Proposed
Residences at Norfolk Station
Norfolk, Massachusetts

RECEIVED
OCT 31 2019
TOWN OF NORFOLK
ZONING BOARD OF APPEALS

Drainage Summary

2 YR STORM (3.2 in.)

Receptor	Pre Development		Post Development	
	Q Max (cfs)	V (AF)	Q Max (cfs)	V (AF)
Existing CB	1.39	0.139	0.05	0.012

10 YR STORM (4.6 in.)

Receptor	Pre Development		Post Development	
	Q Max (cfs)	V (AF)	Q Max (cfs)	V (AF)
Existing CB	4.32	0.338	0.81	0.100

25 YR STORM (5.5 in.)

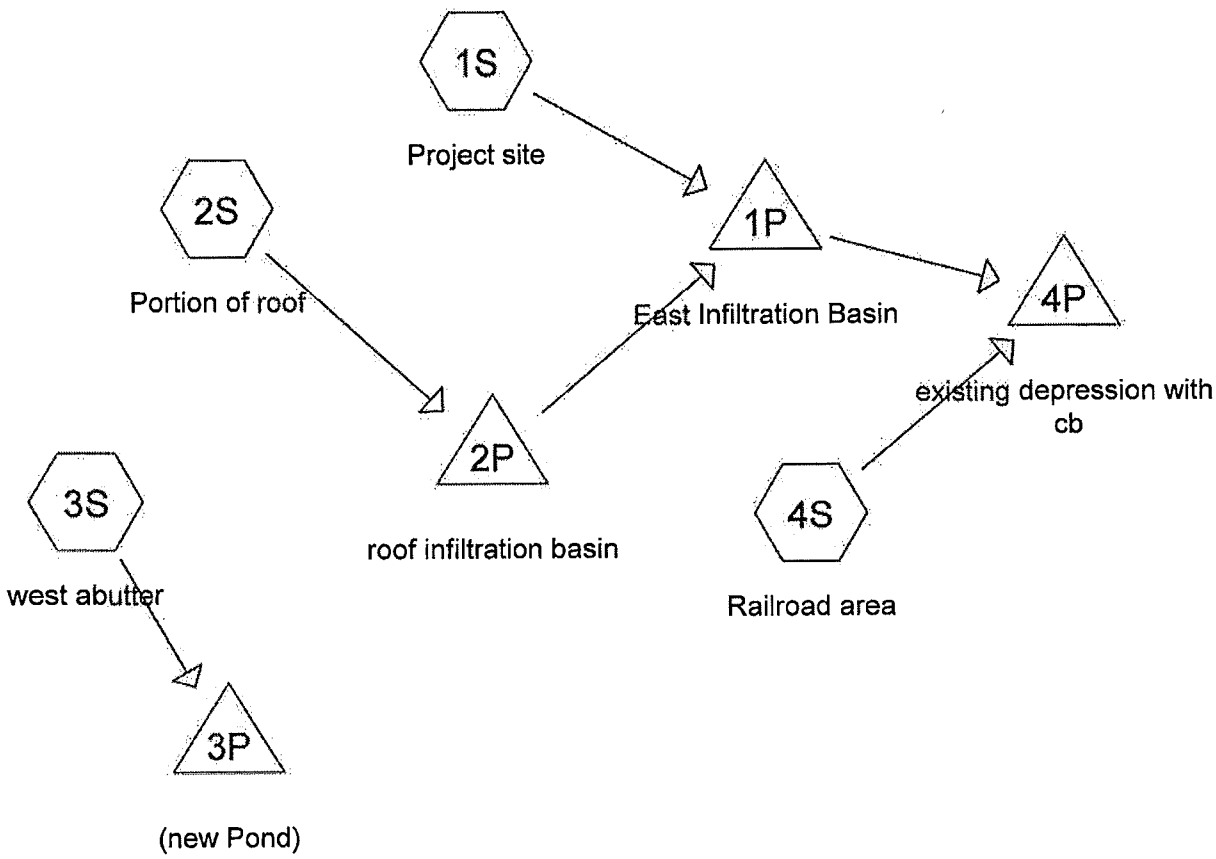
Receptor	Pre Development		Post Development	
	Q Max (cfs)	V (AF)	Q Max (cfs)	V (AF)
Existing CB	6.58	0.491	2.79	0.216

50 YR STORM (6.1 in.)

Receptor	Pre Development		Post Development	
	Q Max (cfs)	V (AF)	Q Max (cfs)	V (AF)
Existing CB	8.20	0.601	4.49	0.302

100 YR STORM (6.8 in.)

Receptor	Pre Development		Post Development	
	Q Max (cfs)	V (AF)	Q Max (cfs)	V (AF)
Existing CB	10.17	0.736	7.14	0.419



Subcat Reach Pond Link

Routing Diagram for Post-Development Site
Prepared by {enter your company name here}, Printed 10/29/2019
HydroCAD® 10.00-16 s/n 09356 © 2015 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.218	39	>75% Grass cover, Good, HSG A (1S, 2S, 3S, 4S)
0.444	98	Roofs (1S)
0.271	30	Woods, Good, HSG A (3S, 4S)
0.011	98	bottom of basin (2S)
0.329	72	crushed stone railroad bed (4S)
0.114	98	paved (3S)
0.609	98	paved and sidewalk (1S)
0.215	98	roof (2S)
3.210	**67**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
1.489	HSG A	1S, 2S, 3S, 4S
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1.722	Other	1S, 2S, 3S, 4S
3.210		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
1.218	0.000	0.000	0.000	0.000	1.218	>75% Grass cover, Good	1S, 2S, 3S, 4S
0.000	0.000	0.000	0.000	0.444	0.444	Roofs	1S
0.271	0.000	0.000	0.000	0.000	0.271	Woods, Good	3S, 4S
0.000	0.000	0.000	0.000	0.011	0.011	bottom of basin	2S
0.000	0.000	0.000	0.000	0.329	0.329	crushed stone railroad bed	4S
0.000	0.000	0.000	0.000	0.114	0.114	paved	3S
0.000	0.000	0.000	0.000	0.609	0.609	paved and sidewalk	1S
0.000	0.000	0.000	0.000	0.215	0.215	roof	2S
1.489	**0.000**	**0.000**	**0.000**	**1.722**	**3.210**	**TOTAL AREA**	

Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Project site Runoff Area=88,222 sf 51.97% Impervious Runoff Depth=0.83"
Tc=6.0 min CN=70 Runoff=1.76 cfs 0.140 af

Subcatchment 2S: Portion of roof Runoff Area=14,660 sf 67.35% Impervious Runoff Depth=1.34"
Tc=6.0 min CN=79 Runoff=0.52 cfs 0.037 af

Subcatchment 3S: west abutter Runoff Area=9,615 sf 51.60% Impervious Runoff Depth=0.64"
Tc=6.0 min CN=66 Runoff=0.13 cfs 0.012 af

Subcatchment 4S: Railroad area Runoff Area=27,343 sf 0.00% Impervious Runoff Depth=0.22"
Tc=6.0 min CN=54 Runoff=0.05 cfs 0.012 af

Pond 1P: East Infiltration Basin Peak Elev=210.78' Storage=2,857 cf Inflow=1.76 cfs 0.140 af
Discarded=0.12 cfs 0.140 af Primary=0.00 cfs 0.000 af Outflow=0.12 cfs 0.140 af

Pond 2P: roof infiltration basin Peak Elev=223.61' Storage=729 cf Inflow=0.52 cfs 0.037 af
Discarded=0.04 cfs 0.037 af Primary=0.00 cfs 0.000 af Outflow=0.04 cfs 0.037 af

Pond 3P: (new Pond) Peak Elev=216.81' Storage=0.002 af Inflow=0.13 cfs 0.012 af
Outflow=0.04 cfs 0.012 af

Pond 4P: existing depression with cb Peak Elev=208.01' Storage=3 cf Inflow=0.05 cfs 0.012 af
Discarded=0.02 cfs 0.005 af Primary=0.04 cfs 0.007 af Outflow=0.05 cfs 0.012 af

Total Runoff Area = 3.210 ac Runoff Volume = 0.201 af Average Runoff Depth = 0.75"
56.61% Pervious = 1.817 ac 43.39% Impervious = 1.393 ac

Summary for Subcatchment 1S: Project site

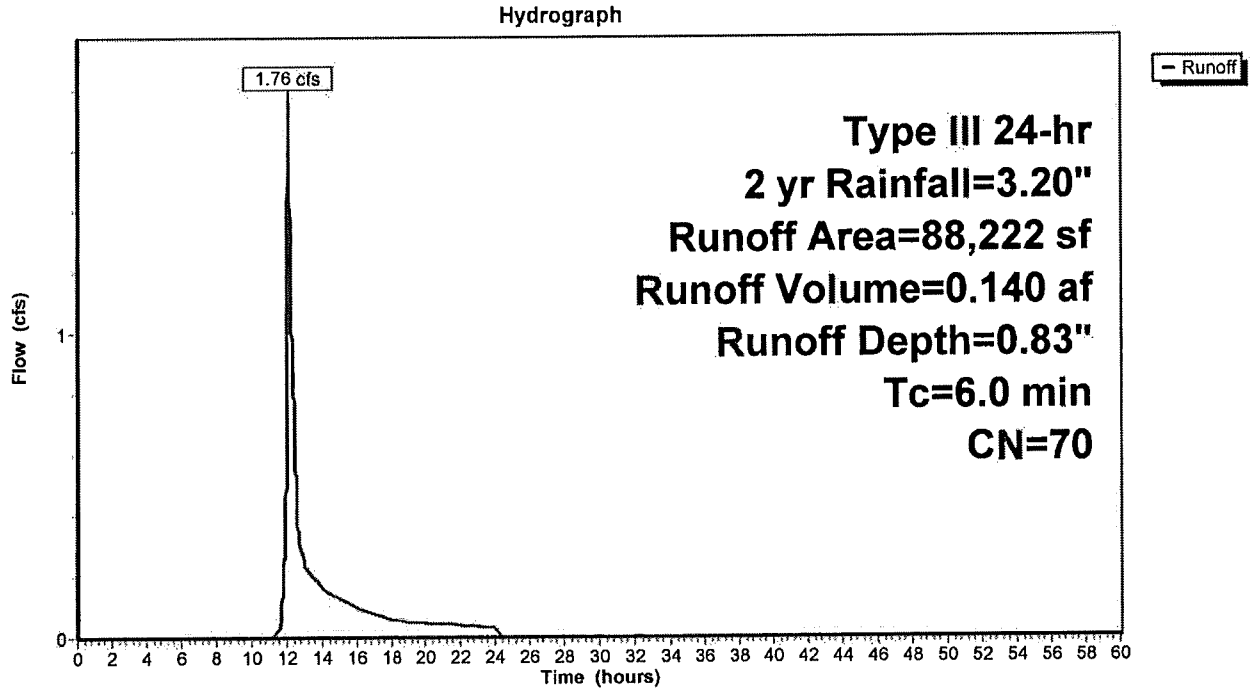
Runoff = 1.76 cfs @ 12.10 hrs, Volume= 0.140 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	19,326	98	Roofs
*	26,521	98	paved and sidewalk
	42,375	39	>75% Grass cover, Good, HSG A
	88,222	70	Weighted Average
	42,375		48.03% Pervious Area
	45,847		51.97% Impervious Area

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

Subcatchment 1S: Project site



Summary for Subcatchment 2S: Portion of roof

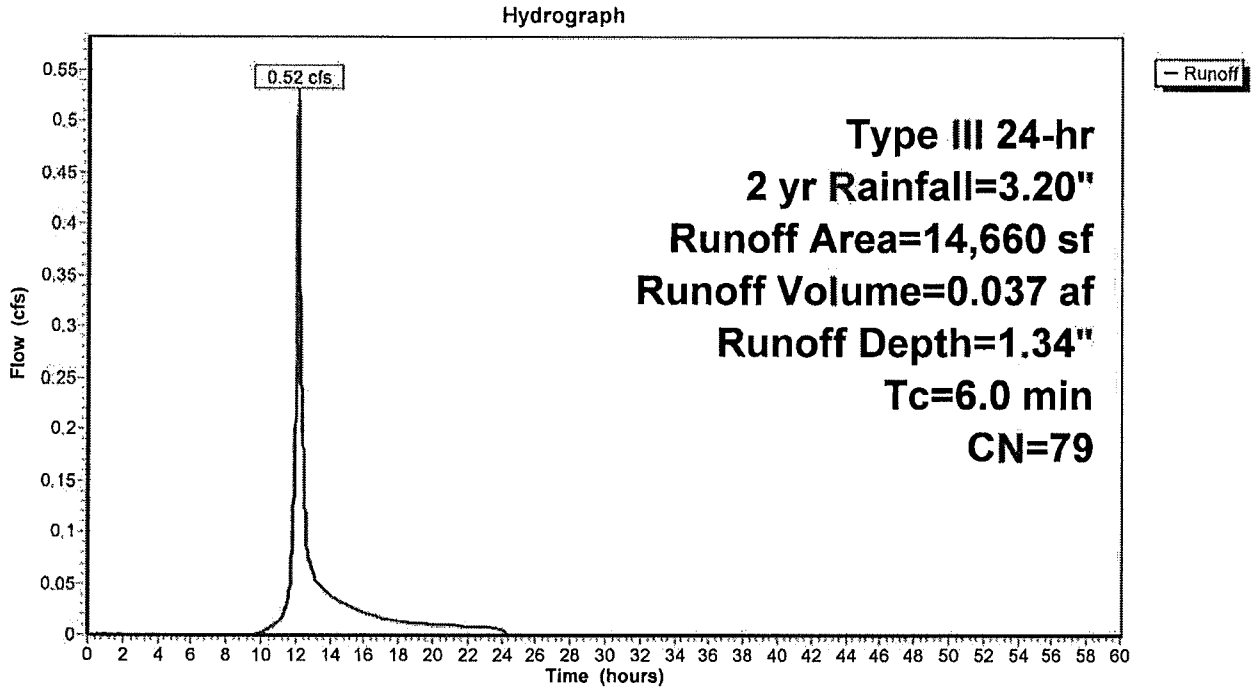
Runoff = 0.52 cfs @ 12.09 hrs, Volume= 0.037 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	9,375	98	roof
*	498	98	bottom of basin
	4,787	39	>75% Grass cover, Good, HSG A
	14,660	79	Weighted Average
	4,787		32.65% Pervious Area
	9,873		67.35% Impervious Area

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

Subcatchment 2S: Portion of roof



Summary for Subcatchment 3S: west abutter

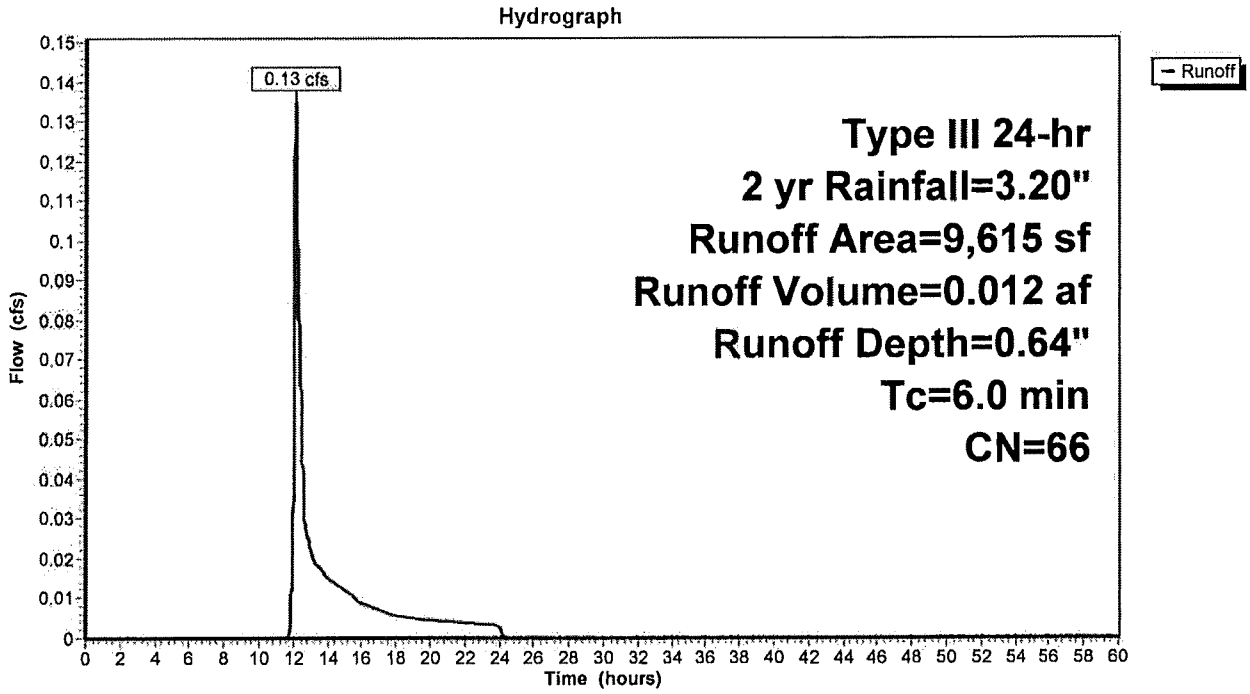
Runoff = 0.13 cfs @ 12.11 hrs, Volume= 0.012 af, Depth= 0.64"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
*	4,961	98	paved
	750	39	>75% Grass cover, Good, HSG A
	3,904	30	Woods, Good, HSG A
	9,615	66	Weighted Average
	4,654		48.40% Pervious Area
	4,961		51.60% Impervious Area

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

Subcatchment 3S: west abutter



Summary for Subcatchment 4S: Railroad area

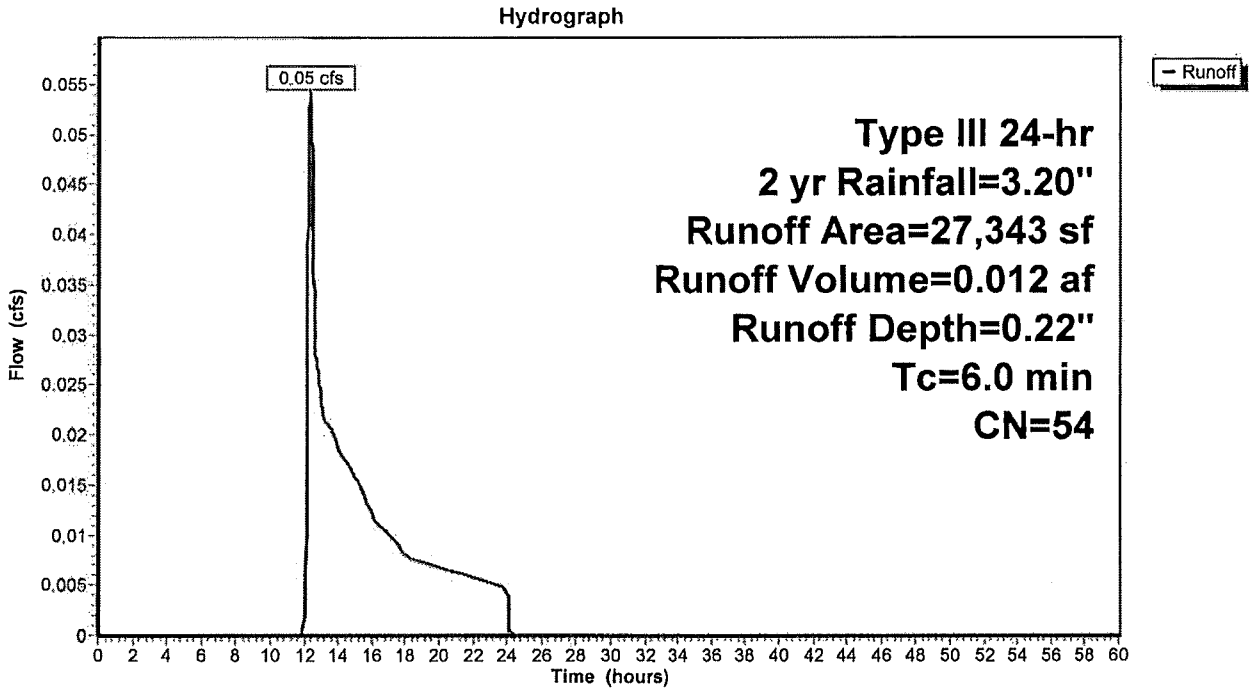
Runoff = 0.05 cfs @ 12.36 hrs, Volume= 0.012 af, Depth= 0.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr Rainfall=3.20"

