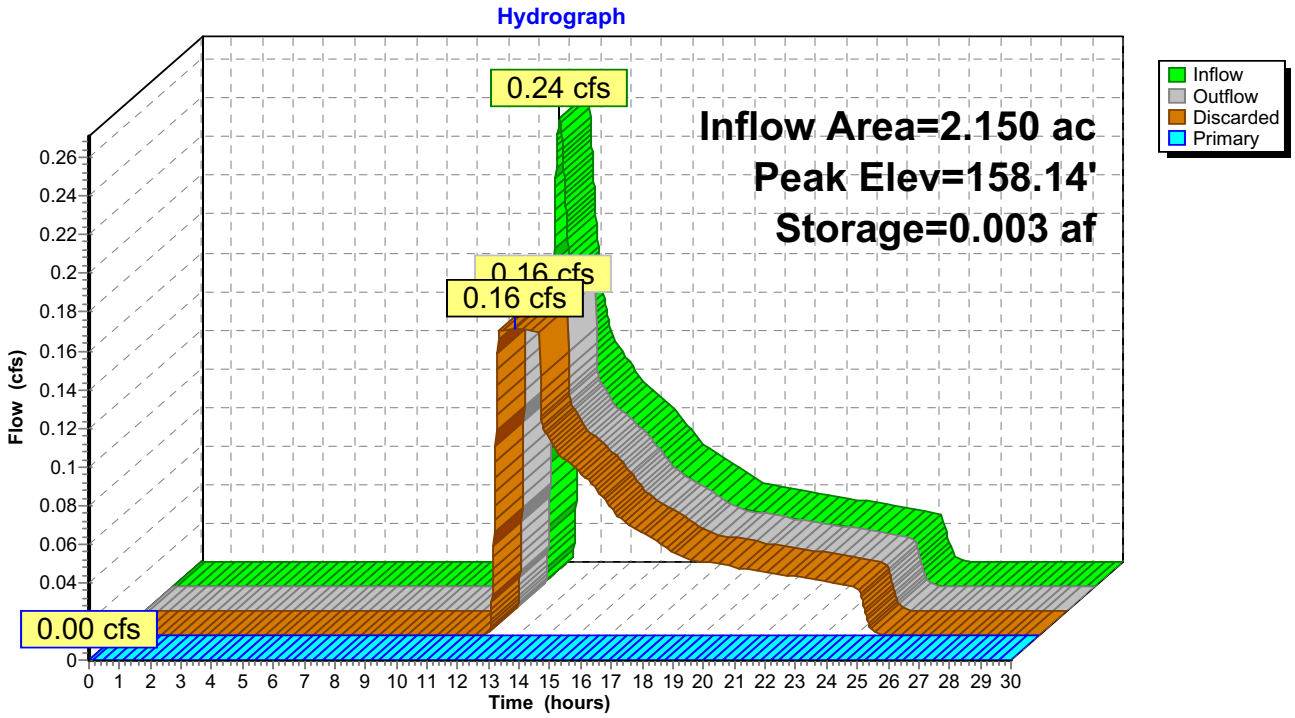
Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	0.038 af	**3.00'W x 260.00'L x 2.00'H Prismatoid Z=0.1**

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**8.710 in/hr Exfiltration over Surface area**
#2	Primary	160.00'	**6.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.16 cfs @ 12.96 hrs HW=158.14' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=158.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Infilitration Trench

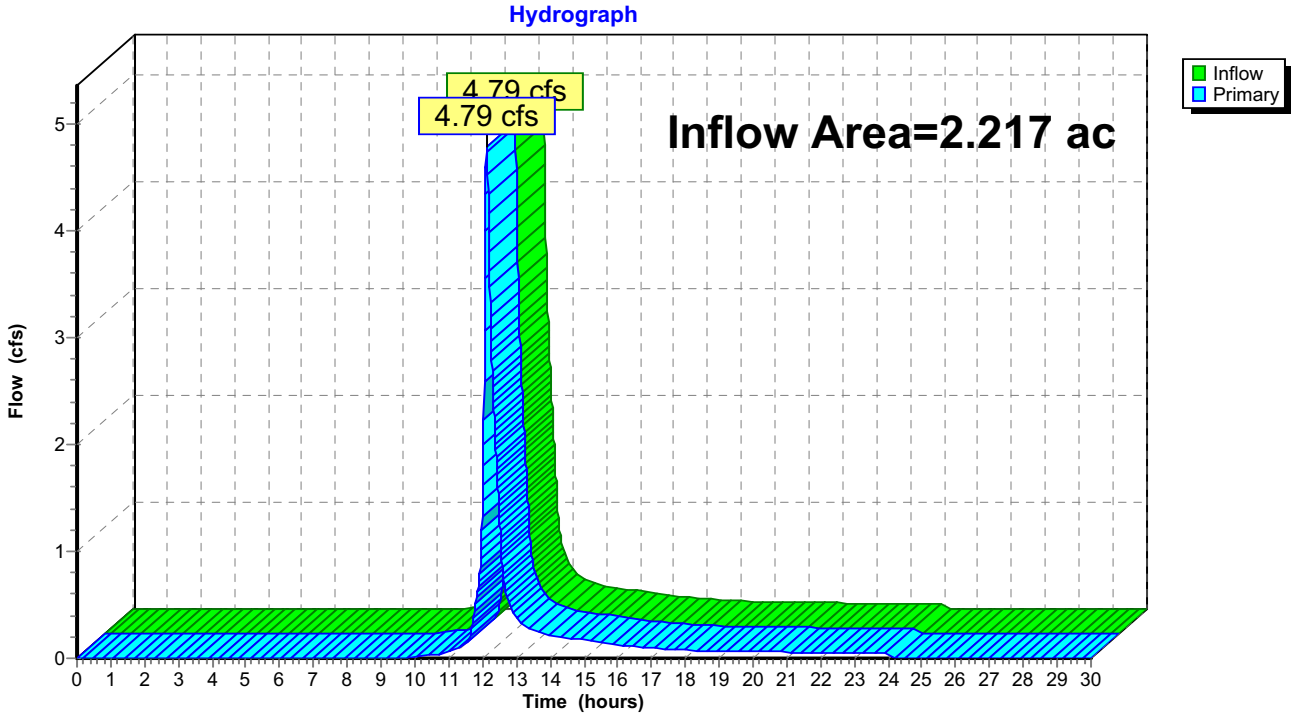


Summary for Link 1L: Flow to Study Point 1

Inflow Area = 2.217 ac, 65.24% Impervious, Inflow Depth = 1.43" for 10-Year event
Inflow = 4.79 cfs @ 12.12 hrs, Volume= 0.265 af
Primary = 4.79 cfs @ 12.12 hrs, Volume= 0.265 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 1L: Flow to Study Point 1

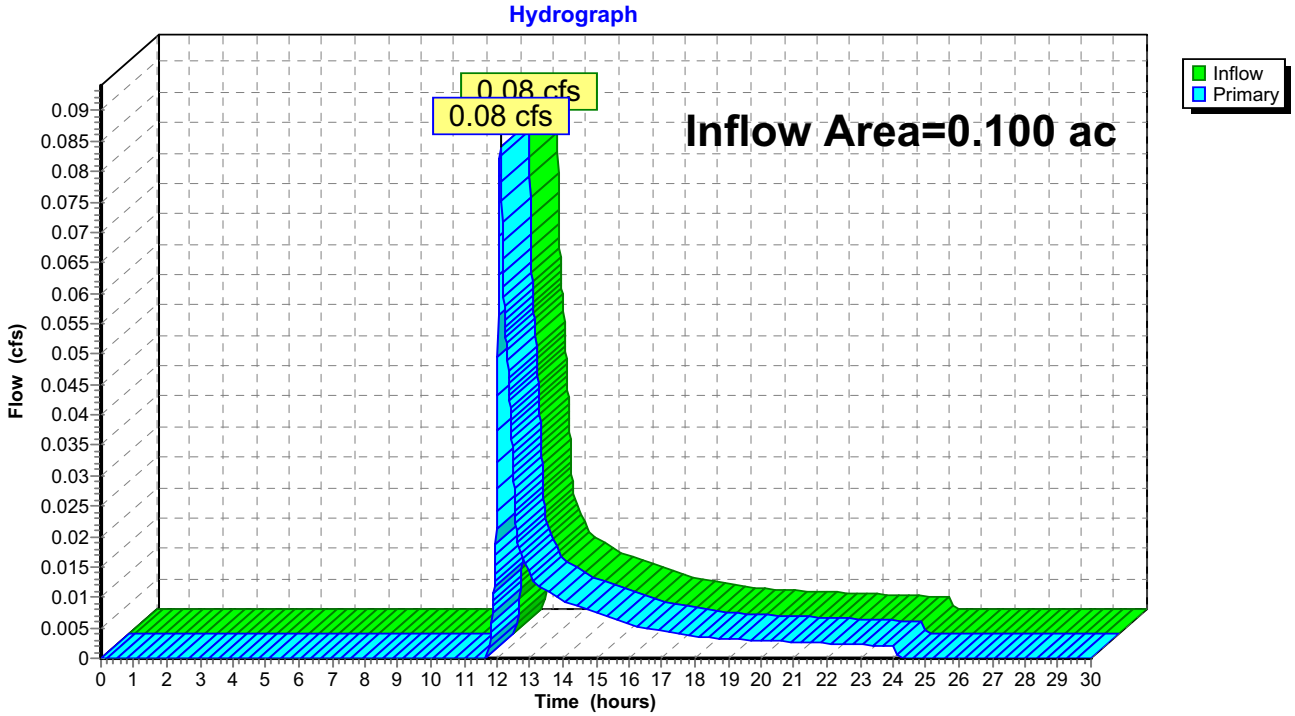


Summary for Link 3L: Flow to Study Point 2

Inflow Area = 0.100 ac, 30.00% Impervious, Inflow Depth = 0.90" for 10-Year event
Inflow = 0.08 cfs @ 12.11 hrs, Volume= 0.007 af
Primary = 0.08 cfs @ 12.11 hrs, Volume= 0.007 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 3L: Flow to Study Point 2

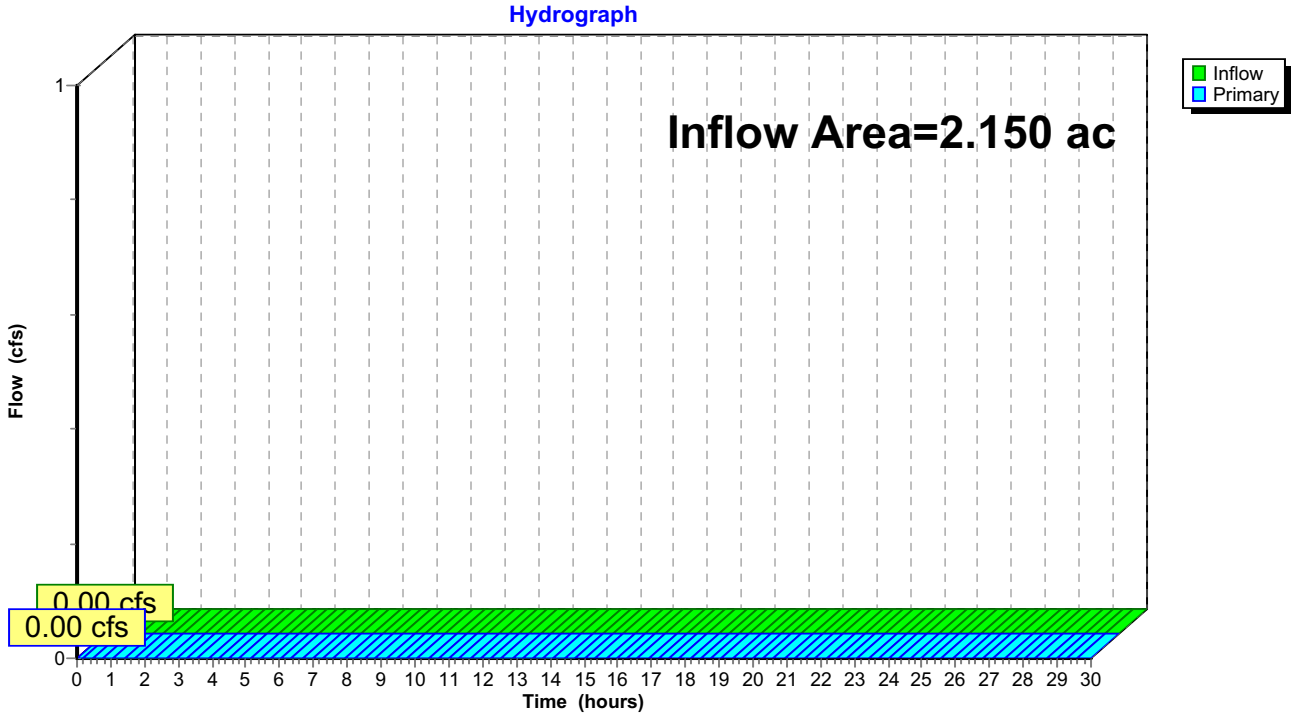


Summary for Link 4L: Flow to Study Point 3

Inflow Area = 2.150 ac, 11.63% Impervious, Inflow Depth = 0.00" for 10-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 4L: Flow to Study Point 3

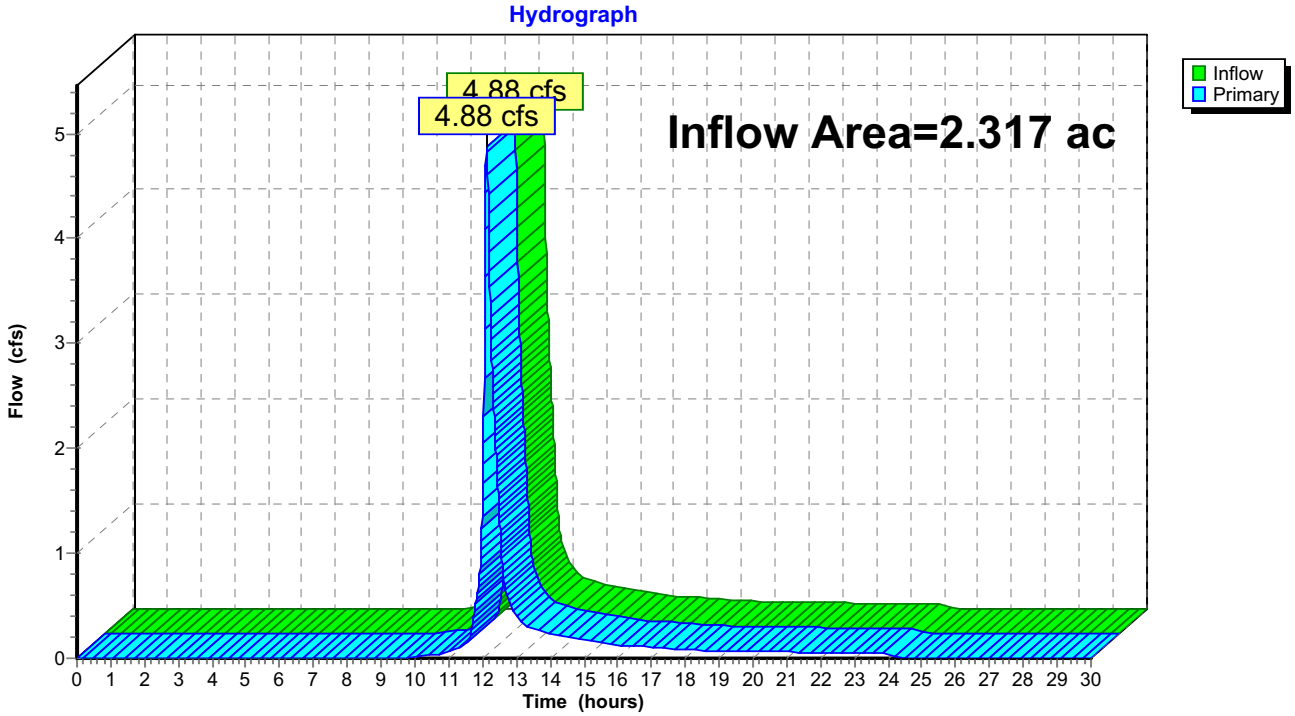


Summary for Link 5L: Combine at Wellesley Ave

Inflow Area = 2.317 ac, 63.72% Impervious, Inflow Depth = 1.41" for 10-Year event
Inflow = 4.88 cfs @ 12.12 hrs, Volume= 0.272 af
Primary = 4.88 cfs @ 12.12 hrs, Volume= 0.272 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5L: Combine at Wellesley Ave



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: P-1 Runoff Area=7,405 sf 54.40% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=71 Runoff=0.49 cfs 0.035 af

Subcatchment P-10: Post Developed Flow Runoff Area=86,249 sf 12.63% Impervious Runoff Depth=0.65"
Flow Length=353' Tc=22.8 min CN=46 Runoff=0.58 cfs 0.107 af

Subcatchment P-2: P-2 Runoff Area=14,375 sf 33.85% Impervious Runoff Depth=1.50"
Tc=6.0 min CN=59 Runoff=0.53 cfs 0.041 af

Subcatchment P-3: P-3 Runoff Area=1,742 sf 28.01% Impervious Runoff Depth=1.28"
Tc=6.0 min CN=56 Runoff=0.05 cfs 0.004 af

Subcatchment P-4: P-4 Runoff Area=1,307 sf 45.45% Impervious Runoff Depth=2.04"
Tc=6.0 min CN=66 Runoff=0.07 cfs 0.005 af

Subcatchment P-5: P-5 Runoff Area=4,356 sf 29.55% Impervious Runoff Depth=1.28"
Tc=6.0 min CN=56 Runoff=0.13 cfs 0.011 af

Subcatchment P-6: P-6 Runoff Area=7,405 sf 0.00% Impervious Runoff Depth=0.30"
Tc=6.0 min CN=39 Runoff=0.02 cfs 0.004 af

Subcatchment P-7: P-7 Runoff Area=4,356 sf 30.00% Impervious Runoff Depth=1.35"
Tc=6.0 min CN=57 Runoff=0.14 cfs 0.011 af

Subcatchment P-8: P-8 Runoff Area=37,462 sf 58.23% Impervious Runoff Depth=2.64"
Tc=6.0 min CN=73 Runoff=2.65 cfs 0.189 af

Subcatchment P-9: P-9 Runoff Area=29,934 sf 100.00% Impervious Runoff Depth=5.21"
Tc=6.0 min CN=98 Runoff=3.67 cfs 0.298 af

Pond 2P: Infiltration Field Peak Elev=154.38' Storage=0.046 af Inflow=3.67 cfs 0.298 af
Discarded=0.25 cfs 0.217 af Primary=2.93 cfs 0.081 af Outflow=3.19 cfs 0.298 af

Pond 7P: Infilitration Trench Peak Elev=159.21' Storage=0.023 af Inflow=0.59 cfs 0.111 af
Discarded=0.17 cfs 0.111 af Primary=0.00 cfs 0.000 af Outflow=0.17 cfs 0.111 af

Link 1L: Flow to Study Point 1 Inflow=6.70 cfs 0.366 af
Primary=6.70 cfs 0.366 af

Link 3L: Flow to Study Point 2 Inflow=0.14 cfs 0.011 af
Primary=0.14 cfs 0.011 af

Link 4L: Flow to Study Point 3 Inflow=0.00 cfs 0.000 af
Primary=0.00 cfs 0.000 af

Link 5L: Combine at Wellesley Ave Inflow=6.84 cfs 0.378 af
Primary=6.84 cfs 0.378 af

Total Runoff Area = 4.467 ac Runoff Volume = 0.706 af Average Runoff Depth = 1.90"
61.35% Pervious = 2.741 ac 38.65% Impervious = 1.727 ac

Summary for Subcatchment P-1: P-1

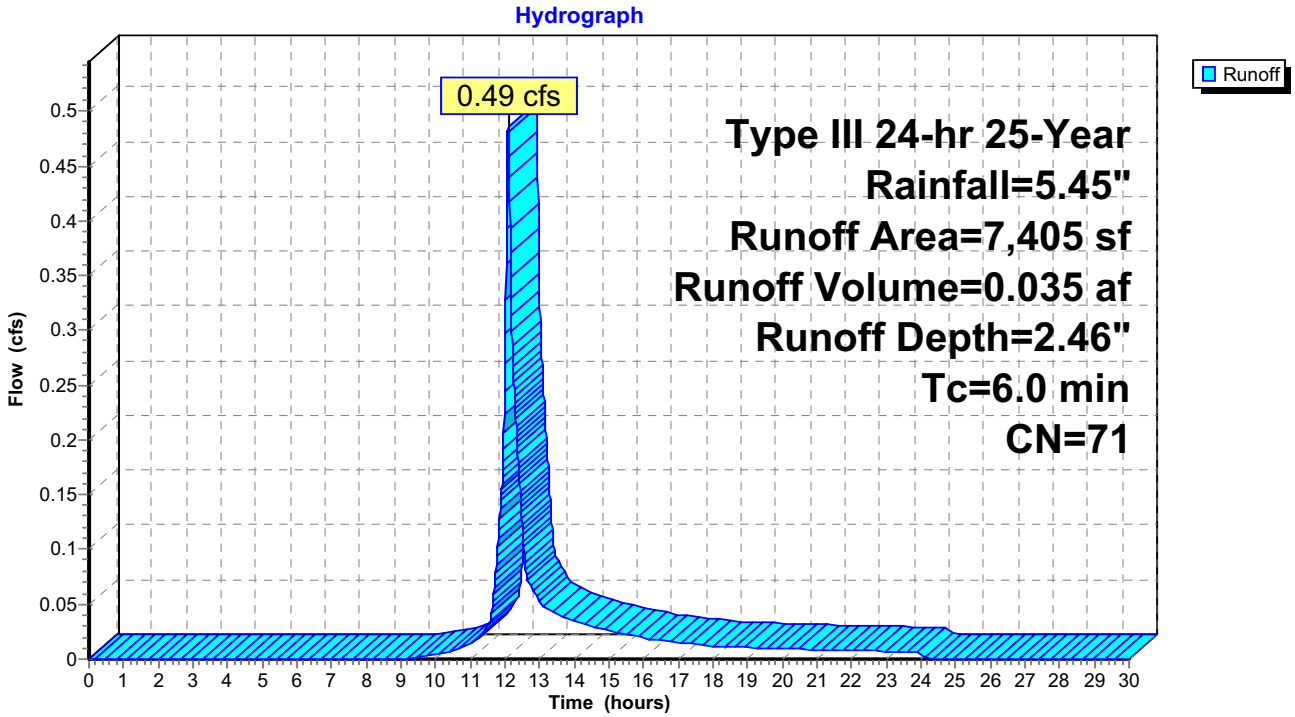
Runoff = 0.49 cfs @ 12.09 hrs, Volume= 0.035 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

Area (sf)	CN	Description
4,028	98	Paved parking, HSG A
3,377	39	>75% Grass cover, Good, HSG A
7,405	71	Weighted Average
3,377		45.60% Pervious Area
4,028		54.40% Impervious Area

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

Subcatchment P-1: P-1



Summary for Subcatchment P-10: Post Developed Flow to Waterway

Existing watershed at Equipment Service station

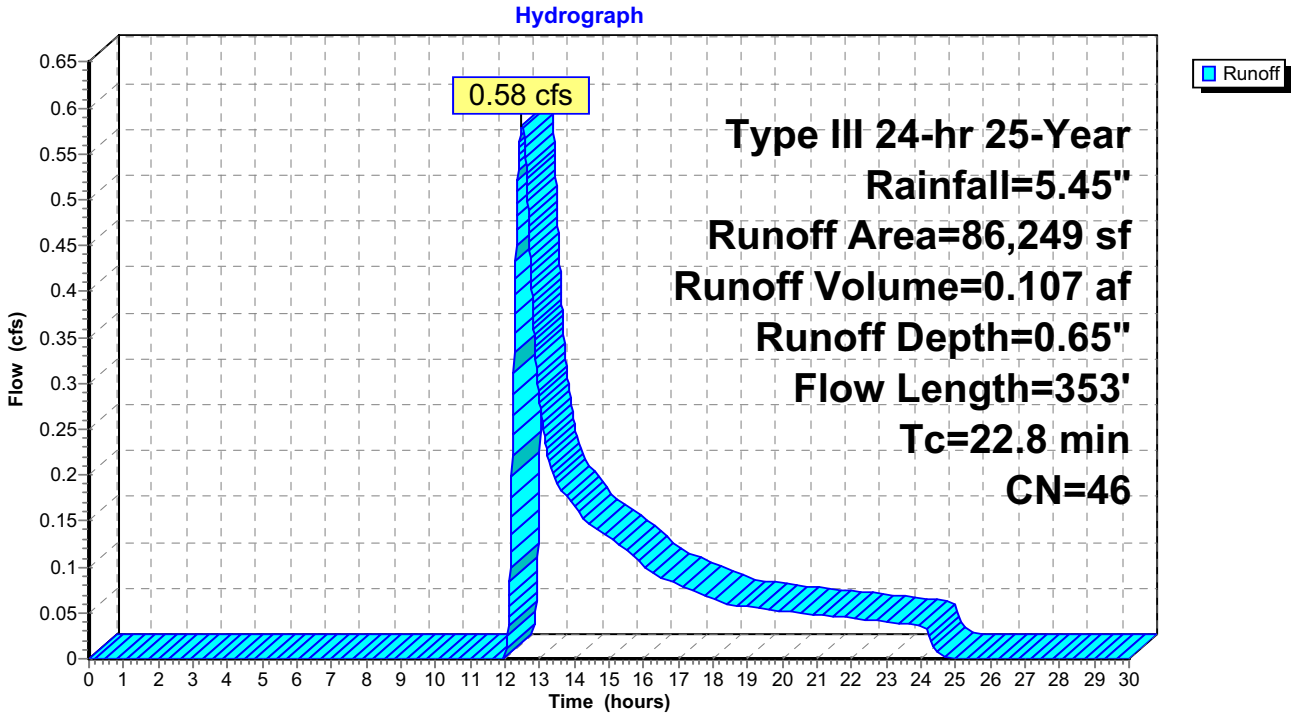
Runoff = 0.58 cfs @ 12.49 hrs, Volume= 0.107 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

