APPENDIX G
HYDROLOGIC COMPUTATIONS

250 Bridge Street
FAIRHAVEN, MASSACHUSETTS

Drainage Summary

2 YR STORM (3.4 in.)

Receptor	Pre Development Q Max (cfs)	Post Development Q Max (cfs)
DP-1	2.25	1.80
DP-2	1.86	1.06

10 YR STORM (4.8 in.)

Receptor	Pre Development Q Max (cfs)	Post Development Q Max (cfs)
DP-1	4.03	3.44
DP-2	3.18	1.45

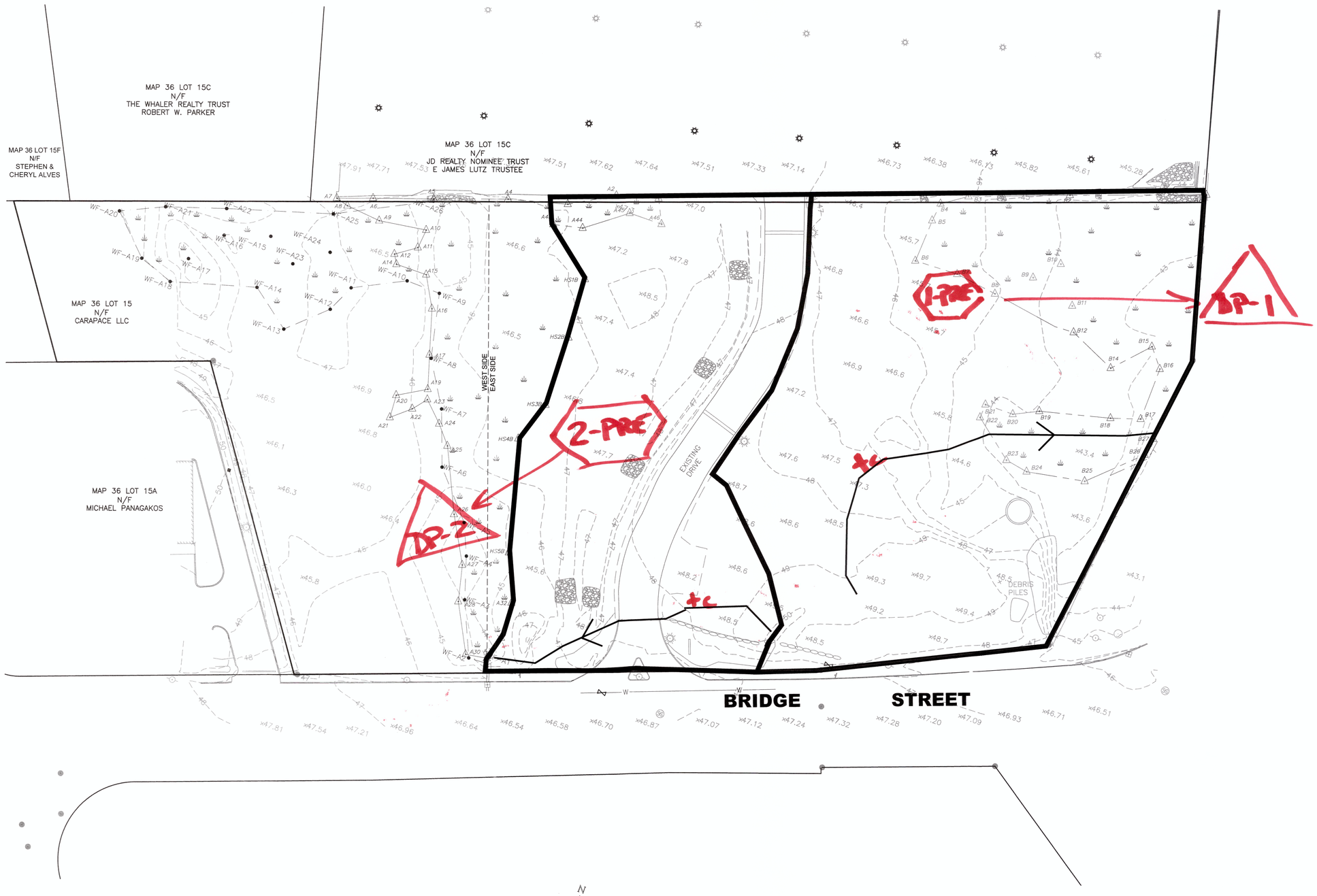
25 YR STORM (5.6 in.)

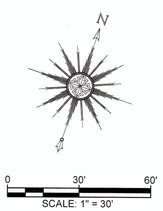
Receptor	Pre Development Q Max (cfs)	Post Development Q Max (cfs)
DP-1	5.09	4.52
DP-2	3.95	1.64

100 YR STORM (7.0 in.)

Receptor	Pre Development Q Max (cfs)	Post Development Q Max (cfs)
DP-1	6.98	5.99
DP-2	5.91	1.93

COMMONWEALTH OF MASSACHUSETTS
RICHARD J. RHEAUME
No 29373
CIVIL
REGISTERED PROFESSIONAL ENGINEER





REV	DATE	DESCRIPTION	BY	APP.
1	7-2-15	GENERAL REVISIONS	EKW	RJR

DRAWING TITLE
PREDEVELEOPMENT

PROJECT
250 BRIDGE STREET
FAIRHAVEN, MASSACHUSETTS

CLIENT
CARAPACE, LLC
FAIRHAVEN, MASSACHUSETTS

- CIVIL ENGINEERING
- LAND SURVEYING
- ENVIRONMENTAL ASSESSMENT

PRIME ENGINEERING INC

P.O. BOX 1088
330 BEDFORD ST.
LAKEVILLE, MA 02347
TEL: 508.947.0050
FAX: 508.947.2004

SCALE:	1" = 30'
DATE:	APRIL 27, 2015
DRAWN BY:	EKW/TRW
DESIGNED BY:	RJR
CHECKED BY:	RJR
SHEET NO.	2
APPROVED BY:	RJR
PROJECT NO.	19830101

O:\PROJECTS\Fairhaven\Bridge St\250 Bridge St Carapace LLC\Engineering\250 Bridge St Dealership_base.DWG

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 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 1-PRE: Runoff Area=66,435 sf 0.00% Impervious Runoff Depth>1.37"
Flow Length=265' Tc=10.3 min CN=79 Runoff=2.25 cfs 0.174 af

Subcatchment 2-PRE: (new Subcat) Runoff Area=42,740 sf 18.48% Impervious Runoff Depth>1.58"
Flow Length=154' Tc=7.0 min CN=82 Runoff=1.86 cfs 0.129 af