	Area (sf)	CN	Description
	7,880	30	Woods, Good, HSG A
	5,145	39	>75% Grass cover, Good, HSG A
*	14,318	72	crushed stone railroad bed
	27,343	54	Weighted Average
	27,343		100.00% Pervious Area

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

Subcatchment 4S: Railroad area



Summary for Pond 1P: East Infiltration Basin

Inflow Area =	2.362 ac, 54.16% Impervious, Inflow Depth = 0.71" for 2 yr event				
Inflow =	1.76 cfs @	12.10 hrs, Volume=	0.140 af		
Outflow =	0.12 cfs @	15.24 hrs, Volume=	0.140 af,	Atten= 93%,	Lag= 188.7 min
Discarded =	0.12 cfs @	15.24 hrs, Volume=	0.140 af		
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 210.78' @ 15.24 hrs Surf.Area= 2,174 sf Storage= 2,857 cf

Plug-Flow detention time= 292.5 min calculated for 0.140 af (100% of inflow)
Center-of-Mass det. time= 292.5 min (1,168.2 - 875.7)

Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	9,524 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

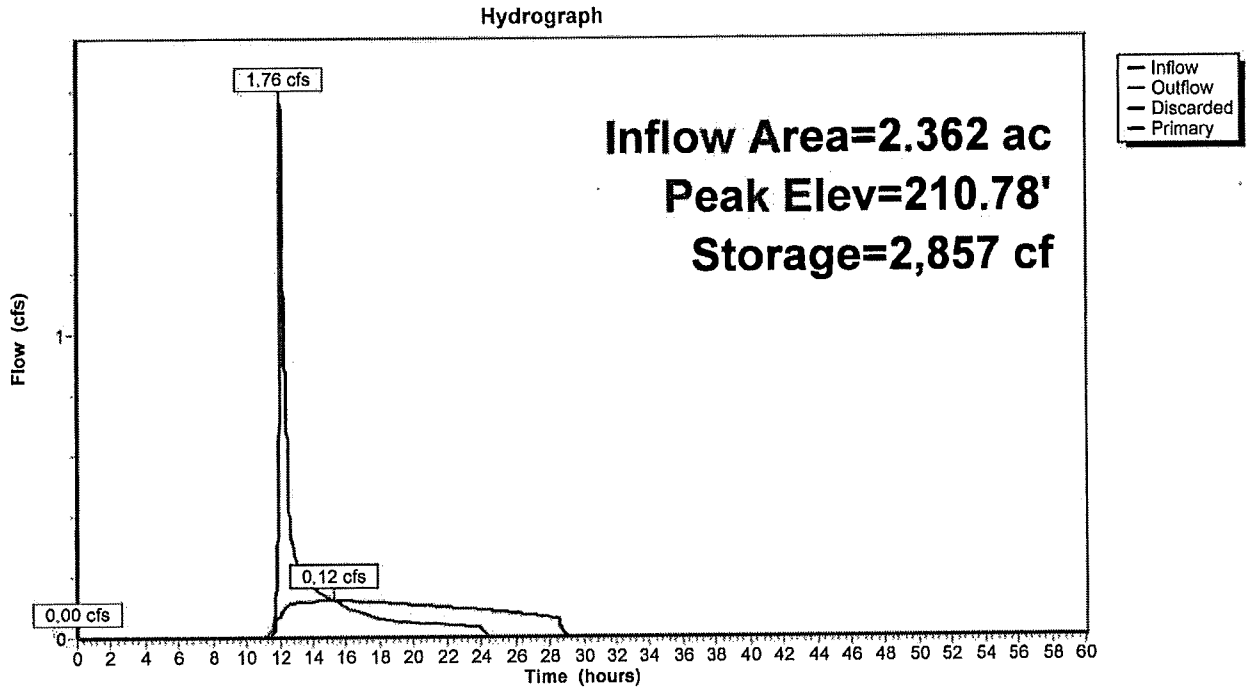
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
209.00	1,077	0	0
210.00	1,649	1,363	1,363
211.00	2,320	1,985	3,348
212.00	3,077	2,699	6,046
213.00	3,879	3,478	9,524

Device	Routing	Invert	Outlet Devices
#1	Discarded	209.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	211.60'	**6.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.12 cfs @ 15.24 hrs HW=210.78' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.12 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=209.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 1P: East Infiltration Basin



Summary for Pond 2P: roof infiltration basin

Inflow Area =	0.337 ac, 67.35% Impervious, Inflow Depth = 1.34" for 2 yr event				
Inflow =	0.52 cfs @	12.09 hrs,	Volume=	0.037 af	
Outflow =	0.04 cfs @	13.59 hrs,	Volume=	0.037 af,	Atten= 91%, Lag= 89.8 min
Discarded =	0.04 cfs @	13.59 hrs,	Volume=	0.037 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 223.61' @ 13.59 hrs Surf.Area= 798 sf Storage= 729 cf

Plug-Flow detention time= 208.2 min calculated for 0.037 af (100% of inflow)
Center-of-Mass det. time= 208.2 min (1,054.1 - 846.0)

Volume	Invert	Avail.Storage	Storage Description
#1	222.00'	4,684 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

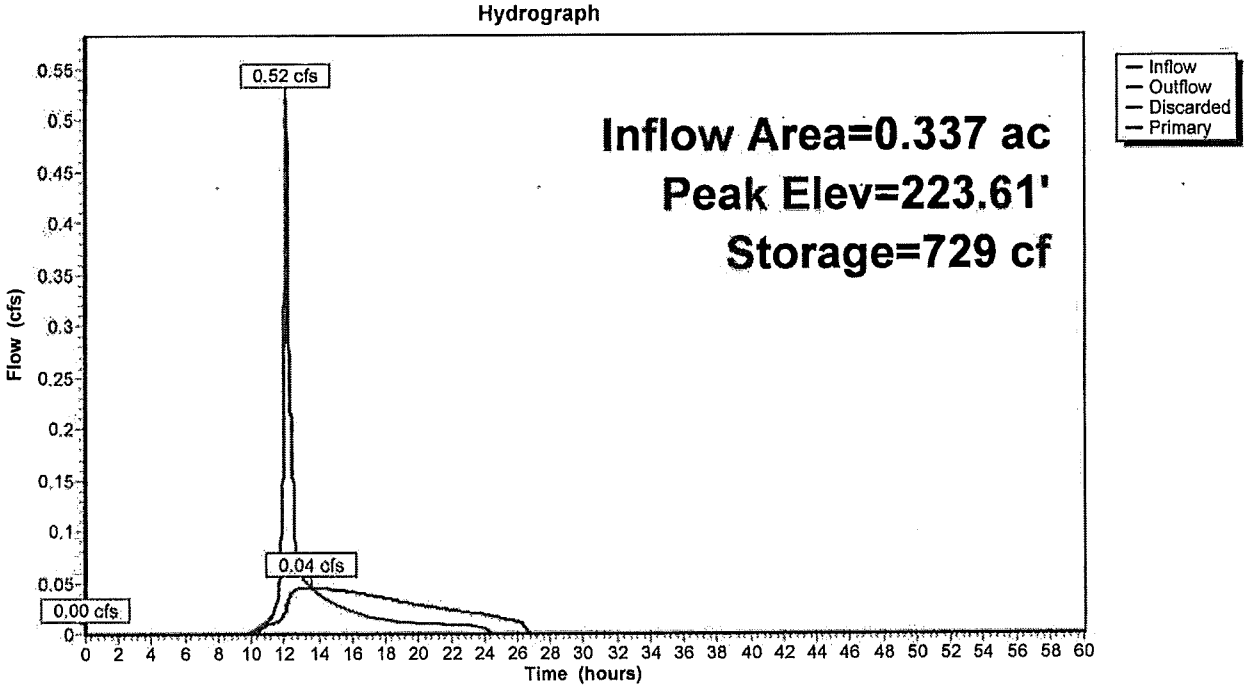
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.00	170	0	0
223.00	498	334	334
224.00	989	744	1,078
225.00	1,612	1,301	2,378
226.00	2,999	2,306	4,684

Device	Routing	Invert	Outlet Devices
#1	Discarded	222.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	225.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 225.00' / 224.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.04 cfs @ 13.59 hrs HW=223.61' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=222.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 2P: roof infiltration basin



Summary for Pond 3P: (new Pond)

Inflow Area = 0.221 ac, 51.60% Impervious, Inflow Depth = 0.64" for 2 yr event
Inflow = 0.13 cfs @ 12.11 hrs, Volume= 0.012 af
Outflow = 0.04 cfs @ 12.03 hrs, Volume= 0.012 af, Atten= 70%, Lag= 0.0 min
Discarded = 0.04 cfs @ 12.03 hrs, Volume= 0.012 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 216.81' @ 12.54 hrs Surf.Area= 0.017 ac Storage= 0.002 af

Plug-Flow detention time= 13.9 min calculated for 0.012 af (100% of inflow)
Center-of-Mass det. time= 13.9 min (905.0 - 891.1)

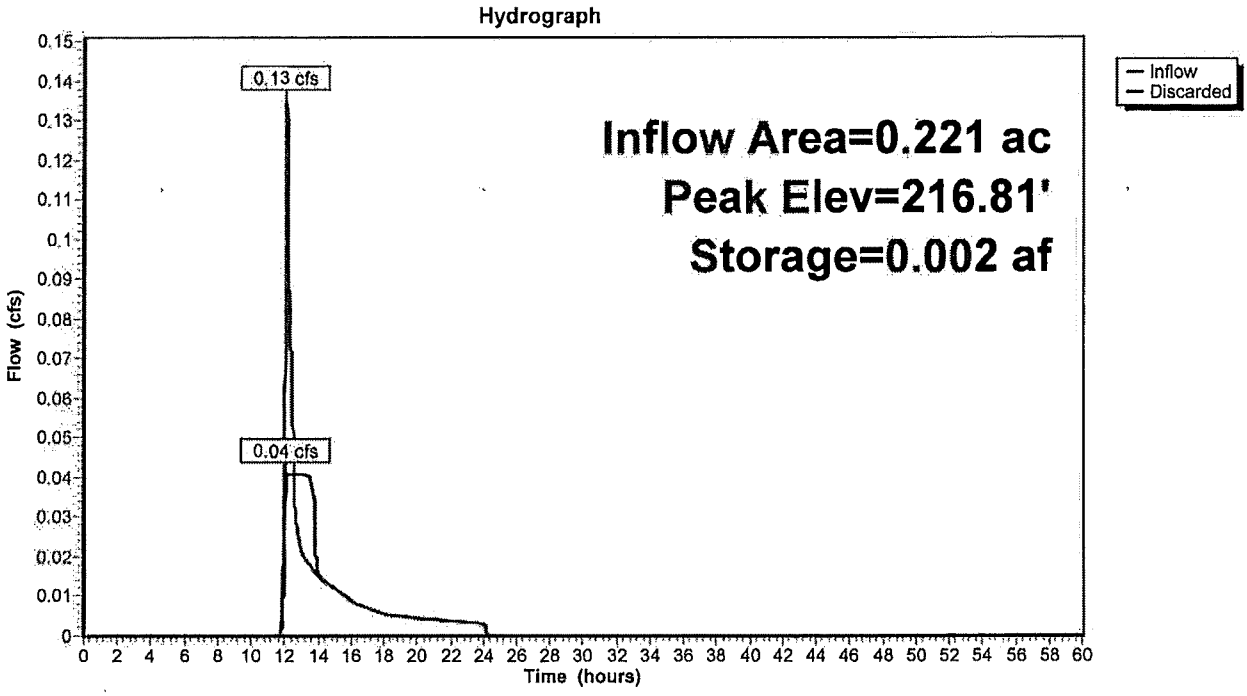
Volume	Invert	Avail.Storage	Storage Description
#1A	216.50'	0.015 af	**16.00'W x 45.50'L x 3.54'H Field A** 0.059 af Overall - 0.022 af Embedded = 0.037 af x 40.0% Voids
#2A	217.00'	0.022 af	**Cultec R-330XLHD** x 18 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.037 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	216.50'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 12.03 hrs HW=216.54' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 3P: (new Pond)



Summary for Pond 4P: existing depression with cb

Inflow Area =	2.990 ac, 42.79% Impervious, Inflow Depth = 0.05" for 2 yr event				
Inflow =	0.05 cfs @	12.36 hrs,	Volume=	0.012 af	
Outflow =	0.05 cfs @	12.38 hrs,	Volume=	0.012 af,	Atten= 0%, Lag= 1.2 min
Discarded =	0.02 cfs @	12.38 hrs,	Volume=	0.005 af	
Primary =	0.04 cfs @	12.38 hrs,	Volume=	0.007 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 208.01' @ 12.38 hrs Surf.Area= 314 sf Storage= 3 cf

Plug-Flow detention time= 1.1 min calculated for 0.012 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (965.3 - 964.3)

Volume	Invert	Avail.Storage	Storage Description
#1	208.00'	2,973 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

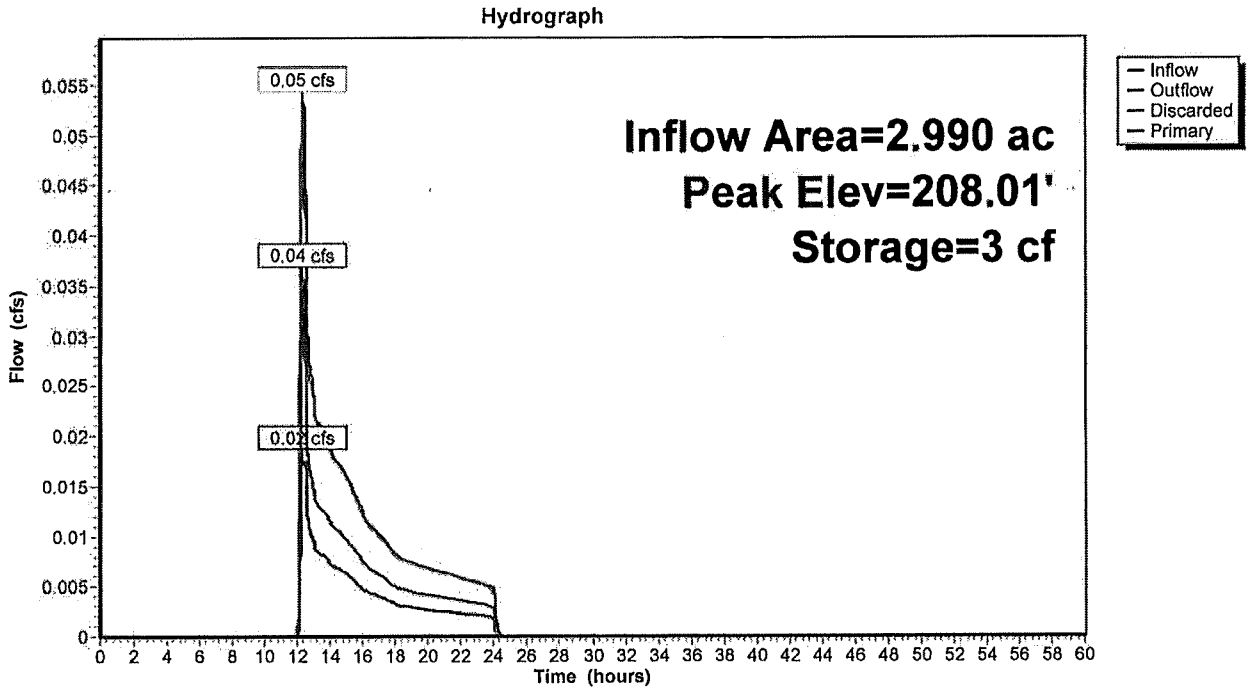
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
208.00	249	0	0
209.00	5,696	2,973	2,973

Device	Routing	Invert	Outlet Devices
#1	Primary	208.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	208.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 12.38 hrs HW=208.01' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.02 cfs)

Primary OutFlow Max=0.03 cfs @ 12.38 hrs HW=208.01' (Free Discharge)
└**1=Orifice/Grate** (Weir Controls 0.03 cfs @ 0.36 fps)

Pond 4P: existing depression with cb



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Project site Runoff Area=88,222 sf 51.97% Impervious Runoff Depth=1.74"
Tc=6.0 min CN=70 Runoff=4.03 cfs 0.294 af

Subcatchment 2S: Portion of roof Runoff Area=14,660 sf 67.35% Impervious Runoff Depth=2.46"
Tc=6.0 min CN=79 Runoff=0.97 cfs 0.069 af

Subcatchment 3S: west abutter Runoff Area=9,615 sf 51.60% Impervious Runoff Depth=1.46"
Tc=6.0 min CN=66 Runoff=0.36 cfs 0.027 af

Subcatchment 4S: Railroad area Runoff Area=27,343 sf 0.00% Impervious Runoff Depth=0.73"
Tc=6.0 min CN=54 Runoff=0.38 cfs 0.038 af

Pond 1P: East Infiltration Basin Peak Elev=211.73' Storage=5,246 cf Inflow=4.03 cfs 0.294 af
Discarded=0.16 cfs 0.233 af Primary=0.68 cfs 0.062 af Outflow=0.84 cfs 0.294 af

Pond 2P: roof infiltration basin Peak Elev=224.39' Storage=1,508 cf Inflow=0.97 cfs 0.069 af
Discarded=0.07 cfs 0.069 af Primary=0.00 cfs 0.000 af Outflow=0.07 cfs 0.069 af

Pond 3P: (new Pond) Peak Elev=217.42' Storage=0.009 af Inflow=0.36 cfs 0.027 af
Outflow=0.04 cfs 0.027 af

Pond 4P: existing depression with cb Peak Elev=208.09' Storage=48 cf Inflow=0.81 cfs 0.100 af
Discarded=0.04 cfs 0.014 af Primary=0.76 cfs 0.086 af Outflow=0.80 cfs 0.100 af

Total Runoff Area = 3.210 ac Runoff Volume = 0.429 af Average Runoff Depth = 1.60"
56.61% Pervious = 1.817 ac 43.39% Impervious = 1.393 ac

Summary for Subcatchment 1S: Project site

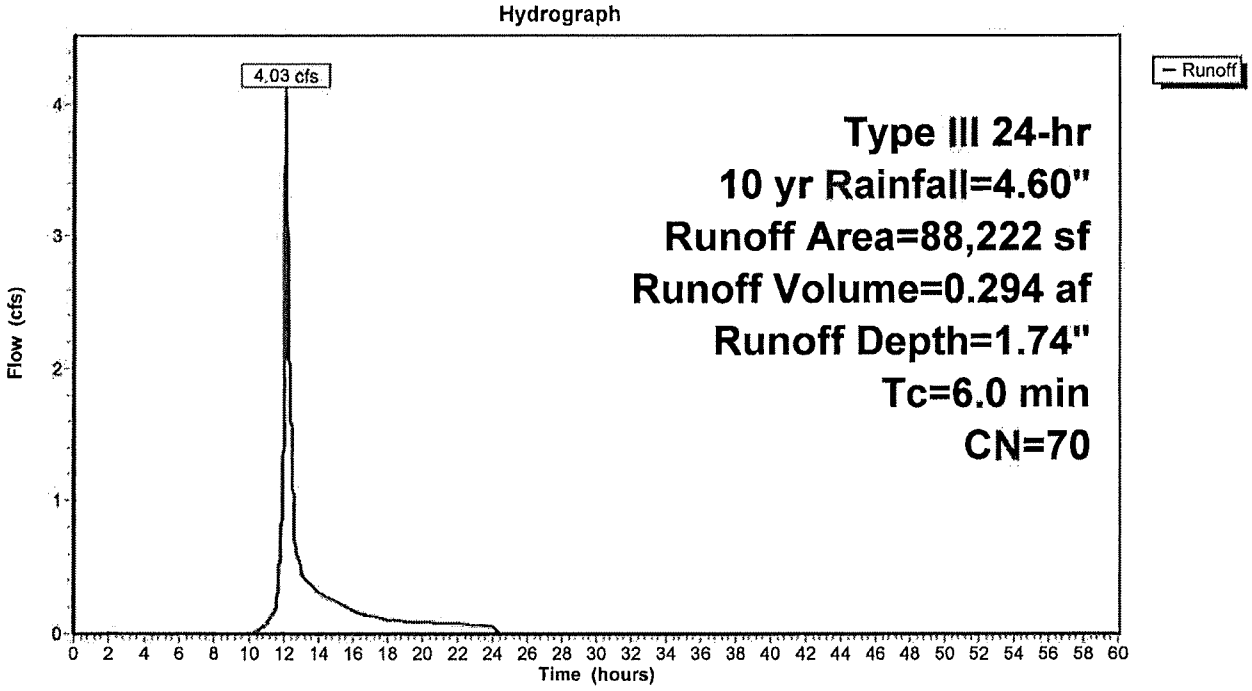
Runoff = 4.03 cfs @ 12.09 hrs, Volume= 0.294 af, Depth= 1.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.60"