	Area (sf)	CN	Description
*	75,359	39	>75% Grass cover, Good, HSG A
	10,890	98	Paved parking, HSG A
	86,249	46	Weighted Average
	75,359		87.37% Pervious Area
	10,890		12.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	152	0.0194	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
8.7	201	0.1144	0.39		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.10"
22.8	353	Total			

Subcatchment P-10: Post Developed Flow to Waterway



Summary for Subcatchment P-2: P-2

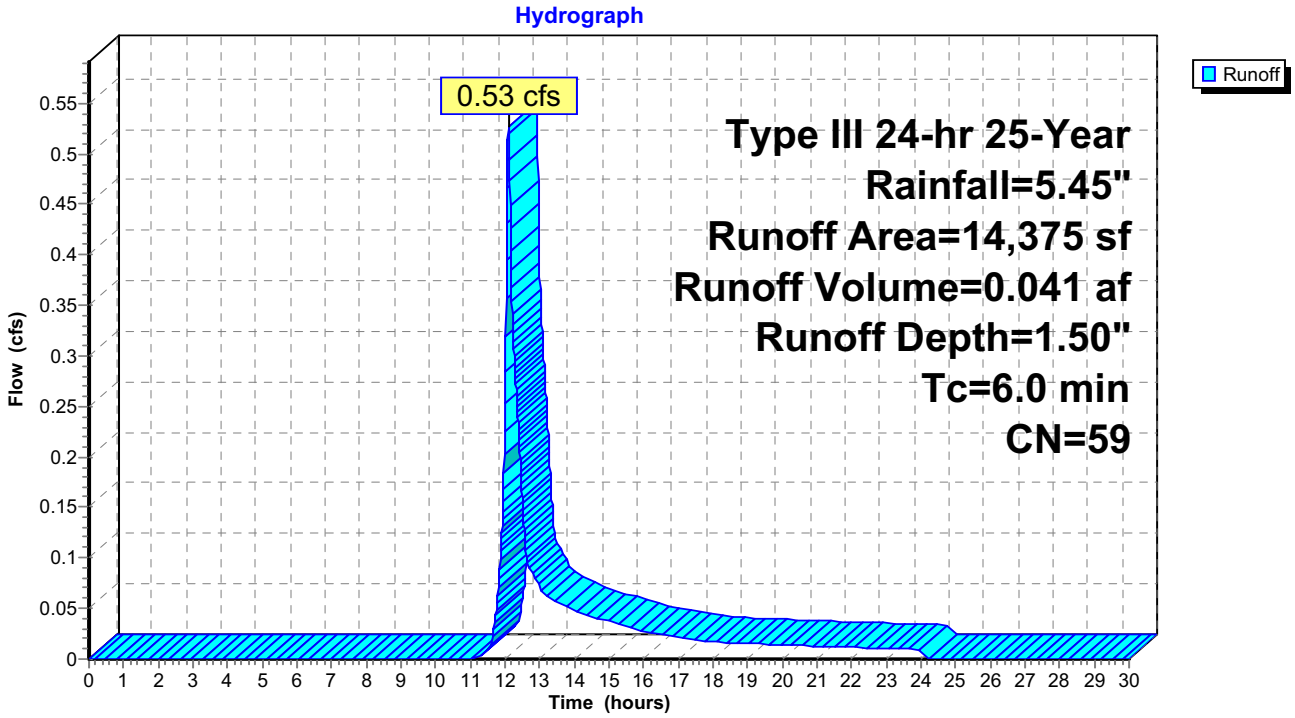
Runoff = 0.53 cfs @ 12.10 hrs, Volume= 0.041 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

Area (sf)	CN	Description
4,866	98	Paved parking, HSG A
9,509	39	>75% Grass cover, Good, HSG A
14,375	59	Weighted Average
9,509		66.15% Pervious Area
4,866		33.85% Impervious Area

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

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

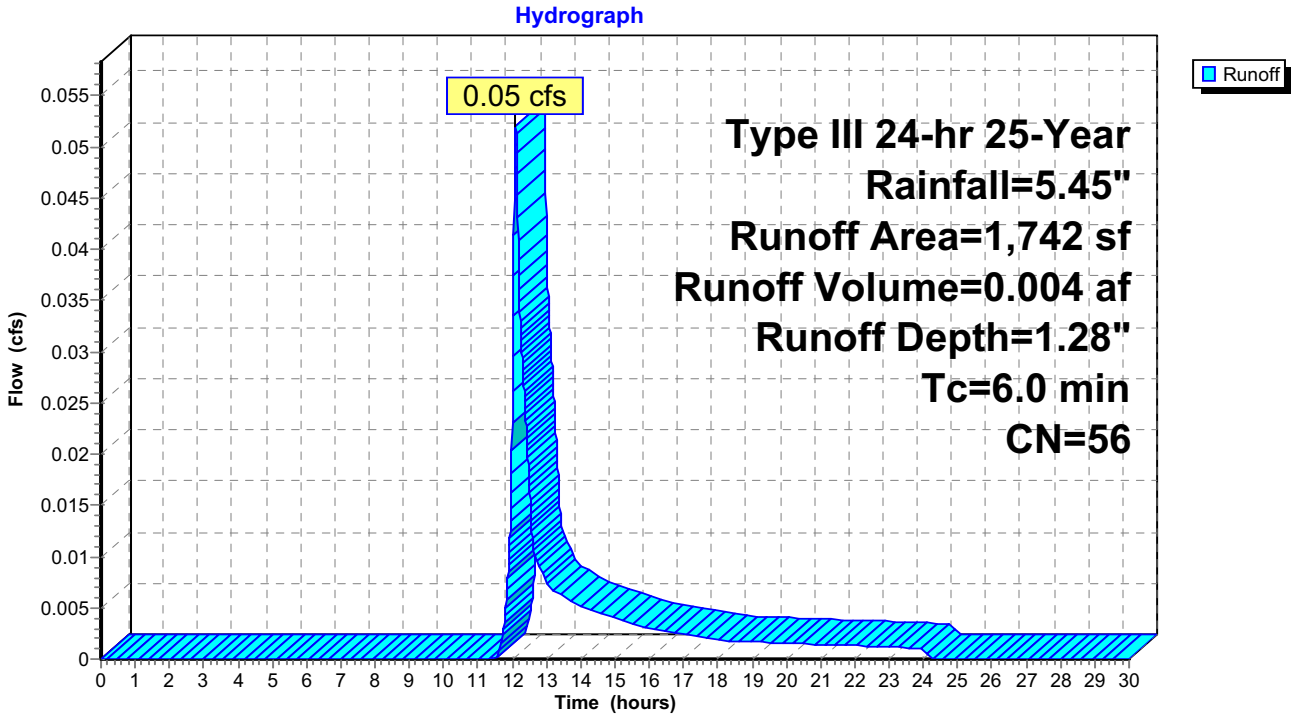
Runoff = 0.05 cfs @ 12.10 hrs, Volume= 0.004 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

Area (sf)	CN	Description
488	98	Paved parking, HSG A
1,254	39	>75% Grass cover, Good, HSG A
1,742	56	Weighted Average
1,254		71.99% Pervious Area
488		28.01% Impervious Area

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

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

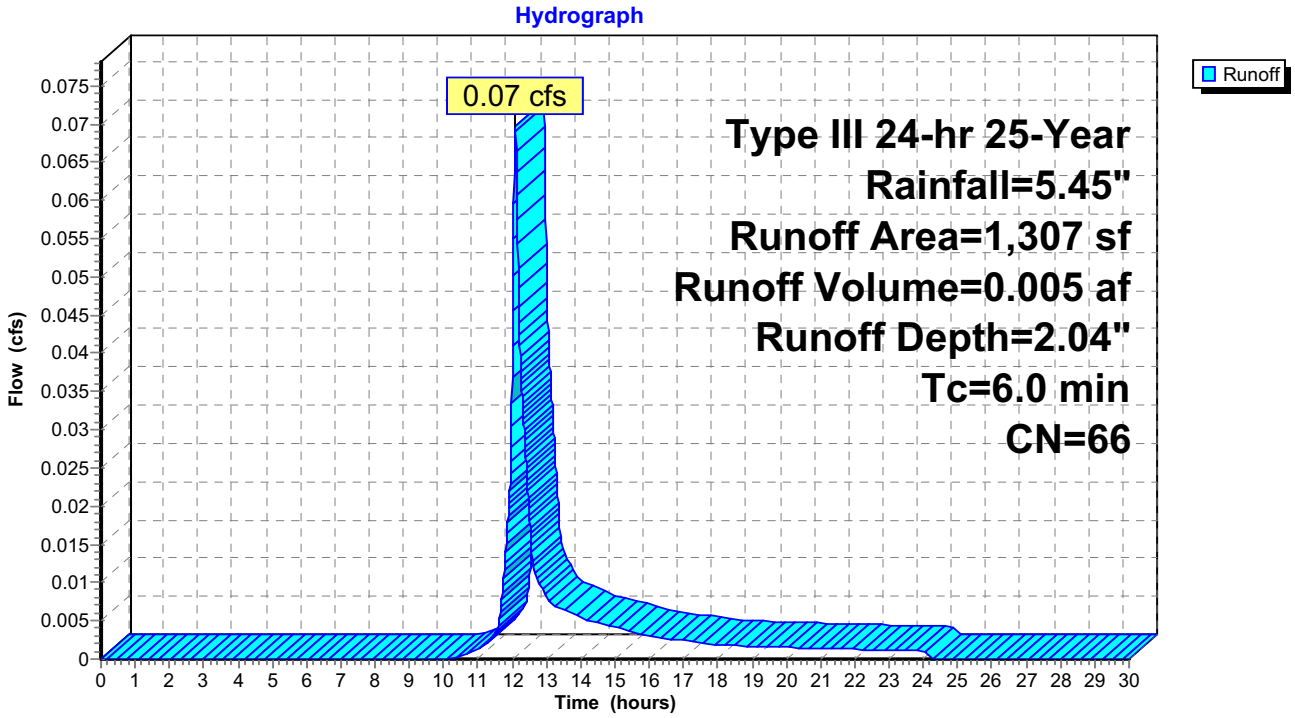
Runoff = 0.07 cfs @ 12.09 hrs, Volume= 0.005 af, Depth= 2.04"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

Area (sf)	CN	Description
594	98	Paved parking, HSG A
713	39	>75% Grass cover, Good, HSG A
1,307	66	Weighted Average
713		54.55% Pervious Area
594		45.45% Impervious Area

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

Subcatchment P-4: P-4



Summary for Subcatchment P-5: P-5

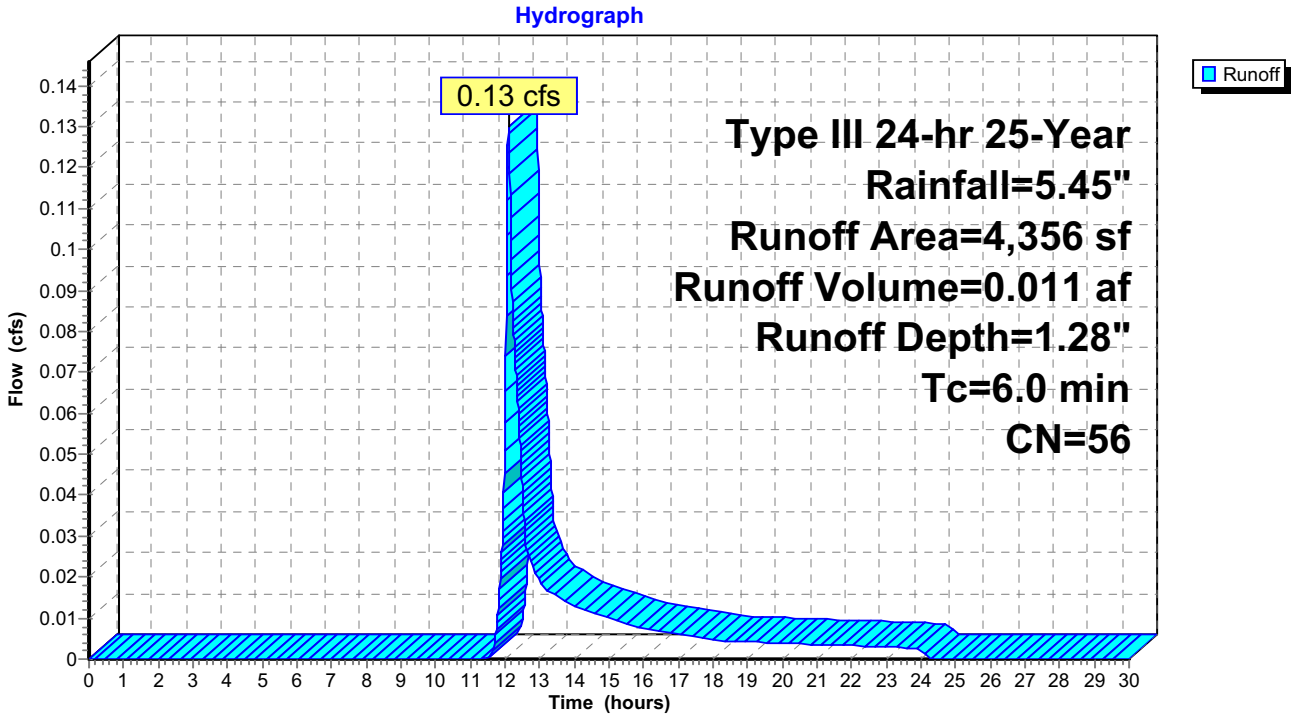
Runoff = 0.13 cfs @ 12.10 hrs, Volume= 0.011 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

Area (sf)	CN	Description
1,287	98	Paved parking, HSG A
3,069	39	>75% Grass cover, Good, HSG A
4,356	56	Weighted Average
3,069		70.45% Pervious Area
1,287		29.55% Impervious Area

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

Subcatchment P-5: P-5



Summary for Subcatchment P-6: P-6

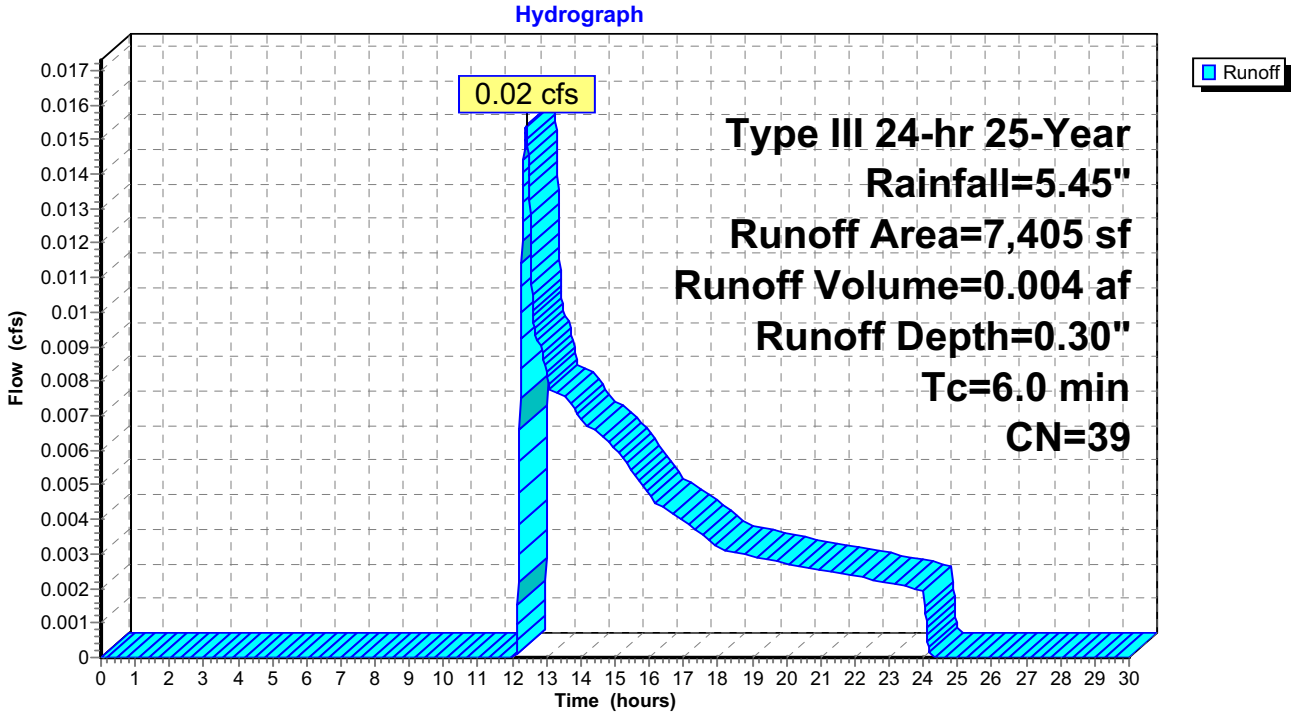
Runoff = 0.02 cfs @ 12.41 hrs, Volume= 0.004 af, Depth= 0.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

Area (sf)	CN	Description
7,405	39	>75% Grass cover, Good, HSG A
7,405		100.00% Pervious Area

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

Subcatchment P-6: P-6



Summary for Subcatchment P-7: P-7

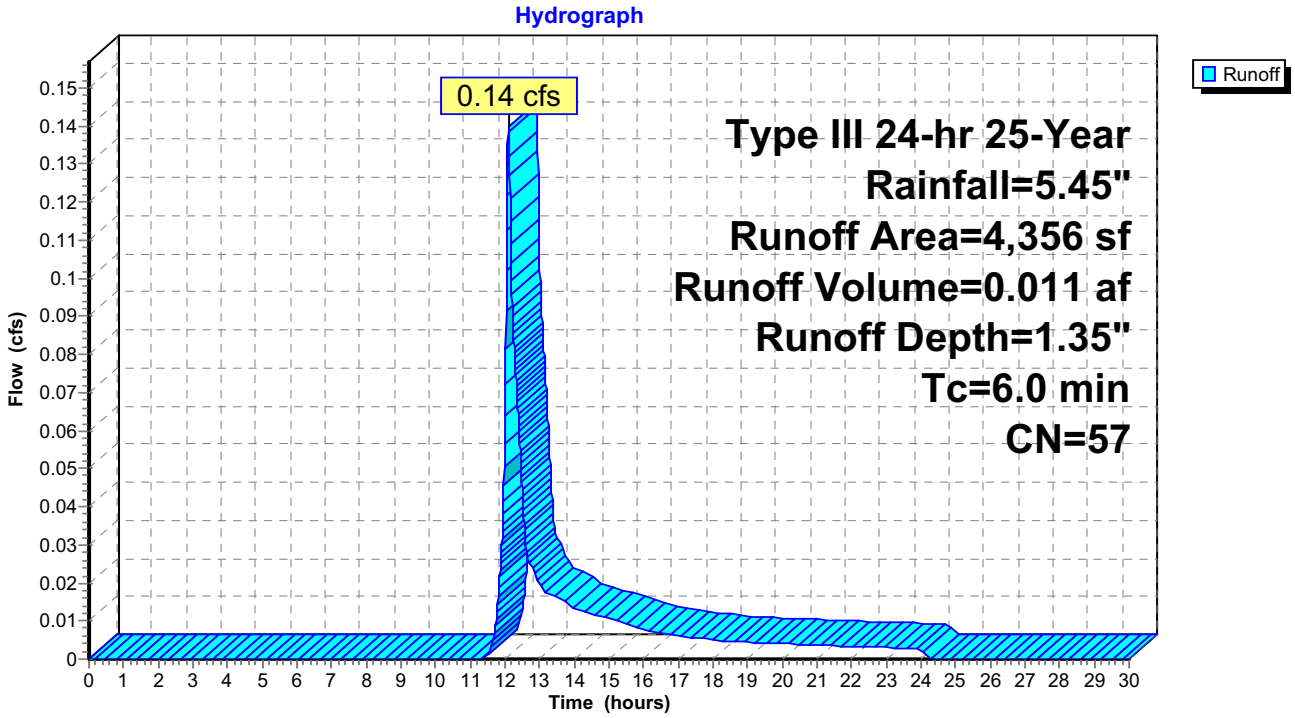
Runoff = 0.14 cfs @ 12.10 hrs, Volume= 0.011 af, Depth= 1.35"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

Area (sf)	CN	Description
1,307	98	Paved parking, HSG A
3,049	39	>75% Grass cover, Good, HSG A
4,356	57	Weighted Average
3,049		70.00% Pervious Area
1,307		30.00% Impervious Area

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

Subcatchment P-7: P-7



Summary for Subcatchment P-8: P-8

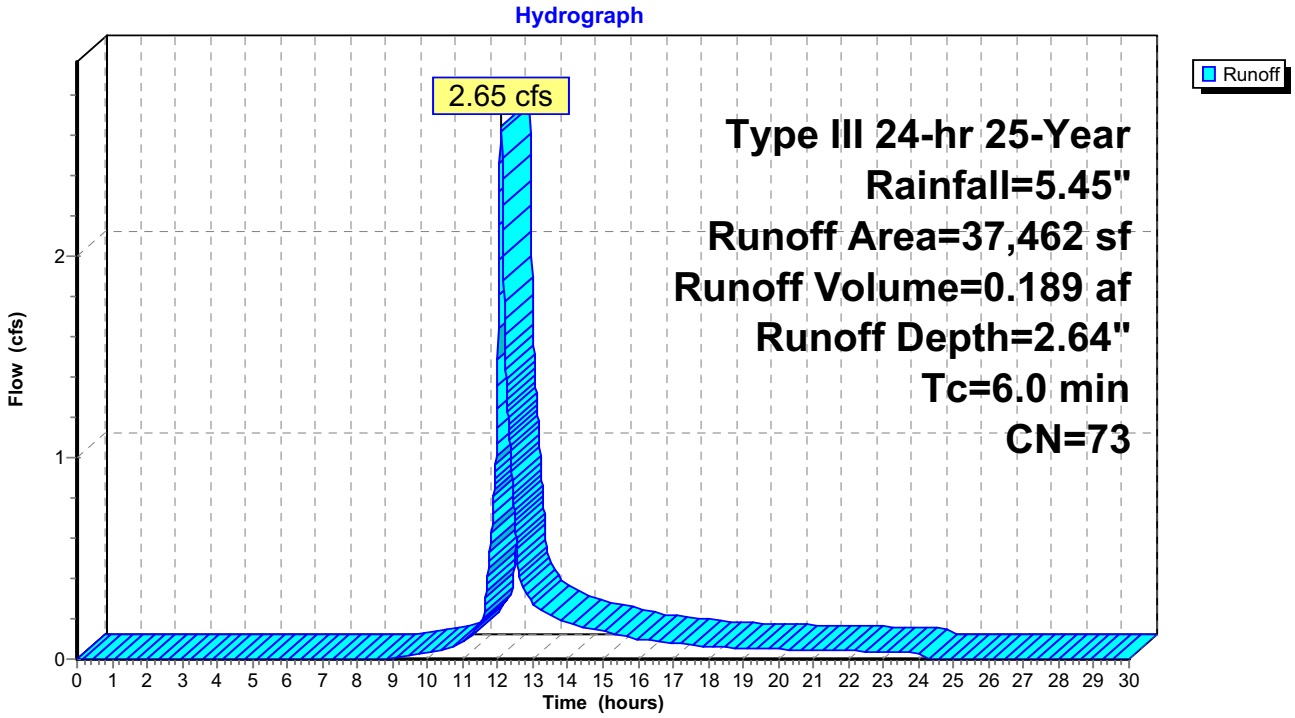
Runoff = 2.65 cfs @ 12.09 hrs, Volume= 0.189 af, Depth= 2.64"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

Area (sf)	CN	Description
21,813	98	Paved parking, HSG A
15,649	39	>75% Grass cover, Good, HSG A
37,462	73	Weighted Average
15,649		41.77% Pervious Area
21,813		58.23% Impervious Area