Pond DP-1: Inflow=2.25 cfs 0.174 af
Primary=2.25 cfs 0.174 af

Pond DP-2: Inflow=1.86 cfs 0.129 af
Primary=1.86 cfs 0.129 af

Total Runoff Area = 2.506 ac Runoff Volume = 0.304 af Average Runoff Depth = 1.45"
92.76% Pervious = 2.325 ac 7.24% Impervious = 0.181 ac

Summary for Subcatchment 1-PRE:

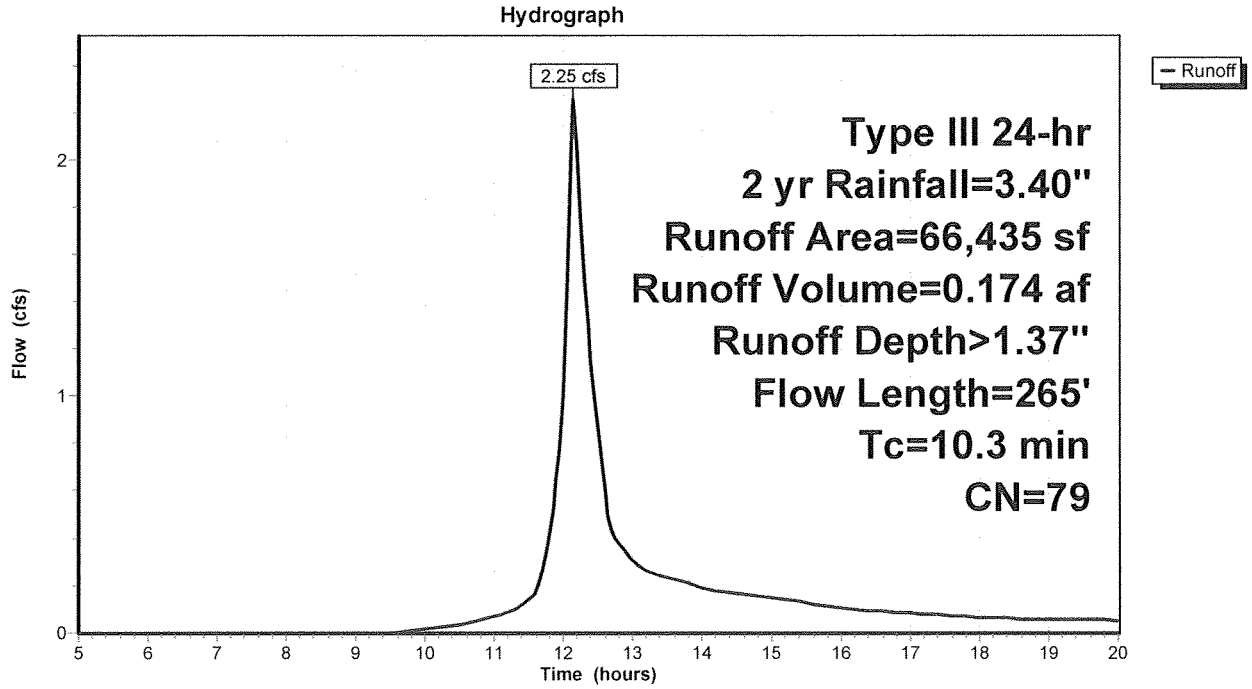
Runoff = 2.25 cfs @ 12.15 hrs, Volume= 0.174 af, Depth> 1.37"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (sf)	CN	Description
17,500	78	Meadow, non-grazed, HSG D
48,935	80	>75% Grass cover, Good, HSG D
66,435	79	Weighted Average
66,435		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
3.0	215	0.0286	1.18		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	265	Total			

Subcatchment 1-PRE:



Summary for Subcatchment 2-PRE: (new Subcat)

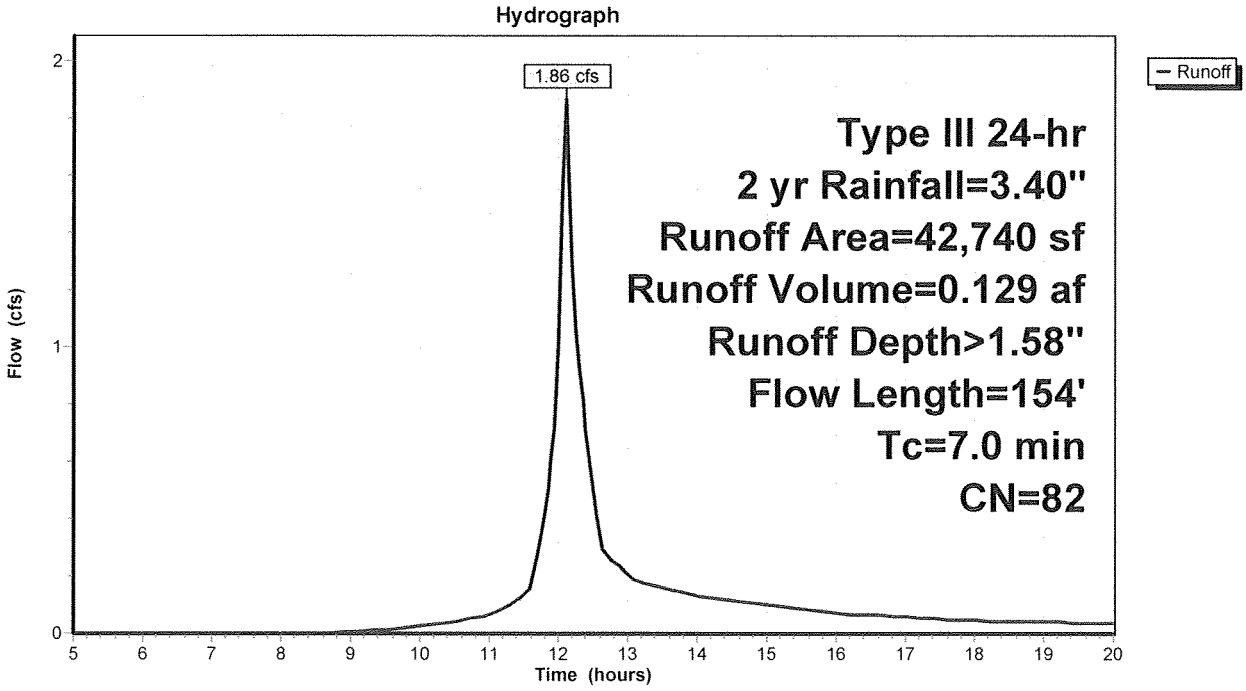
Runoff = 1.86 cfs @ 12.11 hrs, Volume= 0.129 af, Depth> 1.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.40"

	Area (sf)	CN	Description
*	7,900	98	EXIST. ACCESS DRIVE
	34,840	78	Meadow, non-grazed, HSG D
	42,740	82	Weighted Average
	34,840		81.52% Pervious Area
	7,900		18.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0400	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
0.1	24	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	80	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.0	154	Total			

Subcatchment 2-PRE: (new Subcat)