	Area (sf)	CN	Description
*	19,326	98	Roofs
*	26,521	98	paved and sidewalk
	42,375	39	>75% Grass cover, Good, HSG A
	88,222	70	Weighted Average
	42,375		48.03% Pervious Area
	45,847		51.97% Impervious Area

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

Subcatchment 1S: Project site



Summary for Subcatchment 2S: Portion of roof

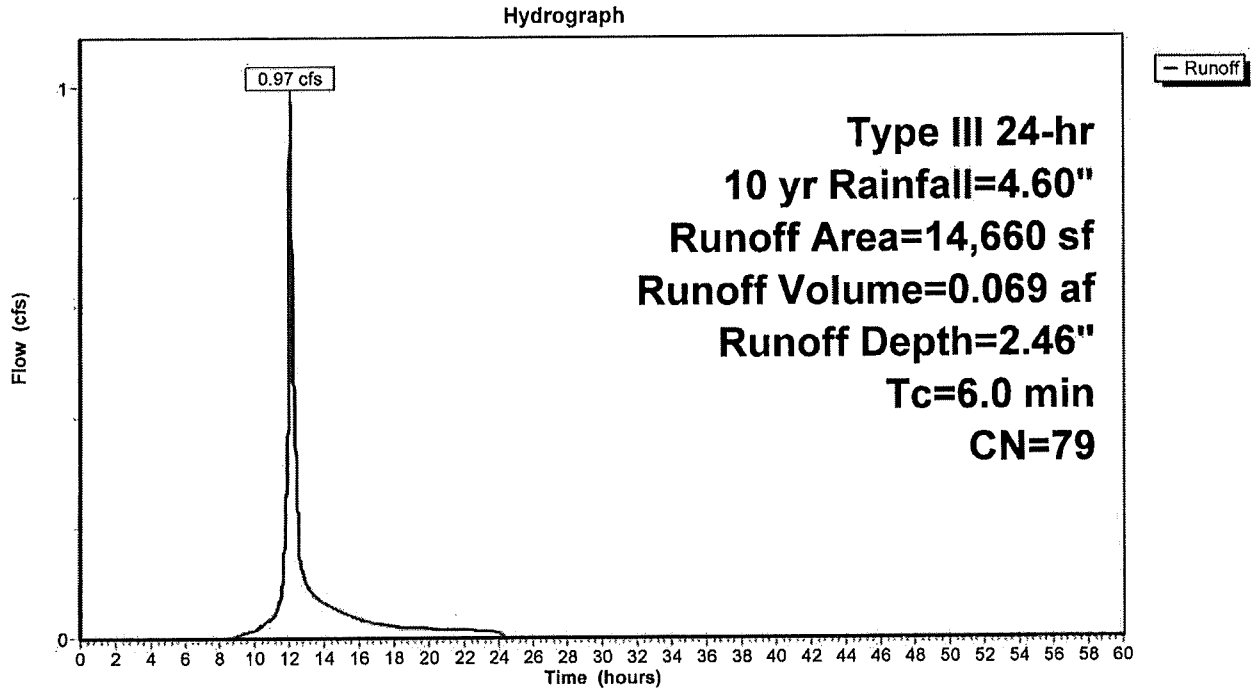
Runoff = 0.97 cfs @ 12.09 hrs, Volume= 0.069 af, Depth= 2.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.60"

	Area (sf)	CN	Description
*	9,375	98	roof
*	498	98	bottom of basin
	4,787	39	>75% Grass cover, Good, HSG A
	14,660	79	Weighted Average
	4,787		32.65% Pervious Area
	9,873		67.35% Impervious Area

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

Subcatchment 2S: Portion of roof



Summary for Subcatchment 3S: west abutter

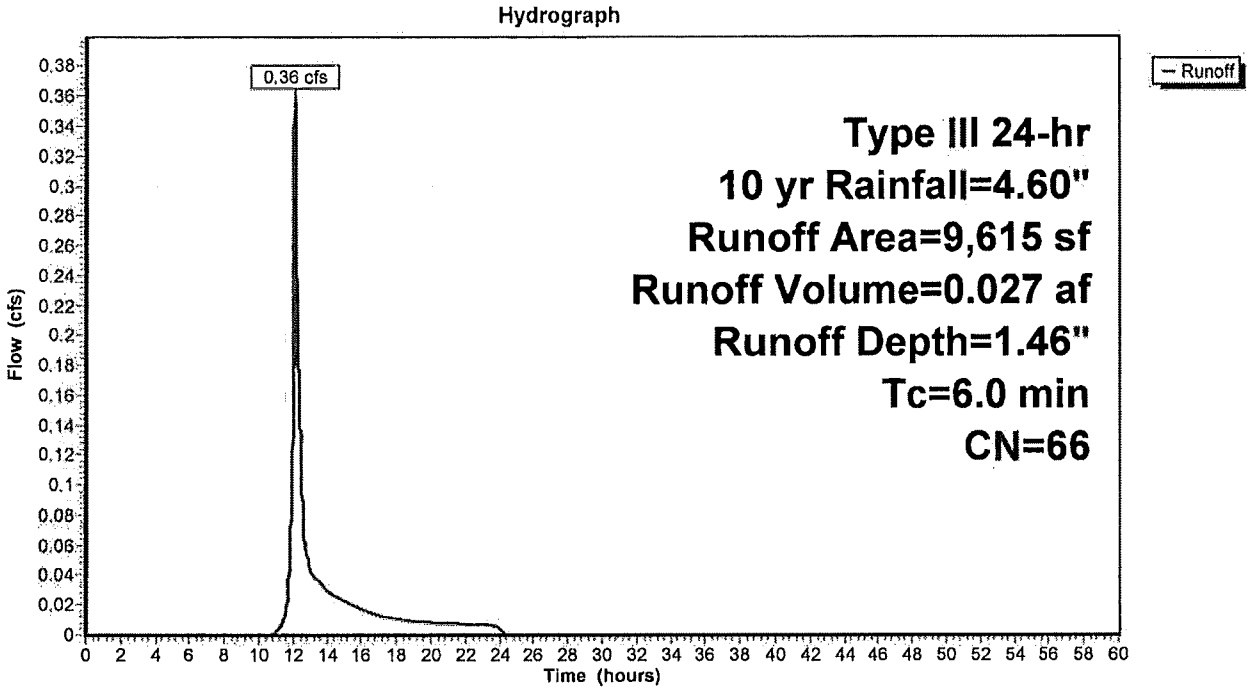
Runoff = 0.36 cfs @ 12.10 hrs, Volume= 0.027 af, Depth= 1.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.60"

	Area (sf)	CN	Description
*	4,961	98	paved
	750	39	>75% Grass cover, Good, HSG A
	3,904	30	Woods, Good, HSG A
	9,615	66	Weighted Average
	4,654		48.40% Pervious Area
	4,961		51.60% Impervious Area

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

Subcatchment 3S: west abutter



Summary for Subcatchment 4S: Railroad area

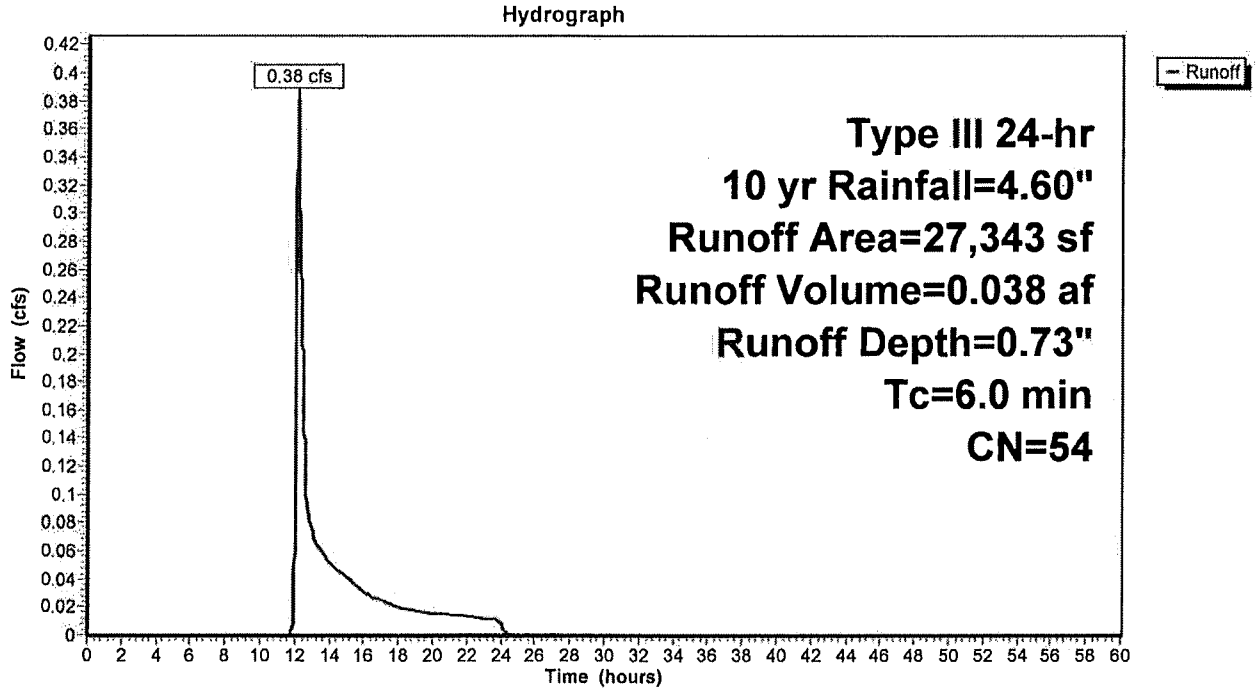
Runoff = 0.38 cfs @ 12.11 hrs, Volume= 0.038 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr Rainfall=4.60"

	Area (sf)	CN	Description
	7,880	30	Woods, Good, HSG A
	5,145	39	>75% Grass cover, Good, HSG A
*	14,318	72	crushed stone railroad bed
	27,343	54	Weighted Average
	27,343		100.00% Pervious Area

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

Subcatchment 4S: Railroad area



Summary for Pond 1P: East Infiltration Basin

Inflow Area =	2.362 ac, 54.16% Impervious, Inflow Depth = 1.50" for 10 yr event				
Inflow =	4.03 cfs @	12.09 hrs,	Volume=	0.294 af	
Outflow =	0.84 cfs @	12.56 hrs,	Volume=	0.294 af,	Atten= 79%, Lag= 27.7 min
Discarded =	0.16 cfs @	12.56 hrs,	Volume=	0.233 af	
Primary =	0.68 cfs @	12.56 hrs,	Volume=	0.062 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 211.73' @ 12.56 hrs Surf.Area= 2,873 sf Storage= 5,246 cf

Plug-Flow detention time= 323.9 min calculated for 0.294 af (100% of inflow)
Center-of-Mass det. time= 323.9 min (1,176.2 - 852.3)

Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	9,524 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

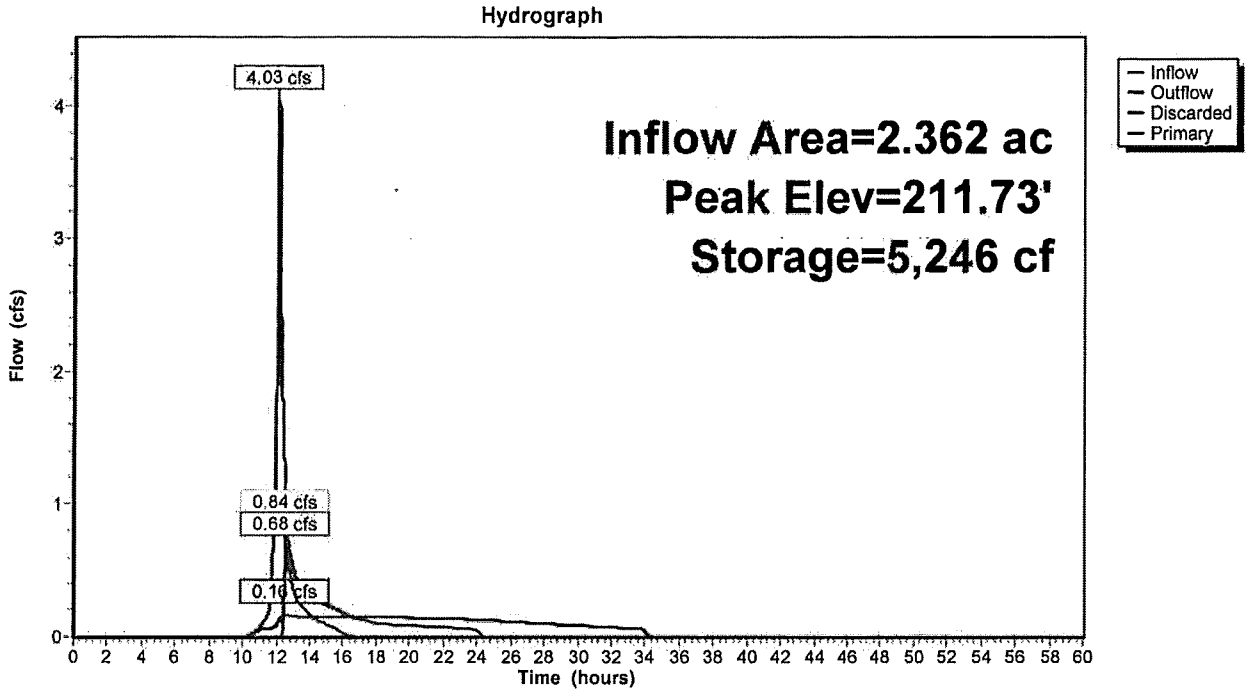
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
209.00	1,077	0	0
210.00	1,649	1,363	1,363
211.00	2,320	1,985	3,348
212.00	3,077	2,699	6,046
213.00	3,879	3,478	9,524

Device	Routing	Invert	Outlet Devices
#1	Discarded	209.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	211.60'	**6.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.16 cfs @ 12.56 hrs HW=211.73' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.16 cfs)

Primary OutFlow Max=0.68 cfs @ 12.56 hrs HW=211.73' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 0.68 cfs @ 0.86 fps)

Pond 1P: East Infiltration Basin



Summary for Pond 2P: roof infiltration basin

Inflow Area =	0.337 ac, 67.35% Impervious, Inflow Depth = 2.46" for 10 yr event				
Inflow =	0.97 cfs @	12.09 hrs,	Volume=	0.069 af	
Outflow =	0.07 cfs @	13.81 hrs,	Volume=	0.069 af,	Atten= 93%, Lag= 103.4 min
Discarded =	0.07 cfs @	13.81 hrs,	Volume=	0.069 af	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 224.39' @ 13.81 hrs Surf.Area= 1,231 sf Storage= 1,508 cf

Plug-Flow detention time= 284.7 min calculated for 0.069 af (100% of inflow)
Center-of-Mass det. time= 284.7 min (1,112.9 - 828.2)

Volume	Invert	Avail.Storage	Storage Description
#1	222.00'	4,684 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

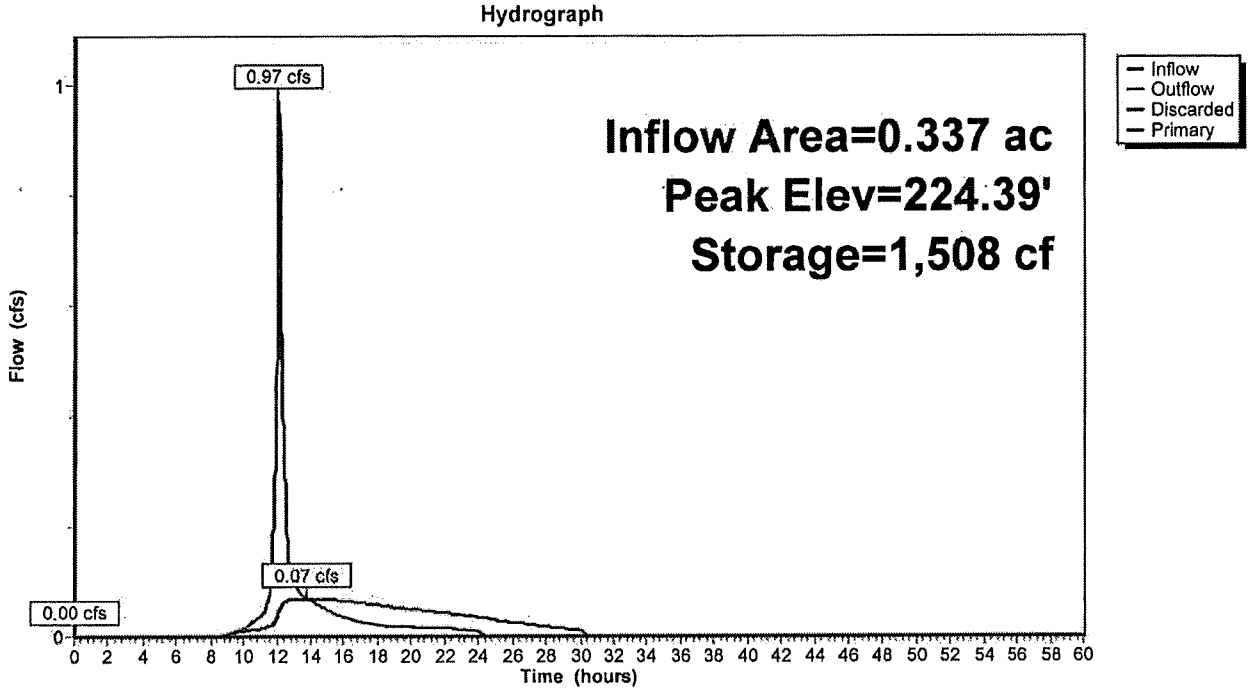
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.00	170	0	0
223.00	498	334	334
224.00	989	744	1,078
225.00	1,612	1,301	2,378
226.00	2,999	2,306	4,684

Device	Routing	Invert	Outlet Devices
#1	Discarded	222.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	225.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 225.00' / 224.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.07 cfs @ 13.81 hrs HW=224.39' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=222.00' (Free Discharge)
└─**2=Culvert** (Controls 0.00 cfs)

Pond 2P: roof infiltration basin



Summary for Pond 3P: (new Pond)

Inflow Area = 0.221 ac, 51.60% Impervious, Inflow Depth = 1.46" for 10 yr event
Inflow = 0.36 cfs @ 12.10 hrs, Volume= 0.027 af
Outflow = 0.04 cfs @ 11.80 hrs, Volume= 0.027 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.80 hrs, Volume= 0.027 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 217.42' @ 13.10 hrs Surf.Area= 0.017 ac Storage= 0.009 af

Plug-Flow detention time= 87.9 min calculated for 0.027 af (100% of inflow)
Center-of-Mass det. time= 87.9 min (951.3 - 863.3)