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

Subcatchment P-8: P-8



Summary for Subcatchment P-9: P-9

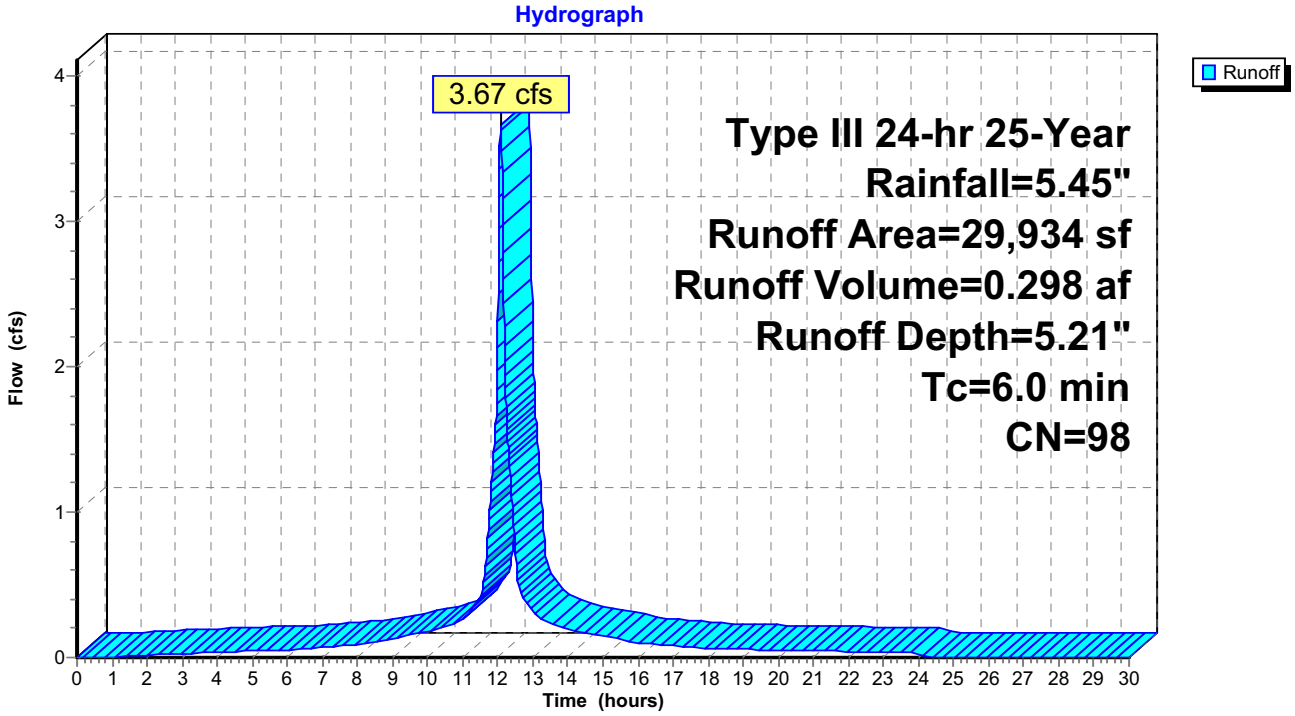
Runoff = 3.67 cfs @ 12.08 hrs, Volume= 0.298 af, Depth= 5.21"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 25-Year Rainfall=5.45"

Area (sf)	CN	Description
29,934	98	Roofs, HSG A
29,934		100.00% Impervious Area

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

Subcatchment P-9: P-9



Summary for Pond 2P: Infiltration Field

Inflow Area =	0.687 ac,100.00% Impervious, Inflow Depth = 5.21" for 25-Year event				
Inflow =	3.67 cfs @	12.08 hrs,	Volume=	0.298 af	
Outflow =	3.19 cfs @	12.13 hrs,	Volume=	0.298 af,	Atten= 13%, Lag= 2.7 min
Discarded =	0.25 cfs @	10.94 hrs,	Volume=	0.217 af	
Primary =	2.93 cfs @	12.13 hrs,	Volume=	0.081 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 154.38' @ 12.13 hrs Surf.Area= 0.031 ac Storage= 0.046 af

Plug-Flow detention time= 26.4 min calculated for 0.298 af (100% of inflow)
Center-of-Mass det. time= 26.4 min (773.0 - 746.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	151.67'	0.026 af	**17.00'W x 78.32'L x 2.83'H Field A** 0.087 af Overall - 0.022 af Embedded = 0.064 af x 40.0% Voids
#2A	152.17'	0.022 af	**StormTech SC-310** x 66 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.048 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	151.67'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	153.20'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 153.20' / 153.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Discarded OutFlow Max=0.25 cfs @ 10.94 hrs HW=151.70' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Primary OutFlow Max=2.93 cfs @ 12.13 hrs HW=154.38' (Free Discharge)
└─**2=Culvert** (Barrel Controls 2.93 cfs @ 4.00 fps)

Pond 2P: Infiltration Field - Chamber Wizard Field A

Chamber Model = StormTech SC-310
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 0.0" Spacing = 34.0" C-C

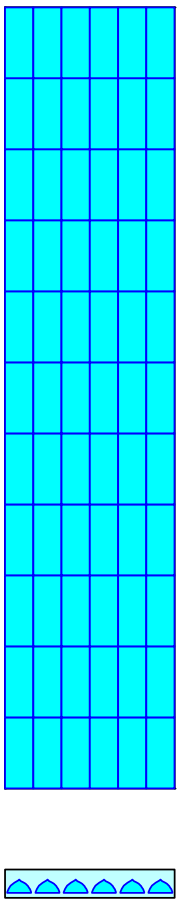
11 Chambers/Row x 7.12' Long = 78.32' Base Length
6 Rows x 34.0" Wide = 17.00' Base Width
6.0" Base + 16.0" Chamber Height + 12.0" Cover = 2.83' Field Height

66 Chambers x 14.7 cf = 973.0 cf Chamber Storage

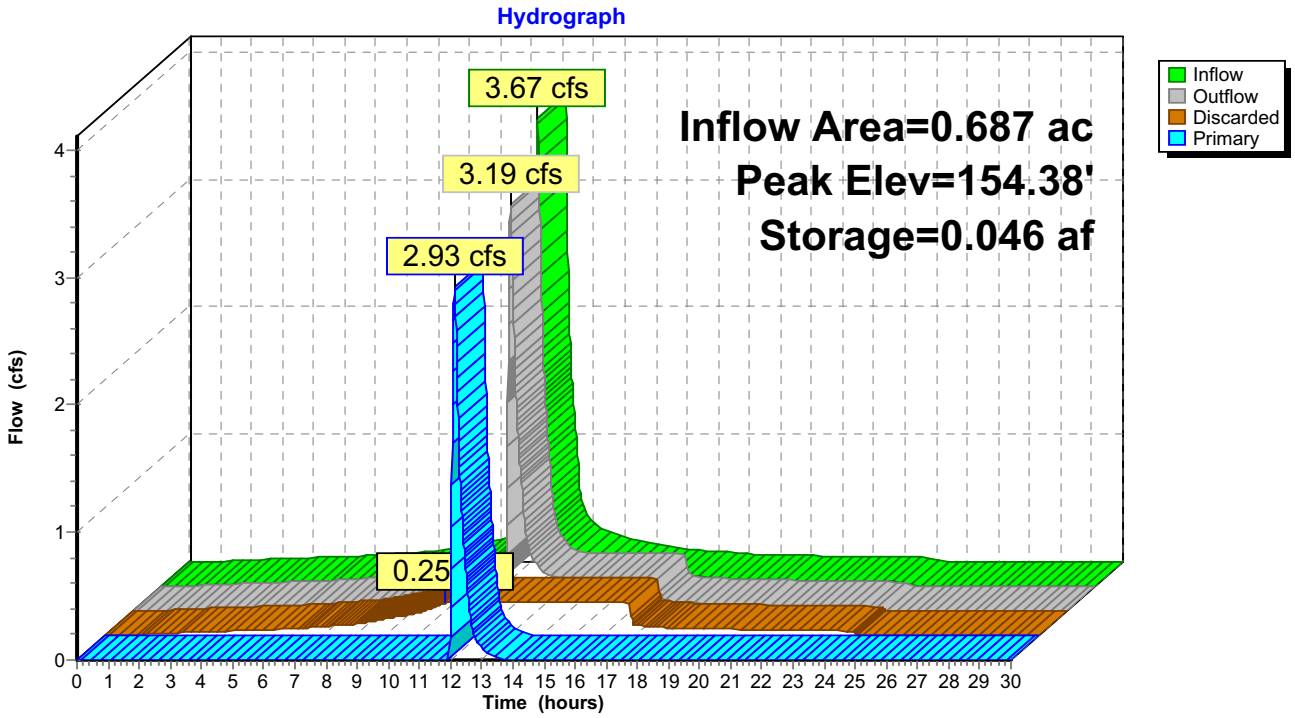
3,772.4 cf Field - 973.0 cf Chambers = 2,799.4 cf Stone x 40.0% Voids = 1,119.8 cf Stone Storage

Stone + Chamber Storage = 2,092.7 cf = 0.048 af

66 Chambers
139.7 cy Field
103.7 cy Stone



Pond 2P: Infiltration Field



Summary for Pond 7P: Infilitration Trench

Inflow Area = 2.150 ac, 11.63% Impervious, Inflow Depth = 0.62" for 25-Year event
Inflow = 0.59 cfs @ 12.49 hrs, Volume= 0.111 af
Outflow = 0.17 cfs @ 14.06 hrs, Volume= 0.111 af, Atten= 71%, Lag= 94.6 min
Discarded = 0.17 cfs @ 14.06 hrs, Volume= 0.111 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 159.21' @ 14.06 hrs Surf.Area= 0.019 ac Storage= 0.023 af

Plug-Flow detention time= 52.0 min calculated for 0.111 af (100% of inflow)
Center-of-Mass det. time= 52.0 min (994.3 - 942.4)

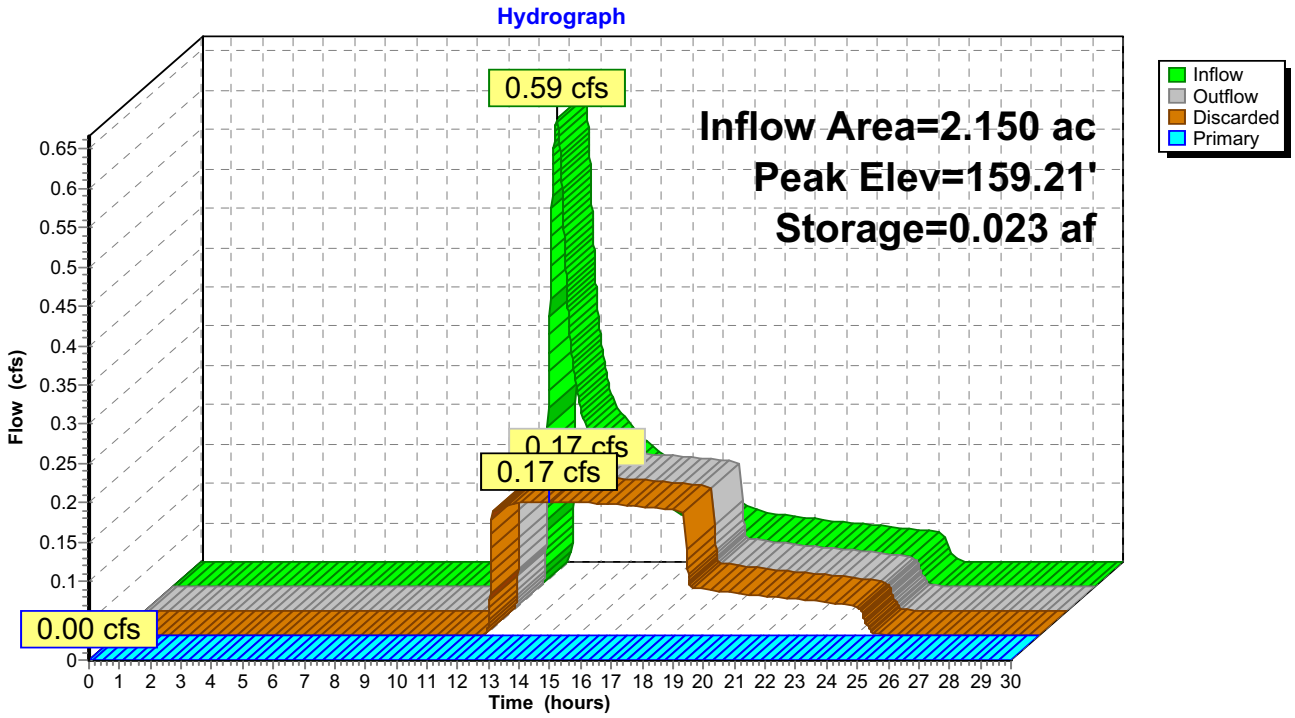
Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	0.038 af	**3.00'W x 260.00'L x 2.00'H Prismatoid Z=0.1**

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**8.710 in/hr Exfiltration over Surface area**
#2	Primary	160.00'	**6.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.17 cfs @ 14.06 hrs HW=159.21' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=158.00' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 7P: Infilitration Trench

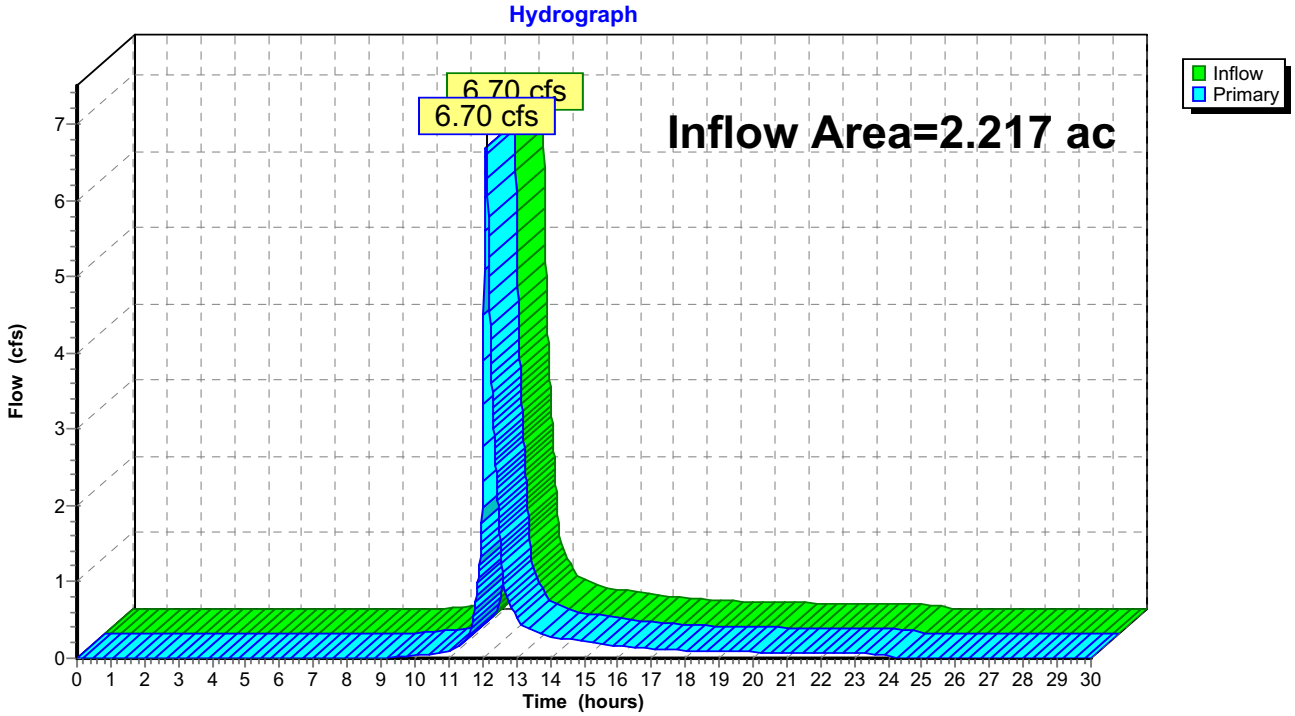


Summary for Link 1L: Flow to Study Point 1

Inflow Area = 2.217 ac, 65.24% Impervious, Inflow Depth = 1.98" for 25-Year event
Inflow = 6.70 cfs @ 12.11 hrs, Volume= 0.366 af
Primary = 6.70 cfs @ 12.11 hrs, Volume= 0.366 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 1L: Flow to Study Point 1

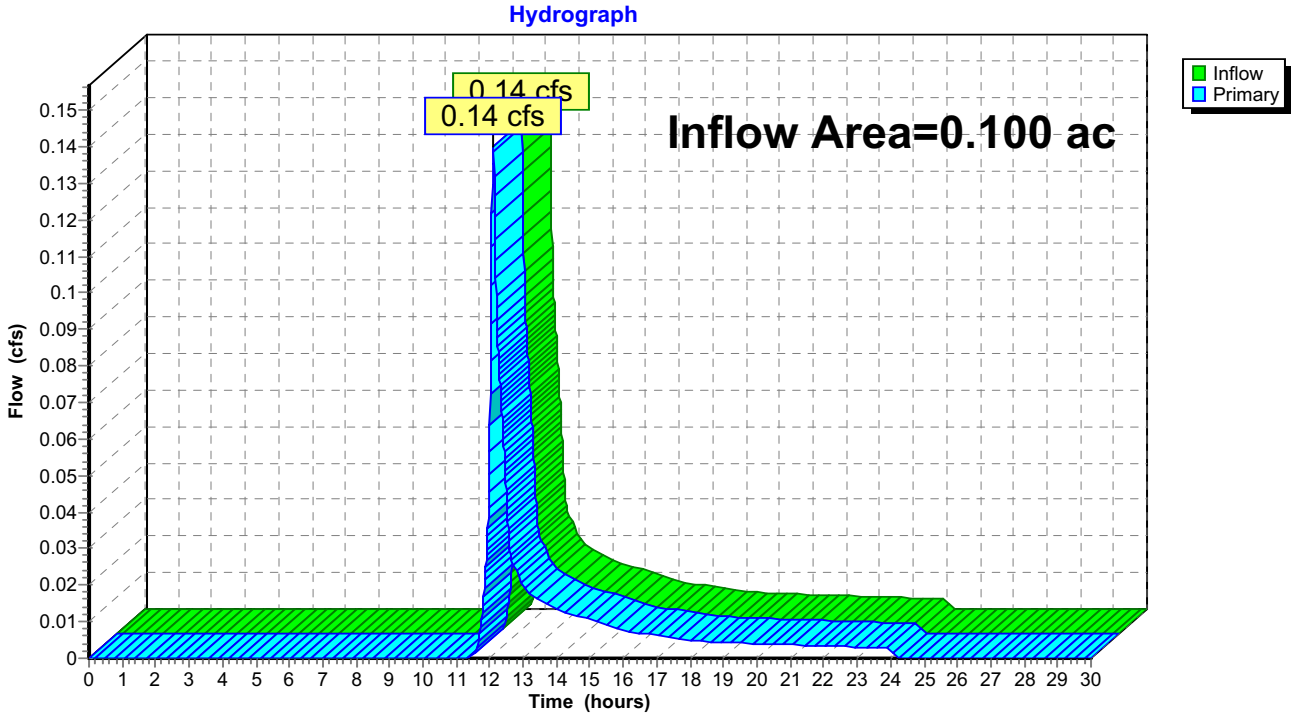


Summary for Link 3L: Flow to Study Point 2

Inflow Area = 0.100 ac, 30.00% Impervious, Inflow Depth = 1.35" for 25-Year event
Inflow = 0.14 cfs @ 12.10 hrs, Volume= 0.011 af
Primary = 0.14 cfs @ 12.10 hrs, Volume= 0.011 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 3L: Flow to Study Point 2

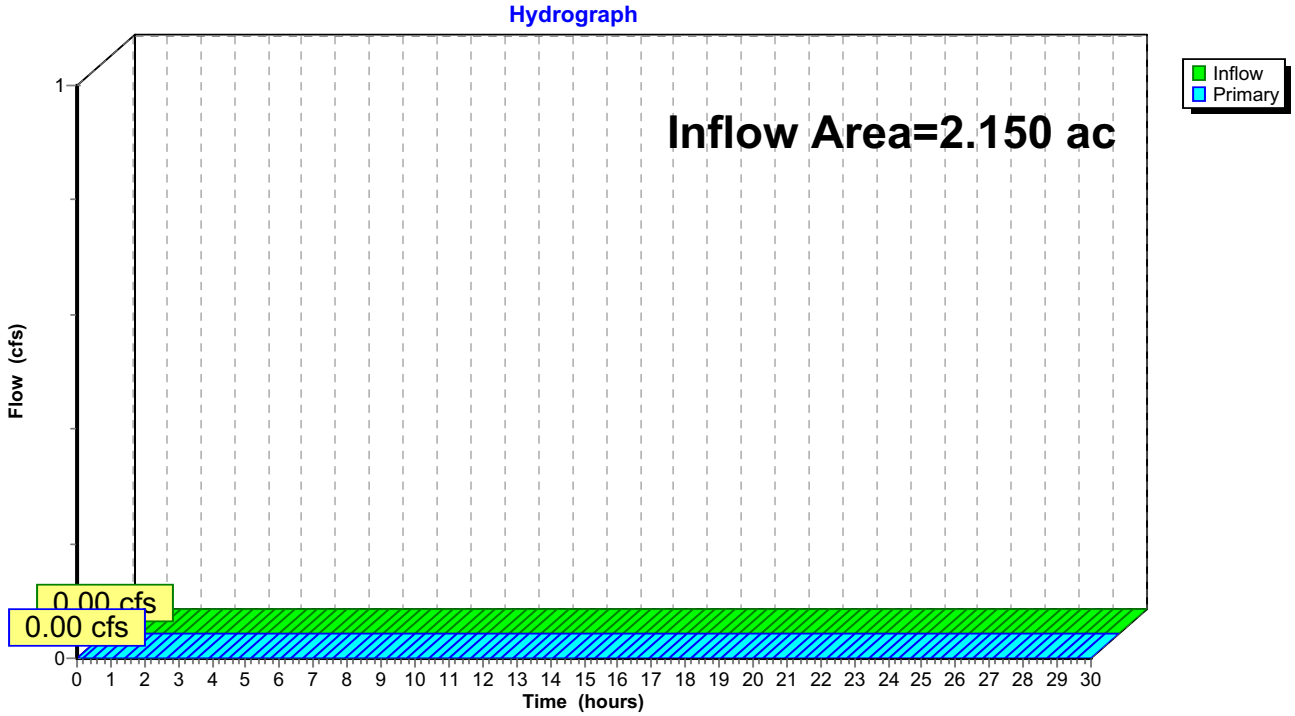


Summary for Link 4L: Flow to Study Point 3

Inflow Area = 2.150 ac, 11.63% Impervious, Inflow Depth = 0.00" for 25-Year event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 4L: Flow to Study Point 3

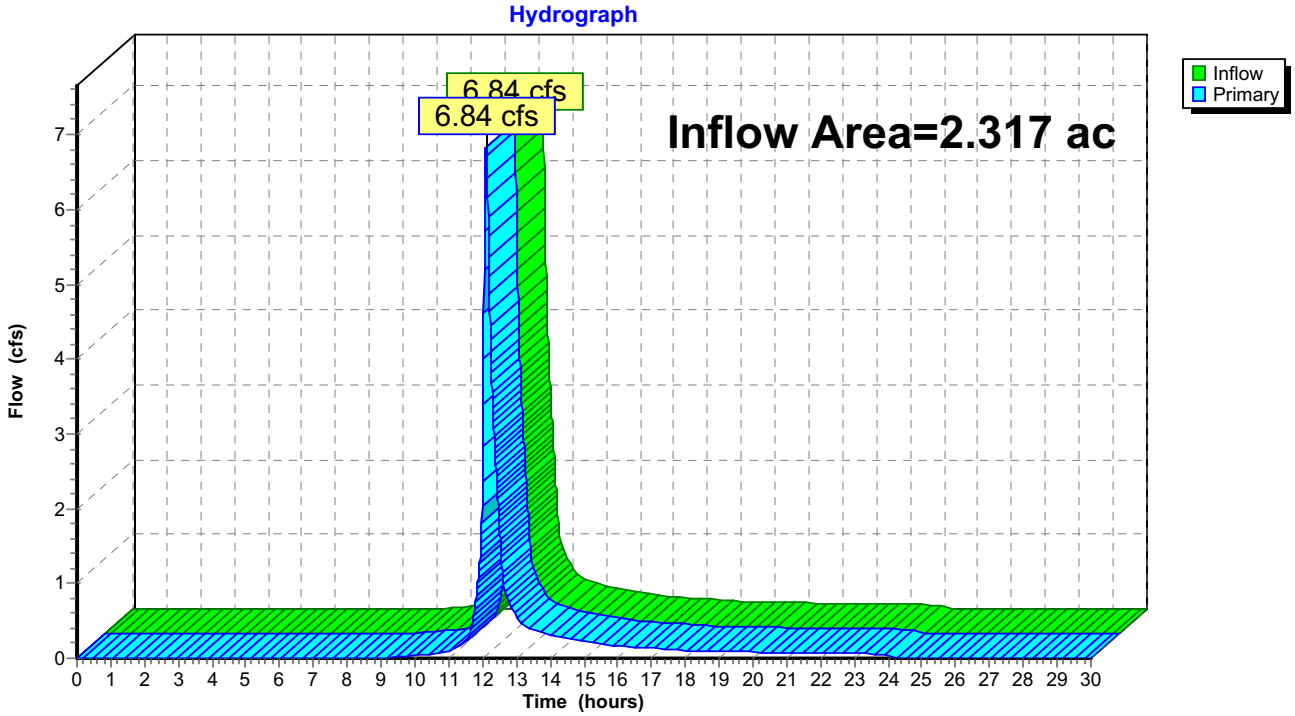


Summary for Link 5L: Combine at Wellesley Ave

Inflow Area = 2.317 ac, 63.72% Impervious, Inflow Depth = 1.96" for 25-Year event
Inflow = 6.84 cfs @ 12.11 hrs, Volume= 0.378 af
Primary = 6.84 cfs @ 12.11 hrs, Volume= 0.378 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5L: Combine at Wellesley Ave