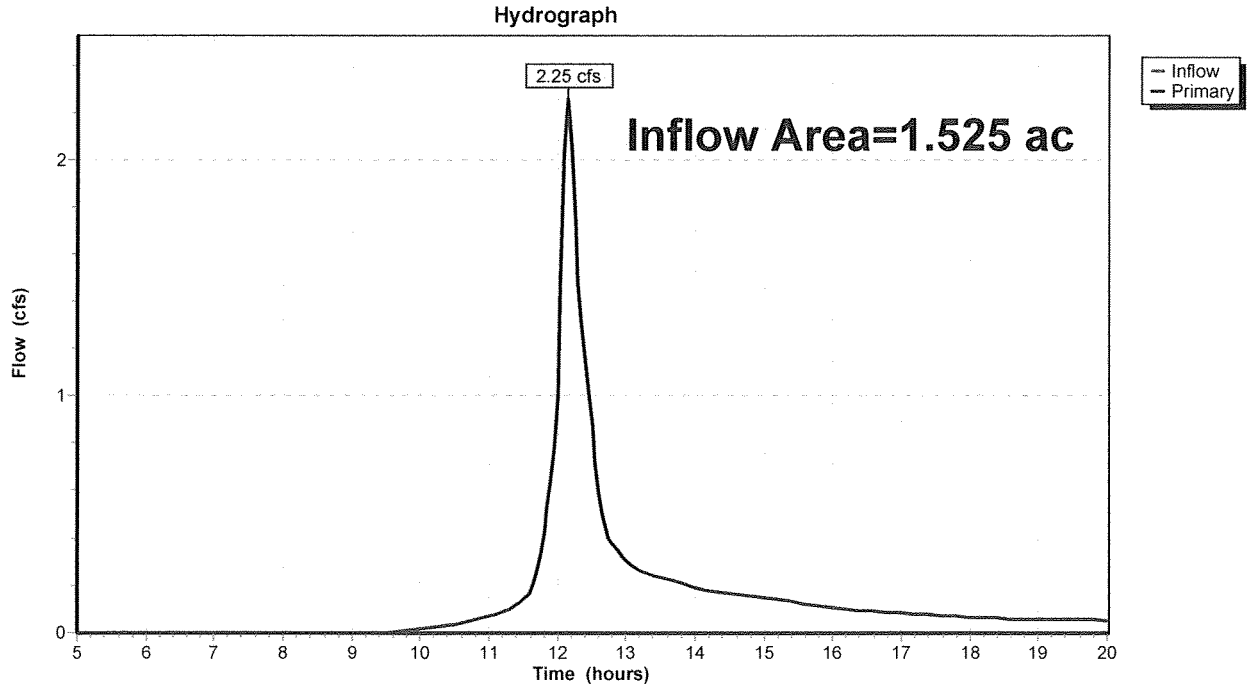


Summary for Pond DP-1:

Inflow Area = 1.525 ac, 0.00% Impervious, Inflow Depth > 1.37" for 2 yr event
Inflow = 2.25 cfs @ 12.15 hrs, Volume= 0.174 af
Primary = 2.25 cfs @ 12.15 hrs, Volume= 0.174 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond DP-1:

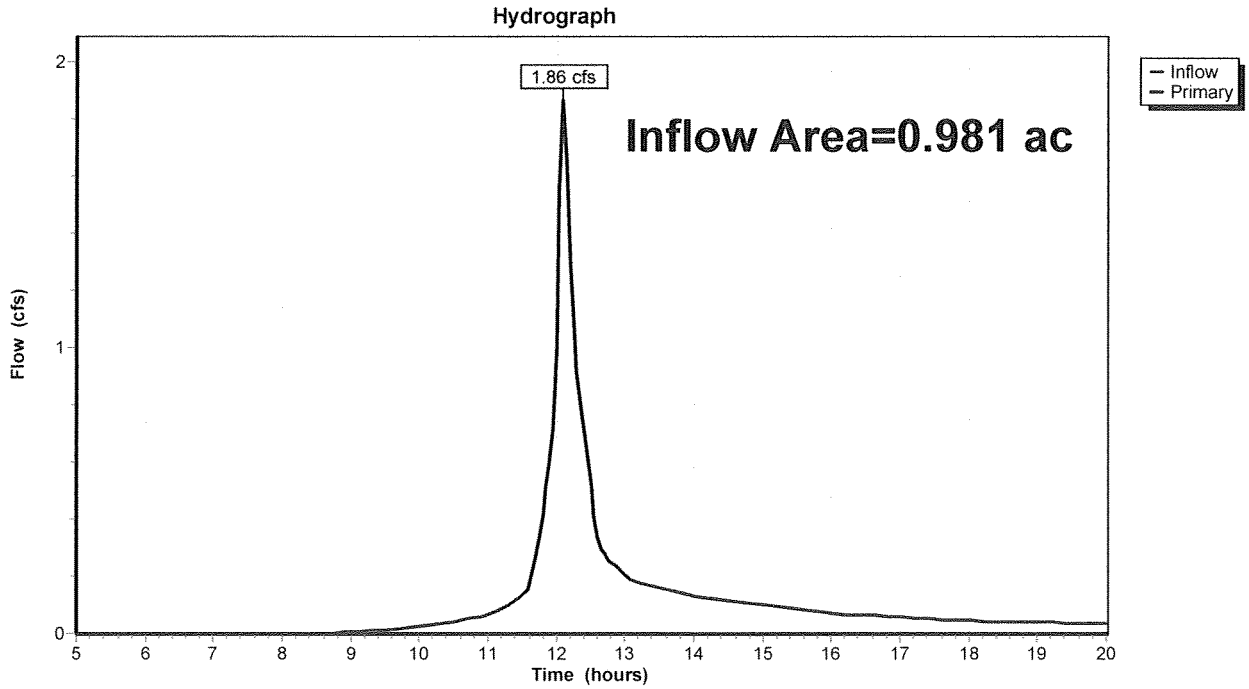


Summary for Pond DP-2:

Inflow Area = 0.981 ac, 18.48% Impervious, Inflow Depth > 1.58" for 2 yr event
Inflow = 1.86 cfs @ 12.11 hrs, Volume= 0.129 af
Primary = 1.86 cfs @ 12.11 hrs, Volume= 0.129 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond DP-2:



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1-PRE: Runoff Area=66,435 sf 0.00% Impervious Runoff Depth>2.45"
Flow Length=265' Tc=10.3 min CN=79 Runoff=4.03 cfs 0.311 af

Subcatchment2-PRE: (new Subcat) Runoff Area=42,740 sf 18.48% Impervious Runoff Depth>2.71"
Flow Length=154' Tc=7.0 min CN=82 Runoff=3.18 cfs 0.222 af