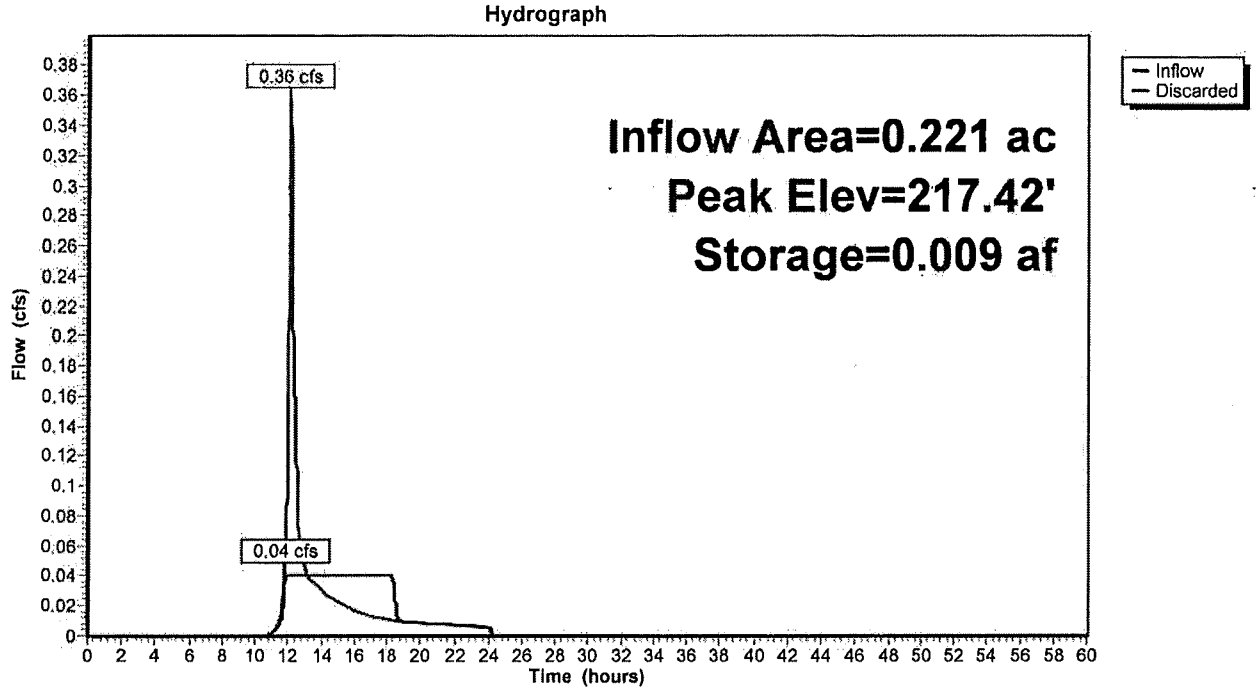
Volume	Invert	Avail.Storage	Storage Description
#1A	216.50'	0.015 af	**16.00'W x 45.50'L x 3.54'H Field A** 0.059 af Overall - 0.022 af Embedded = 0.037 af x 40.0% Voids
#2A	217.00'	0.022 af	**Cultec R-330XLHD** x 18 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.037 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	216.50'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 11.80 hrs HW=216.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 3P: (new Pond)



Summary for Pond 4P: existing depression with cb

Inflow Area =	2.990 ac, 42.79% Impervious, Inflow Depth = 0.40" for 10 yr event				
Inflow =	0.81 cfs @	12.54 hrs,	Volume=	0.100 af	
Outflow =	0.80 cfs @	12.56 hrs,	Volume=	0.100 af,	Atten= 1%, Lag= 1.2 min
Discarded =	0.04 cfs @	12.56 hrs,	Volume=	0.014 af	
Primary =	0.76 cfs @	12.56 hrs,	Volume=	0.086 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 208.09' @ 12.56 hrs Surf.Area= 762 sf Storage= 48 cf

Plug-Flow detention time= 1.0 min calculated for 0.100 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (849.0 - 847.9)

Volume	Invert	Avail.Storage	Storage Description
#1	208.00'	2,973 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

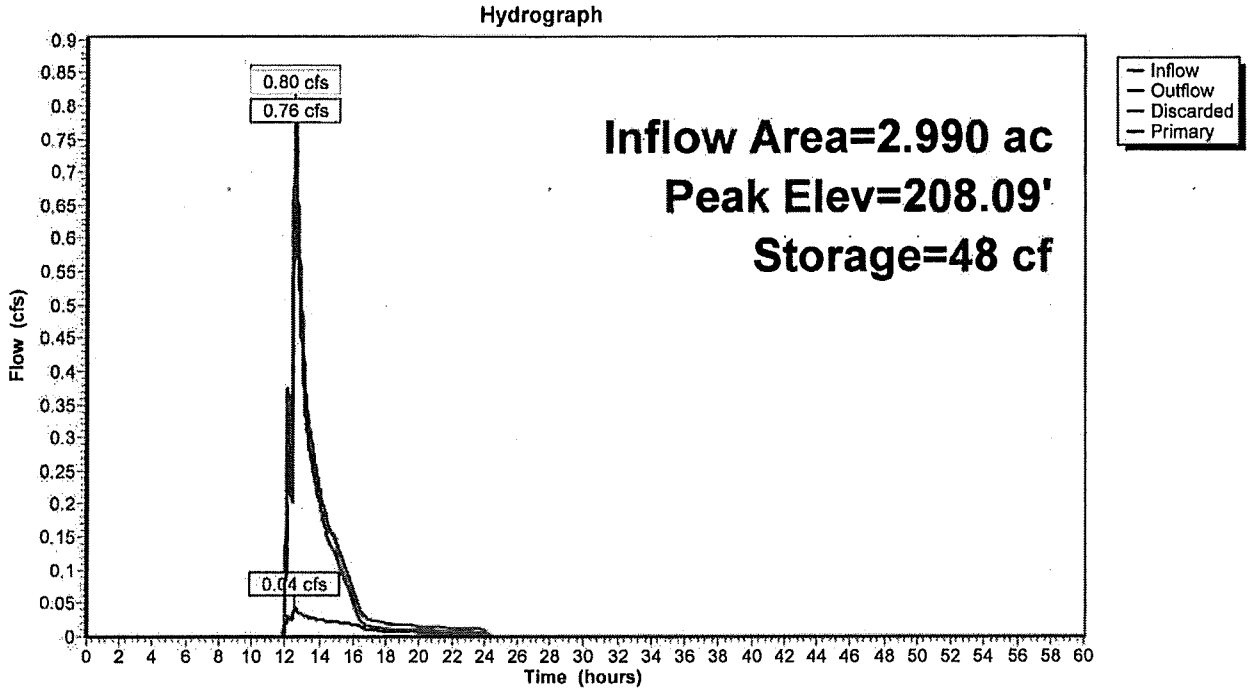
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
208.00	249	0	0
209.00	5,696	2,973	2,973

Device	Routing	Invert	Outlet Devices
#1	Primary	208.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	208.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 12.56 hrs HW=208.09' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.04 cfs)

Primary OutFlow Max=0.76 cfs @ 12.56 hrs HW=208.09' (Free Discharge)
└**1=Orifice/Grate** (Weir Controls 0.76 cfs @ 1.00 fps)

Pond 4P: existing depression with cb



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Project site Runoff Area=88,222 sf 51.97% Impervious Runoff Depth=2.41"
Tc=6.0 min CN=70 Runoff=5.68 cfs 0.407 af

Subcatchment 2S: Portion of roof Runoff Area=14,660 sf 67.35% Impervious Runoff Depth=3.24"
Tc=6.0 min CN=79 Runoff=1.28 cfs 0.091 af

Subcatchment 3S: west abutter Runoff Area=9,615 sf 51.60% Impervious Runoff Depth=2.08"
Tc=6.0 min CN=66 Runoff=0.52 cfs 0.038 af

Subcatchment 4S: Railroad area Runoff Area=27,343 sf 0.00% Impervious Runoff Depth=1.17"
Tc=6.0 min CN=54 Runoff=0.72 cfs 0.061 af

Pond 1P: East Infiltration Basin Peak Elev=211.90' Storage=5,736 cf Inflow=5.68 cfs 0.407 af
Discarded=0.17 cfs 0.253 af Primary=2.38 cfs 0.155 af Outflow=2.55 cfs 0.407 af

Pond 2P: roof infiltration basin Peak Elev=224.80' Storage=2,073 cf Inflow=1.28 cfs 0.091 af
Discarded=0.08 cfs 0.091 af Primary=0.00 cfs 0.000 af Outflow=0.08 cfs 0.091 af

Pond 3P: (new Pond) Peak Elev=217.92' Storage=0.016 af Inflow=0.52 cfs 0.038 af
Outflow=0.04 cfs 0.038 af

Pond 4P: existing depression with cb Peak Elev=208.22' Storage=185 cf Inflow=2.79 cfs 0.216 af
Discarded=0.08 cfs 0.019 af Primary=2.68 cfs 0.197 af Outflow=2.76 cfs 0.216 af

Total Runoff Area = 3.210 ac Runoff Volume = 0.598 af Average Runoff Depth = 2.23"
56.61% Pervious = 1.817 ac 43.39% Impervious = 1.393 ac

Summary for Subcatchment 1S: Project site

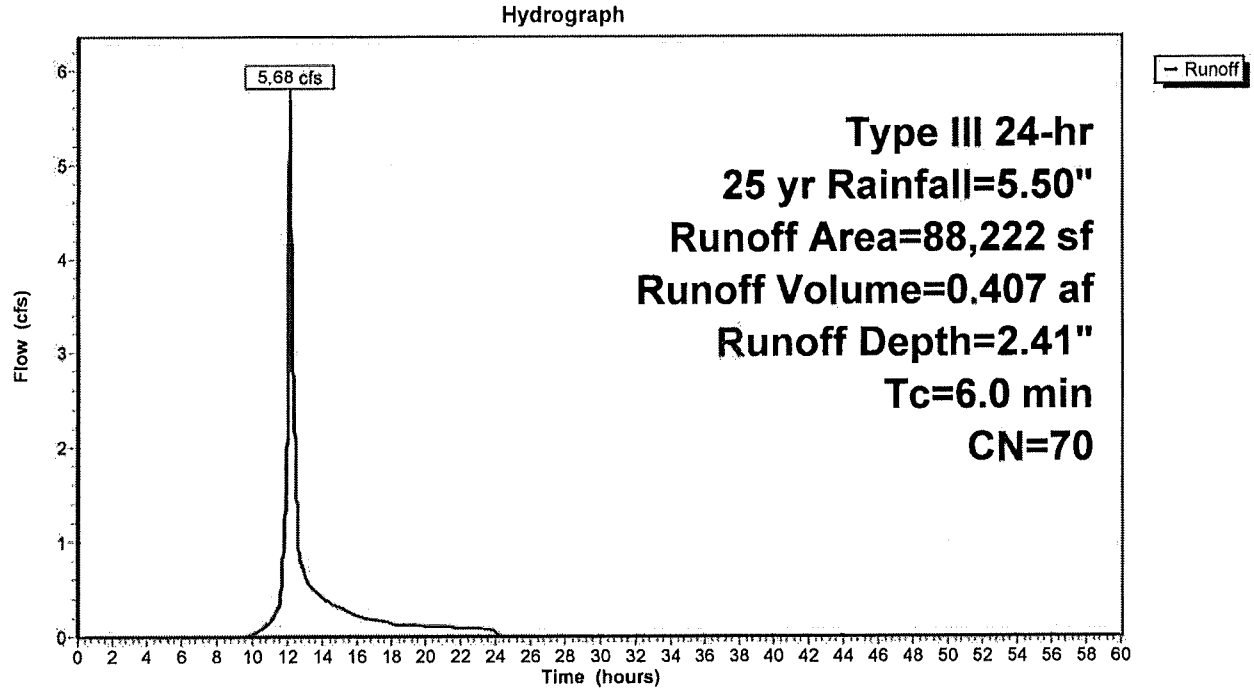
Runoff = 5.68 cfs @ 12.09 hrs, Volume= 0.407 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
*	19,326	98	Roofs
*	26,521	98	paved and sidewalk
	42,375	39	>75% Grass cover, Good, HSG A
	88,222	70	Weighted Average
	42,375		48.03% Pervious Area
	45,847		51.97% Impervious Area

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

Subcatchment 1S: Project site



Summary for Subcatchment 2S: Portion of roof

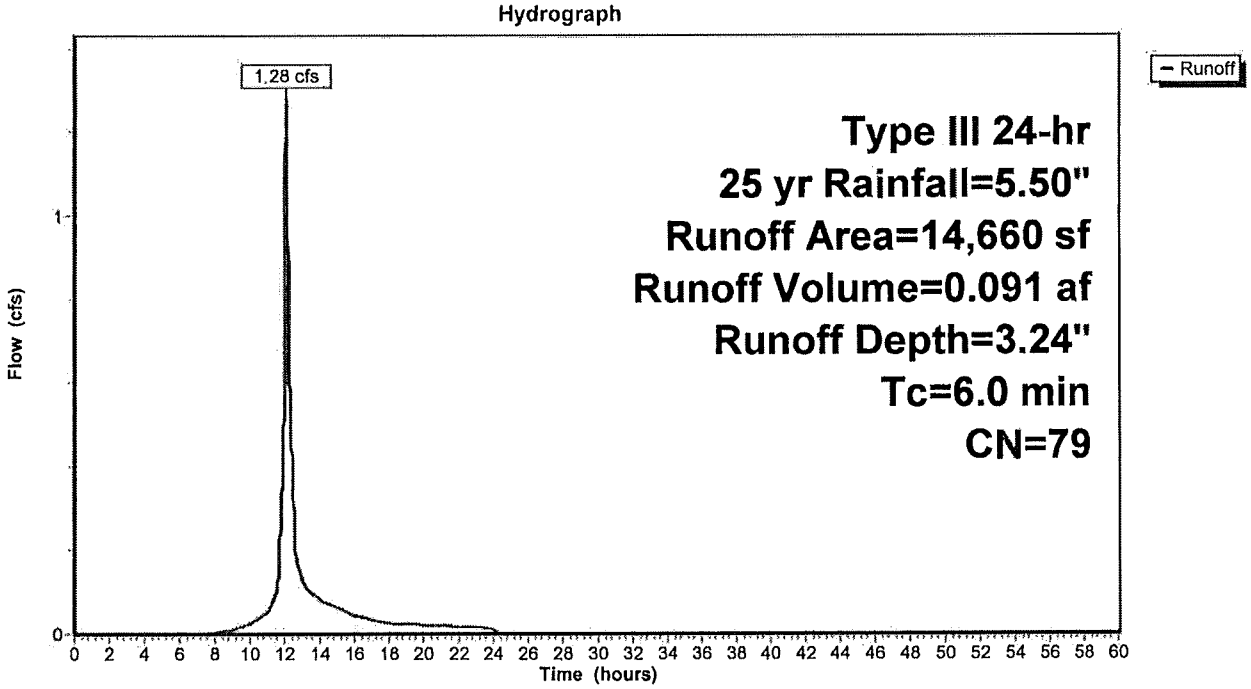
Runoff = 1.28 cfs @ 12.09 hrs, Volume= 0.091 af, Depth= 3.24"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
*	9,375	98	roof
*	498	98	bottom of basin
	4,787	39	>75% Grass cover, Good, HSG A
	14,660	79	Weighted Average
	4,787		32.65% Pervious Area
	9,873		67.35% Impervious Area

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

Subcatchment 2S: Portion of roof



Summary for Subcatchment 3S: west abutter

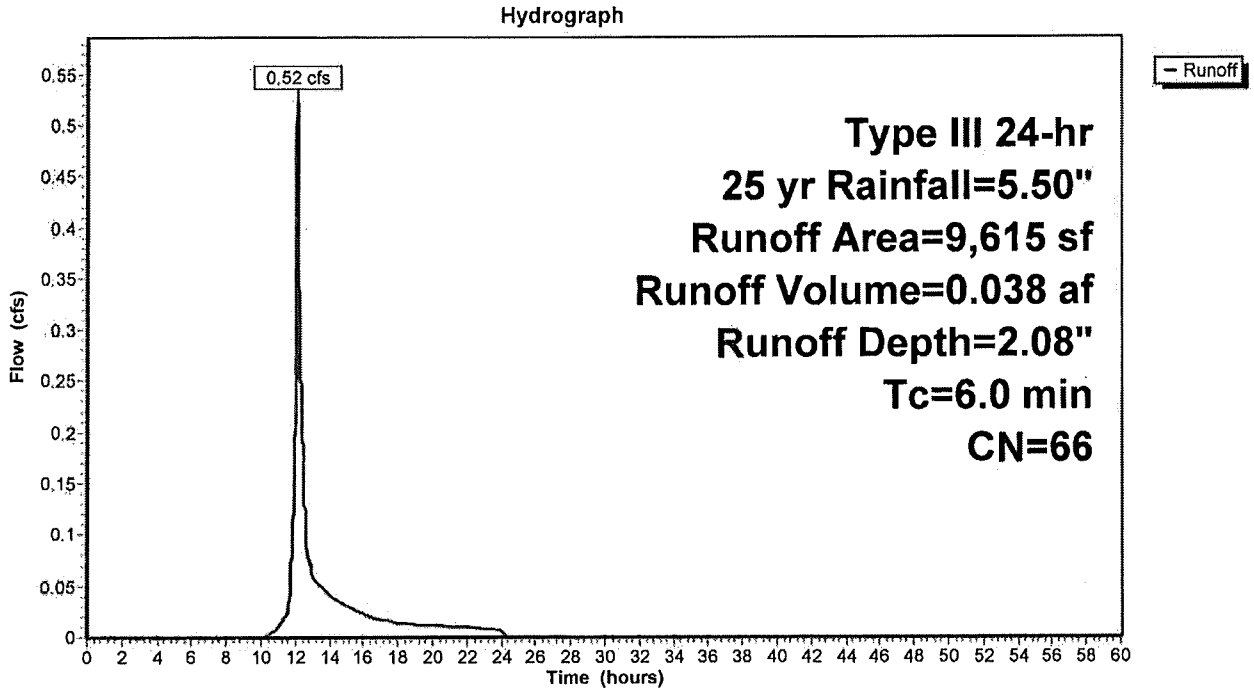
Runoff = 0.52 cfs @ 12.09 hrs, Volume= 0.038 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
*	4,961	98	paved
	750	39	>75% Grass cover, Good, HSG A
	3,904	30	Woods, Good, HSG A
	9,615	66	Weighted Average
	4,654		48.40% Pervious Area
	4,961		51.60% Impervious Area

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

Subcatchment 3S: west abutter



Summary for Subcatchment 4S: Railroad area

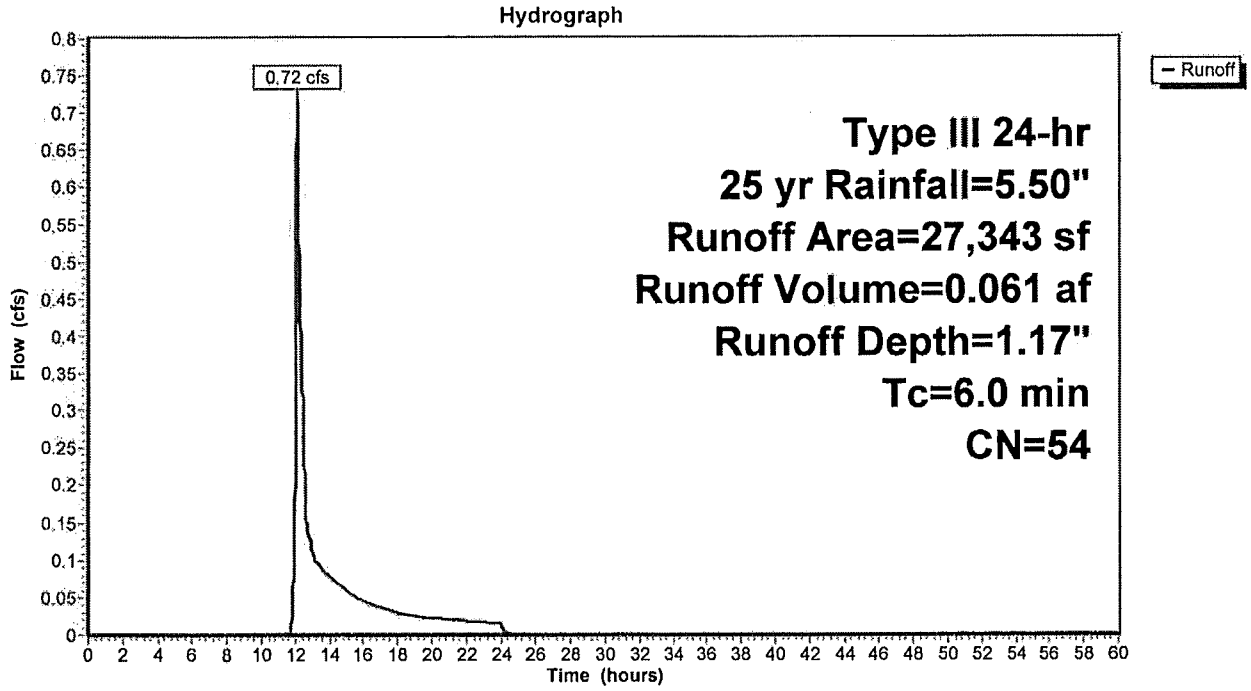
Runoff = 0.72 cfs @ 12.10 hrs, Volume= 0.061 af, Depth= 1.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 25 yr Rainfall=5.50"