Time span=0.00-30.00 hrs, dt=0.01 hrs, 3001 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment P-1: P-1 Runoff Area=7,405 sf 54.40% Impervious Runoff Depth=3.39"
Tc=6.0 min CN=71 Runoff=0.68 cfs 0.048 af

Subcatchment P-10: Post Developed Flow Runoff Area=86,249 sf 12.63% Impervious Runoff Depth=1.13"
Flow Length=353' Tc=22.8 min CN=46 Runoff=1.26 cfs 0.187 af

Subcatchment P-2: P-2 Runoff Area=14,375 sf 33.85% Impervious Runoff Depth=2.23"
Tc=6.0 min CN=59 Runoff=0.83 cfs 0.061 af

Subcatchment P-3: P-3 Runoff Area=1,742 sf 28.01% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=56 Runoff=0.09 cfs 0.007 af

Subcatchment P-4: P-4 Runoff Area=1,307 sf 45.45% Impervious Runoff Depth=2.89"
Tc=6.0 min CN=66 Runoff=0.10 cfs 0.007 af

Subcatchment P-5: P-5 Runoff Area=4,356 sf 29.55% Impervious Runoff Depth=1.96"
Tc=6.0 min CN=56 Runoff=0.21 cfs 0.016 af

Subcatchment P-6: P-6 Runoff Area=7,405 sf 0.00% Impervious Runoff Depth=0.63"
Tc=6.0 min CN=39 Runoff=0.05 cfs 0.009 af

Subcatchment P-7: P-7 Runoff Area=4,356 sf 30.00% Impervious Runoff Depth=2.05"
Tc=6.0 min CN=57 Runoff=0.23 cfs 0.017 af

Subcatchment P-8: P-8 Runoff Area=37,462 sf 58.23% Impervious Runoff Depth=3.59"
Tc=6.0 min CN=73 Runoff=3.62 cfs 0.257 af

Subcatchment P-9: P-9 Runoff Area=29,934 sf 100.00% Impervious Runoff Depth=6.36"
Tc=6.0 min CN=98 Runoff=4.45 cfs 0.364 af

Pond 2P: Infiltration Field Peak Elev=155.17' Storage=0.048 af Inflow=4.45 cfs 0.364 af
Discarded=0.25 cfs 0.246 af Primary=4.58 cfs 0.118 af Outflow=4.84 cfs 0.364 af

Pond 7P: Infilitration Trench Peak Elev=160.15' Storage=0.038 af Inflow=1.30 cfs 0.195 af
Discarded=0.18 cfs 0.158 af Primary=0.89 cfs 0.038 af Outflow=1.07 cfs 0.195 af

Link 1L: Flow to Study Point 1 Inflow=10.10 cfs 0.515 af
Primary=10.10 cfs 0.515 af

Link 3L: Flow to Study Point 2 Inflow=0.23 cfs 0.017 af
Primary=0.23 cfs 0.017 af

Link 4L: Flow to Study Point 3 Inflow=0.89 cfs 0.038 af
Primary=0.89 cfs 0.038 af

Link 5L: Combine at Wellesley Ave Inflow=10.33 cfs 0.532 af
Primary=10.33 cfs 0.532 af

Total Runoff Area = 4.467 ac Runoff Volume = 0.974 af Average Runoff Depth = 2.62"
61.35% Pervious = 2.741 ac 38.65% Impervious = 1.727 ac

Summary for Subcatchment P-1: P-1

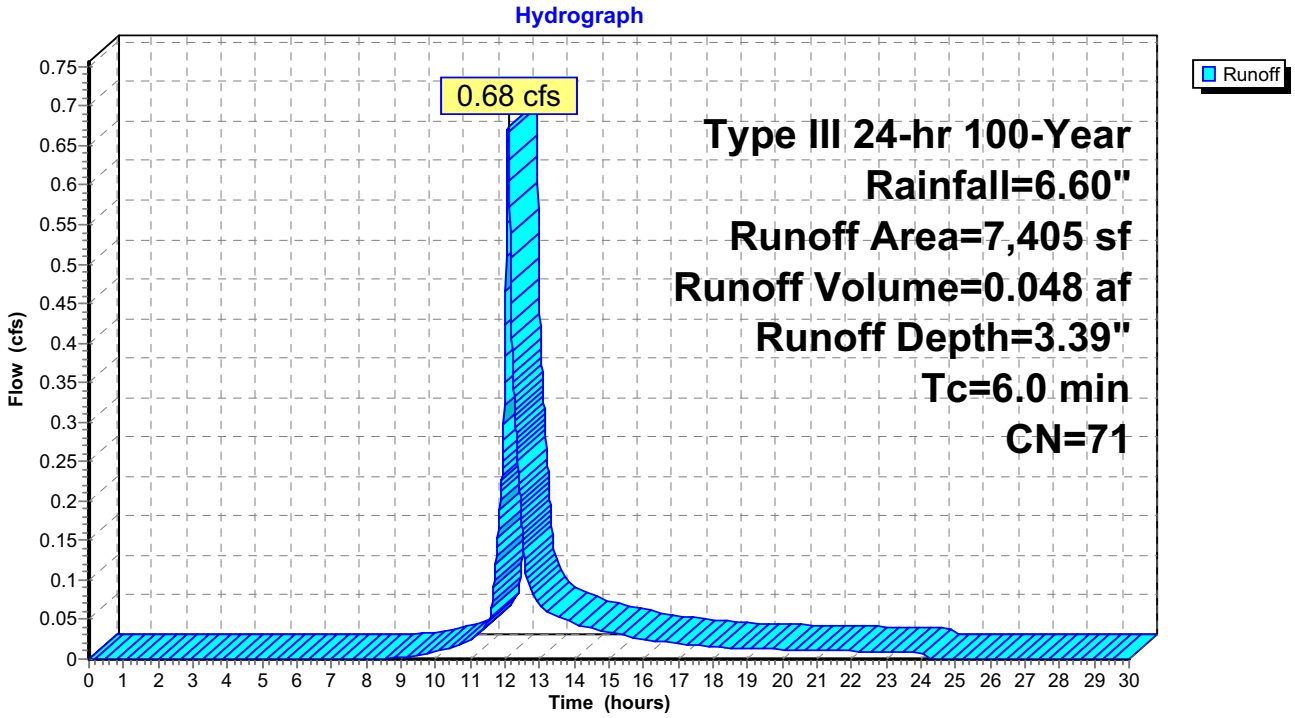
Runoff = 0.68 cfs @ 12.09 hrs, Volume= 0.048 af, Depth= 3.39"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

Area (sf)	CN	Description
4,028	98	Paved parking, HSG A
3,377	39	>75% Grass cover, Good, HSG A
7,405	71	Weighted Average
3,377		45.60% Pervious Area
4,028		54.40% Impervious Area

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

Subcatchment P-1: P-1



Summary for Subcatchment P-10: Post Developed Flow to Waterway

Existing watershed at Equipment Service station

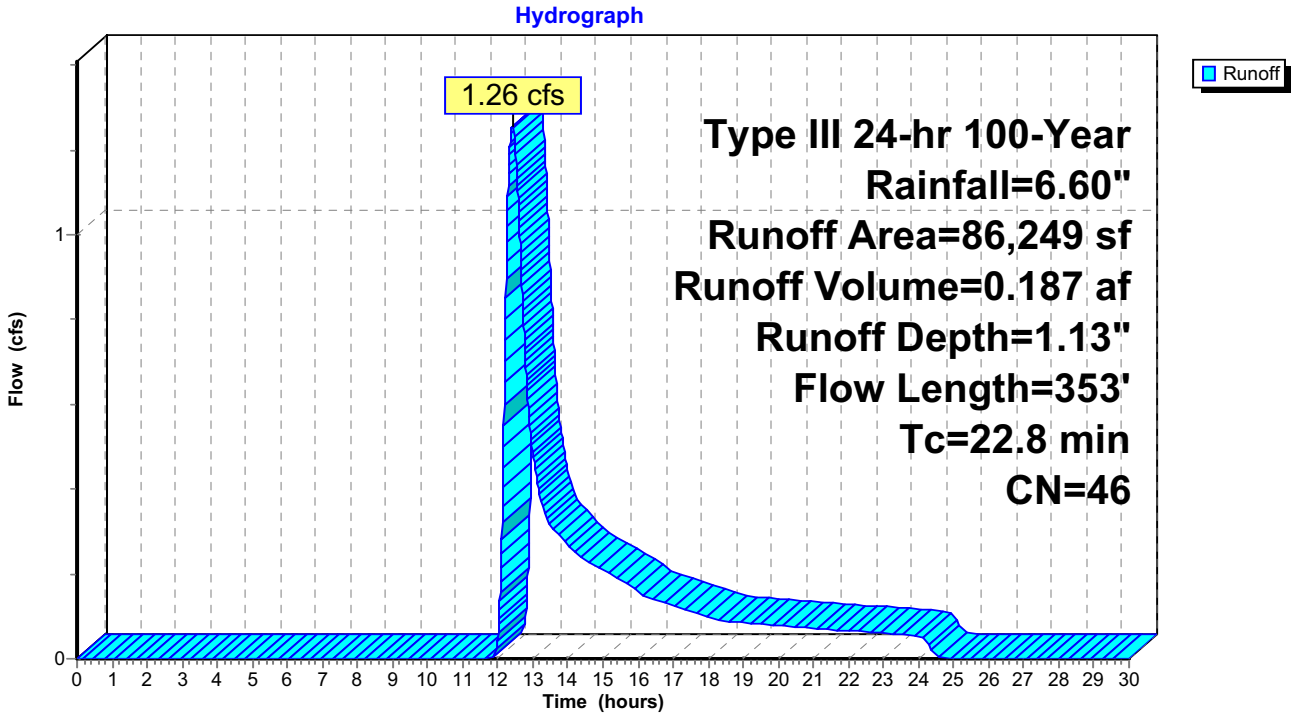
Runoff = 1.26 cfs @ 12.41 hrs, Volume= 0.187 af, Depth= 1.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

	Area (sf)	CN	Description
*	75,359	39	>75% Grass cover, Good, HSG A
	10,890	98	Paved parking, HSG A
	86,249	46	Weighted Average
	75,359		87.37% Pervious Area
	10,890		12.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.1	152	0.0194	0.18		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.10"
8.7	201	0.1144	0.39		**Sheet Flow, B-C** Grass: Short n= 0.150 P2= 3.10"
22.8	353	Total			

Subcatchment P-10: Post Developed Flow to Waterway



Summary for Subcatchment P-2: P-2

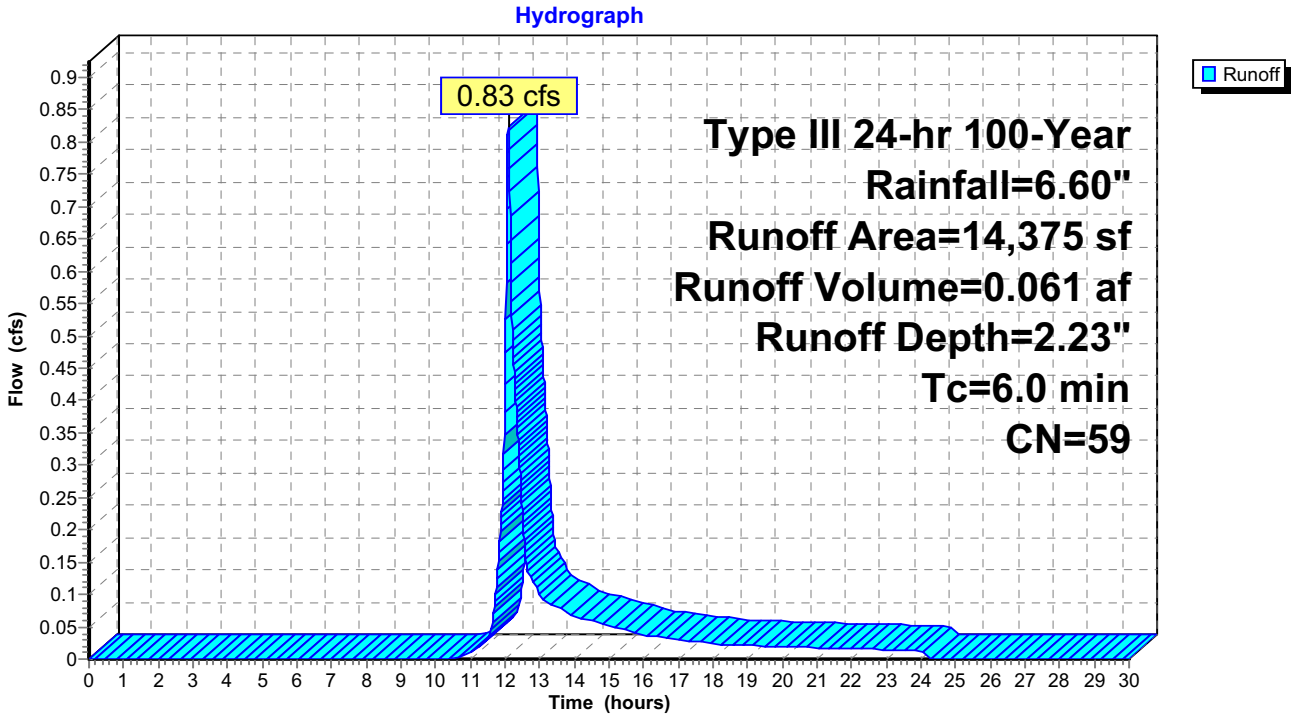
Runoff = 0.83 cfs @ 12.10 hrs, Volume= 0.061 af, Depth= 2.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

Area (sf)	CN	Description
4,866	98	Paved parking, HSG A
9,509	39	>75% Grass cover, Good, HSG A
14,375	59	Weighted Average
9,509		66.15% Pervious Area
4,866		33.85% Impervious Area

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

Subcatchment P-2: P-2



Summary for Subcatchment P-3: P-3

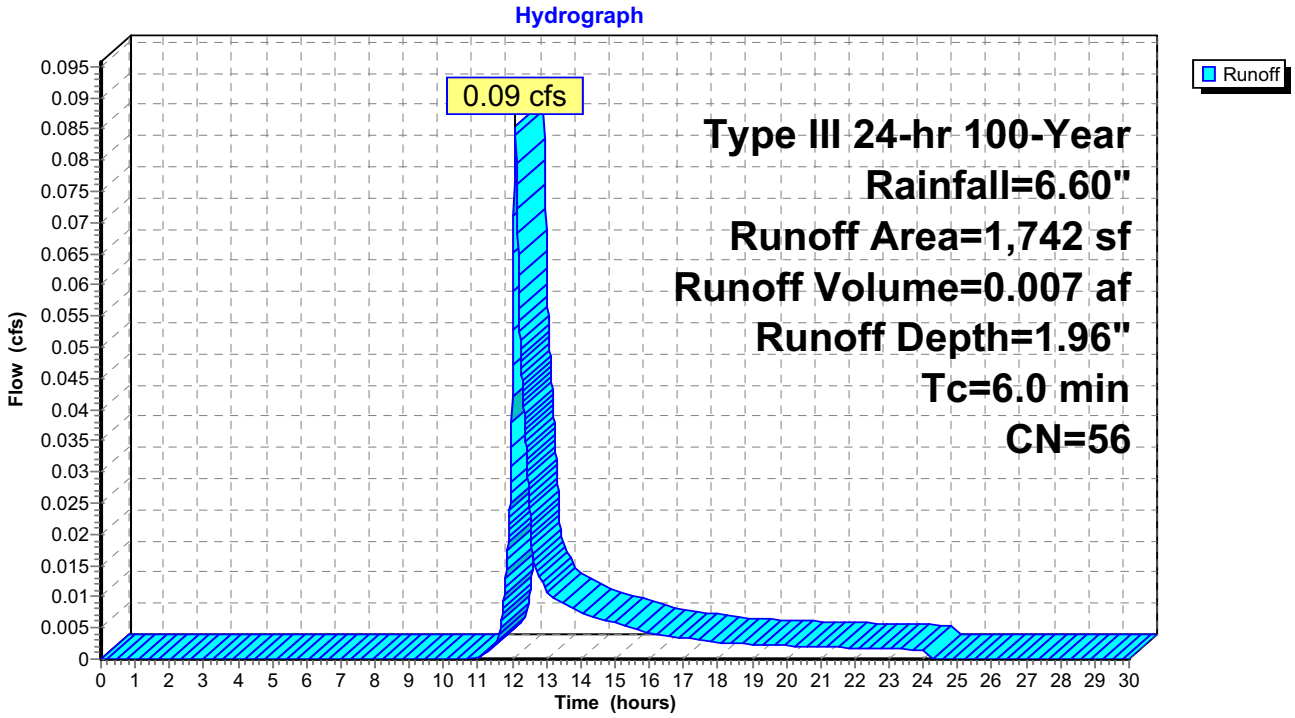
Runoff = 0.09 cfs @ 12.10 hrs, Volume= 0.007 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

Area (sf)	CN	Description
488	98	Paved parking, HSG A
1,254	39	>75% Grass cover, Good, HSG A
1,742	56	Weighted Average
1,254		71.99% Pervious Area
488		28.01% Impervious Area

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

Subcatchment P-3: P-3



Summary for Subcatchment P-4: P-4

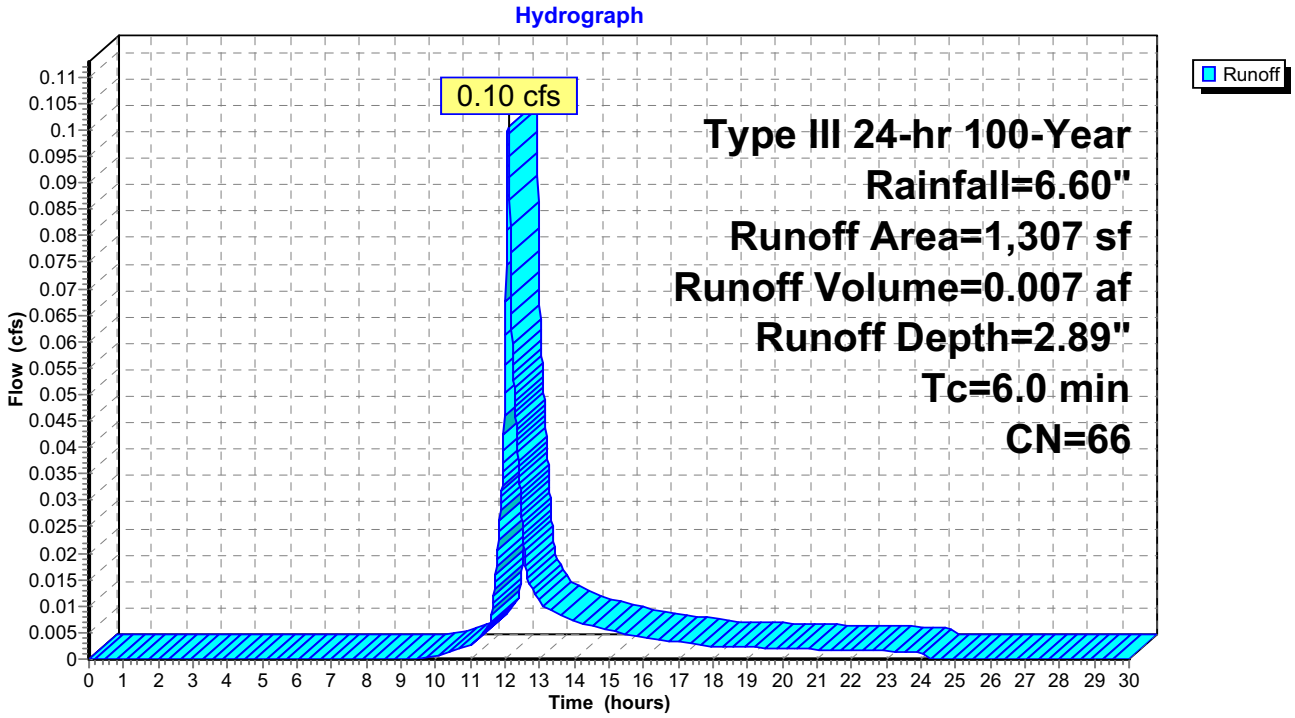
Runoff = 0.10 cfs @ 12.09 hrs, Volume= 0.007 af, Depth= 2.89"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

Area (sf)	CN	Description
594	98	Paved parking, HSG A
713	39	>75% Grass cover, Good, HSG A
1,307	66	Weighted Average
713		54.55% Pervious Area
594		45.45% Impervious Area

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

Subcatchment P-4: P-4



Summary for Subcatchment P-5: P-5

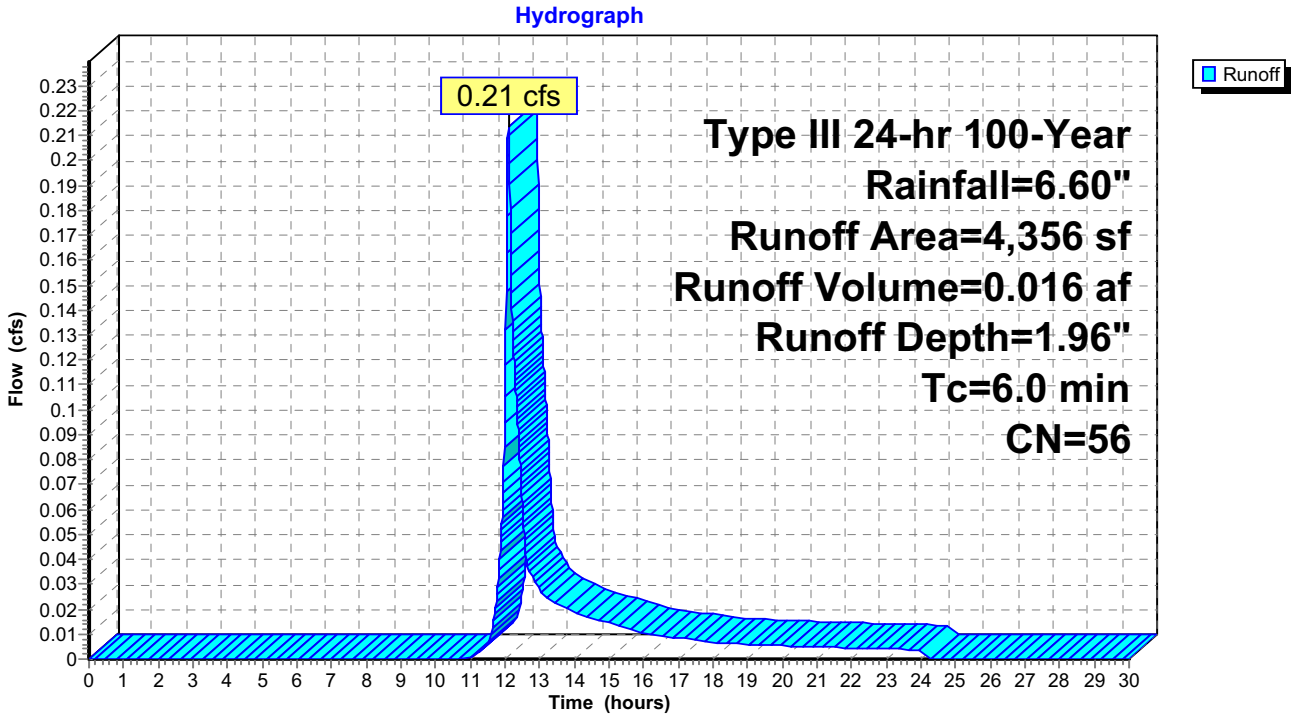
Runoff = 0.21 cfs @ 12.10 hrs, Volume= 0.016 af, Depth= 1.96"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

Area (sf)	CN	Description
1,287	98	Paved parking, HSG A
3,069	39	>75% Grass cover, Good, HSG A
4,356	56	Weighted Average
3,069		70.45% Pervious Area
1,287		29.55% Impervious Area