Pond DP-1: Inflow=4.03 cfs 0.311 af
Primary=4.03 cfs 0.311 af

Pond DP-2: Inflow=3.18 cfs 0.222 af
Primary=3.18 cfs 0.222 af

Total Runoff Area = 2.506 ac Runoff Volume = 0.533 af Average Runoff Depth = 2.55"
92.76% Pervious = 2.325 ac 7.24% Impervious = 0.181 ac

Summary for Subcatchment 1-PRE:

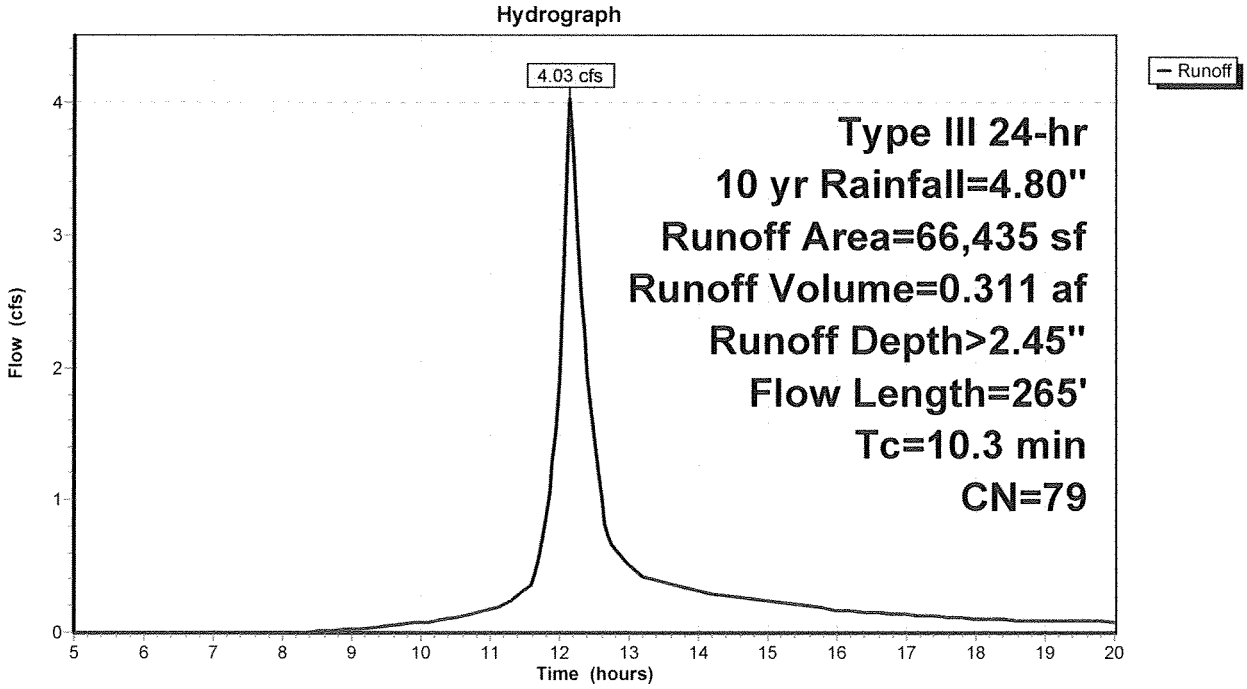
Runoff = 4.03 cfs @ 12.15 hrs, Volume= 0.311 af, Depth> 2.45"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (sf)	CN	Description
17,500	78	Meadow, non-grazed, HSG D
48,935	80	>75% Grass cover, Good, HSG D
66,435	79	Weighted Average
66,435		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
3.0	215	0.0286	1.18		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	265	Total			

Subcatchment 1-PRE:



Summary for Subcatchment 2-PRE: (new Subcat)

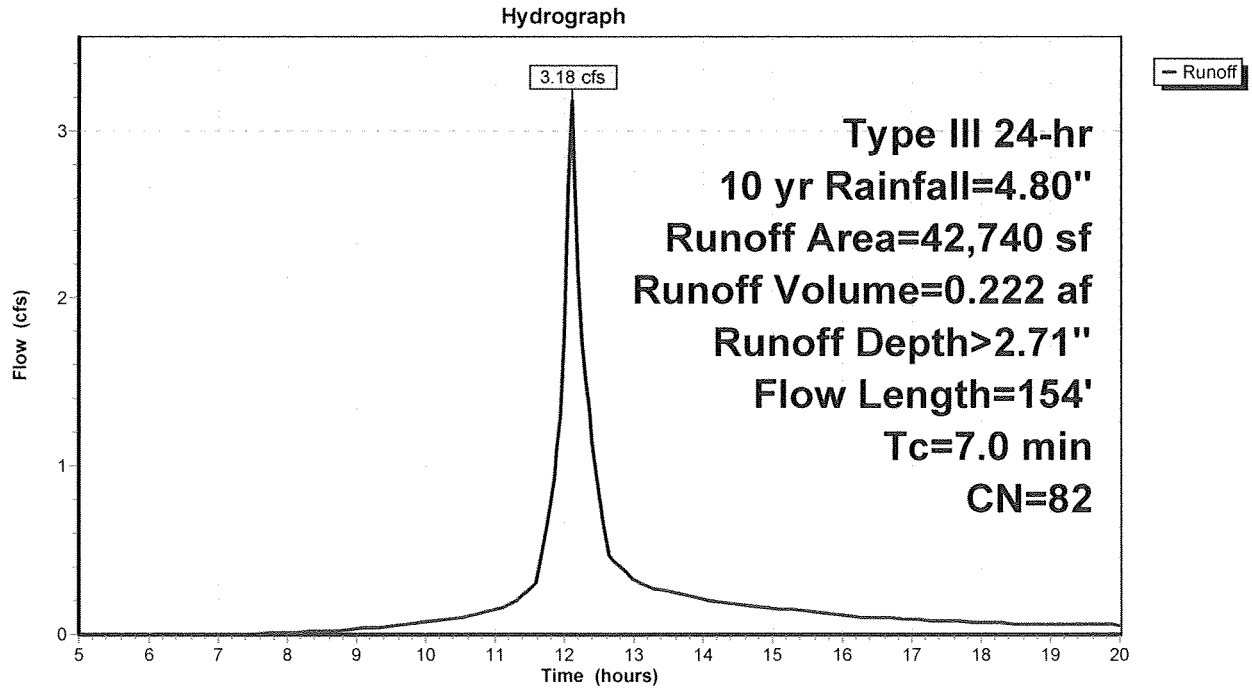
Runoff = 3.18 cfs @ 12.10 hrs, Volume= 0.222 af, Depth> 2.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.80"

	Area (sf)	CN	Description
*	7,900	98	EXIST. ACCESS DRIVE
	34,840	78	Meadow, non-grazed, HSG D
	42,740	82	Weighted Average
	34,840		81.52% Pervious Area
	7,900		18.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0400	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
0.1	24	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	80	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.0	154	Total			