	Area (sf)	CN	Description
	7,880	30	Woods, Good, HSG A
	5,145	39	>75% Grass cover, Good, HSG A
*	14,318	72	crushed stone railroad bed
	27,343	54	Weighted Average
	27,343		100.00% Pervious Area

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

Subcatchment 4S: Railroad area



Summary for Pond 1P: East Infiltration Basin

Inflow Area =	2.362 ac, 54.16% Impervious, Inflow Depth = 2.07" for 25 yr event				
Inflow =	5.68 cfs @	12.09 hrs, Volume=	0.407 af		
Outflow =	2.55 cfs @	12.31 hrs, Volume=	0.407 af, Atten= 55%, Lag= 13.3 min		
Discarded =	0.17 cfs @	12.31 hrs, Volume=	0.253 af		
Primary =	2.38 cfs @	12.31 hrs, Volume=	0.155 af		

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 211.90' @ 12.31 hrs Surf.Area= 3,000 sf Storage= 5,736 cf

Plug-Flow detention time= 258.6 min calculated for 0.407 af (100% of inflow)
Center-of-Mass det. time= 258.6 min (1,101.3 - 842.6)

Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	9,524 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

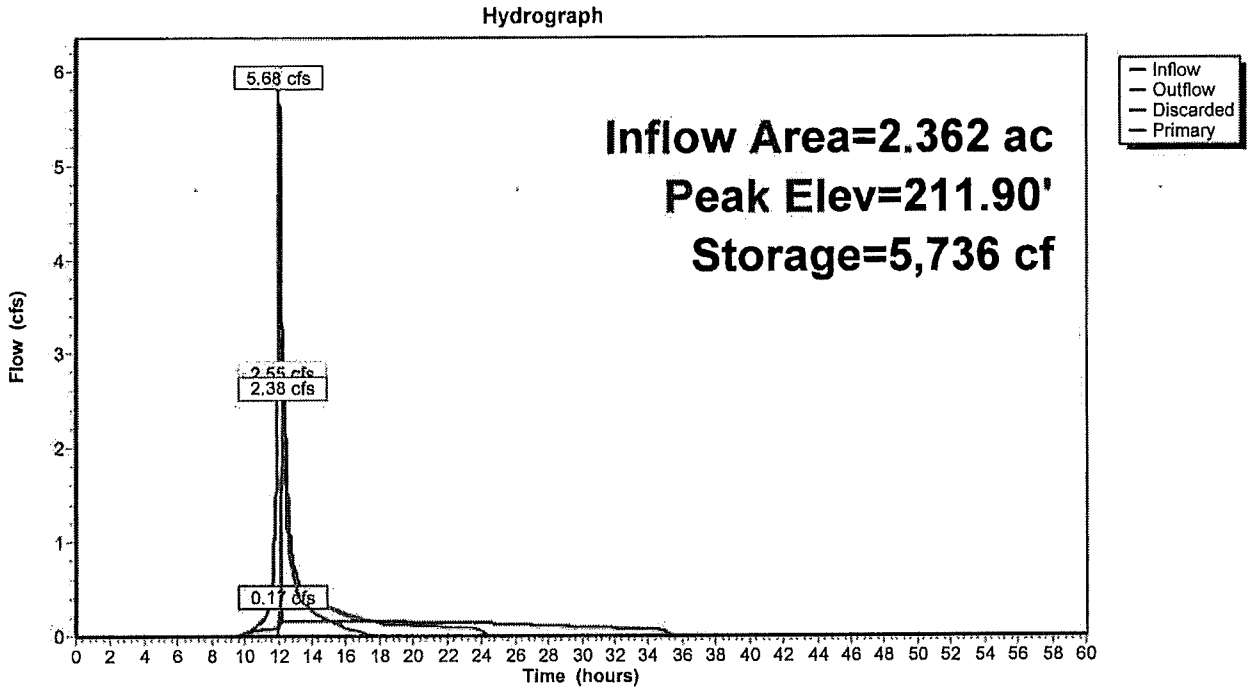
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
209.00	1,077	0	0
210.00	1,649	1,363	1,363
211.00	2,320	1,985	3,348
212.00	3,077	2,699	6,046
213.00	3,879	3,478	9,524

Device	Routing	Invert	Outlet Devices
#1	Discarded	209.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	211.60'	**6.0' long x 6.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.17 cfs @ 12.31 hrs HW=211.90' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=2.38 cfs @ 12.31 hrs HW=211.90' (Free Discharge)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 2.38 cfs @ 1.33 fps)

Pond 1P: East Infiltration Basin



Summary for Pond 2P: roof infiltration basin

Inflow Area =	0.337 ac, 67.35% Impervious, Inflow Depth = 3.24" for 25 yr event				
Inflow =	1.28 cfs @	12.09 hrs, Volume=	0.091 af		
Outflow =	0.08 cfs @	13.91 hrs, Volume=	0.091 af, Atten= 93%, Lag= 109.4 min		
Discarded =	0.08 cfs @	13.91 hrs, Volume=	0.091 af		
Primary =	0.00 cfs @	0.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 224.80' @ 13.91 hrs Surf.Area= 1,490 sf Storage= 2,073 cf

Plug-Flow detention time= 323.3 min calculated for 0.091 af (100% of inflow)
Center-of-Mass det. time= 323.4 min (1,143.7 - 820.3)

Volume	Invert	Avail.Storage	Storage Description
#1	222.00'	4,684 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

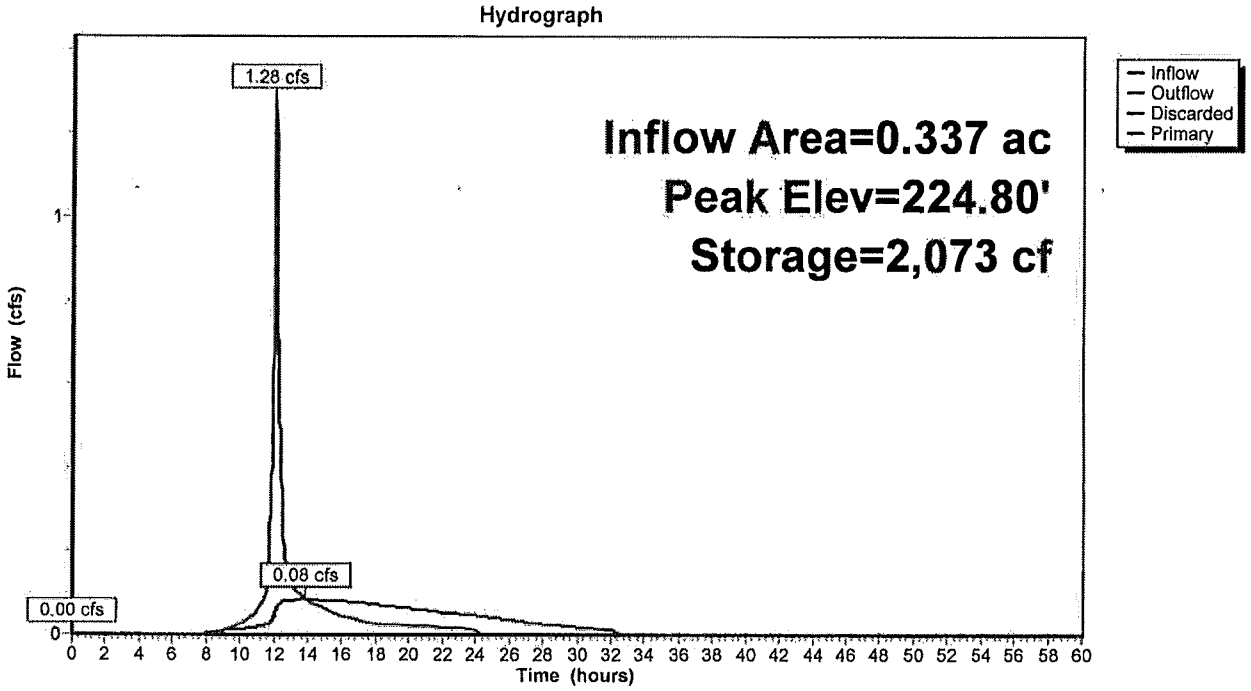
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.00	170	0	0
223.00	498	334	334
224.00	989	744	1,078
225.00	1,612	1,301	2,378
226.00	2,999	2,306	4,684

Device	Routing	Invert	Outlet Devices
#1	Discarded	222.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	225.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 225.00' / 224.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.08 cfs @ 13.91 hrs HW=224.80' (Free Discharge)
└1=**Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=222.00' (Free Discharge)
└2=**Culvert** (Controls 0.00 cfs)

Pond 2P: roof infiltration basin



Summary for Pond 3P: (new Pond)

Inflow Area = 0.221 ac, 51.60% Impervious, Inflow Depth = 2.08" for 25 yr event
Inflow = 0.52 cfs @ 12.09 hrs, Volume= 0.038 af
Outflow = 0.04 cfs @ 11.69 hrs, Volume= 0.038 af, Atten= 92%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.69 hrs, Volume= 0.038 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 217.92' @ 13.96 hrs Surf.Area= 0.017 ac Storage= 0.016 af

Plug-Flow detention time= 168.0 min calculated for 0.038 af (100% of inflow)
Center-of-Mass det. time= 167.9 min (1,020.5 - 852.6)

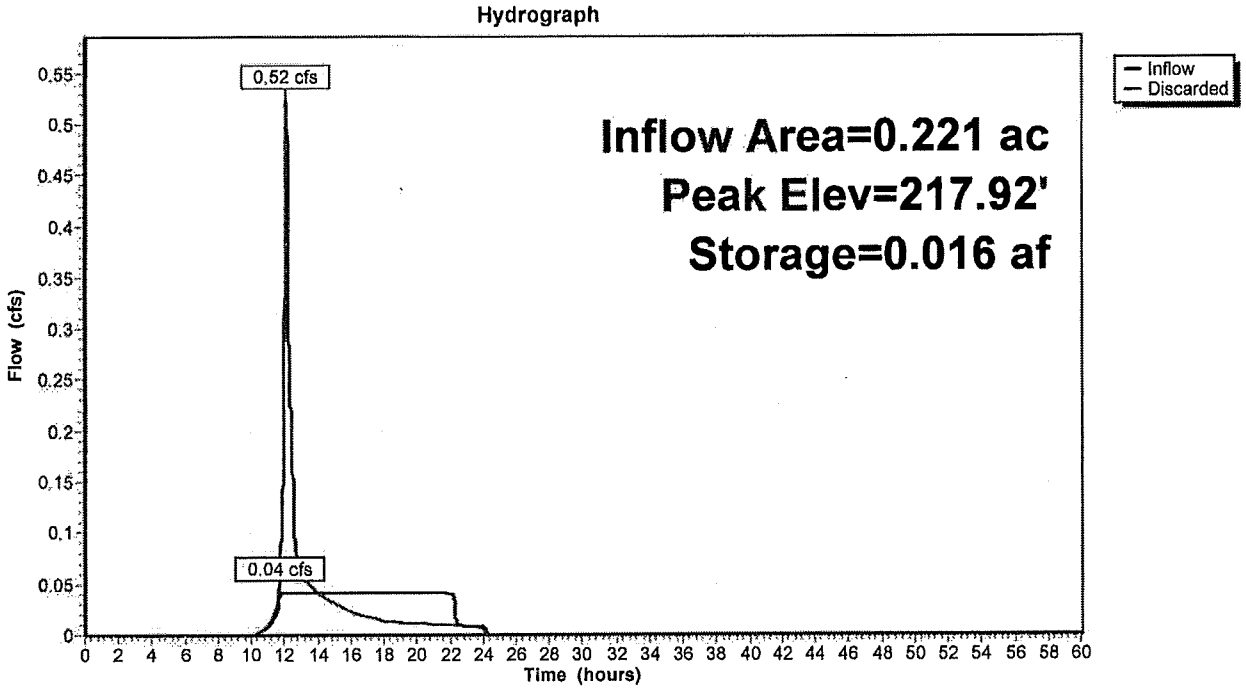
Volume	Invert	Avail.Storage	Storage Description
#1A	216.50'	0.015 af	**16.00'W x 45.50'L x 3.54'H Field A** 0.059 af Overall - 0.022 af Embedded = 0.037 af x 40.0% Voids
#2A	217.00'	0.022 af	**Cultec R-330XLHD** x 18 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.037 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	216.50'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 11.69 hrs HW=216.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 3P: (new Pond)



Summary for Pond 4P: existing depression with cb

Inflow Area =	2.990 ac, 42.79% Impervious, Inflow Depth = 0.87" for 25 yr event				
Inflow =	2.79 cfs @	12.30 hrs,	Volume=	0.216 af	
Outflow =	2.76 cfs @	12.33 hrs,	Volume=	0.216 af,	Atten= 1%, Lag= 1.5 min
Discarded =	0.08 cfs @	12.33 hrs,	Volume=	0.019 af	
Primary =	2.68 cfs @	12.33 hrs,	Volume=	0.197 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 208.22' @ 12.33 hrs Surf.Area= 1,442 sf Storage= 185 cf

Plug-Flow detention time= 1.0 min calculated for 0.216 af (100% of inflow)
Center-of-Mass det. time= 1.0 min (822.6 - 821.6)

Volume	Invert	Avail.Storage	Storage Description
#1	208.00'	2,973 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

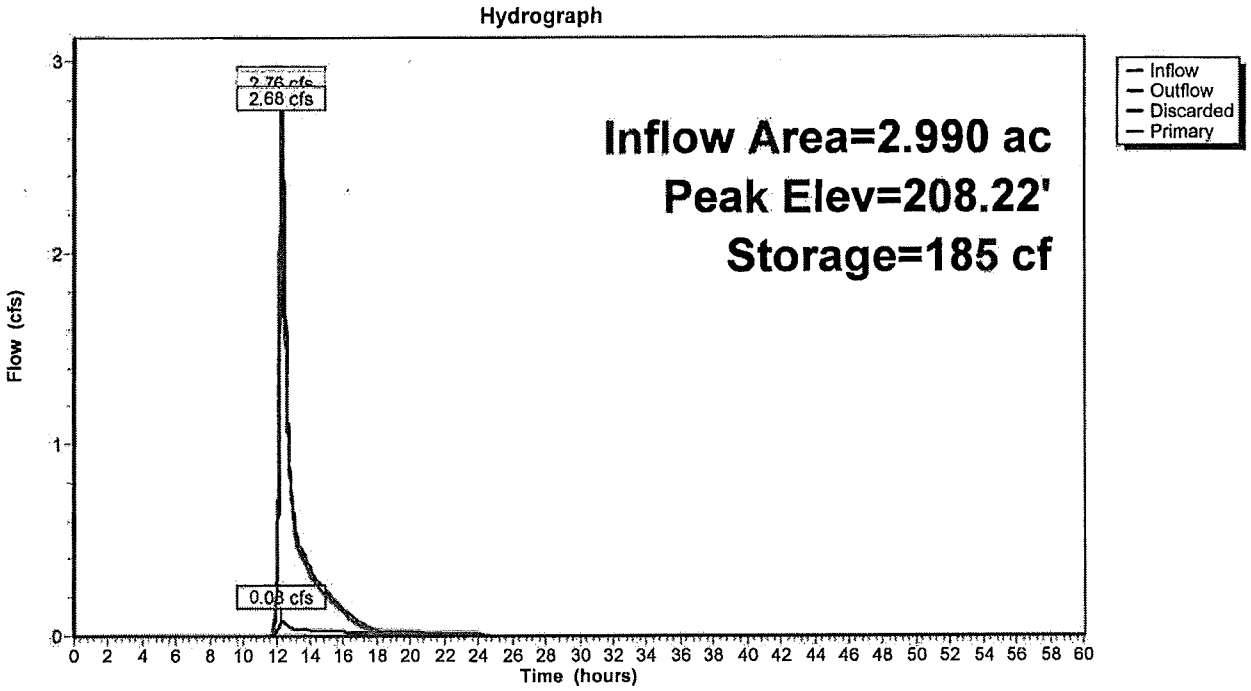
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
208.00	249	0	0
209.00	5,696	2,973	2,973

Device	Routing	Invert	Outlet Devices
#1	Primary	208.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	208.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.08 cfs @ 12.33 hrs HW=208.22' (Free Discharge)
└**2=Exfiltration** (Exfiltration Controls 0.08 cfs)

Primary OutFlow Max=2.68 cfs @ 12.33 hrs HW=208.22' (Free Discharge)
└**1=Orifice/Grate** (Weir Controls 2.68 cfs @ 1.53 fps)

Pond 4P: existing depression with cb



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Project site Runoff Area=88,222 sf 51.97% Impervious Runoff Depth=2.88"
Tc=6.0 min CN=70 Runoff=6.82 cfs 0.487 af

Subcatchment 2S: Portion of roof Runoff Area=14,660 sf 67.35% Impervious Runoff Depth=3.77"
Tc=6.0 min CN=79 Runoff=1.48 cfs 0.106 af

Subcatchment 3S: west abutter Runoff Area=9,615 sf 51.60% Impervious Runoff Depth=2.51"
Tc=6.0 min CN=66 Runoff=0.64 cfs 0.046 af

Subcatchment 4S: Railroad area Runoff Area=27,343 sf 0.00% Impervious Runoff Depth=1.50"
Tc=6.0 min CN=54 Runoff=0.97 cfs 0.078 af

Pond 1P: East Infiltration Basin Peak Elev=212.00' Storage=6,052 cf Inflow=6.82 cfs 0.488 af
Discarded=0.17 cfs 0.264 af Primary=3.84 cfs 0.224 af Outflow=4.01 cfs 0.488 af

Pond 2P: roof infiltration basin Peak Elev=225.04' Storage=2,451 cf Inflow=1.48 cfs 0.106 af
Discarded=0.09 cfs 0.105 af Primary=0.01 cfs 0.001 af Outflow=0.10 cfs 0.106 af

Pond 3P: (new Pond) Peak Elev=218.33' Storage=0.021 af Inflow=0.64 cfs 0.046 af
Outflow=0.04 cfs 0.046 af

Pond 4P: existing depression with cb Peak Elev=208.30' Storage=318 cf Inflow=4.49 cfs 0.302 af
Discarded=0.10 cfs 0.022 af Primary=4.28 cfs 0.280 af Outflow=4.38 cfs 0.302 af

Total Runoff Area = 3.210 ac Runoff Volume = 0.717 af Average Runoff Depth = 2.68"
56.61% Pervious = 1.817 ac 43.39% Impervious = 1.393 ac