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

Subcatchment P-5: P-5



Summary for Subcatchment P-6: P-6

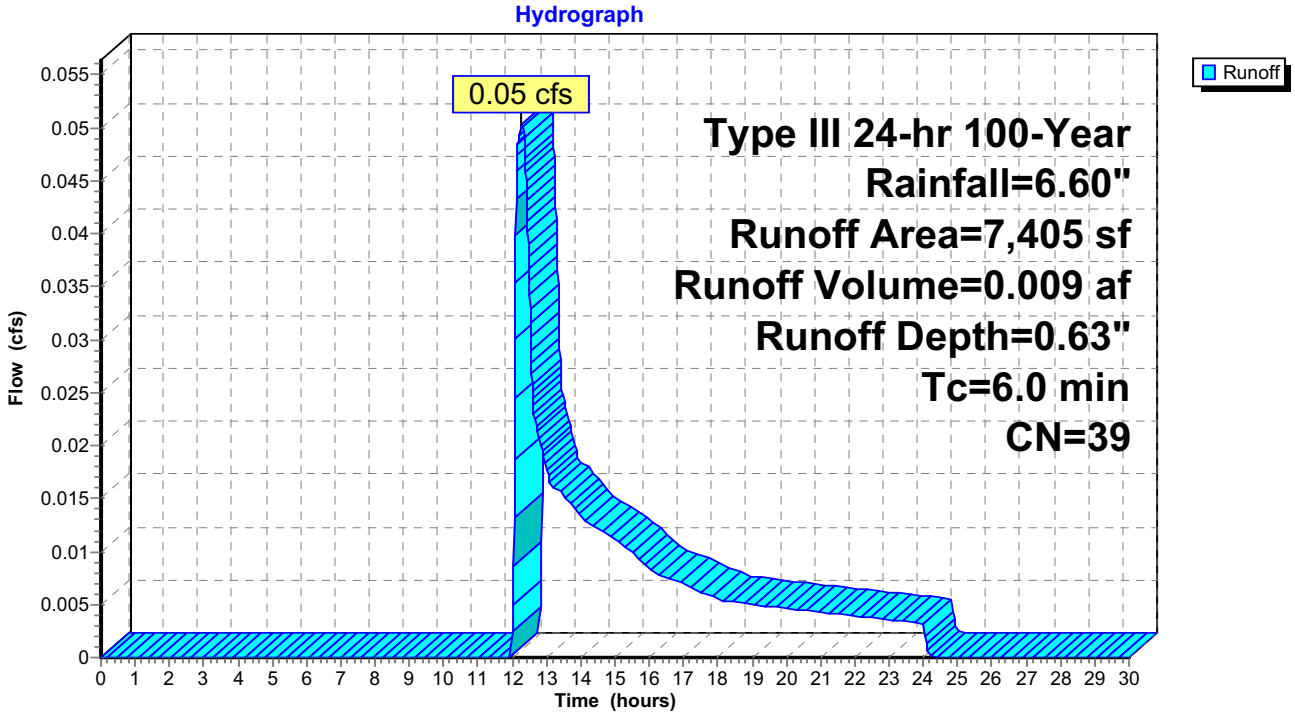
Runoff = 0.05 cfs @ 12.29 hrs, Volume= 0.009 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

Area (sf)	CN	Description
7,405	39	>75% Grass cover, Good, HSG A
7,405		100.00% Pervious Area

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

Subcatchment P-6: P-6



Summary for Subcatchment P-7: P-7

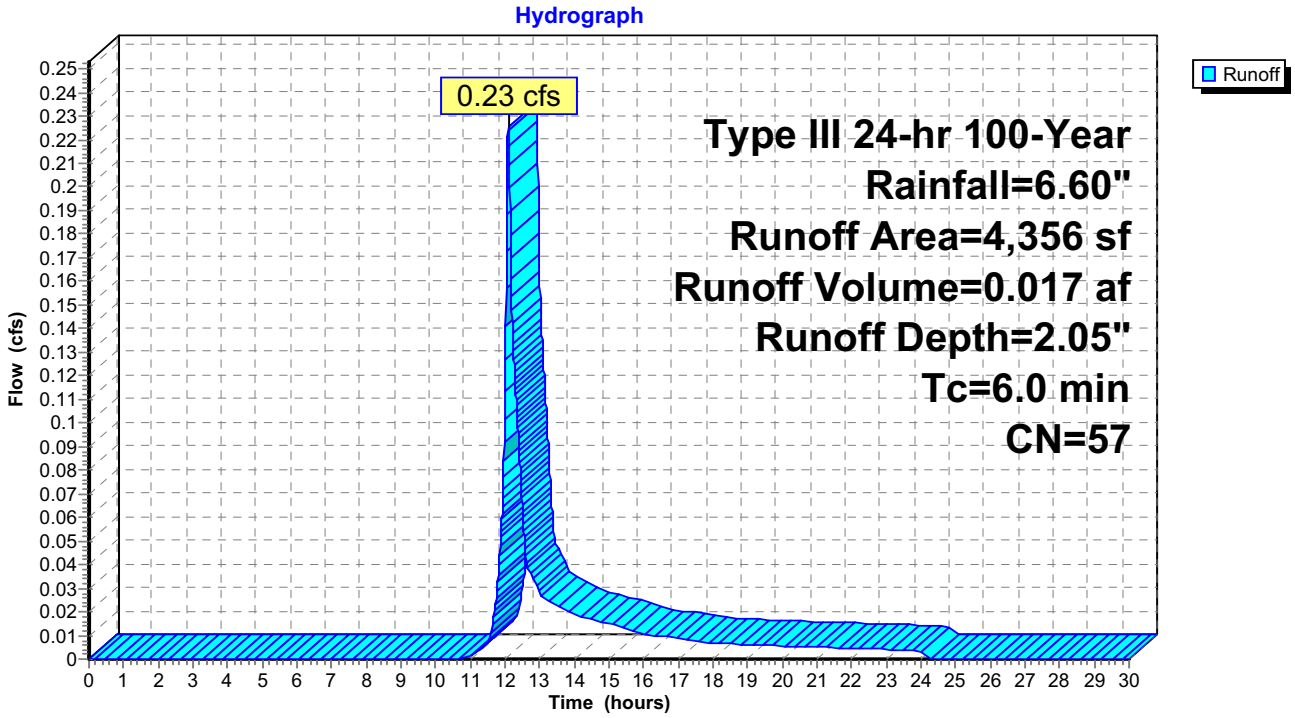
Runoff = 0.23 cfs @ 12.10 hrs, Volume= 0.017 af, Depth= 2.05"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

Area (sf)	CN	Description
1,307	98	Paved parking, HSG A
3,049	39	>75% Grass cover, Good, HSG A
4,356	57	Weighted Average
3,049		70.00% Pervious Area
1,307		30.00% Impervious Area

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

Subcatchment P-7: P-7



Summary for Subcatchment P-8: P-8

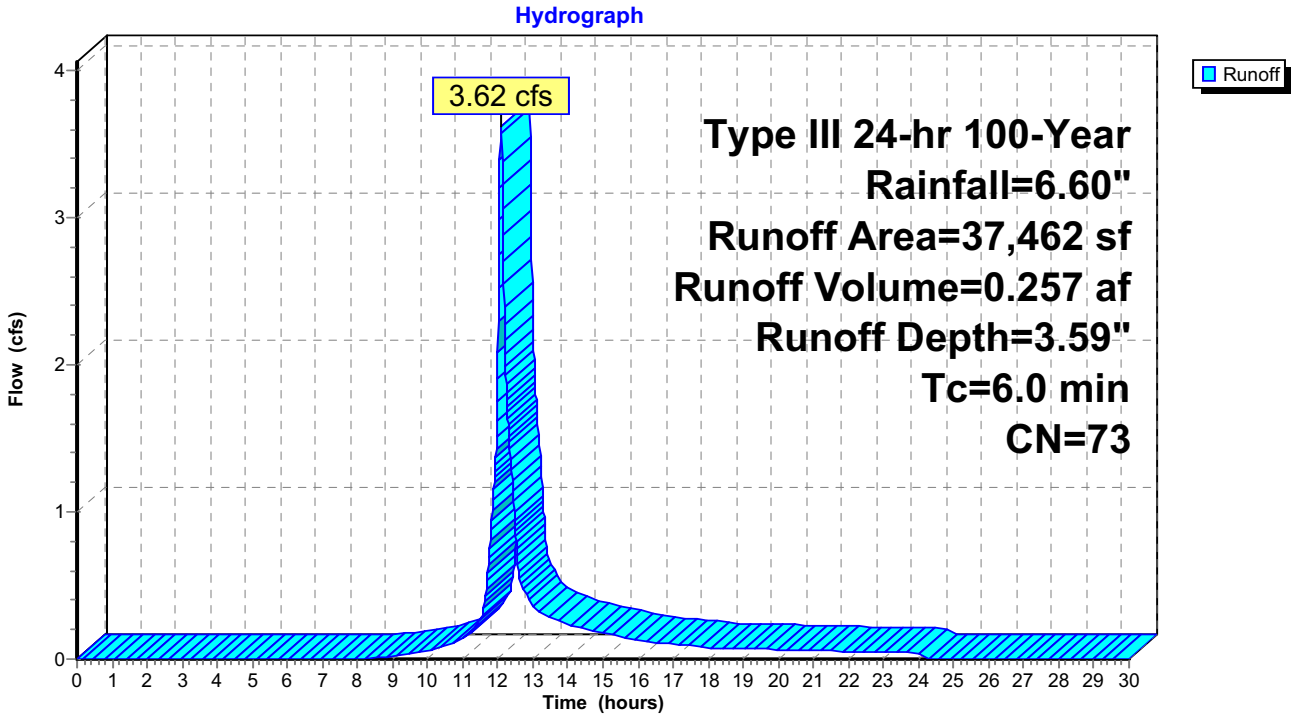
Runoff = 3.62 cfs @ 12.09 hrs, Volume= 0.257 af, Depth= 3.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

Area (sf)	CN	Description
21,813	98	Paved parking, HSG A
15,649	39	>75% Grass cover, Good, HSG A
37,462	73	Weighted Average
15,649		41.77% Pervious Area
21,813		58.23% Impervious Area

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

Subcatchment P-8: P-8



Summary for Subcatchment P-9: P-9

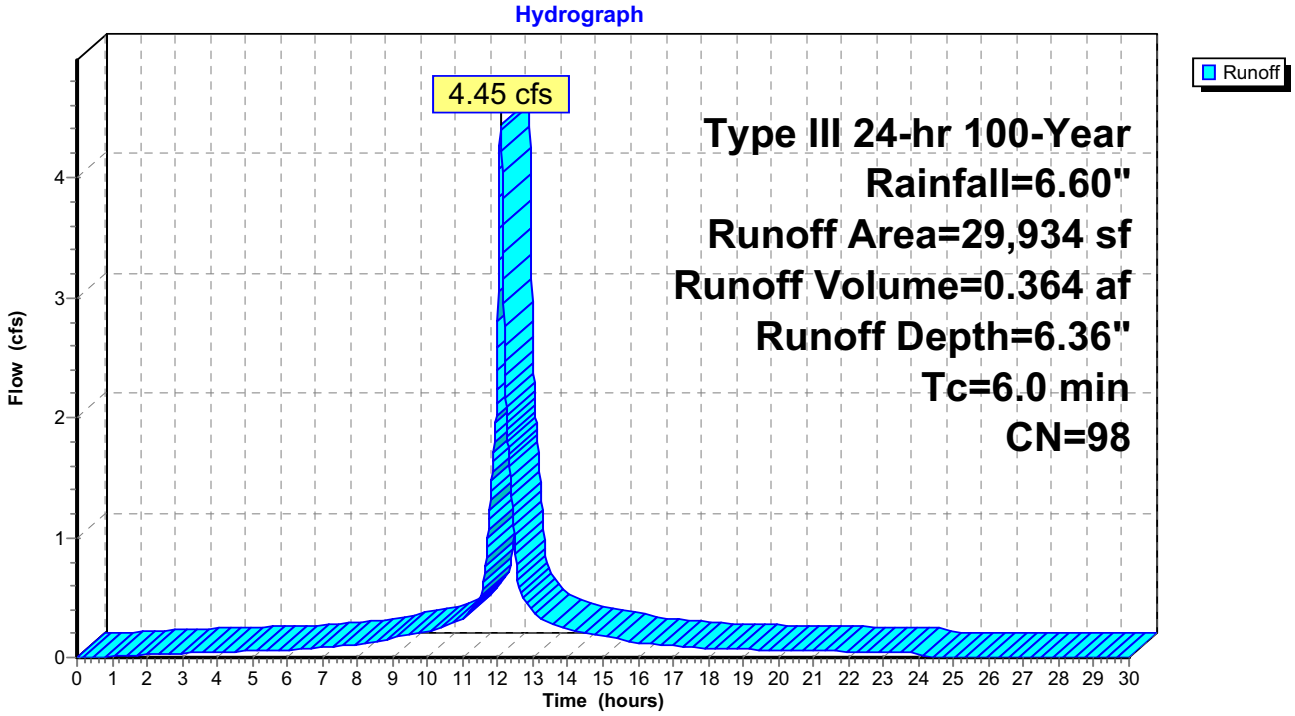
Runoff = 4.45 cfs @ 12.08 hrs, Volume= 0.364 af, Depth= 6.36"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Type III 24-hr 100-Year Rainfall=6.60"

Area (sf)	CN	Description
29,934	98	Roofs, HSG A
29,934		100.00% Impervious Area

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

Subcatchment P-9: P-9



Summary for Pond 2P: Infiltration Field

[93] Warning: Storage range exceeded by 0.66'
[88] Warning: Qout>Qin may require Finer Routing>1

Inflow Area =	0.687 ac,100.00% Impervious, Inflow Depth = 6.36" for 100-Year event				
Inflow =	4.45 cfs @	12.08 hrs,	Volume=	0.364 af	
Outflow =	4.84 cfs @	12.09 hrs,	Volume=	0.364 af,	Atten= 0%, Lag= 0.4 min
Discarded =	0.25 cfs @	10.44 hrs,	Volume=	0.246 af	
Primary =	4.58 cfs @	12.09 hrs,	Volume=	0.118 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 155.17' @ 12.09 hrs Surf.Area= 0.031 ac Storage= 0.048 af

Plug-Flow detention time= 25.9 min calculated for 0.364 af (100% of inflow)
Center-of-Mass det. time= 25.9 min (769.7 - 743.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	151.67'	0.026 af	**17.00'W x 78.32'L x 2.83'H Field A** 0.087 af Overall - 0.022 af Embedded = 0.064 af x 40.0% Voids
#2A	152.17'	0.022 af	**StormTech SC-310** x 66 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.048 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	151.67'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	153.20'	**12.0" Round Culvert** L= 20.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 153.20' / 153.00' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior

Discarded OutFlow Max=0.25 cfs @ 10.44 hrs HW=151.70' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.25 cfs)

Primary OutFlow Max=4.56 cfs @ 12.09 hrs HW=155.16' (Free Discharge)
└─**2=Culvert** (Inlet Controls 4.56 cfs @ 5.81 fps)

Pond 2P: Infiltration Field - Chamber Wizard Field A

Chamber Model = StormTech SC-310
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 0.0" Spacing = 34.0" C-C

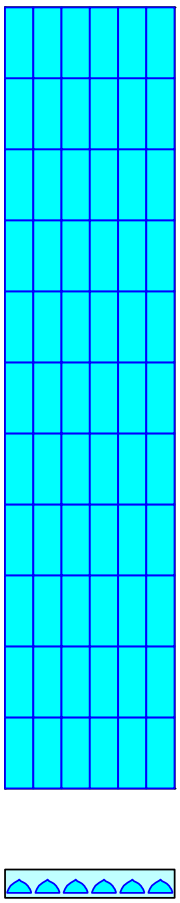
11 Chambers/Row x 7.12' Long = 78.32' Base Length
6 Rows x 34.0" Wide = 17.00' Base Width
6.0" Base + 16.0" Chamber Height + 12.0" Cover = 2.83' Field Height

66 Chambers x 14.7 cf = 973.0 cf Chamber Storage

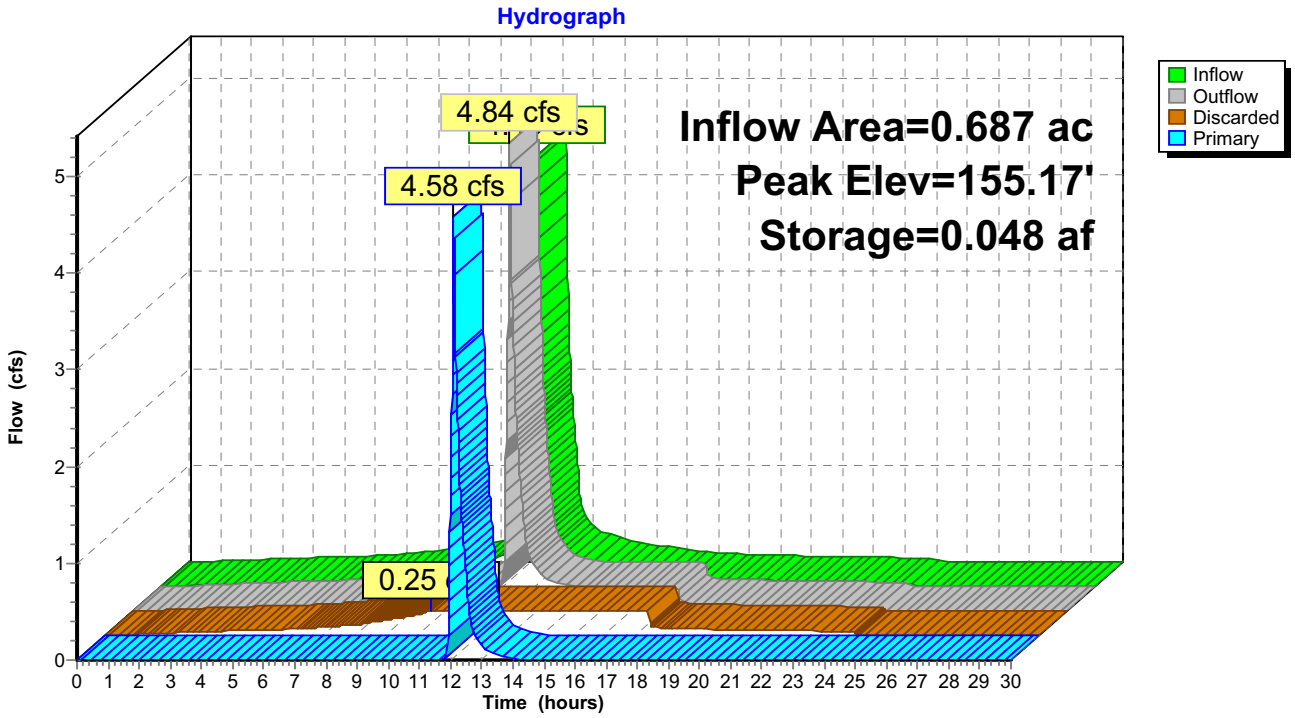
3,772.4 cf Field - 973.0 cf Chambers = 2,799.4 cf Stone x 40.0% Voids = 1,119.8 cf Stone Storage

Stone + Chamber Storage = 2,092.7 cf = 0.048 af

66 Chambers
139.7 cy Field
103.7 cy Stone



Pond 2P: Infiltration Field



Summary for Pond 7P: Infilitration Trench

[93] Warning: Storage range exceeded by 0.15'
[85] Warning: Oscillations may require Finer Routing>1

Inflow Area =	2.150 ac, 11.63% Impervious, Inflow Depth = 1.09" for 100-Year event				
Inflow =	1.30 cfs @	12.39 hrs,	Volume=	0.195 af	
Outflow =	1.07 cfs @	12.64 hrs,	Volume=	0.195 af,	Atten= 18%, Lag= 14.7 min
Discarded =	0.18 cfs @	12.63 hrs,	Volume=	0.158 af	
Primary =	0.89 cfs @	12.64 hrs,	Volume=	0.038 af	

Routing by Stor-Ind method, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs
Peak Elev= 160.15' @ 12.64 hrs Surf.Area= 0.020 ac Storage= 0.038 af

Plug-Flow detention time= 85.5 min calculated for 0.195 af (100% of inflow)
Center-of-Mass det. time= 85.5 min (1,003.3 - 917.8)

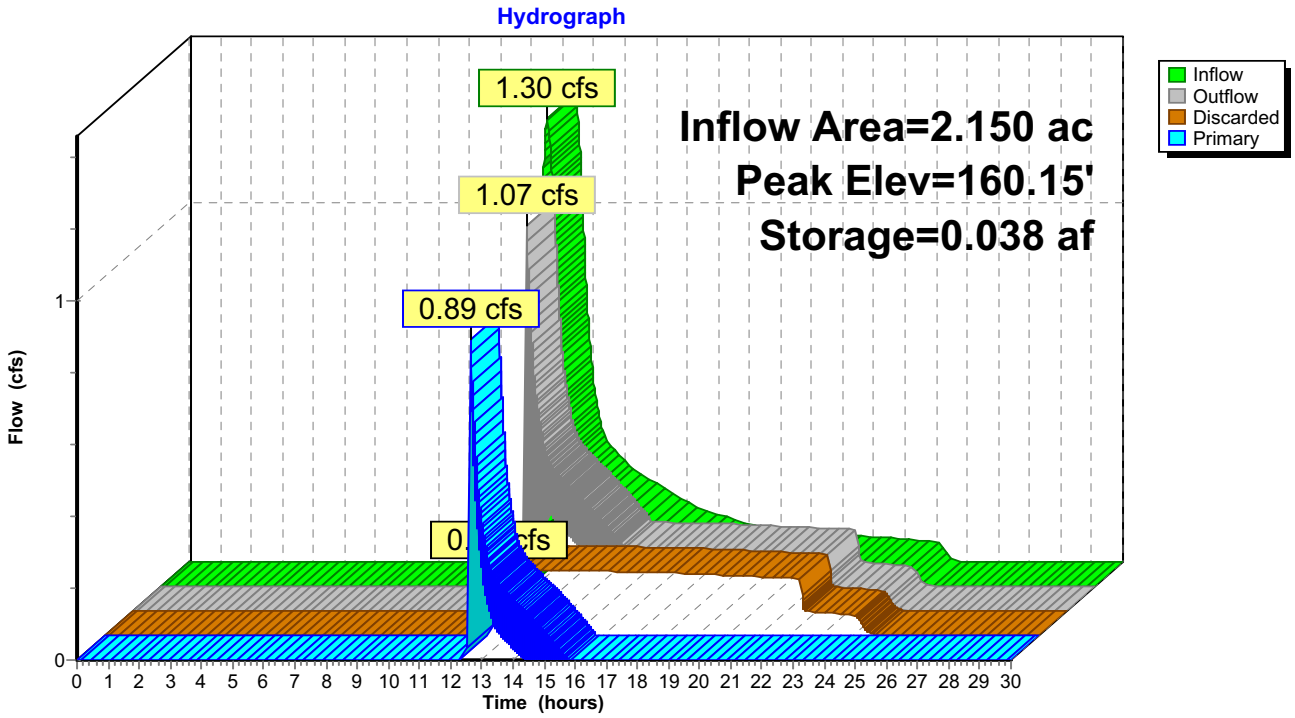
Volume	Invert	Avail.Storage	Storage Description
#1	158.00'	0.038 af	**3.00'W x 260.00'L x 2.00'H Prismatoid Z=0.1**

Device	Routing	Invert	Outlet Devices
#1	Discarded	158.00'	**8.710 in/hr Exfiltration over Surface area**
#2	Primary	160.00'	**6.0' long x 10.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
			Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Discarded OutFlow Max=0.18 cfs @ 12.63 hrs HW=160.14' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=0.89 cfs @ 12.64 hrs HW=160.15' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.89 cfs @ 0.97 fps)

Pond 7P: Infilitration Trench

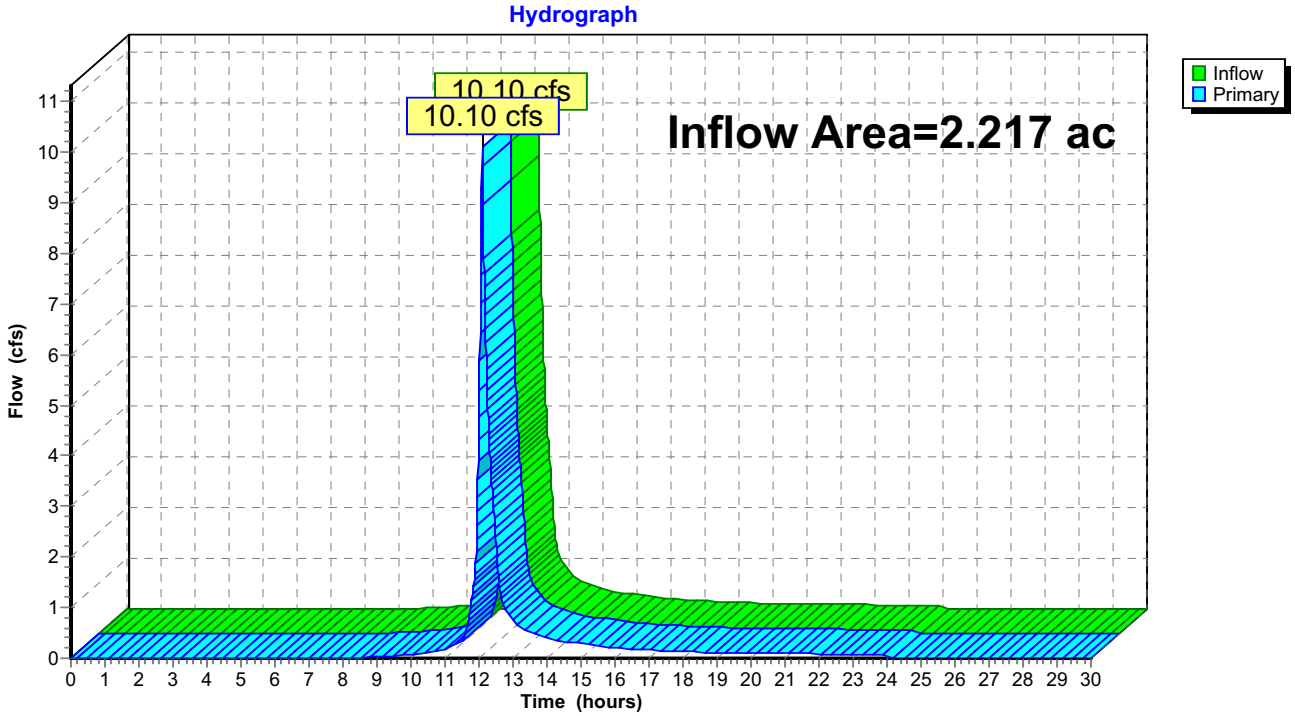


Summary for Link 1L: Flow to Study Point 1

Inflow Area = 2.217 ac, 65.24% Impervious, Inflow Depth = 2.79" for 100-Year event
Inflow = 10.10 cfs @ 12.09 hrs, Volume= 0.515 af
Primary = 10.10 cfs @ 12.09 hrs, Volume= 0.515 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 1L: Flow to Study Point 1