Subcatchment 2-PRE: (new Subcat)

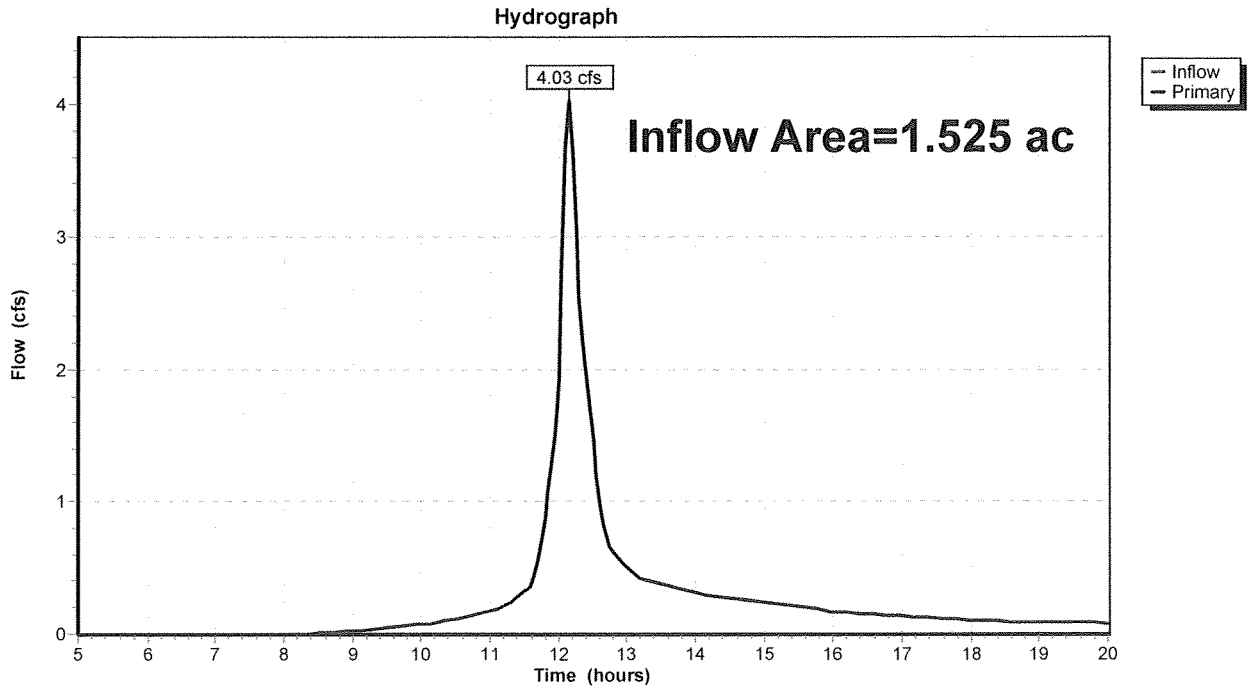


Summary for Pond DP-1:

Inflow Area =	1.525 ac,	0.00% Impervious,	Inflow Depth >	2.45"	for 10 yr event
Inflow =	4.03 cfs @	12.15 hrs,	Volume=	0.311 af	
Primary =	4.03 cfs @	12.15 hrs,	Volume=	0.311 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond DP-1:

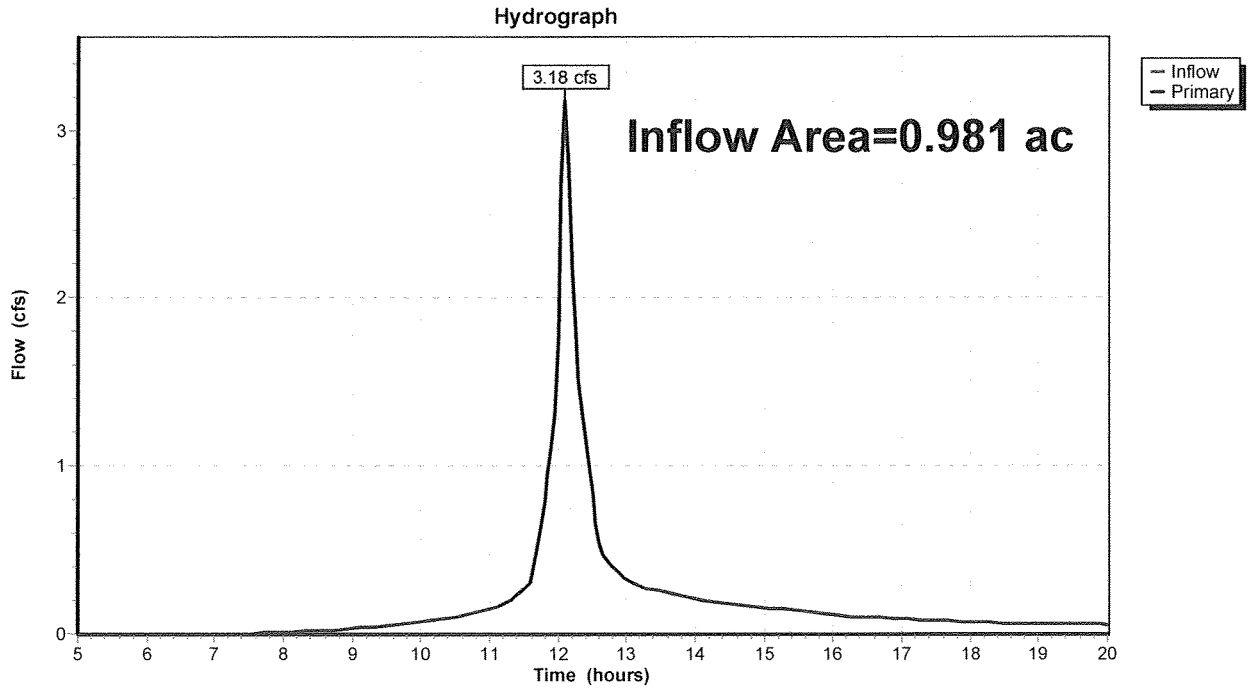


Summary for Pond DP-2:

Inflow Area = 0.981 ac, 18.48% Impervious, Inflow Depth > 2.71" for 10 yr event
Inflow = 3.18 cfs @ 12.10 hrs, Volume= 0.222 af
Primary = 3.18 cfs @ 12.10 hrs, Volume= 0.222 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond DP-2:



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1-PRE: Runoff Area=66,435 sf 0.00% Impervious Runoff Depth>3.10"
Flow Length=265' Tc=10.3 min CN=79 Runoff=5.09 cfs 0.395 af

Subcatchment2-PRE: (new Subcat) Runoff Area=42,740 sf 18.48% Impervious Runoff Depth>3.40"
Flow Length=154' Tc=7.0 min CN=82 Runoff=3.95 cfs 0.278 af