Summary for Subcatchment 1S: Project site

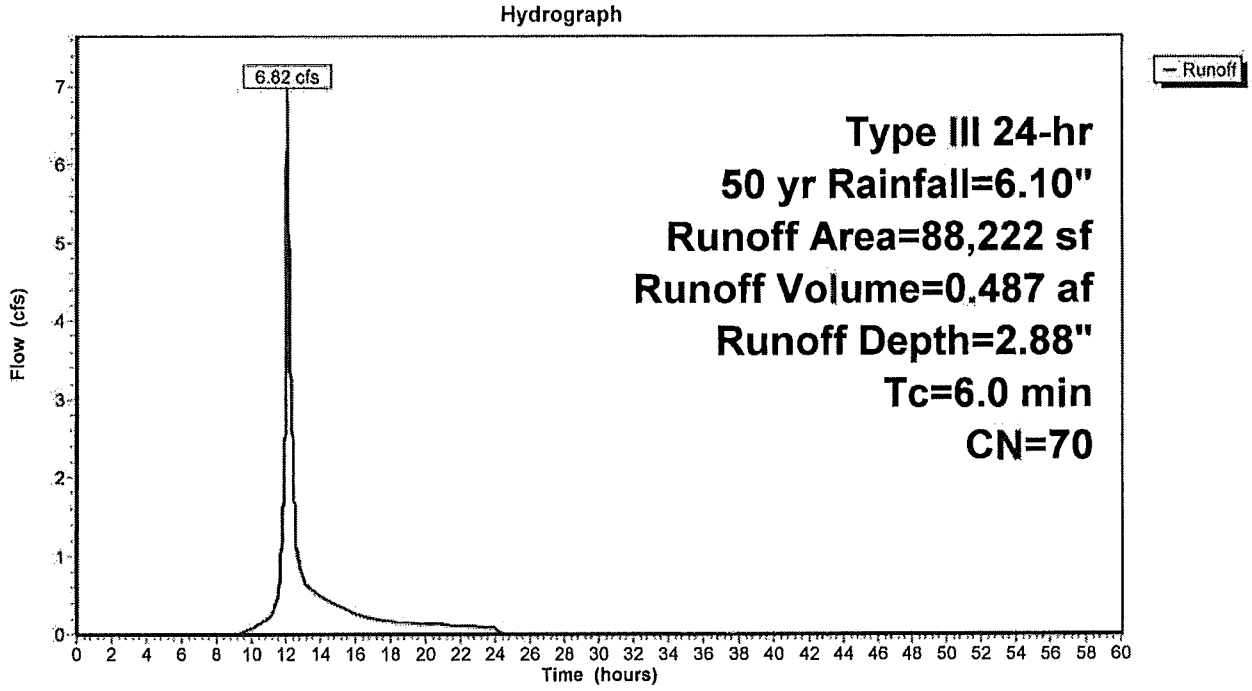
Runoff = 6.82 cfs @ 12.09 hrs, Volume= 0.487 af, Depth= 2.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 yr Rainfall=6.10"

	Area (sf)	CN	Description
*	19,326	98	Roofs
*	26,521	98	paved and sidewalk
	42,375	39	>75% Grass cover, Good, HSG A
	88,222	70	Weighted Average
	42,375		48.03% Pervious Area
	45,847		51.97% Impervious Area

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

Subcatchment 1S: Project site



Summary for Subcatchment 2S: Portion of roof

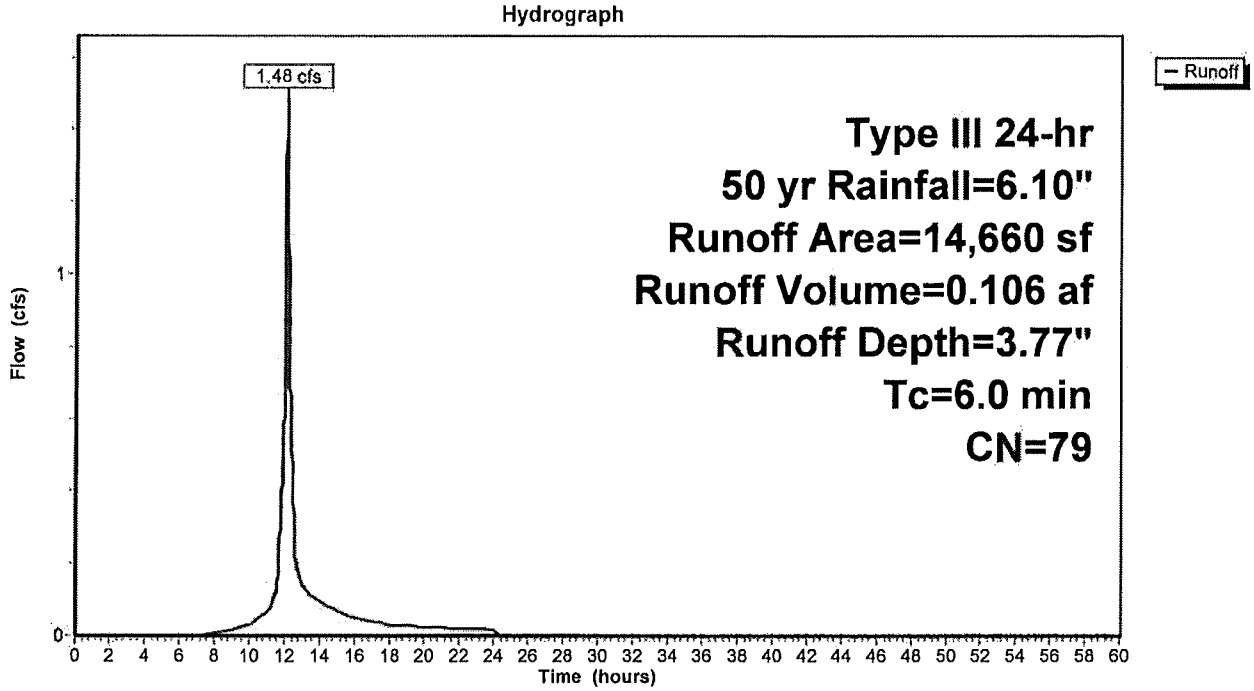
Runoff = 1.48 cfs @ 12.09 hrs, Volume= 0.106 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 yr Rainfall=6.10"

	Area (sf)	CN	Description
*	9,375	98	roof
*	498	98	bottom of basin
	4,787	39	>75% Grass cover, Good, HSG A
	14,660	79	Weighted Average
	4,787		32.65% Pervious Area
	9,873		67.35% Impervious Area

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

Subcatchment 2S: Portion of roof



Summary for Subcatchment 3S: west abutter

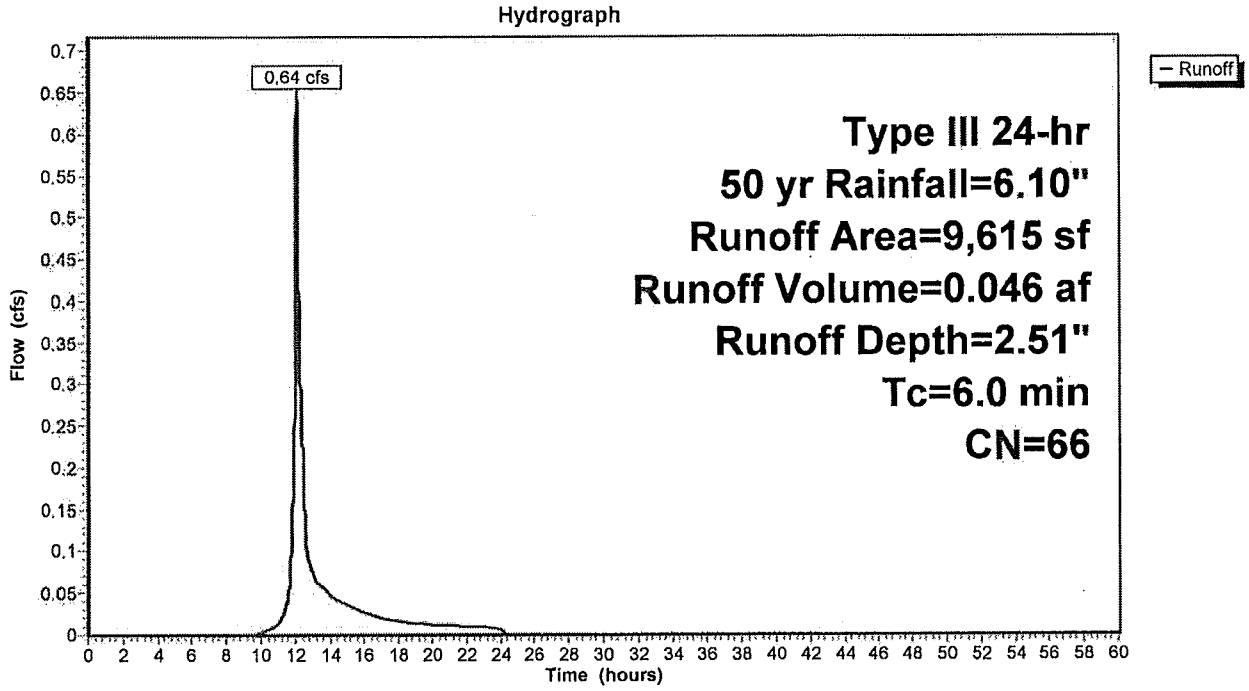
Runoff = 0.64 cfs @ 12.09 hrs, Volume= 0.046 af, Depth= 2.51"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 yr Rainfall=6.10"

	Area (sf)	CN	Description
*	4,961	98	paved
	750	39	>75% Grass cover, Good, HSG A
	3,904	30	Woods, Good, HSG A
	9,615	66	Weighted Average
	4,654		48.40% Pervious Area
	4,961		51.60% Impervious Area

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

Subcatchment 3S: west abutter



Summary for Subcatchment 4S: Railroad area

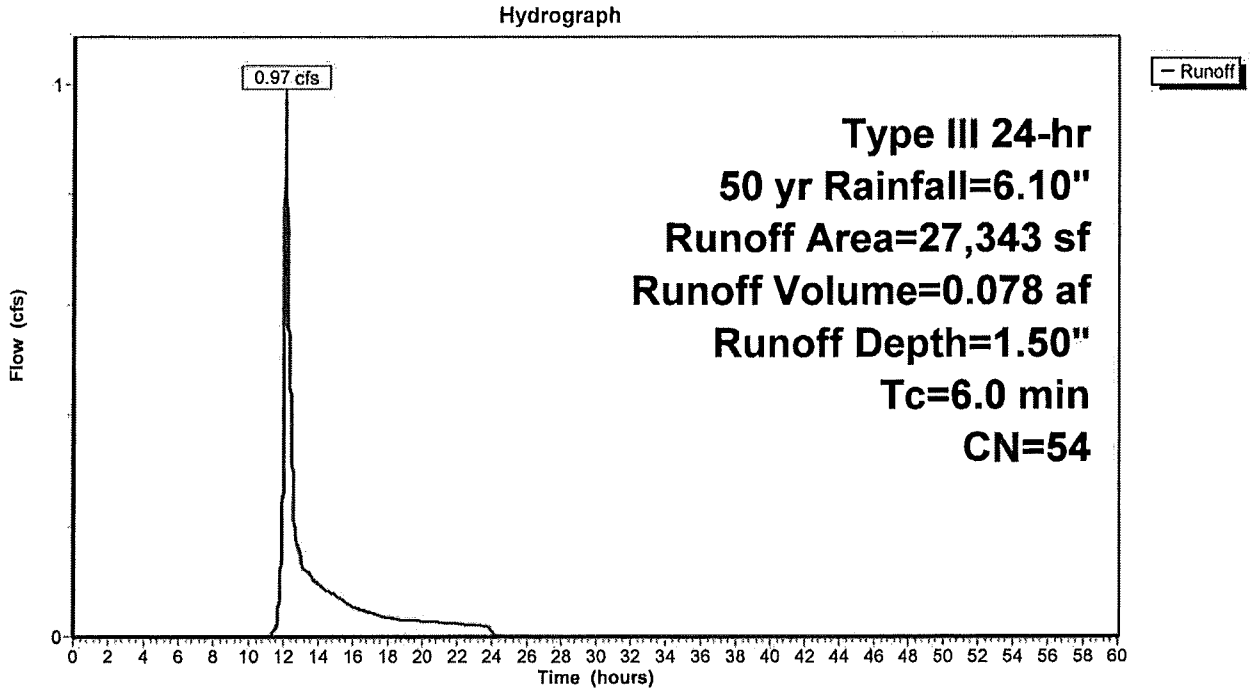
Runoff = 0.97 cfs @ 12.10 hrs, Volume= 0.078 af, Depth= 1.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 50 yr Rainfall=6.10"

	Area (sf)	CN	Description
	7,880	30	Woods, Good, HSG A
	5,145	39	>75% Grass cover, Good, HSG A
*	14,318	72	crushed stone railroad bed
	27,343	54	Weighted Average
	27,343		100.00% Pervious Area

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

Subcatchment 4S: Railroad area



Summary for Pond 1P: East Infiltration Basin

Inflow Area =	2.362 ac, 54.16% Impervious, Inflow Depth = 2.48" for 50 yr event				
Inflow =	6.82 cfs @	12.09 hrs,	Volume=	0.488 af	
Outflow =	4.01 cfs @	12.21 hrs,	Volume=	0.488 af,	Atten= 41%, Lag= 7.1 min
Discarded =	0.17 cfs @	12.21 hrs,	Volume=	0.264 af	
Primary =	3.84 cfs @	12.21 hrs,	Volume=	0.224 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 212.00' @ 12.21 hrs Surf.Area= 3,079 sf Storage= 6,052 cf

Plug-Flow detention time= 227.9 min calculated for 0.488 af (100% of inflow)
Center-of-Mass det. time= 227.9 min (1,065.4 - 837.4)

Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	9,524 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

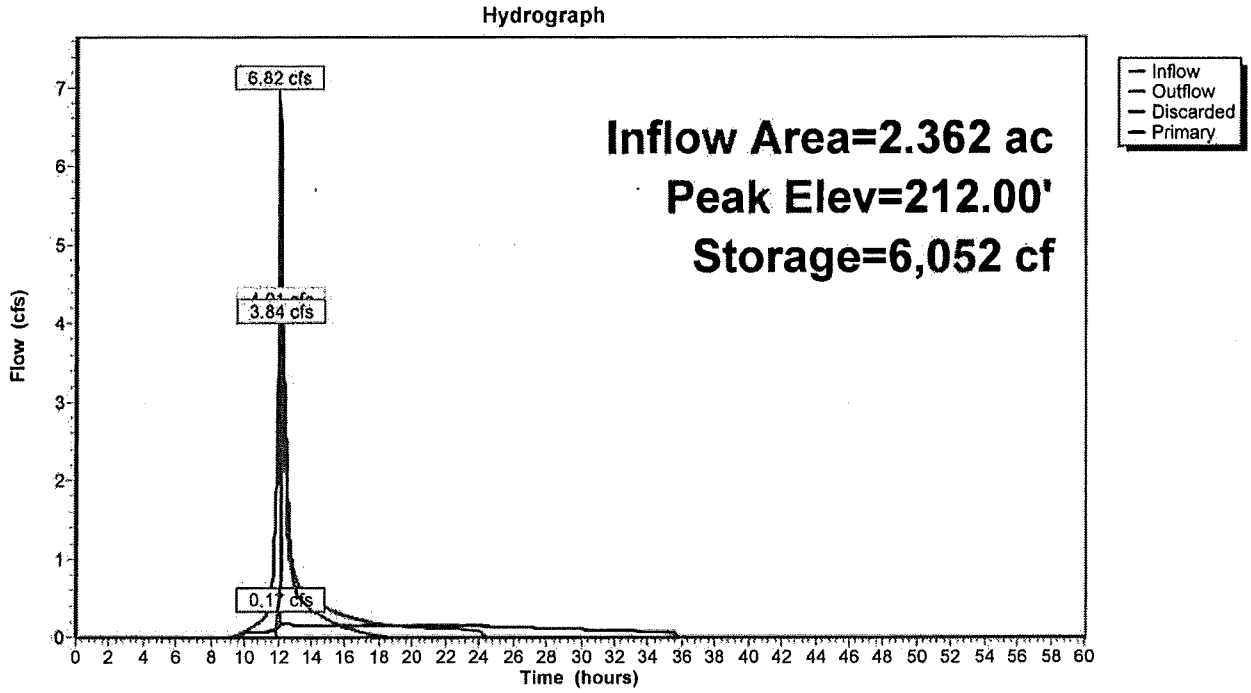
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
209.00	1,077	0	0
210.00	1,649	1,363	1,363
211.00	2,320	1,985	3,348
212.00	3,077	2,699	6,046
213.00	3,879	3,478	9,524

Device	Routing	Invert	Outlet Devices
#1	Discarded	209.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	211.60'	**6.0' long x 6.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.17 cfs @ 12.21 hrs HW=212.00' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.17 cfs)

Primary OutFlow Max=3.84 cfs @ 12.21 hrs HW=212.00' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 3.84 cfs @ 1.59 fps)

Pond 1P: East Infiltration Basin



Summary for Pond 2P: roof infiltration basin

Inflow Area =	0.337 ac, 67.35% Impervious, Inflow Depth = 3.77" for 50 yr event				
Inflow =	1.48 cfs @	12.09 hrs,	Volume=	0.106 af	
Outflow =	0.10 cfs @	13.75 hrs,	Volume=	0.106 af,	Atten= 93%, Lag= 99.9 min
Discarded =	0.09 cfs @	13.75 hrs,	Volume=	0.105 af	
Primary =	0.01 cfs @	13.75 hrs,	Volume=	0.001 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 225.04' @ 13.75 hrs Surf.Area= 1,673 sf Storage= 2,451 cf

Plug-Flow detention time= 342.2 min calculated for 0.106 af (100% of inflow)
Center-of-Mass det. time= 342.3 min (1,158.3 - 816.0)

Volume	Invert	Avail.Storage	Storage Description
#1	222.00'	4,684 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

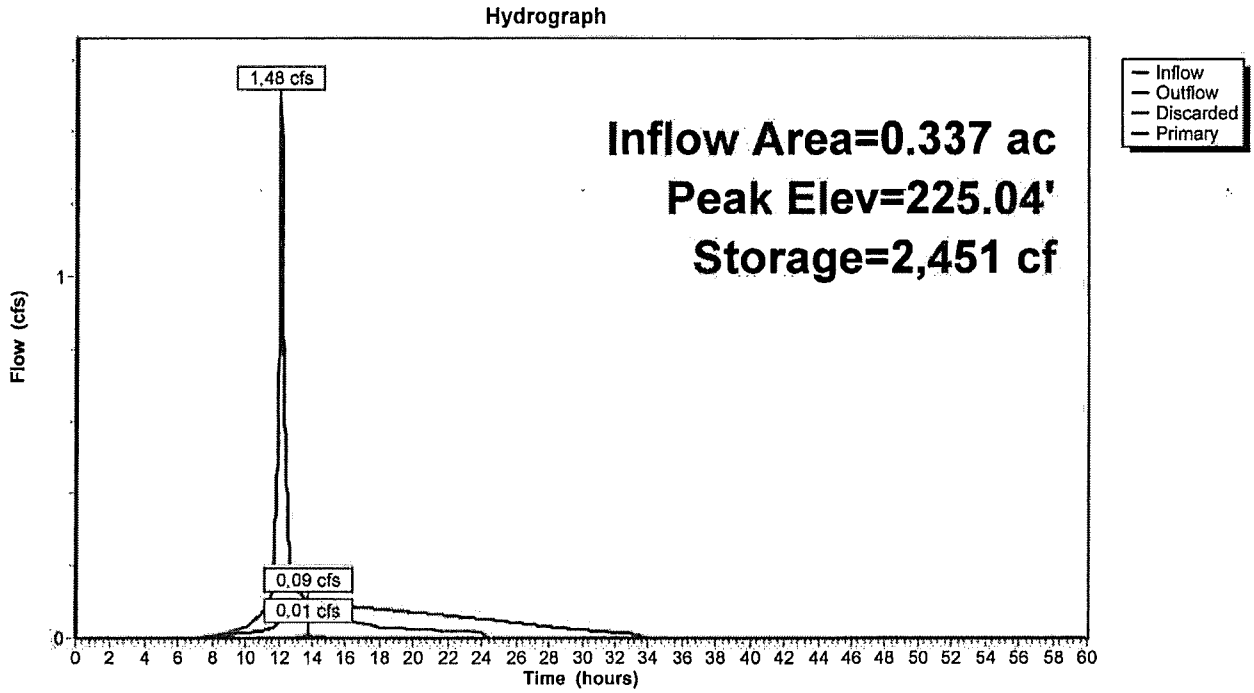
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.00	170	0	0
223.00	498	334	334
224.00	989	744	1,078
225.00	1,612	1,301	2,378
226.00	2,999	2,306	4,684