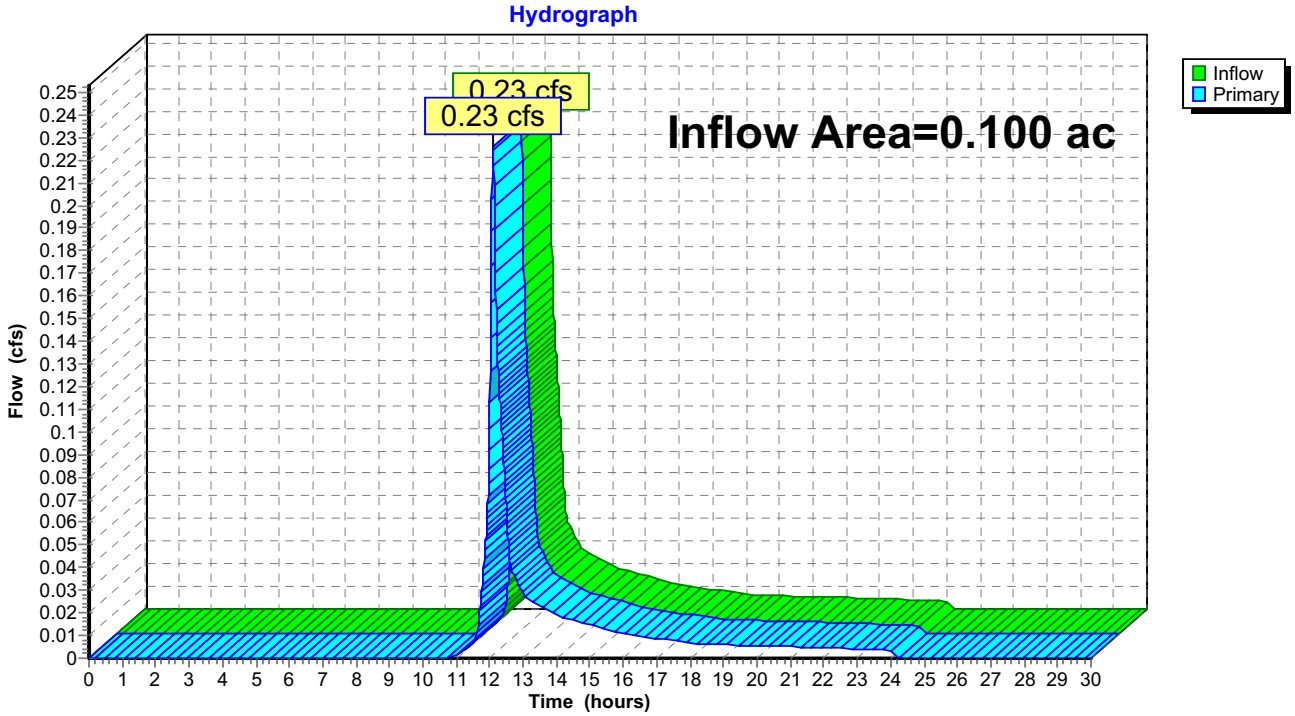


Summary for Link 3L: Flow to Study Point 2

Inflow Area = 0.100 ac, 30.00% Impervious, Inflow Depth = 2.05" for 100-Year event
Inflow = 0.23 cfs @ 12.10 hrs, Volume= 0.017 af
Primary = 0.23 cfs @ 12.10 hrs, Volume= 0.017 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 3L: Flow to Study Point 2

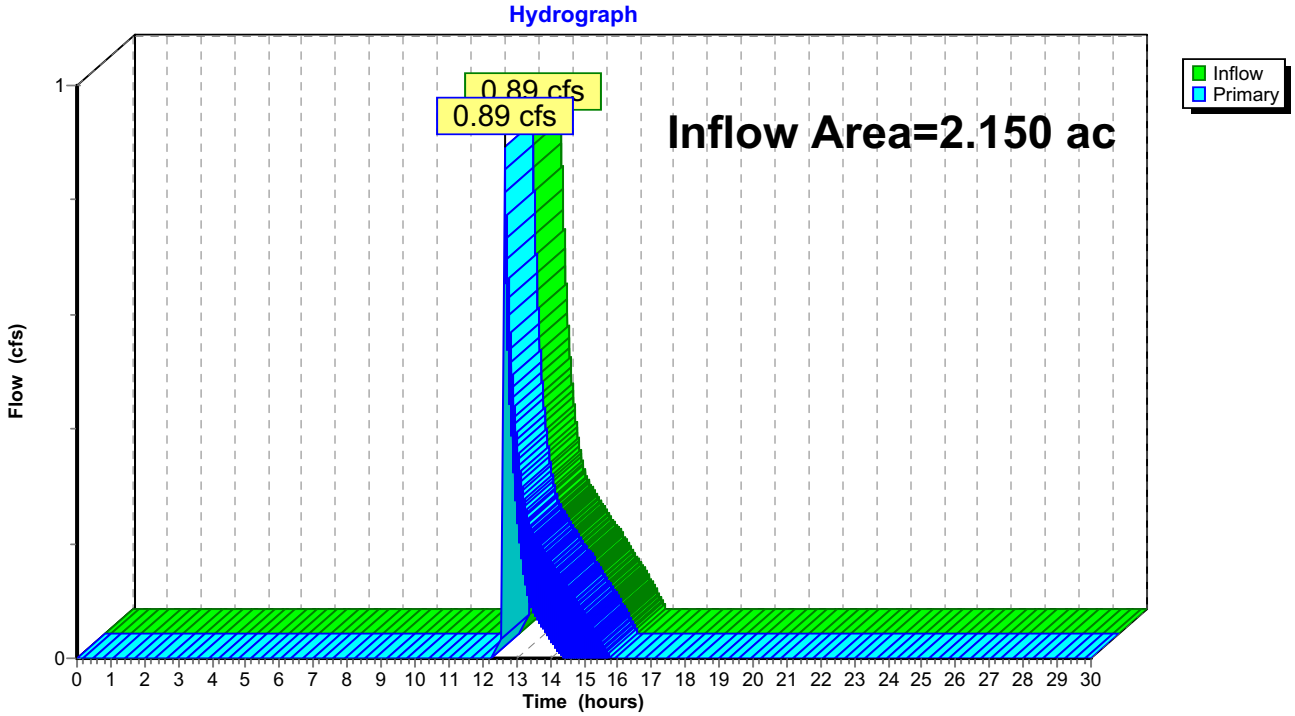


Summary for Link 4L: Flow to Study Point 3

Inflow Area = 2.150 ac, 11.63% Impervious, Inflow Depth = 0.21" for 100-Year event
Inflow = 0.89 cfs @ 12.64 hrs, Volume= 0.038 af
Primary = 0.89 cfs @ 12.64 hrs, Volume= 0.038 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 4L: Flow to Study Point 3

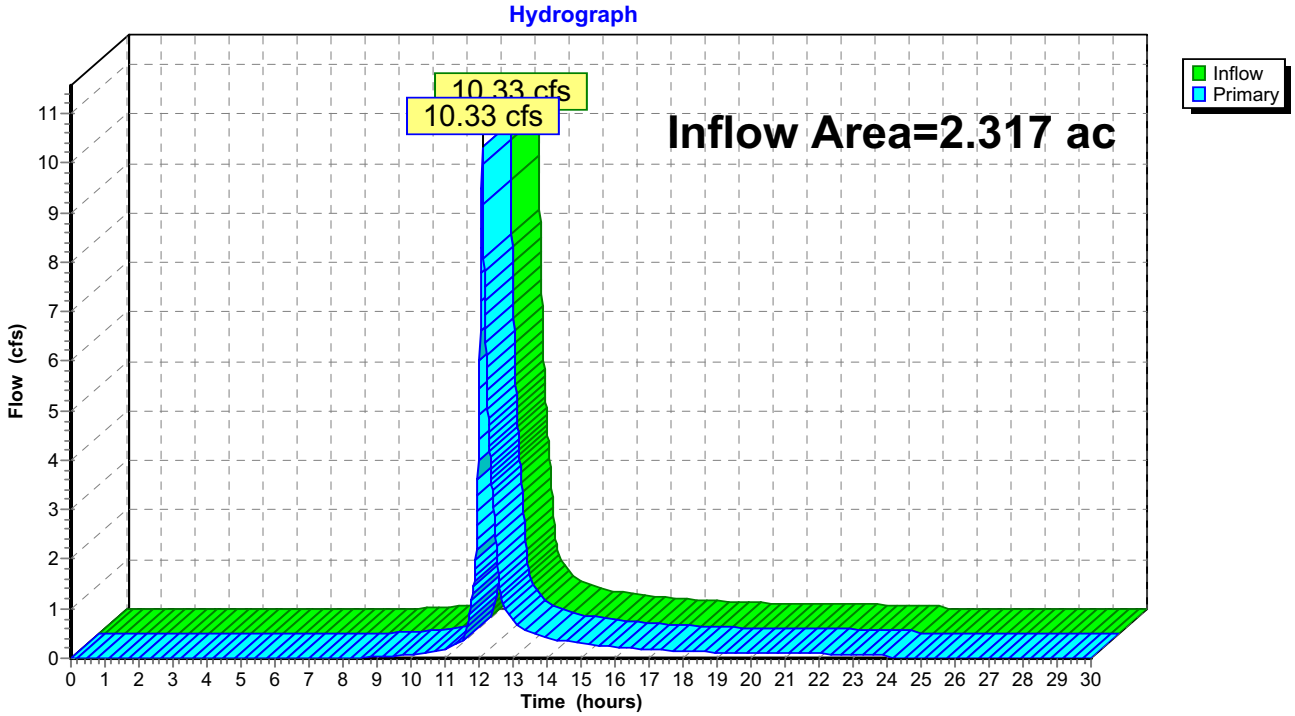


Summary for Link 5L: Combine at Wellesley Ave

Inflow Area = 2.317 ac, 63.72% Impervious, Inflow Depth = 2.76" for 100-Year event
Inflow = 10.33 cfs @ 12.09 hrs, Volume= 0.532 af
Primary = 10.33 cfs @ 12.09 hrs, Volume= 0.532 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-30.00 hrs, dt= 0.01 hrs

Link 5L: Combine at Wellesley Ave



5 Appendix

GEORGE J. GEISSER, JR., P.E.
GEORGE J. GEISSER, III, P.E.
NORMAN R. PAQUETTE, P.E.
1921-1985

Geisser Engineering Corporation
Consulting Engineers

227 Wampanoag Trail
Riverside, R.I. 02915-0480
(401) 438-7711
Fax # (401) 438-0281

December 13, 2011

New England Construction
Attn: Leo Hudon
293 Bourne Ave
Rumford, RI

RE: Soil Review & Evaluation
Wellesley Country Club
Wellesley, MA

Mr. Hudon,

At your request our office witnessed and reviewed the excavation at the above referenced project in order to determine the suitability of various on-site soils for structural bearing. Three test pits were excavated, one in the footprint of each of the proposed structures. At each test pit, an overlying layer of fill material covered the native soils. The native soils, including subsoil, were uniformly acceptable for structural bearing.

In the area of the wash pad, the test pit was excavated near the center of the pad, in-line with the ridge of the existing structure. At this location, there was a 1.3' thick layer of crushed stone and sand resting atop a 1.2' thick layer of native subsoil (Sample A). Beneath this subsoil, at a total depth below grade of 2.5', a native substratum was encountered (Sample B). This substratum was composed of a fine to coarse sand, containing trace gravel and trace fines.

In the area of the existing mulched plantings to the north of the paddle court, there was a 6.1' thick layer of mixed loamy fill, comprised of blended sands, organics and rubbish. This fill is resting atop a 1.3' thick layer of native subsoil. Beneath this subsoil, at a total depth below grade of 7.4', a native substratum was encountered. This substratum was identical to that found in the area of the wash pad.

The final test pit was performed near the west end of the proposed turf center. At this location, there was a +/-3.5' thick layer of mixed loamy fill, comprised of blended sands, organics and rubbish. This fill is directly resting atop a native substratum. This substratum was very similar to that found at the other locations, though the grain size distribution tended towards finer particles, and the color was a slightly lighter brown.

The blended loamy fill should be stripped down to the native subsoil or native substrata. This native substratum is excellent material for structural bearing purposes, and should be allowed a design bearing capacity of 5,500 psf if fully compacted. Once the loamy fill is stripped, the native material should be compacted with a heavy vibratory plate compactor or a vibratory roller in order to re-consolidate the soil disturbed during excavation. The soil may then be brought back up to the required grade by placing and compacting 8" lifts of structural fill. The fill must be compacted to 95% of the maximum dry density. The native sub-strata may be used as structural fill. The native subsoil may be used as a bearing stratum if prepared in the manner described above; however an allowable bearing capacity of 4,000 psf should be used in design if bearing on the subsoil.

If you have any questions, or require any additional information, please do not hesitate to contact our office.

Sincerely,
Geisser Engineering Corporation

Asa Bender
Project Engineer
ADB
\\GEISSER-FMQ48T8\d\Asa\Wellesley country club, wellesley ma.docx

Test Pit Results

July 2, 2012

All tests conducted adjacent to existing environmental management center (see sketch)

<u>Environmental Management Center</u>

TP-2 (Conducted in December 2011)

Fill	0-37”	Blended Fill, Fine course sand, Rubbish
B	37” –73”	LS, Trace gravel
C	73-88”	Sand

Perc Test Results: No perc test performed. Material was consistent with TP-1 performed in December 2011 (use 2 min/in.)

TP-2A (Conducted on July 2, 2012)

Location: Range line intersection of east paddle ball court stairs and propane tank

Fill		Blended Fill, Fine course sand, Rubbish
B		Coarse sand
C		Gravelly Coarse Sand

Perc Test Results: Less than 2 minutes per inch

TP-2B (Conducted on July 2, 2012)

Location: Approximately 75’ north of TP-2A located on gravel cart path

Fill		Blended Fill, Fine course sand, Rubbish
B		Coarse sand with cobbles and boulders
C1		Coarse sand
C2		Gravelly Coarse Sand

Perc Test Results: 2 minutes per inch (No perc test performed. Material was consistent with TP-2A)

Test Pit Results

December 2011

<u>Equipment Service Center:</u>

TP-1

Fill	0-27”	Asphalt / Gravel fill
C	27” – 91”	Sand / LS, Trace gravel

Perc Test Results: 1.45 min/in → use 2 min/in.

<u>Environmental Management Center</u>

TP-2

Fill	0-37”	Blended Fill, Fine course sand, Rubbish
B	37” –73”	LS, Trace gravel
C	73-88”	Sand

Perc Test Results: No perc test performed. Material was consistent with TP-1

<u>Maintenance Building</u>

TP-3

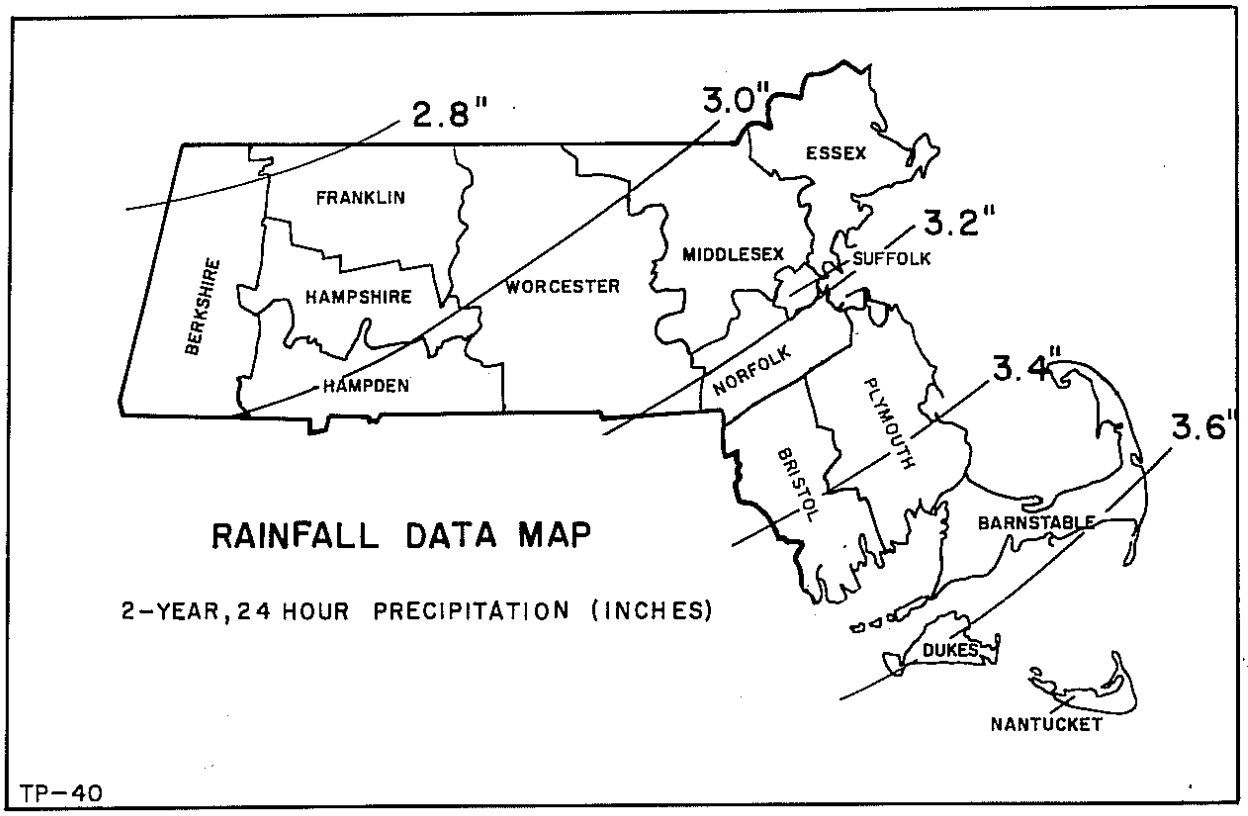
Fill	0-36”	Asphalt / Gravel fill
C	27” – 54”	Loamy Sand (LS)

Perc Test Results: No Perc test performed.

TP-4

A	0-12”	Loam
B	12”-60”	Loamy Sand (LS)
C	60” – 120”	Loamy Sand (LS)

Perc Test Results: 0.88 min/in → Use 2 min/in.



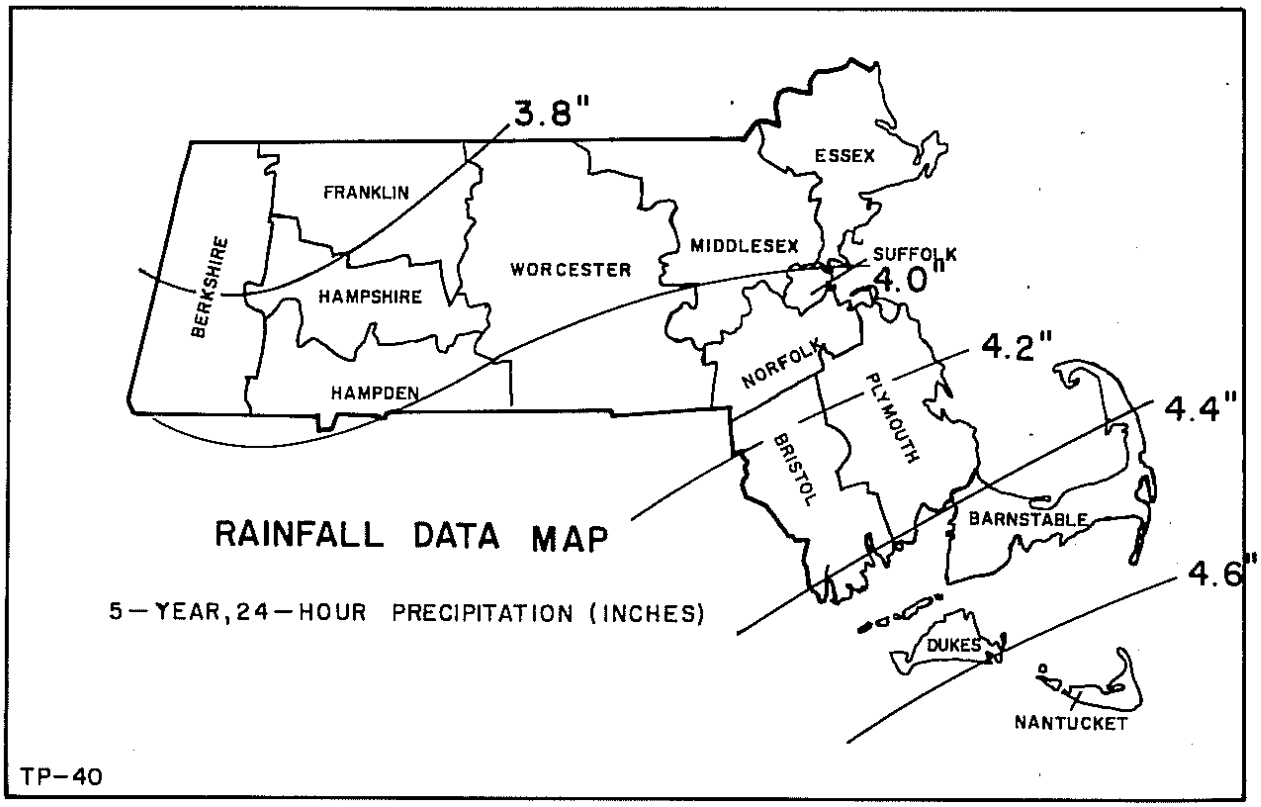
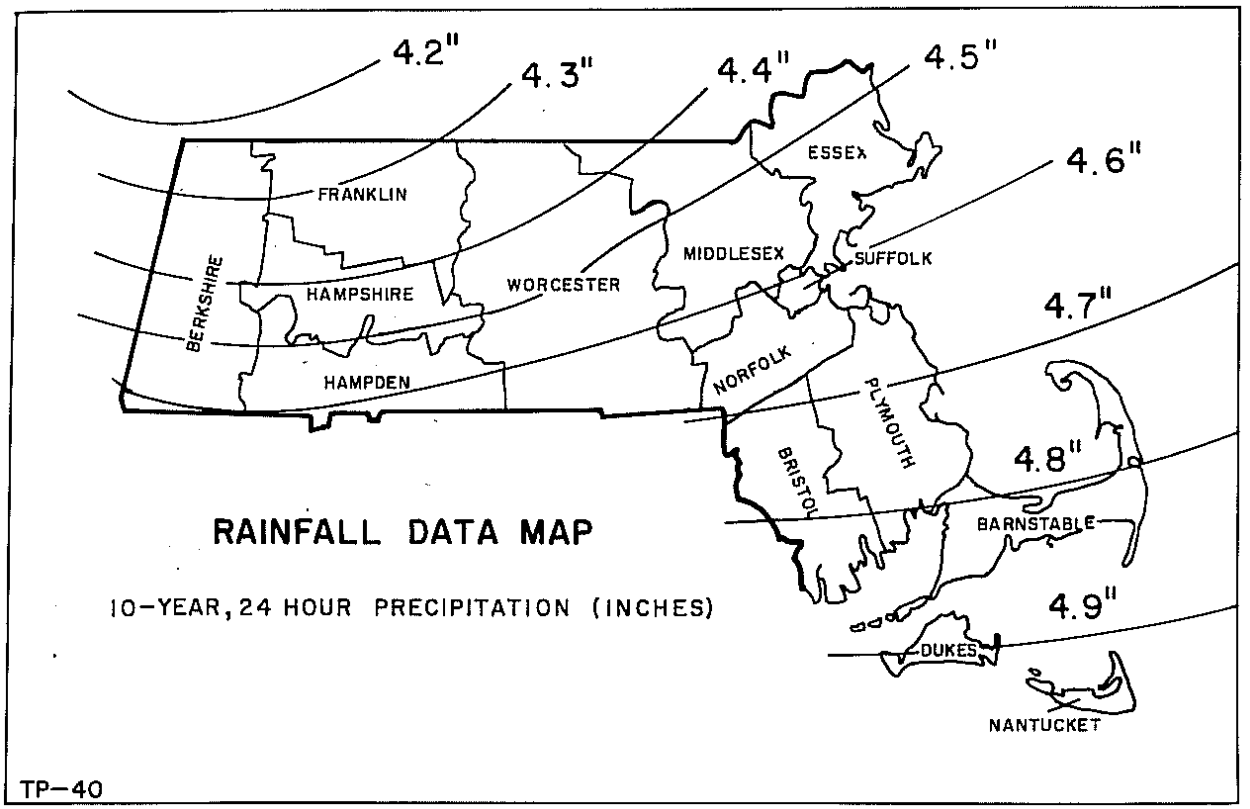