Pond DP-1: Inflow=5.09 cfs 0.395 af
Primary=5.09 cfs 0.395 af

Pond DP-2: Inflow=3.95 cfs 0.278 af
Primary=3.95 cfs 0.278 af

Total Runoff Area = 2.506 ac Runoff Volume = 0.672 af Average Runoff Depth = 3.22"
92.76% Pervious = 2.325 ac 7.24% Impervious = 0.181 ac

Summary for Subcatchment 1-PRE:

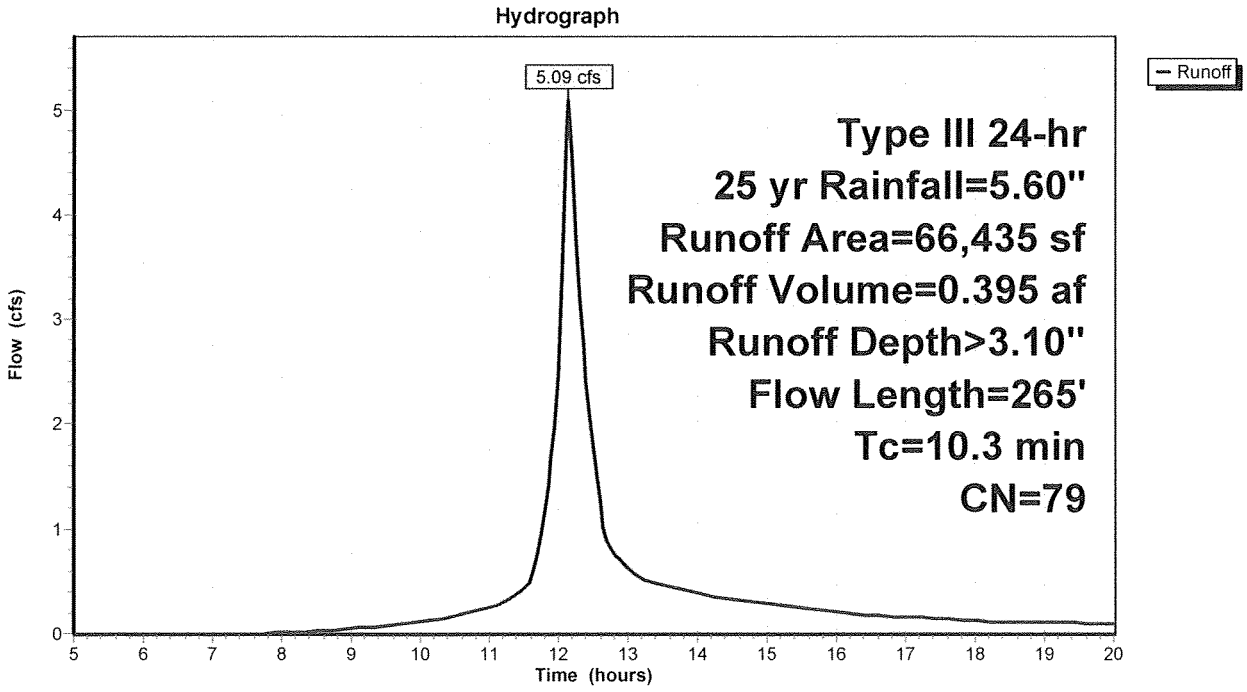
Runoff = 5.09 cfs @ 12.15 hrs, Volume= 0.395 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.60"

Area (sf)	CN	Description
17,500	78	Meadow, non-grazed, HSG D
48,935	80	>75% Grass cover, Good, HSG D
66,435	79	Weighted Average
66,435		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
3.0	215	0.0286	1.18		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	265	Total			

Subcatchment 1-PRE:



Summary for Subcatchment 2-PRE: (new Subcat)

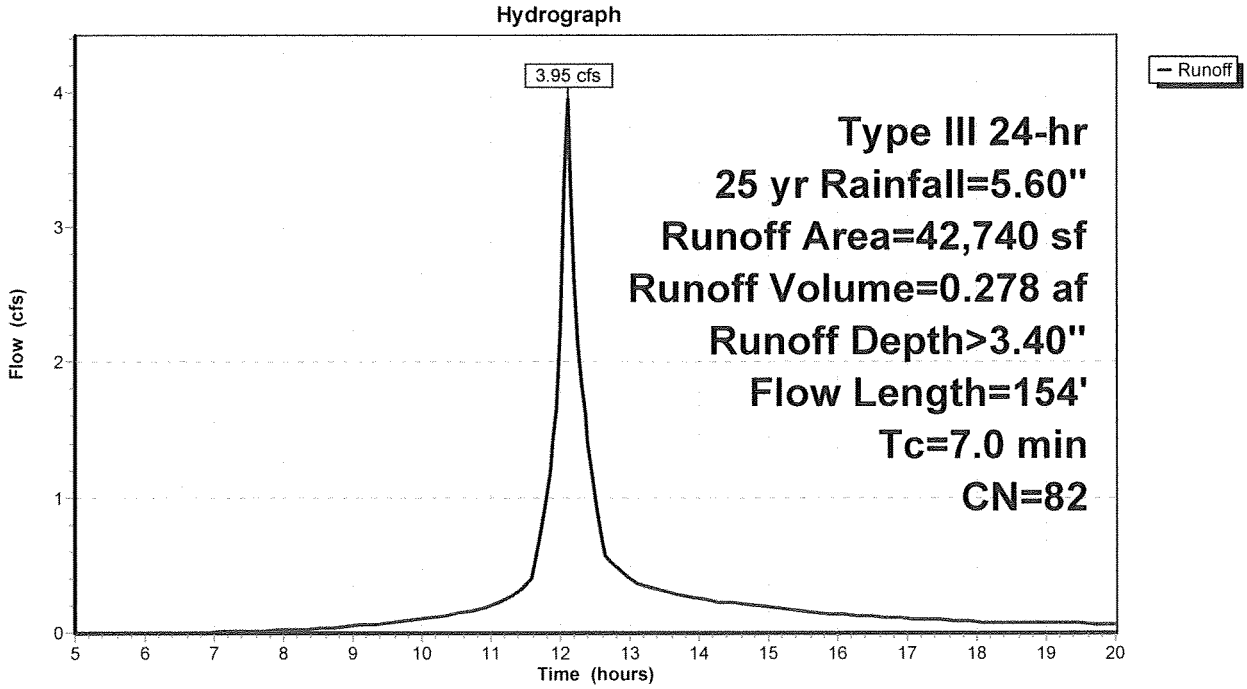
Runoff = 3.95 cfs @ 12.10 hrs, Volume= 0.278 af, Depth> 3.40"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.60"