Device	Routing	Invert	Outlet Devices
#1	Discarded	222.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	225.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 225.00' / 224.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.09 cfs @ 13.75 hrs HW=225.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.09 cfs)

Primary OutFlow Max=0.01 cfs @ 13.75 hrs HW=225.04' (Free Discharge)
└**2=Culvert** (Barrel Controls 0.01 cfs @ 0.89 fps)

Pond 2P: roof infiltration basin



Summary for Pond 3P: (new Pond)

Inflow Area = 0.221 ac, 51.60% Impervious, Inflow Depth = 2.51" for 50 yr event
Inflow = 0.64 cfs @ 12.09 hrs, Volume= 0.046 af
Outflow = 0.04 cfs @ 11.62 hrs, Volume= 0.046 af, Atten= 94%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.62 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 218.33' @ 14.56 hrs Surf.Area= 0.017 ac Storage= 0.021 af

Plug-Flow detention time= 231.0 min calculated for 0.046 af (100% of inflow)
Center-of-Mass det. time= 231.0 min (1,077.8 - 846.9)

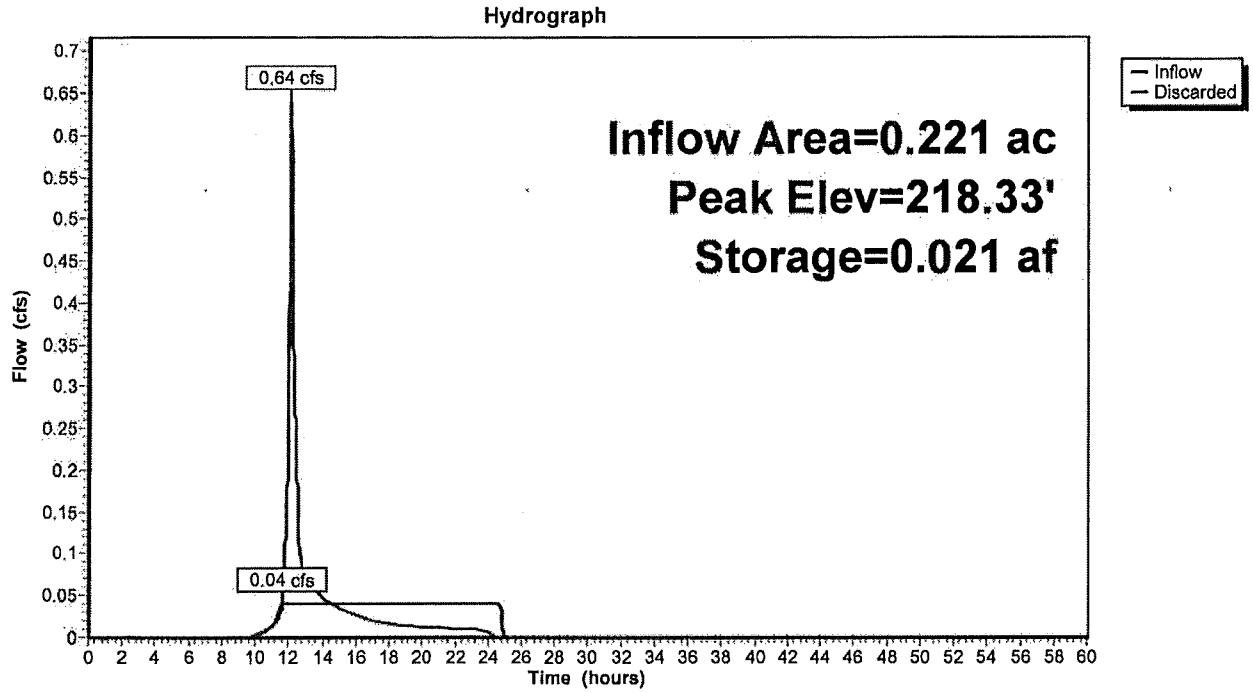
Volume	Invert	Avail.Storage	Storage Description
#1A	216.50'	0.015 af	**16.00'W x 45.50'L x 3.54'H Field A** 0.059 af Overall - 0.022 af Embedded = 0.037 af x 40.0% Voids
#2A	217.00'	0.022 af	**Cultec R-330XLHD** x 18 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.037 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	216.50'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 11.62 hrs HW=216.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 3P: (new Pond)



Summary for Pond 4P: existing depression with cb

Inflow Area =	2.990 ac, 42.79% Impervious, Inflow Depth = 1.21" for 50 yr event				
Inflow =	4.49 cfs @	12.20 hrs,	Volume=	0.302 af	
Outflow =	4.38 cfs @	12.23 hrs,	Volume=	0.302 af,	Atten= 2%, Lag= 1.9 min
Discarded =	0.10 cfs @	12.23 hrs,	Volume=	0.022 af	
Primary =	4.28 cfs @	12.23 hrs,	Volume=	0.280 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 208.30' @ 12.23 hrs Surf.Area= 1,878 sf Storage= 318 cf

Plug-Flow detention time= 1.1 min calculated for 0.302 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (815.8 - 814.7)

Volume	Invert	Avail.Storage	Storage Description
#1	208.00'	2,973 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

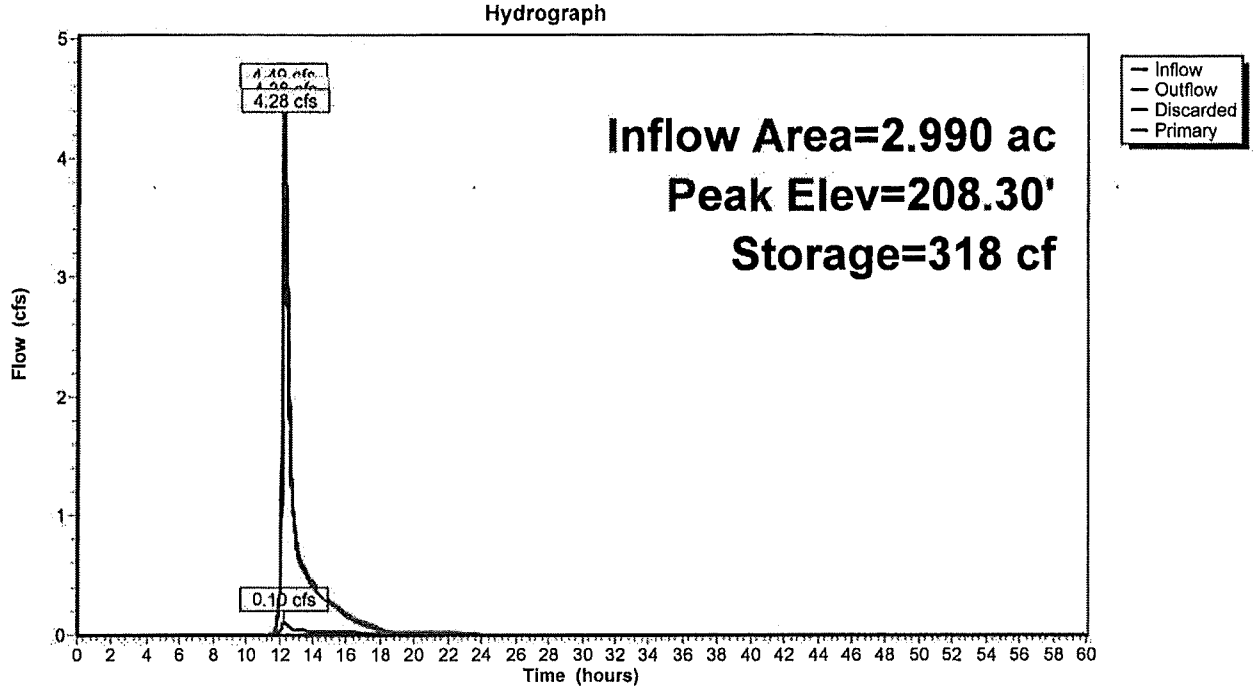
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
208.00	249	0	0
209.00	5,696	2,973	2,973

Device	Routing	Invert	Outlet Devices
#1	Primary	208.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	208.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.10 cfs @ 12.23 hrs HW=208.30' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=4.27 cfs @ 12.23 hrs HW=208.30' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 4.27 cfs @ 1.79 fps)

Pond 4P: existing depression with cb



Time span=0.00-60.00 hrs, dt=0.01 hrs, 6001 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Project site Runoff Area=88,222 sf 51.97% Impervious Runoff Depth=3.45"
Tc=6.0 min CN=70 Runoff=8.19 cfs 0.583 af

Subcatchment 2S: Portion of roof Runoff Area=14,660 sf 67.35% Impervious Runoff Depth=4.40"
Tc=6.0 min CN=79 Runoff=1.73 cfs 0.123 af

Subcatchment 3S: west abutter Runoff Area=9,615 sf 51.60% Impervious Runoff Depth=3.05"
Tc=6.0 min CN=66 Runoff=0.78 cfs 0.056 af

Subcatchment 4S: Railroad area Runoff Area=27,343 sf 0.00% Impervious Runoff Depth=1.91"
Tc=6.0 min CN=54 Runoff=1.29 cfs 0.100 af

Pond 1P: East Infiltration Basin Peak Elev=212.13' Storage=6,448 cf Inflow=8.19 cfs 0.594 af
Discarded=0.18 cfs 0.275 af Primary=6.07 cfs 0.319 af Outflow=6.25 cfs 0.594 af

Pond 2P: roof infiltration basin Peak Elev=225.16' Storage=2,662 cf Inflow=1.73 cfs 0.123 af
Discarded=0.10 cfs 0.112 af Primary=0.11 cfs 0.011 af Outflow=0.22 cfs 0.123 af

Pond 3P: (new Pond) Peak Elev=218.90' Storage=0.028 af Inflow=0.78 cfs 0.056 af
Outflow=0.04 cfs 0.056 af

Pond 4P: existing depression with cb Peak Elev=208.40' Storage=540 cf Inflow=7.14 cfs 0.419 af
Discarded=0.14 cfs 0.026 af Primary=6.67 cfs 0.393 af Outflow=6.80 cfs 0.419 af

Total Runoff Area = 3.210 ac Runoff Volume = 0.862 af Average Runoff Depth = 3.22"
56.61% Pervious = 1.817 ac 43.39% Impervious = 1.393 ac

Summary for Subcatchment 1S: Project site

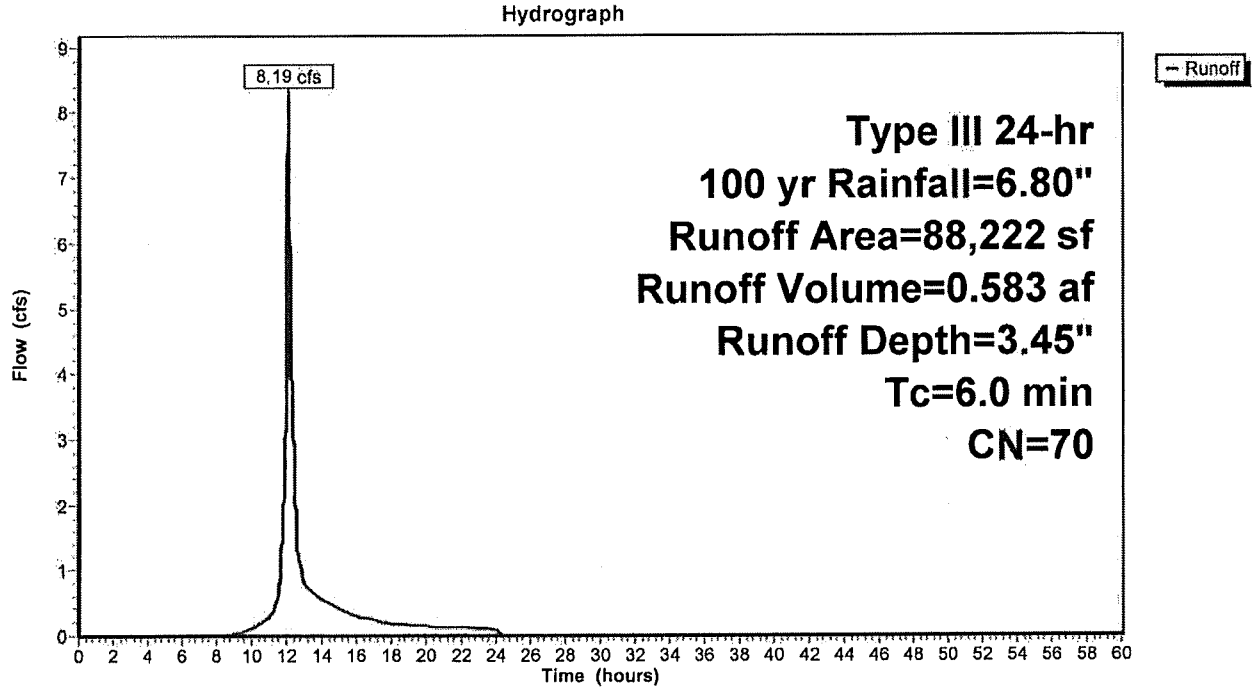
Runoff = 8.19 cfs @ 12.09 hrs, Volume= 0.583 af, Depth= 3.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=6.80"

	Area (sf)	CN	Description
*	19,326	98	Roofs
*	26,521	98	paved and sidewalk
	42,375	39	>75% Grass cover, Good, HSG A
	88,222	70	Weighted Average
	42,375		48.03% Pervious Area
	45,847		51.97% Impervious Area

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

Subcatchment 1S: Project site



Summary for Subcatchment 2S: Portion of roof

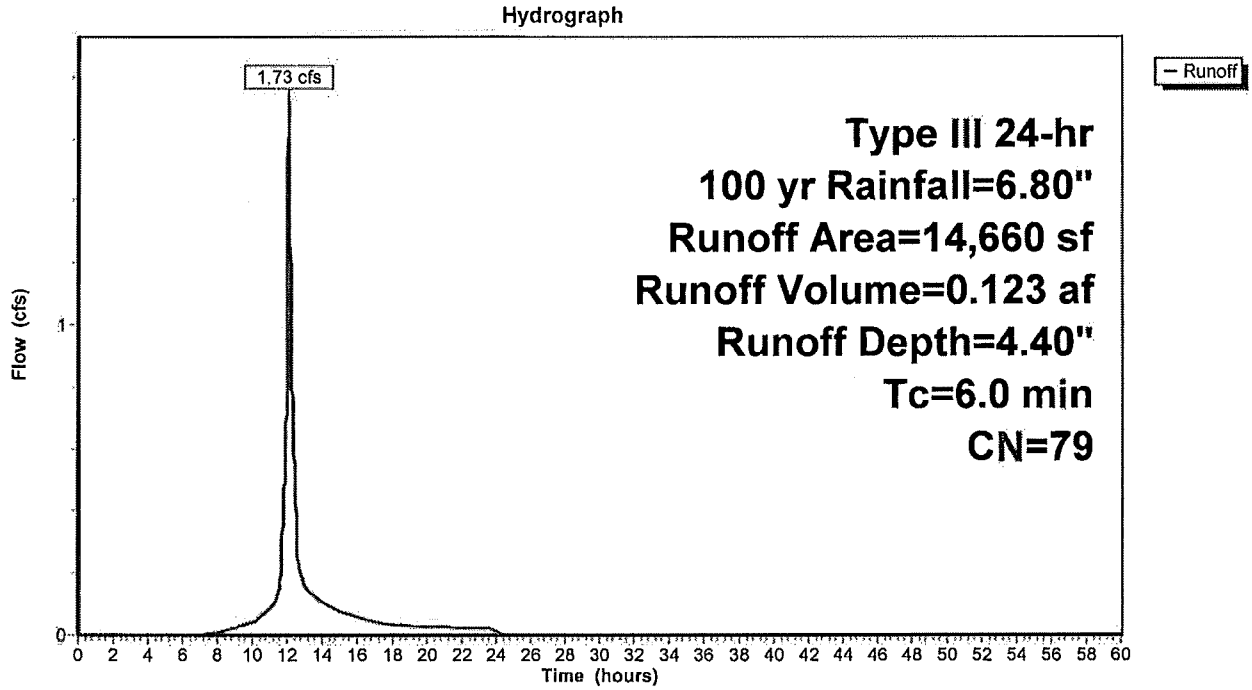
Runoff = 1.73 cfs @ 12.09 hrs, Volume= 0.123 af, Depth= 4.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=6.80"

	Area (sf)	CN	Description
*	9,375	98	roof
*	498	98	bottom of basin
	4,787	39	>75% Grass cover, Good, HSG A
	14,660	79	Weighted Average
	4,787		32.65% Pervious Area
	9,873		67.35% Impervious Area

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

Subcatchment 2S: Portion of roof



Summary for Subcatchment 3S: west abutter

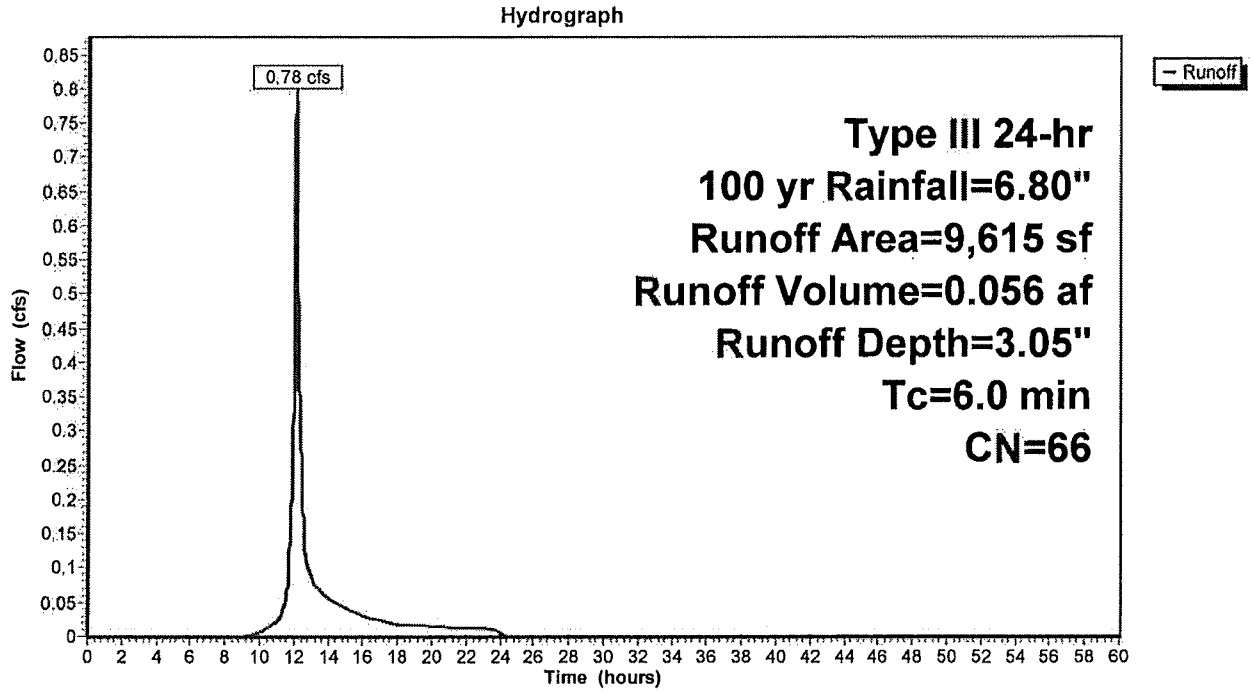
Runoff = 0.78 cfs @ 12.09 hrs, Volume= 0.056 af, Depth= 3.05"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=6.80"

	Area (sf)	CN	Description
*	4,961	98	paved
	750	39	>75% Grass cover, Good, HSG A
	3,904	30	Woods, Good, HSG A
	9,615	66	Weighted Average
	4,654		48.40% Pervious Area
	4,961		51.60% Impervious Area