FIGURE B-1, SHEET 1 OF 3



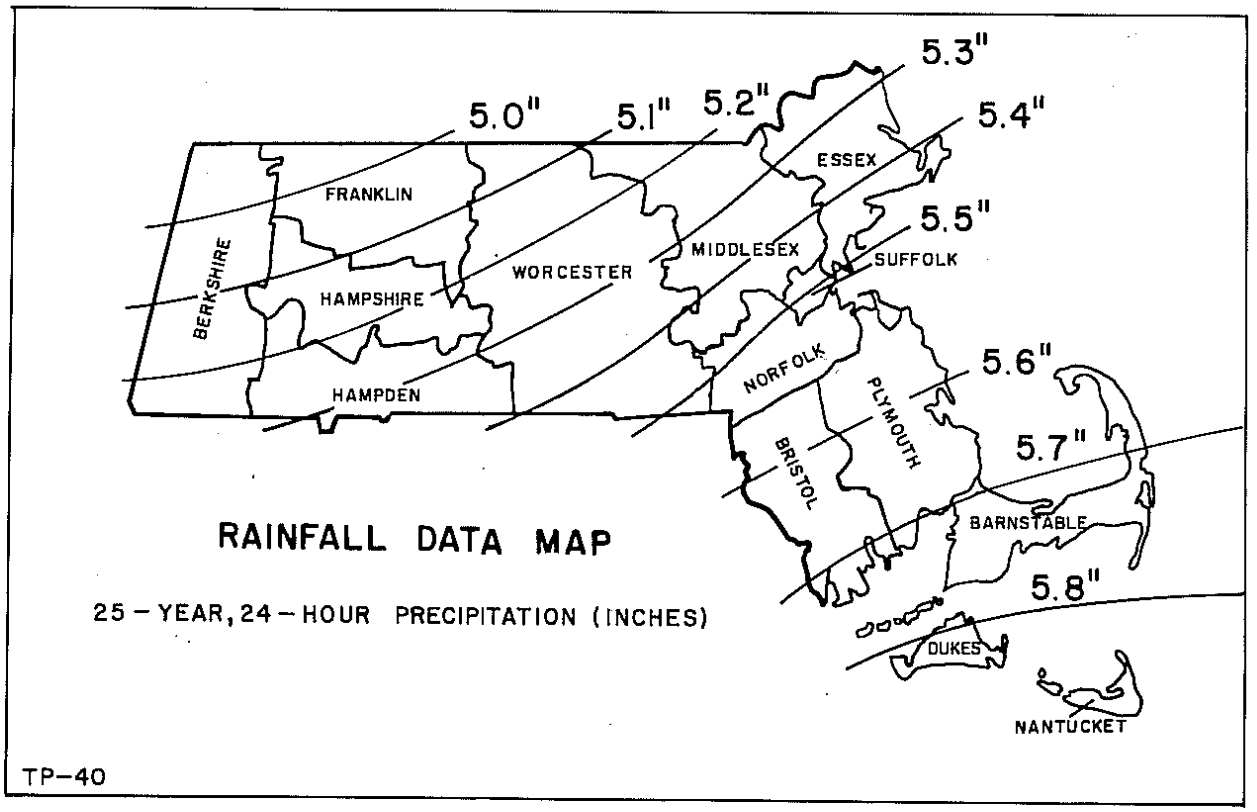
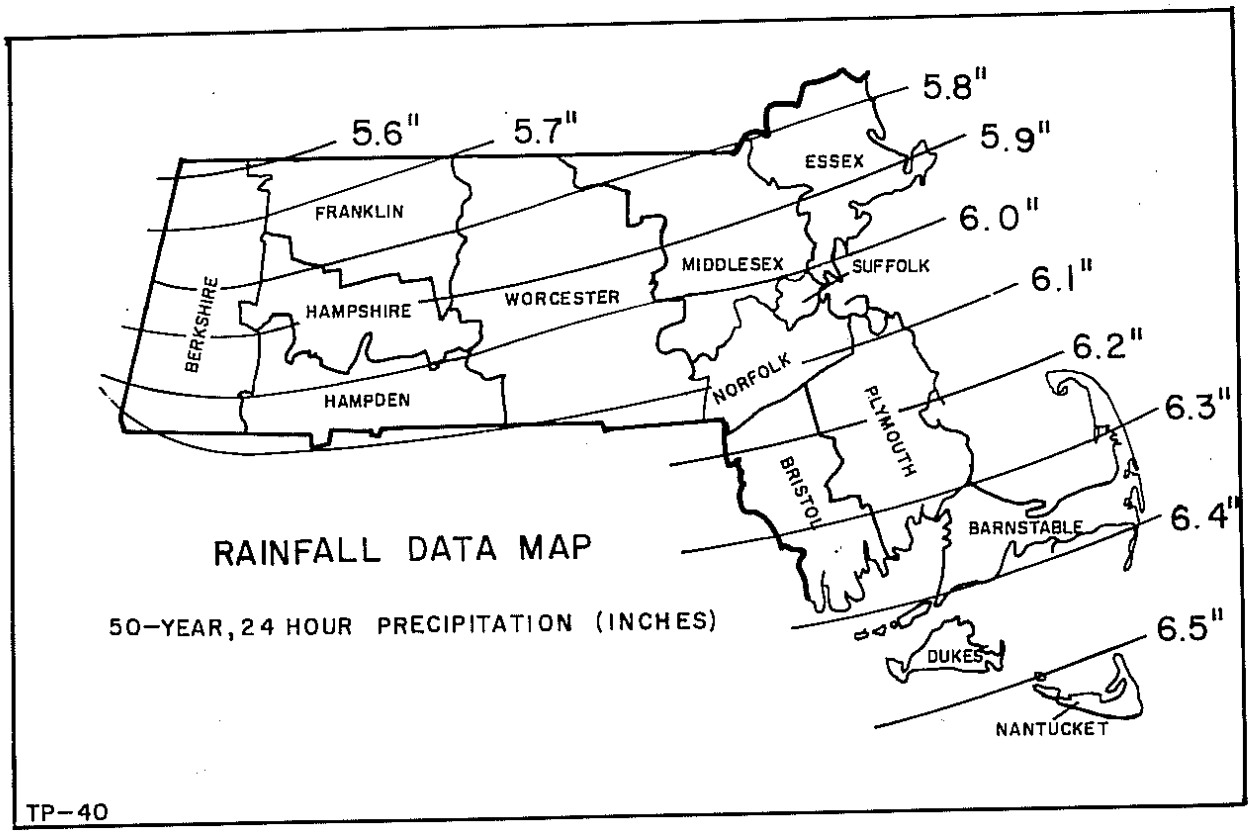


FIGURE B-1, SHEET 2 OF 3



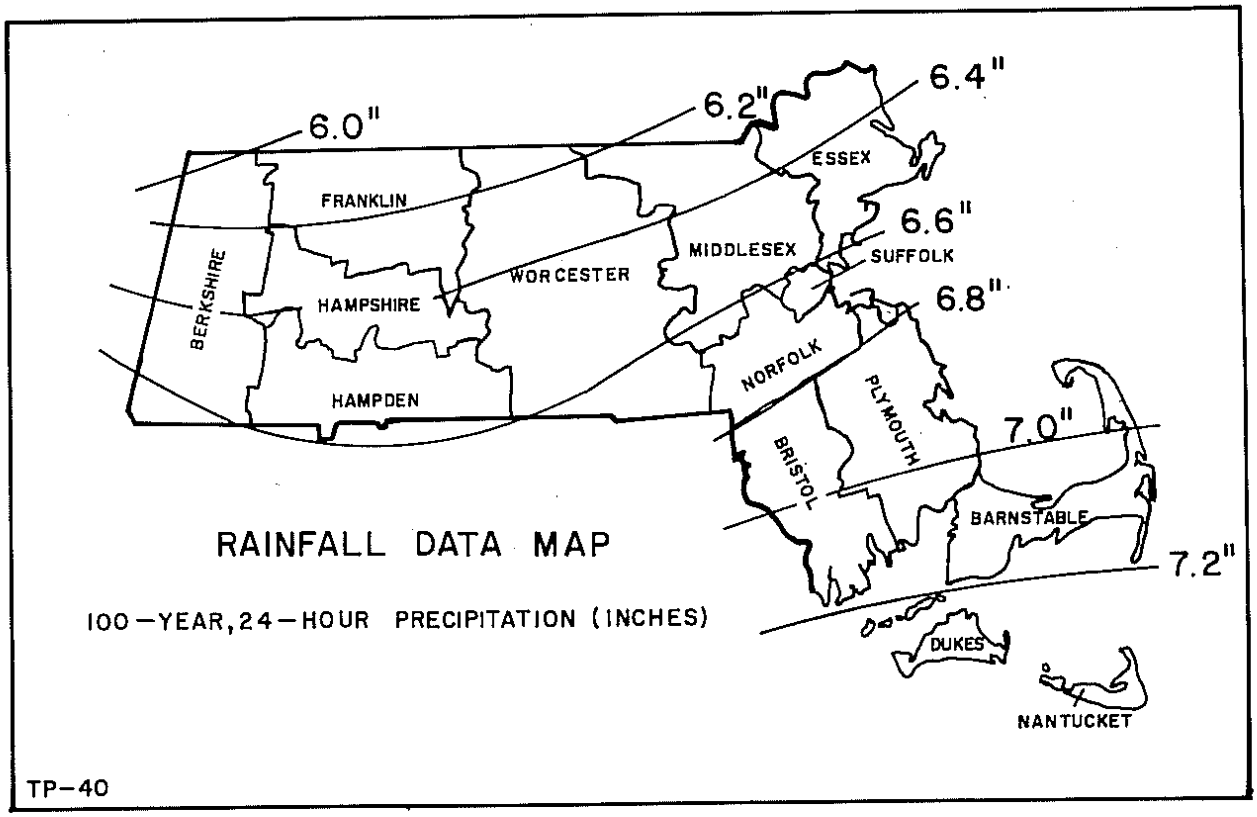
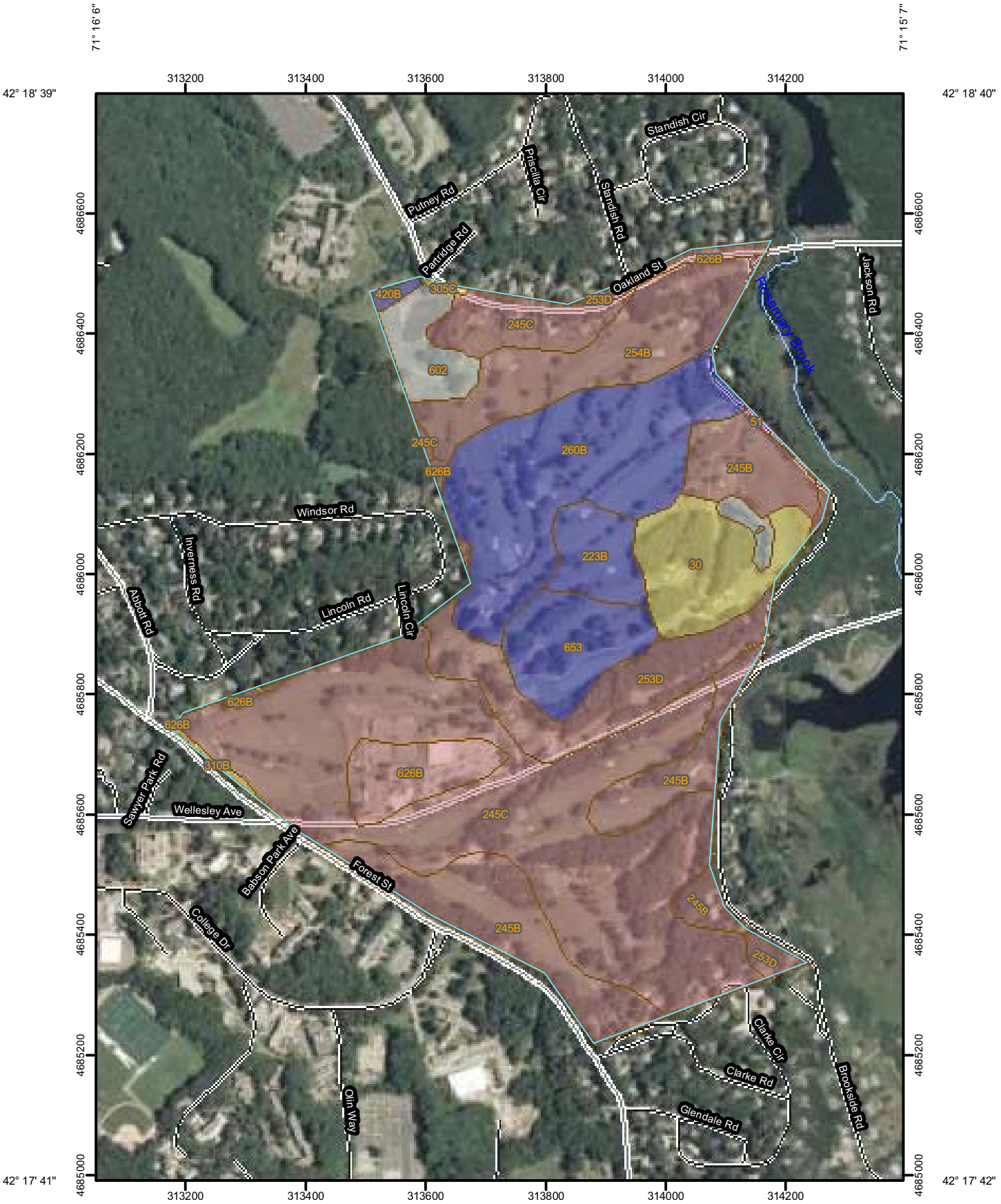


FIGURE B-1, SHEET 3 OF 3


71° 16' 6"
71° 15' 7"
42° 18' 39"
42° 18' 40"
42° 17' 41"
42° 17' 42"
71° 16' 4"
71° 15' 5"
313200
313400
313600
313800
314000
314200
4686600
4686400
4686200
4686000
4685800
4685600
4685400
4685200
4685000
Standish Cir
Priscilla Cir
Standish Rd
Putney Rd
Partridge Rd
Oakland St
Jackson Rd
Rosemary Brook
Windsor Rd
Inverness Rd
Abbott Rd
Lincoln Rd
Lincoln Cir
Sawyer Park Rd
Wellesley Ave
Babson Park Ave
Forest St
College Dr
Olin Way
Clarke Cir
Clarke Rd
Glendale Rd
Brookside Rd
420B
305C
253D
626B
245C
254B
602
260B
51
245B
223B
30
653
310B
N
Map Scale: 1:8,630 if printed on A size (8.5" x 11") sheet.
Meters
0 50 100 200 300
Feet
0 300 600 1,200 1,800

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Units

Soil Ratings

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Political Features

Cities

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

MAP INFORMATION

Map Scale: 1:8,630 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:25,000.

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

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 19N NAD83

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

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 8, Jul 23, 2010

Date(s) aerial images were photographed: 7/10/2003

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

Hydrologic Soil Group

Hydrologic Soil Group— Summary by Map Unit — Norfolk and Suffolk Counties, Massachusetts (MA616)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
1	Water		1.2	0.6%
30	Raynham silt loam, 0 to 3 percent slopes	C	10.7	5.8%
51	Swansea muck, 0 to 1 percent slopes	D	0.2	0.1%
223B	Scio very fine sandy loam, 2 to 5 percent slopes	B	5.4	2.9%
245B	Hinckley sandy loam, 3 to 8 percent slopes	A	25.7	13.8%
245C	Hinckley sandy loam, 8 to 15 percent slopes	A	63.4	34.1%
253D	Hinckley loamy sand, 15 to 35 percent slopes	A	15.1	8.1%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	A	15.2	8.2%
260B	Sudbury fine sandy loam, 2 to 8 percent slopes	B	26.7	14.4%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	C	0.2	0.1%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	C	0.5	0.2%
420B	Canton fine sandy loam, 3 to 8 percent slopes	B	0.5	0.3%
602	Urban land, 0 to 15 percent slopes		4.8	2.6%
626B	Merrimac-Urban land complex, 0 to 8 percent slopes	A	7.7	4.1%
653	Udorthents, sandy	B	8.8	4.7%
Totals for Area of Interest			**186.0**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Stormceptor Sizing Detailed Report

PCSWMM for Stormceptor

Project Information

Date	12/3/2012
Project Name	Wellesley Country Club - Pool
Project Number	1917-01
Location	Wellesley, MA

Stormwater Quality Objective

This report outlines how Stormceptor System can achieve a defined water quality objective through the removal of total suspended solids (TSS). Attached to this report is the Stormceptor Sizing Summary.

Stormceptor System Recommendation

The Stormceptor System model STC 900 achieves the water quality objective removing 81% TSS for a Fine (organics, silts and sand) particle size distribution.

The Stormceptor System

The Stormceptor oil and sediment separator is sized to treat stormwater runoff by removing pollutants through gravity separation and flotation. Stormceptor's patented design generates positive TSS removal for all rainfall events, including large storms. Significant levels of pollutants such as heavy metals, free oils and nutrients are prevented from entering natural water resources and the re-suspension of previously captured sediment (scour) does not occur.

Stormceptor provides a high level of TSS removal for small frequent storm events that represent the majority of annual rainfall volume and pollutant load. Positive treatment continues for large infrequent events, however, such events have little impact on the average annual TSS removal as they represent a small percentage of the total runoff volume and pollutant load.

Stormceptor is the only oil and sediment separator on the market sized to remove TSS for a wide range of particle sizes, including fine sediments (clays and silts), that are often overlooked in the design of other stormwater treatment devices.

Small storms dominate hydrologic activity, US EPA reports

"*Early efforts in stormwater management focused on flood events ranging from the 2-yr to the 100-yr storm. Increasingly stormwater professionals have come to realize that small storms (i.e. < 1 in. rainfall) dominate watershed hydrologic parameters typically associated with water quality management issues and BMP design. These small storms are responsible for most annual urban runoff and groundwater recharge. Likewise, with the exception of eroded sediment, they are responsible for most pollutant washoff from urban surfaces. Therefore, the small storms are of most concern for the stormwater management objectives of ground water recharge, water quality resource protection and thermal impacts control.*"

"*Most rainfall events are much smaller than design storms used for urban drainage models. In any given area, most frequently recurrent rainfall events are small (less than 1 in. of daily rainfall).*"

"Continuous simulation offers possibilities for designing and managing BMPs on an individual site-by-site basis that are not provided by other widely used simpler analysis methods. Therefore its application and use should be encouraged."

– US EPA Stormwater Best Management Practice Design Guide, Volume 1 – General Considerations, 2004

Design Methodology

Each Stormceptor system is sized using PCSWMM for Stormceptor, a continuous simulation model based on US EPA SWMM. The program calculates hydrology from up-to-date local historical rainfall data and specified site parameters. With US EPA SWMM's precision, every Stormceptor unit is designed to achieve a defined water quality objective.

The TSS removal data presented follows US EPA guidelines to reduce the average annual TSS load. Stormceptor's unit process for TSS removal is settling. The settling model calculates TSS removal by analyzing (summary of analysis presented in Appendix 2):

- Site parameters
- Continuous historical rainfall, including duration, distribution, peaks (Figure 1)
- Interevent periods
- Particle size distribution
- Particle settling velocities (Stokes Law, corrected for drag)
- TSS load (Figure 2)
- Detention time of the system

The Stormceptor System maintains continuous positive TSS removal for all influent flow rates. Figure 3 illustrates the continuous treatment by Stormceptor throughout the full range of storm events analyzed. It is clear that large events do not significantly impact the average annual TSS removal. There is no decline in cumulative TSS removal, indicating scour does not occur as the flow rate increases.

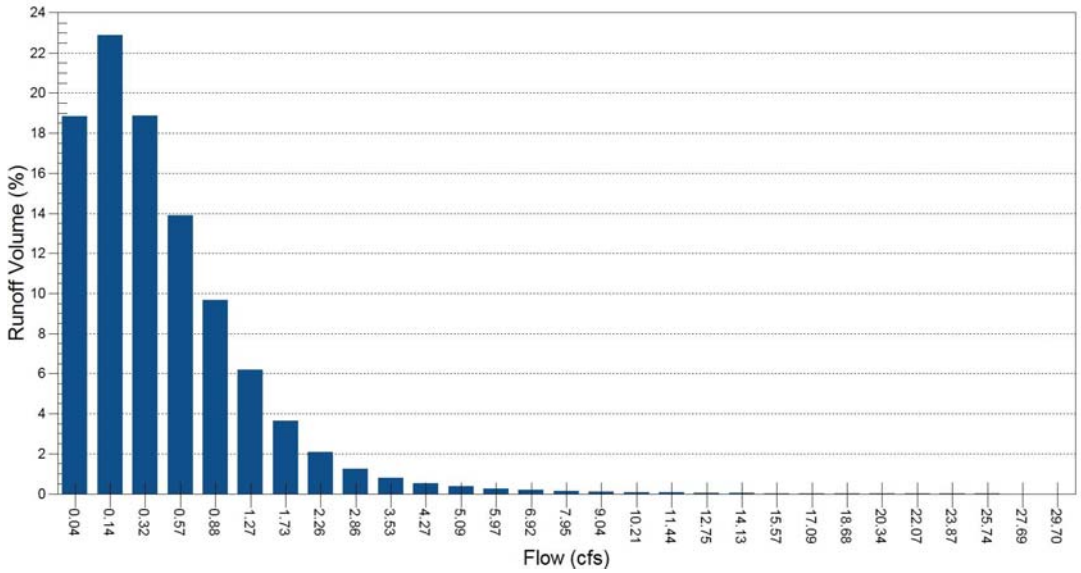


Figure 1. Runoff Volume by Flow Rate for BLUE HILL – MA 736, 1948 to 2005 for 2.217 ac, 65.24% impervious. Small frequent storm events represent the majority of annual rainfall volume. Large infrequent events have little impact on the average annual TSS removal, as they represent a small percentage of the total annual volume of runoff.

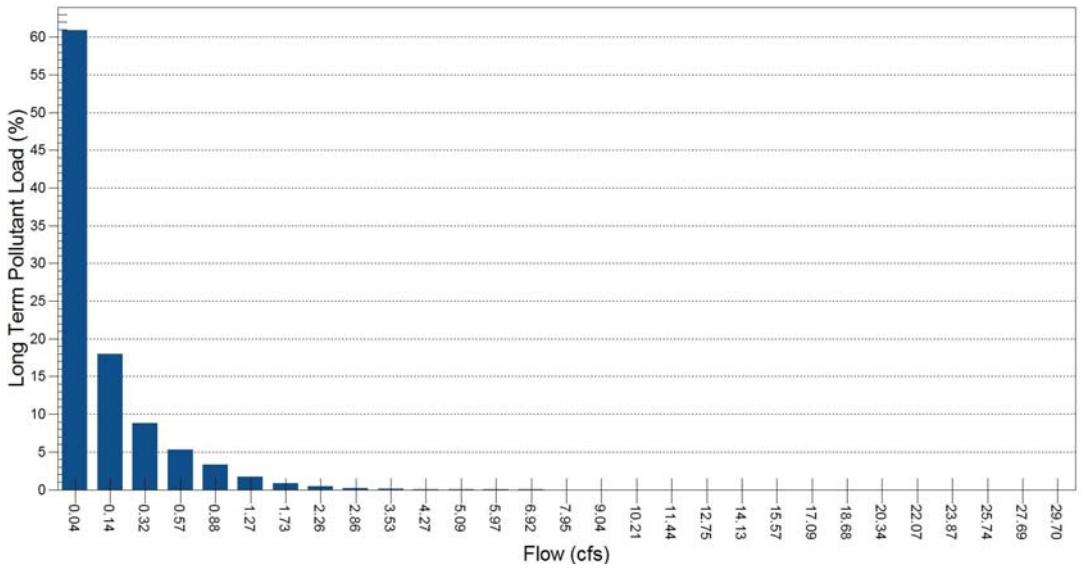
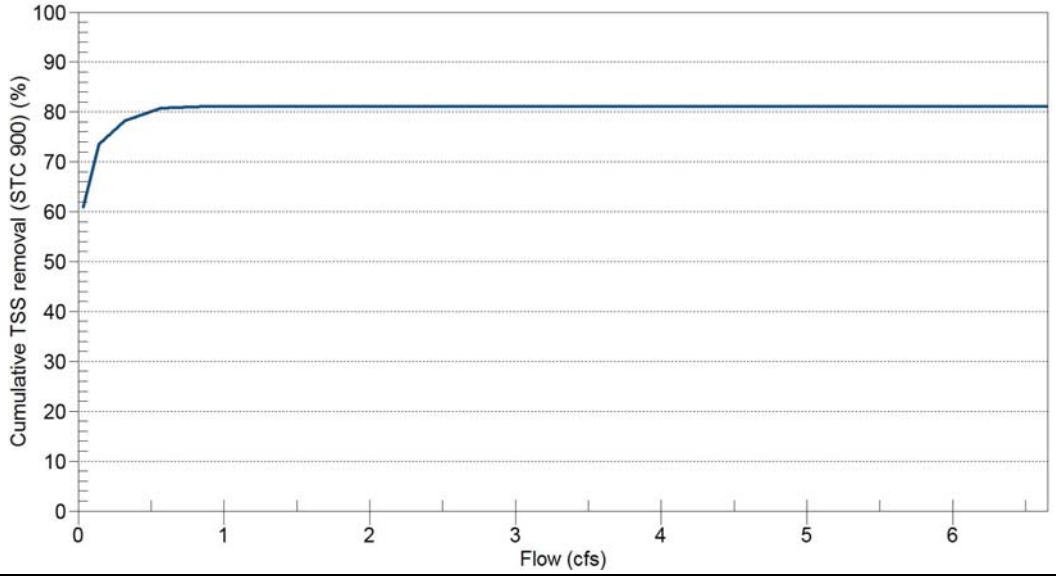


Figure 2. Long Term Pollutant Load by Flow Rate for BLUE HILL – 736, 1948 to 2005 for 2.217 ac, 65.24% impervious. The majority of the annual pollutant load is transported by small frequent storm

events. Conversely, large infrequent events carry an insignificant percentage of the total annual pollutant load.