	Area (sf)	CN	Description
*	7,900	98	EXIST. ACCESS DRIVE
	34,840	78	Meadow, non-grazed, HSG D
	42,740	82	Weighted Average
	34,840		81.52% Pervious Area
	7,900		18.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0400	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
0.1	24	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	80	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.0	154	Total			

Subcatchment 2-PRE: (new Subcat)

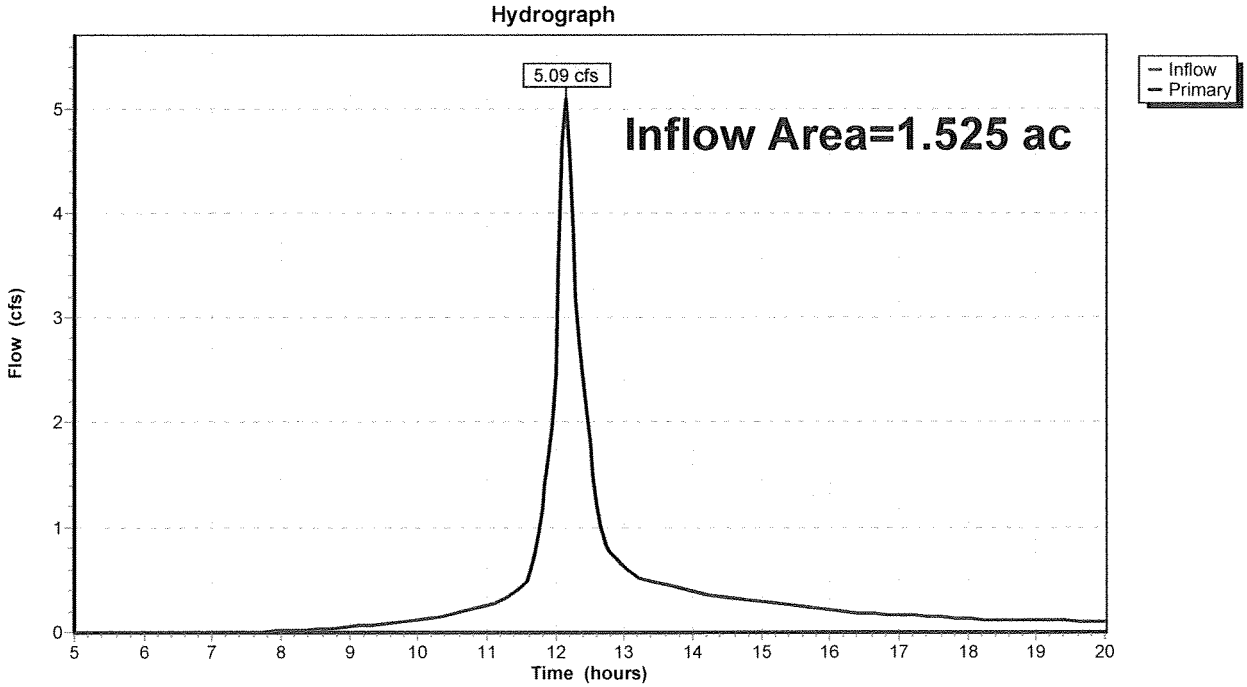


Summary for Pond DP-1:

Inflow Area =	1.525 ac,	0.00% Impervious,	Inflow Depth >	3.10"	for 25 yr event
Inflow =	5.09 cfs @	12.15 hrs, Volume=	0.395 af		
Primary =	5.09 cfs @	12.15 hrs, Volume=	0.395 af,	Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond DP-1:

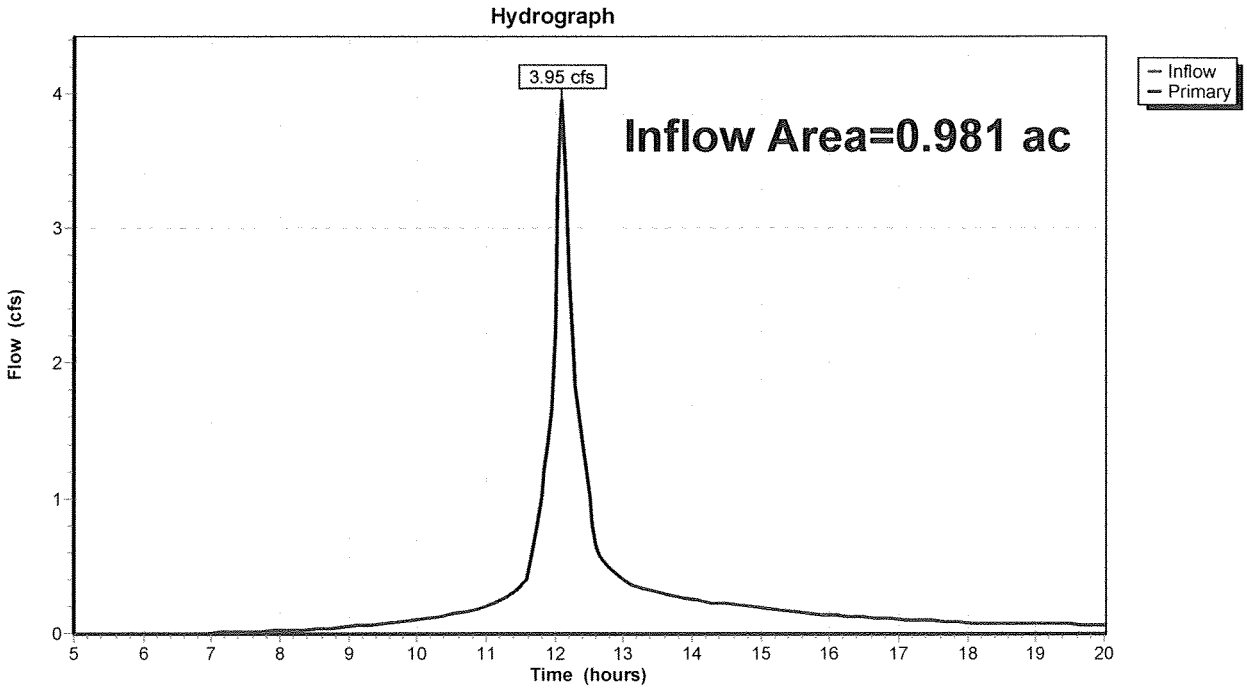


Summary for Pond DP-2:

Inflow Area = 0.981 ac, 18.48% Impervious, Inflow Depth > 3.40" for 25 yr event
Inflow = 3.95 cfs @ 12.10 hrs, Volume= 0.278 af
Primary = 3.95 cfs @ 12.10 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond DP-2:



Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1-PRE: Runoff Area=66,435 sf 0.00% Impervious Runoff Depth>4.30"
Flow Length=265' Tc=10.3 min CN=79 Runoff=6.98 cfs 0.546 af