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

Subcatchment 3S: west abutter



Summary for Subcatchment 4S: Railroad area

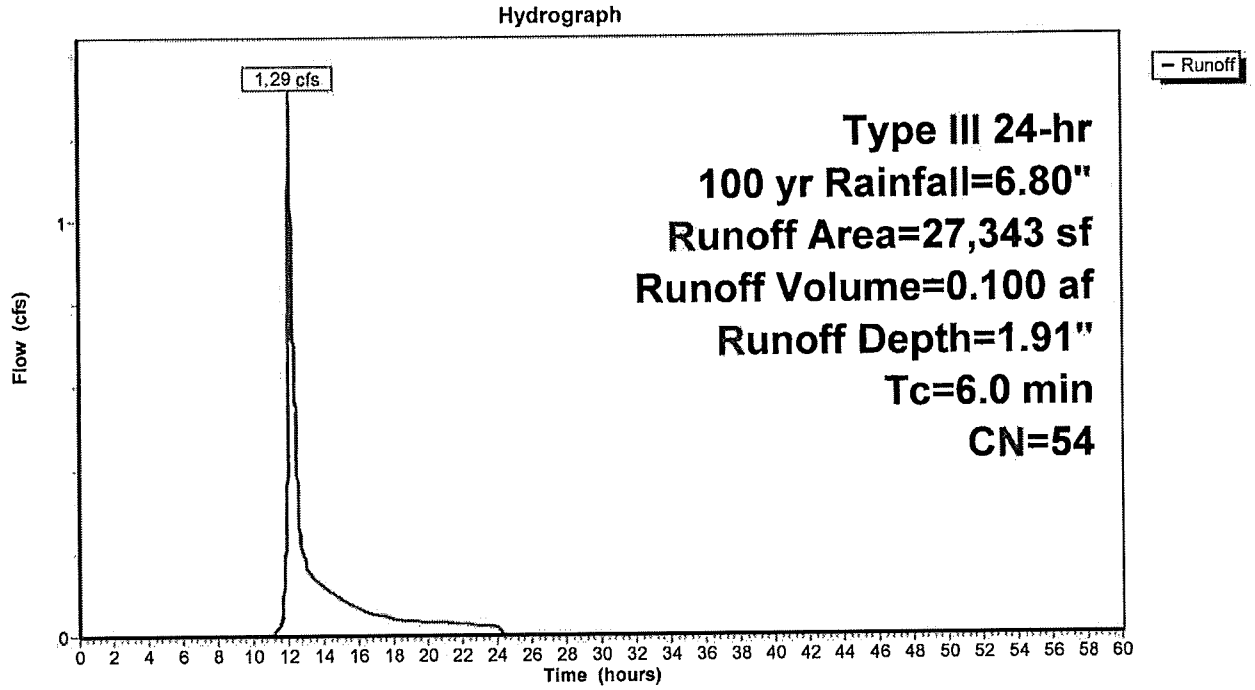
Runoff = 1.29 cfs @ 12.10 hrs, Volume= 0.100 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr Rainfall=6.80"

	Area (sf)	CN	Description
	7,880	30	Woods, Good, HSG A
	5,145	39	>75% Grass cover, Good, HSG A
*	14,318	72	crushed stone railroad bed
	27,343	54	Weighted Average
	27,343		100.00% Pervious Area

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

Subcatchment 4S: Railroad area



Summary for Pond 1P: East Infiltration Basin

Inflow Area =	2.362 ac, 54.16% Impervious, Inflow Depth = 3.02" for 100 yr event				
Inflow =	8.19 cfs @	12.09 hrs,	Volume=	0.594 af	
Outflow =	6.25 cfs @	12.16 hrs,	Volume=	0.594 af,	Atten= 24%, Lag= 4.1 min
Discarded =	0.18 cfs @	12.16 hrs,	Volume=	0.275 af	
Primary =	6.07 cfs @	12.16 hrs,	Volume=	0.319 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 212.13' @ 12.16 hrs Surf.Area= 3,180 sf Storage= 6,448 cf

Plug-Flow detention time= 196.7 min calculated for 0.594 af (100% of inflow)
Center-of-Mass det. time= 196.7 min (1,028.3 - 831.5)

Volume	Invert	Avail.Storage	Storage Description
#1	209.00'	9,524 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

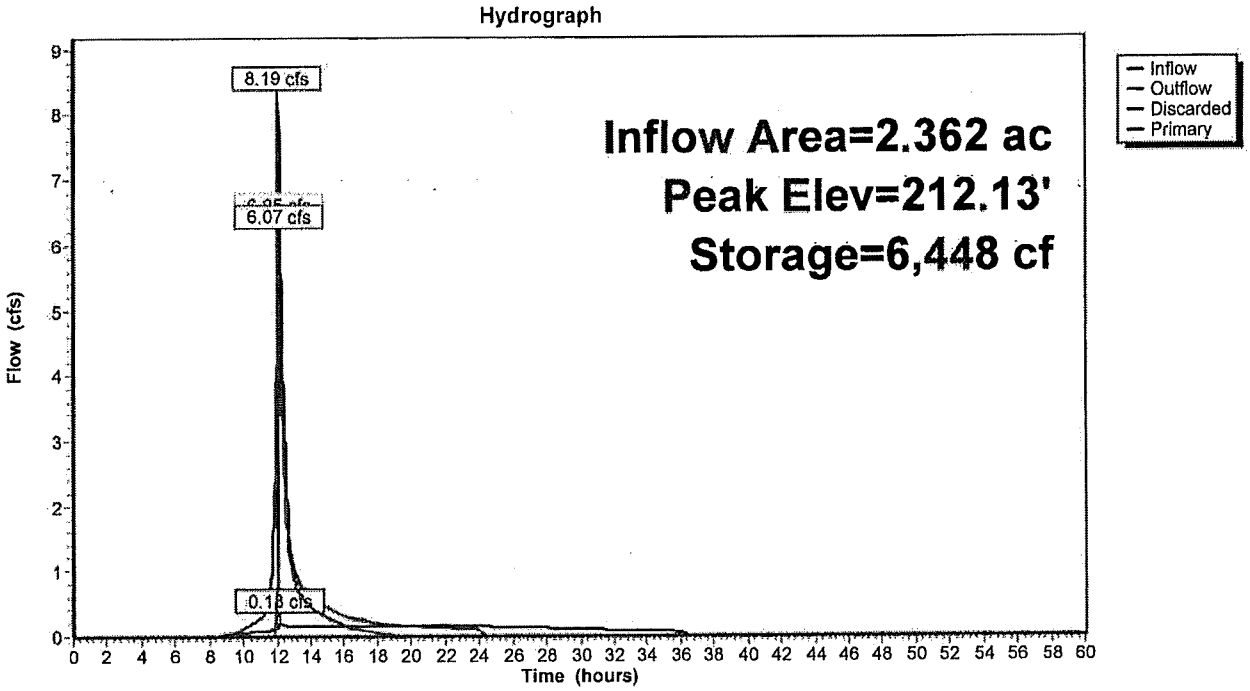
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
209.00	1,077	0	0
210.00	1,649	1,363	1,363
211.00	2,320	1,985	3,348
212.00	3,077	2,699	6,046
213.00	3,879	3,478	9,524

Device	Routing	Invert	Outlet Devices
#1	Discarded	209.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	211.60'	**6.0' long x 6.0' breadth Broad-Crested Rectangular Weir**
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Discarded OutFlow Max=0.18 cfs @ 12.16 hrs HW=212.13' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.18 cfs)

Primary OutFlow Max=6.06 cfs @ 12.16 hrs HW=212.13' (Free Discharge)
└─**2=Broad-Crested Rectangular Weir** (Weir Controls 6.06 cfs @ 1.91 fps)

Pond 1P: East Infiltration Basin



Summary for Pond 2P: roof infiltration basin

Inflow Area =	0.337 ac, 67.35% Impervious, Inflow Depth = 4.40" for 100 yr event				
Inflow =	1.73 cfs @	12.09 hrs,	Volume=	0.123 af	
Outflow =	0.22 cfs @	12.71 hrs,	Volume=	0.123 af,	Atten= 88%, Lag= 37.3 min
Discarded =	0.10 cfs @	12.71 hrs,	Volume=	0.112 af	
Primary =	0.11 cfs @	12.71 hrs,	Volume=	0.011 af	

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 225.16' @ 12.71 hrs Surf.Area= 1,840 sf Storage= 2,662 cf

Plug-Flow detention time= 316.6 min calculated for 0.123 af (100% of inflow)
Center-of-Mass det. time= 316.7 min (1,128.2 - 811.6)

Volume	Invert	Avail.Storage	Storage Description
#1	222.00'	4,684 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

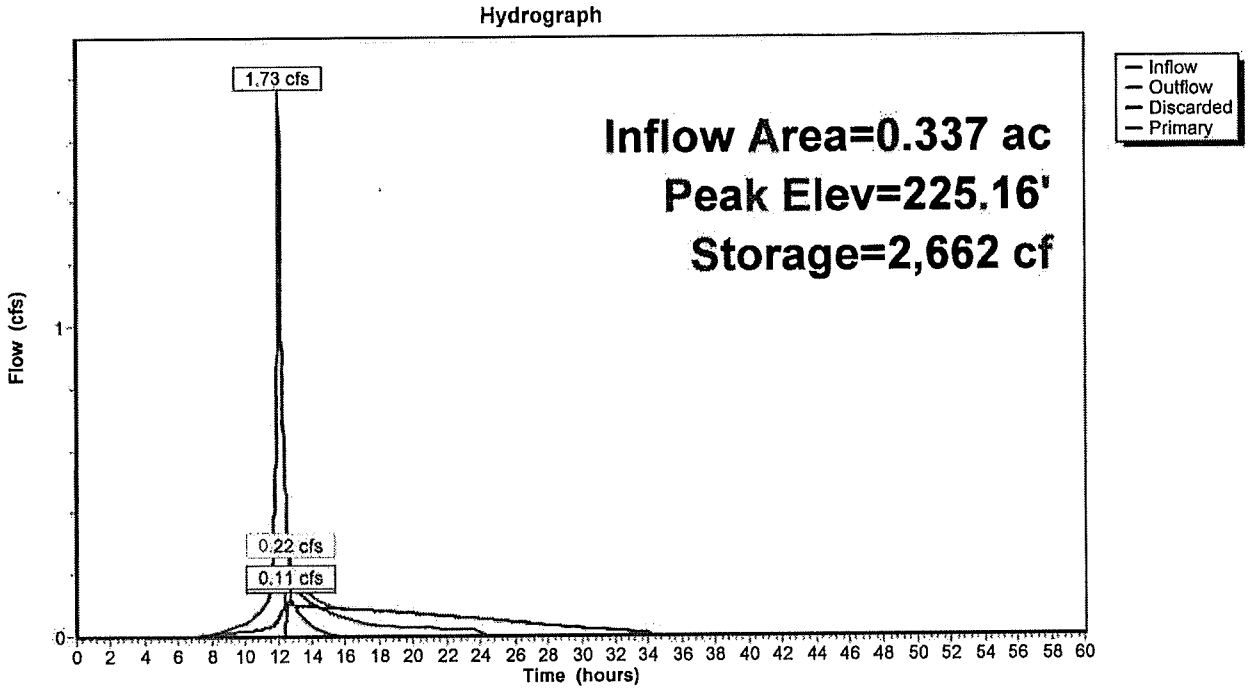
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
222.00	170	0	0
223.00	498	334	334
224.00	989	744	1,078
225.00	1,612	1,301	2,378
226.00	2,999	2,306	4,684

Device	Routing	Invert	Outlet Devices
#1	Discarded	222.00'	**2.410 in/hr Exfiltration over Surface area**
#2	Primary	225.00'	**12.0" Round Culvert** L= 100.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 225.00' / 224.00' S= 0.0100 '/' Cc= 0.900 n= 0.013, Flow Area= 0.79 sf

Discarded OutFlow Max=0.10 cfs @ 12.71 hrs HW=225.16' (Free Discharge)
└─**1=Exfiltration** (Exfiltration Controls 0.10 cfs)

Primary OutFlow Max=0.11 cfs @ 12.71 hrs HW=225.16' (Free Discharge)
└─**2=Culvert** (Barrel Controls 0.11 cfs @ 2.02 fps)

Pond 2P: roof infiltration basin



Summary for Pond 3P: (new Pond)

Inflow Area = 0.221 ac, 51.60% Impervious, Inflow Depth = 3.05" for 100 yr event
Inflow = 0.78 cfs @ 12.09 hrs, Volume= 0.056 af
Outflow = 0.04 cfs @ 11.48 hrs, Volume= 0.056 af, Atten= 95%, Lag= 0.0 min
Discarded = 0.04 cfs @ 11.48 hrs, Volume= 0.056 af

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 218.90' @ 15.16 hrs Surf.Area= 0.017 ac Storage= 0.028 af

Plug-Flow detention time= 307.5 min calculated for 0.056 af (100% of inflow)
Center-of-Mass det. time= 307.5 min (1,148.7 - 841.2)

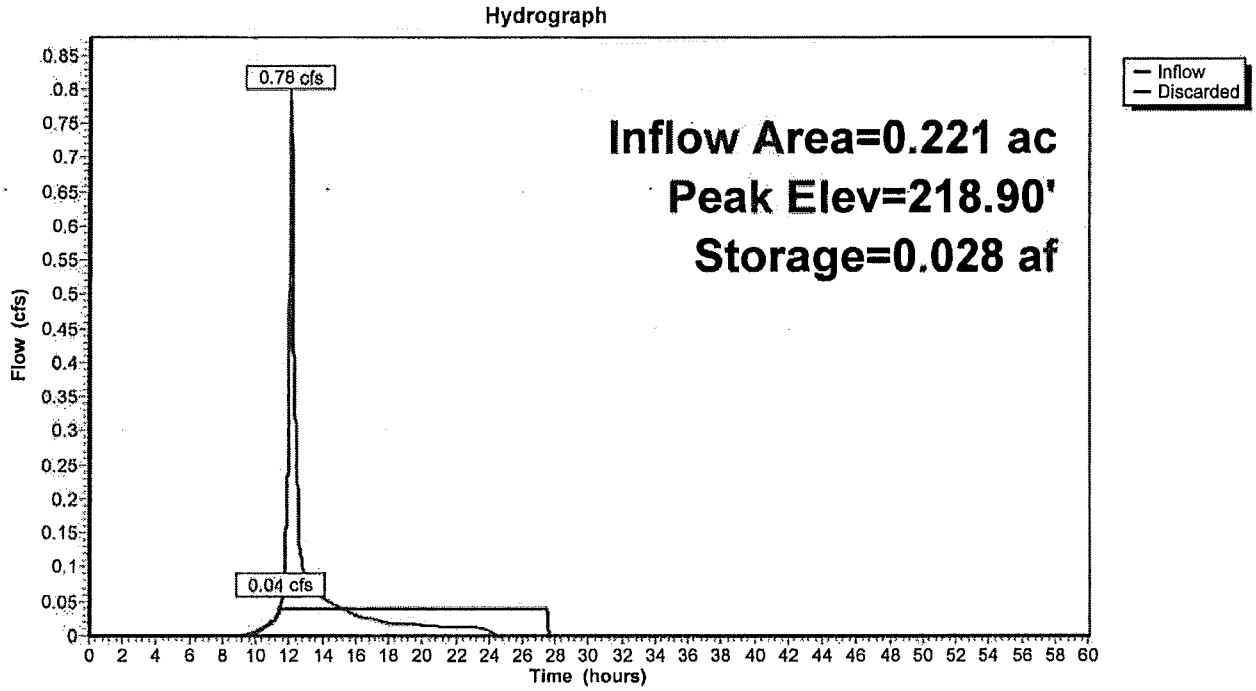
Volume	Invert	Avail.Storage	Storage Description
#1A	216.50'	0.015 af	**16.00'W x 45.50'L x 3.54'H Field A** 0.059 af Overall - 0.022 af Embedded = 0.037 af x 40.0% Voids
#2A	217.00'	0.022 af	**Cultec R-330XLHD** x 18 Inside #1 Effective Size= 47.8"W x 30.0"H => 7.45 sf x 7.00'L = 52.2 cf Overall Size= 52.0"W x 30.5"H x 8.50'L with 1.50' Overlap Row Length Adjustment= +1.50' x 7.45 sf x 3 rows
		0.037 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	216.50'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.04 cfs @ 11.48 hrs HW=216.54' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.04 cfs)

Pond 3P: (new Pond)



Summary for Pond 4P: existing depression with cb

Inflow Area =	2.990 ac, 42.79% Impervious, Inflow Depth = 1.68" for 100 yr event				
Inflow =	7.14 cfs @	12.15 hrs, Volume=	0.419 af		
Outflow =	6.80 cfs @	12.18 hrs, Volume=	0.419 af, Atten= 5%, Lag= 1.8 min		
Discarded =	0.14 cfs @	12.18 hrs, Volume=	0.026 af		
Primary =	6.67 cfs @	12.18 hrs, Volume=	0.393 af		

Routing by Stor-Ind method, Time Span= 0.00-60.00 hrs, dt= 0.01 hrs
Peak Elev= 208.40' @ 12.18 hrs Surf.Area= 2,439 sf Storage= 540 cf

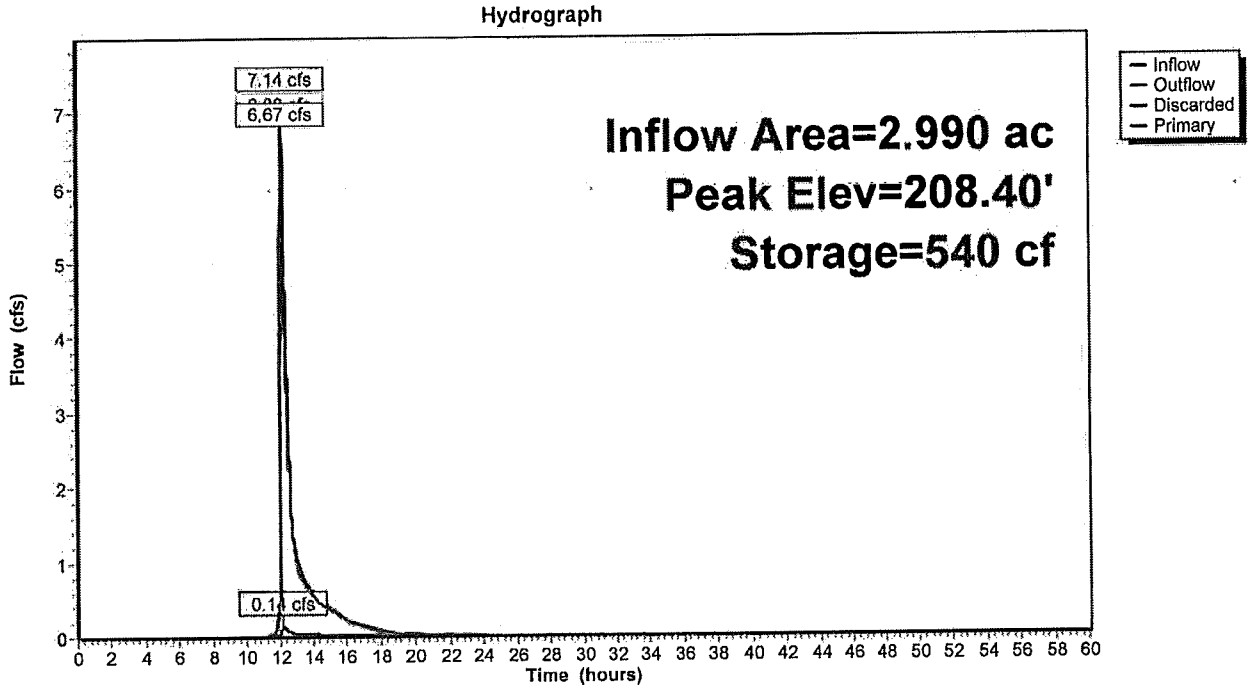
Plug-Flow detention time= 1.1 min calculated for 0.419 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (811.6 - 810.5)

Volume	Invert	Avail.Storage	Storage Description
#1	208.00'	2,973 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
208.00	249	0	0
209.00	5,696	2,973	2,973

Device	Routing	Invert	Outlet Devices
#1	Primary	208.00'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads
#2	Discarded	208.00'	**2.410 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.14 cfs @ 12.18 hrs HW=208.40' (Free Discharge)
└─**2=Exfiltration** (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max=6.66 cfs @ 12.18 hrs HW=208.40' (Free Discharge)
└─**1=Orifice/Grate** (Weir Controls 6.66 cfs @ 2.07 fps)

Pond 4P: existing depression with cb