Stormceptor Model	STC 900	Drainage Area (ac)	2.217
TSS Removal (%)	81	Impervious (%)	65.24

Figure 3. Cumulative TSS Removal by Flow Rate for BLUE HILL – 736, 1948 to 2005. Stormceptor continuously removes TSS throughout the full range of storm events analyzed. Note that large events do not significantly impact the average annual TSS removal. Therefore no decline in cumulative TSS removal indicates scour does not occur as the flow rate increases.

Appendix 1
Stormceptor Design Summary

Project Information

Date	12/3/2012
Project Name	Wellesley Country Club - Pool
Project Number	1917-01
Location	Wellesley, MA

Designer Information

Company	Allen & Major Associates, Inc.
Contact	Philip Cordeiro, PE

Notes

WQ#1

Drainage Area

Total Area (ac)	2.217
Imperviousness (%)	65.24

The Stormceptor System model STC 900 achieves the water quality objective removing 81% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

Name	BLUE HILL
State	MA
ID	736
Years of Records	1948 to 2005
Latitude	42°12'44"N
Longitude	71°6'53"W

Water Quality Objective

TSS Removal (%)	80

Upstream Storage

Storage (ac-ft)	Discharge (cfs)
0	0

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 450i	72
STC 900	**81**
STC 1200	81
STC 1800	81
STC 2400	85
STC 3600	86
STC 4800	88
STC 6000	89
STC 7200	91
STC 11000	93
STC 13000	93
STC 16000	94

Particle Size Distribution

Removing silt particles from runoff ensures that the majority of the pollutants, such as hydrocarbons and heavy metals that adhere to fine particles, are not discharged into our natural water courses. The table below lists the particle size distribution used to define the annual TSS removal.

Fine (organics, silts and sand)

Particle Size µm	Distribution %	Specific Gravity	Settling Velocity ft/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity ft/s
20	20	1.3	0.0013					
60	20	1.8	0.0051					
150	20	2.2	0.0354					
400	20	2.65	0.2123					
2000	20	2.65	0.9417					

Stormceptor Design Notes

- Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor.
- Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal.
- Only the STC 450i is adaptable to function with a catch basin inlet and/or inline pipes.
- Only the Stormceptor models STC 450i to STC 7200 may accommodate multiple inlet pipes.
- Inlet and outlet invert elevation differences are as follows:

Inlet and Outlet Pipe Invert Elevations Differences

Inlet Pipe Configuration	STC 450i	STC 900 to STC 7200	STC 11000 to STC 16000
Single inlet pipe	3 in.	1 in.	3 in.
Multiple inlet pipes	3 in.	3 in.	Only one inlet pipe.

- Design estimates are based on stable site conditions only, after construction is completed.
- Design estimates assume that the storm drain is not submerged during zero flows. For submerged applications, please contact your local Stormceptor representative.
- Design estimates may be modified for specific spills controls. Please contact your local Stormceptor representative for further assistance.
- For pricing inquiries or assistance, please contact Rinker Materials 1 (800) 909-7763 www.rinkerstormceptor.com

Stormceptor®

Appendix 2
Summary of Design Assumptions

SITE DETAILS

Site Drainage Area

Total Area (ac)	2.217	Imperviousness (%)	65.24

Surface Characteristics

Width (ft)	622
Slope (%)	2
Impervious Depression Storage (in.)	0.02
Pervious Depression Storage (in.)	0.2
Impervious Manning's n	0.015
Pervious Manning's n	0.25

Infiltration Parameters

Horton's equation is used to estimate infiltration	
Max. Infiltration Rate (in/hr)	2.44
Min. Infiltration Rate (in/hr)	0.4
Decay Rate (s^{-1})	0.00055
Regeneration Rate (s^{-1})	0.01

Maintenance Frequency

Sediment build-up reduces the storage volume for sedimentation. Frequency of maintenance is assumed for TSS removal calculations.	
Maintenance Frequency (months)	12

Evaporation

Daily Evaporation Rate (inches/day)	0.1

Dry Weather Flow

Dry Weather Flow (cfs)	No

Upstream Attenuation

Stage-storage and stage-discharge relationship used to model attenuation upstream of the Stormceptor System is identified in the table below.

Storage ac-ft	Discharge cfs
0	0

Rinker MATERIALS™

PARTICLE SIZE DISTRIBUTION

Particle Size Distribution

Removing fine particles from runoff ensures the majority of pollutants, such as heavy metals, hydrocarbons, free oils and nutrients are not discharged into natural water resources. The table below identifies the particle size distribution selected to define TSS removal for the design of the Stormceptor System.

Fine (organics, silts and sand)

Particle Size µm	Distribution %	Specific Gravity	Settling Velocity ft/s		Particle Size µm	Distribution %	Specific Gravity	Settling Velocity ft/s
20	20	1.3	0.0013					
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400	20	2.65	0.2123					
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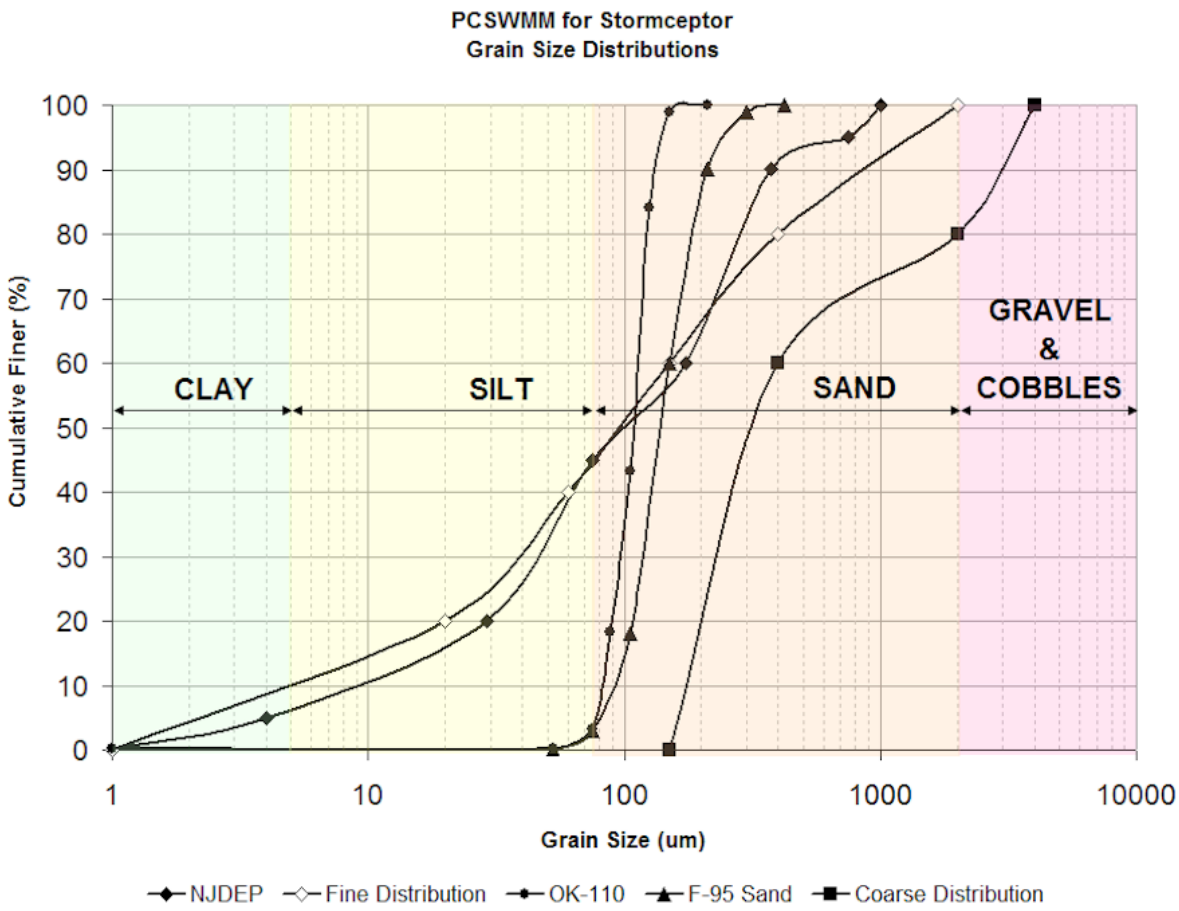


Figure 1. PCSWMM for Stormceptor standard design grain size distributions.

TSS LOADING

TSS Loading Parameters

TSS Loading Function	Buildup / Washoff

Parameters

Target Event Mean Concentration (EMC) (mg/L)	125
Exponential Buildup Power	0.4
Exponential Washoff Exponential	0.2

HYDROLOGY ANALYSIS

PCSWMM for Stormceptor calculates annual hydrology with the US EPA SWMM and local continuous historical rainfall data. Performance calculations of the Stormceptor System are based on the average annual removal of TSS for the selected site parameters. The Stormceptor System is engineered to capture fine particles (silts and sands) by focusing on average annual runoff volume ensuring positive removal efficiency is maintained during all rainfall events, while preventing the opportunity for negative removal efficiency (scour).

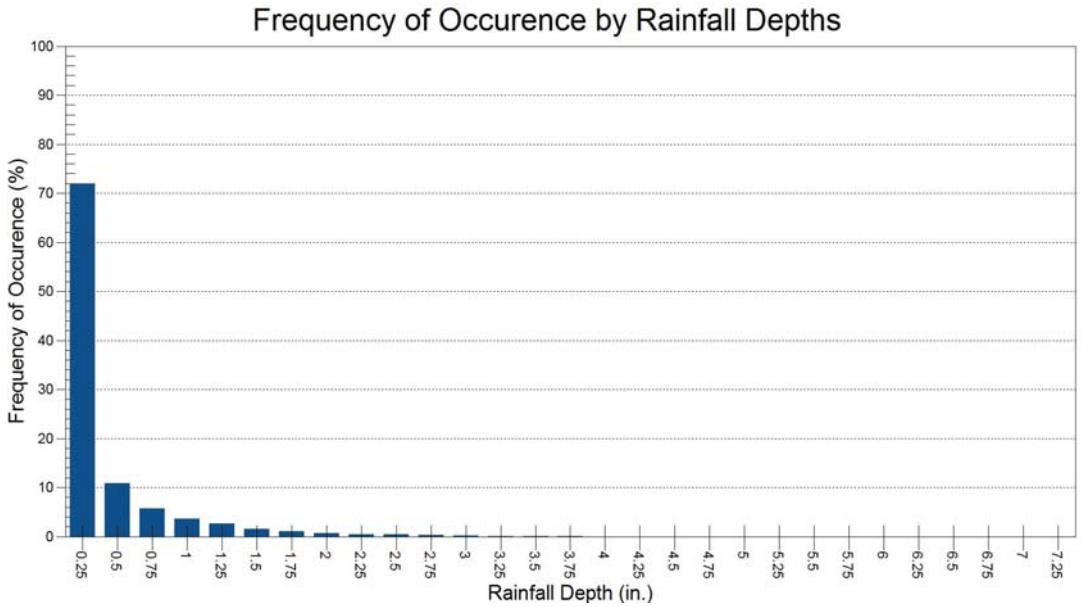
Smaller recurring storms account for the majority of rainfall events and average annual runoff volume, as observed in the historical rainfall data analyses presented in this section.

Rainfall Station

Rainfall Station	BLUE HILL		
Rainfall File Name	MA736.NDC	Total Number of Events	9865
Latitude	42°12'44"N	Total Rainfall (in.)	2849.7
Longitude	71°6'53"W	Average Annual Rainfall (in.)	49.1
Elevation (ft)	630	Total Evaporation (in.)	169.8
Rainfall Period of Record (y)	58	Total Infiltration (in.)	976.3
Total Rainfall Period (y)	58	Percentage of Rainfall that is Runoff (%)	61.8

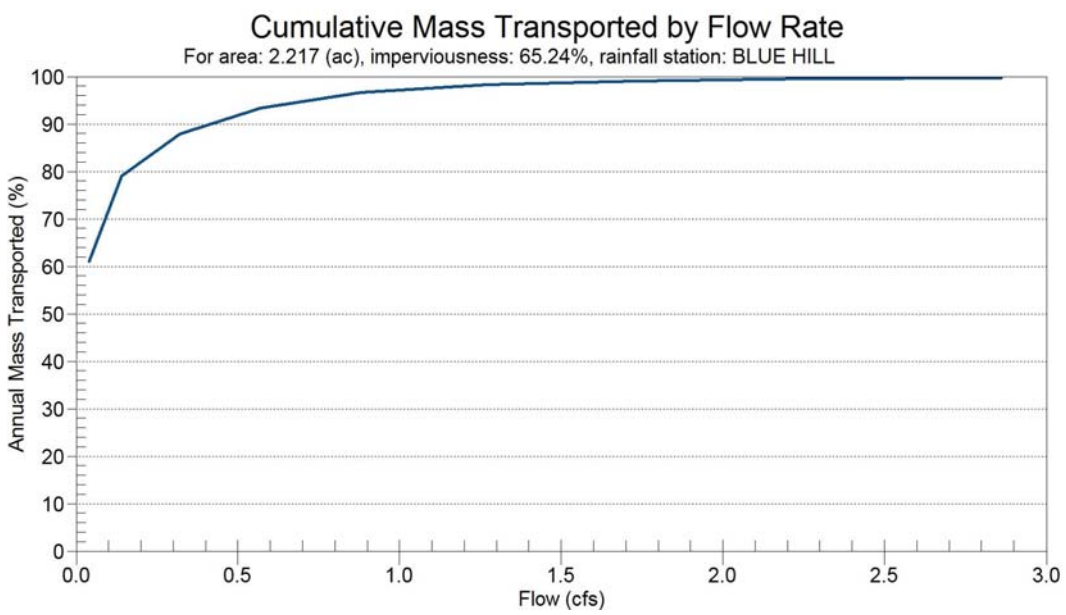
Rainfall Event Analysis

Rainfall Depth in.	No. of Events	Percentage of Total Events %	Total Volume in.	Percentage of Annual Volume %
0.25	7098	72.0	431	15.1
0.50	1076	10.9	393	13.8
0.75	563	5.7	350	12.3
1.00	360	3.6	311	10.9
1.25	257	2.6	288	10.1
1.50	151	1.5	207	7.3
1.75	102	1.0	165	5.8
2.00	70	0.7	130	4.6
2.25	42	0.4	89	3.1
2.50	41	0.4	98	3.4
2.75	27	0.3	71	2.5
3.00	21	0.2	61	2.1
3.25	13	0.1	40	1.4
3.50	10	0.1	34	1.2
3.75	5	0.1	18	0.6
4.00	2	0.0	8	0.3
4.25	1	0.0	4	0.1
4.50	4	0.0	18	0.6
4.75	4	0.0	18	0.6
5.00	0	0.0	0	0.0
5.25	1	0.0	5	0.2
5.50	3	0.0	16	0.6
5.75	2	0.0	11	0.4
6.00	4	0.0	23	0.8
6.25	0	0.0	0	0.0
6.50	0	0.0	0	0.0
6.75	1	0.0	7	0.2
7.00	1	0.0	7	0.2
7.25	2	0.0	14	0.5
7.50	0	0.0	0	0.0
7.75	1	0.0	8	0.3
8.00	1	0.0	8	0.3
8.25	0	0.0	0	0.0
>8.25	2	0.0	17	0.6

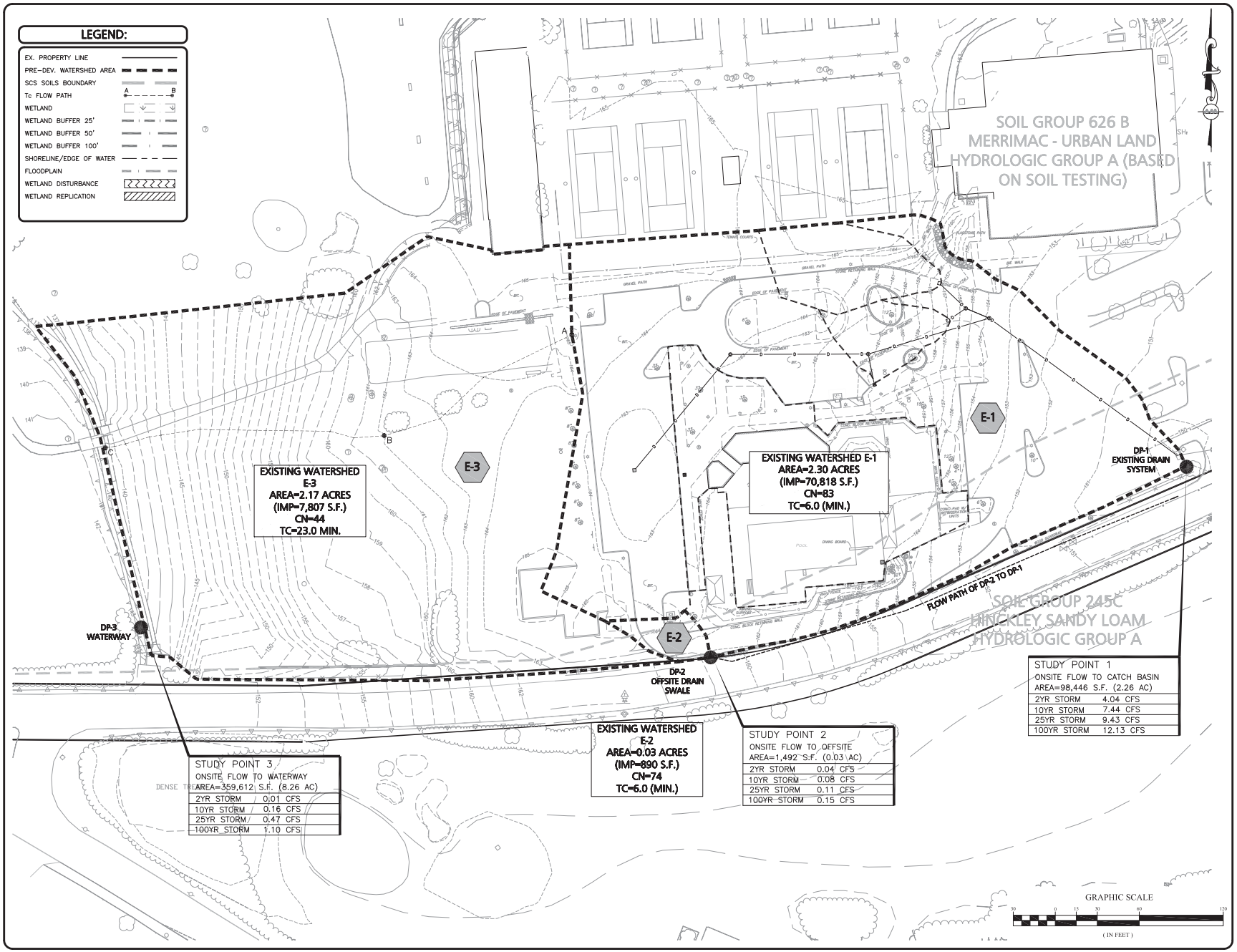


Pollutograph

Flow Rate cfs	Cumulative Mass %
0.035	61.1
0.141	79.1
0.318	87.9
0.565	93.3
0.883	96.6
1.271	98.3
1.73	99.1
2.26	99.5
2.86	99.7
3.531	99.8
4.273	99.9
5.085	100.0
5.968	100.0
6.922	100.0
7.946	100.0
9.041	100.0
10.206	100.0
11.442	100.0
12.749	100.0
14.126	100.0
15.574	100.0
17.092	100.0
18.681	100.0
20.341	100.0
22.072	100.0
23.873	100.0
25.744	100.0
27.687	100.0
29.7	100.0
31.783	100.0



6 Watershed Plans



1910

PROFESSIONAL ENGINEER FOR
ALLEN & MAJOR ASSOCIATES, INC.

REV.	DATE	DESCRIPTION

APPLICANT\OWNER:
WELLESLEY COUNTRY CLUB
300 WELLESLEY AVE.
WELLESLEY, MA 02481

PROJECT:
WELLESLEY COUNTRY CLUB
PROPOSED POOL
REPLACEMENT AND RENOVATION
WELLESLEY, MA

PROJECT NO.	1917-01	DATE:	DECEMBER 4, 2012
SCALE:	1"=30'	DWG. NAME:	GRADING
DESIGNED BY:	PLC	CHECKED BY:	PLC

PREPARED BY:

ALLEN & MAJOR ASSOCIATES, INC.
civil & structural engineering ◆ land surveying
environmental consulting ◆ landscape architecture
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10 MAIN STREET
LAKEVILLE, MA 02347-1674
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WOBURN, MA ◆ LAKEVILLE, MA ◆ MANCHESTER, NH

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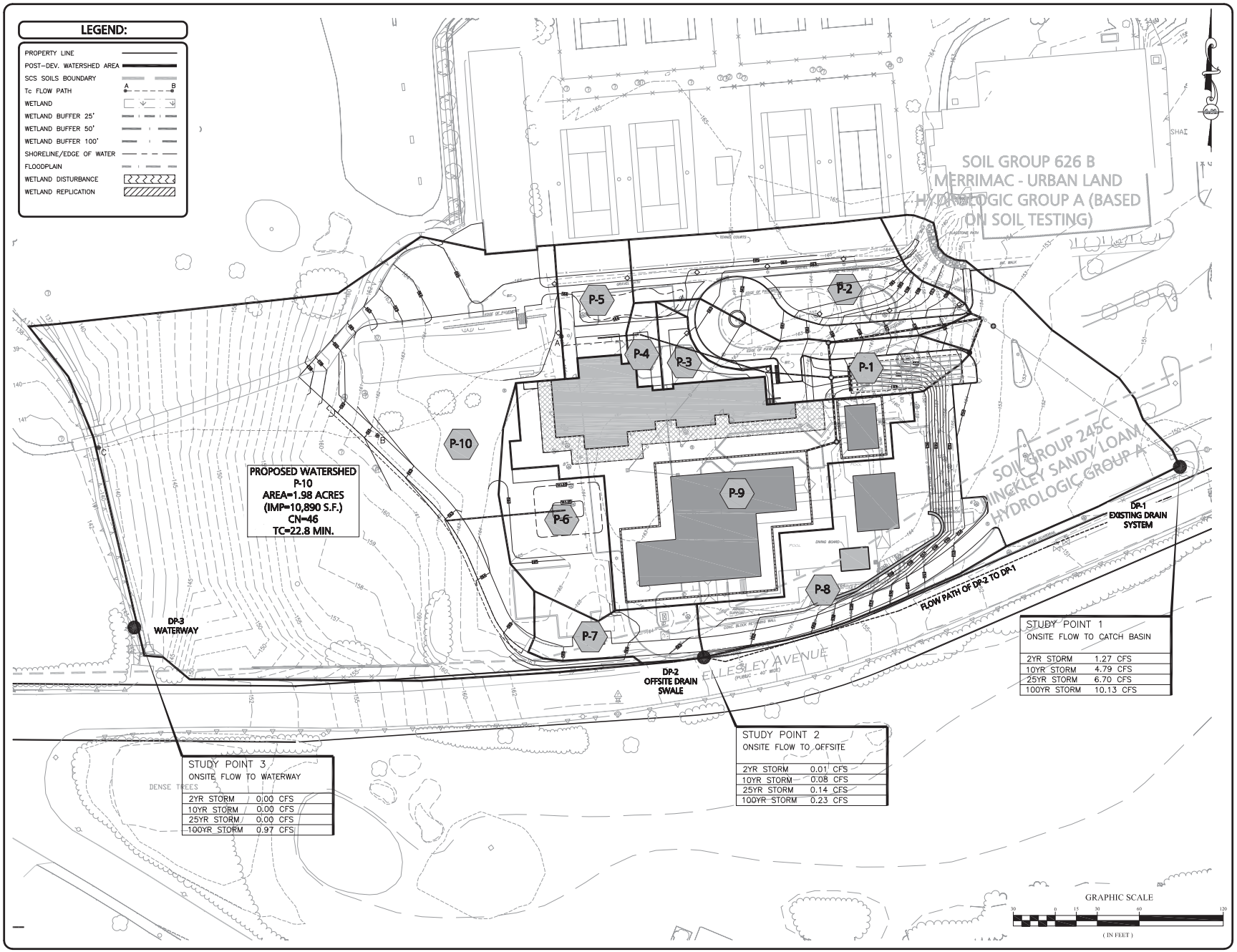

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