Subcatchment2-PRE: (new Subcat) Runoff Area=42,740 sf 18.48% Impervious Runoff Depth>4.63"
Flow Length=154' Tc=7.0 min CN=82 Runoff=5.31 cfs 0.378 af

Pond DP-1: Inflow=6.98 cfs 0.546 af
Primary=6.98 cfs 0.546 af

Pond DP-2: Inflow=5.31 cfs 0.378 af
Primary=5.31 cfs 0.378 af

Total Runoff Area = 2.506 ac Runoff Volume = 0.925 af Average Runoff Depth = 4.43"
92.76% Pervious = 2.325 ac 7.24% Impervious = 0.181 ac

Summary for Subcatchment 1-PRE:

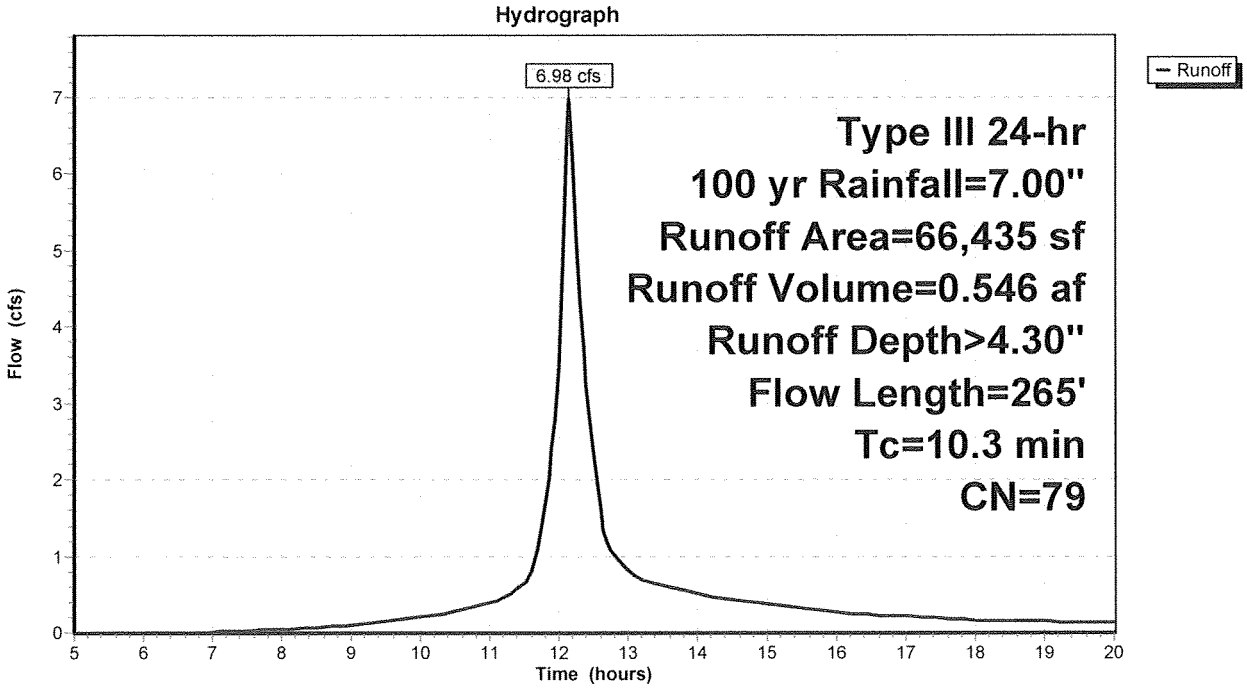
Runoff = 6.98 cfs @ 12.15 hrs, Volume= 0.546 af, Depth> 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
17,500	78	Meadow, non-grazed, HSG D
48,935	80	>75% Grass cover, Good, HSG D
66,435	79	Weighted Average
66,435		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.3	50	0.0250	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
3.0	215	0.0286	1.18		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
10.3	265	Total			

Subcatchment 1-PRE:



Summary for Subcatchment 2-PRE: (new Subcat)

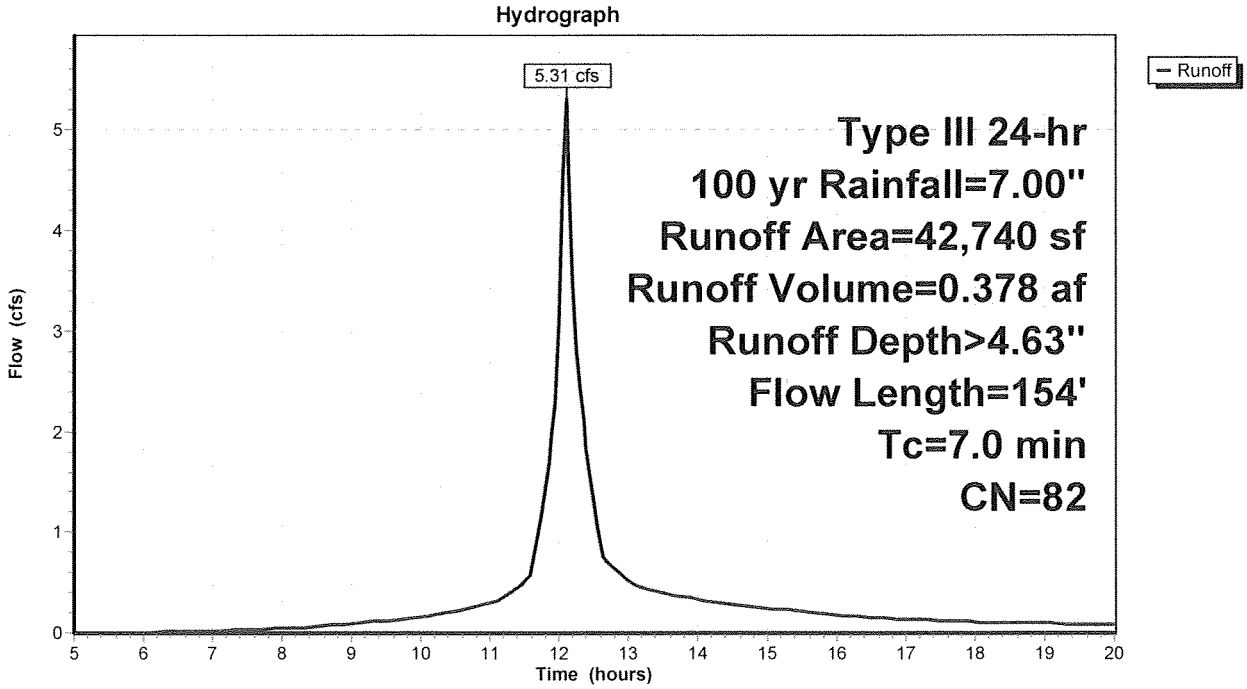
Runoff = 5.31 cfs @ 12.10 hrs, Volume= 0.378 af, Depth> 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	7,900	98	EXIST. ACCESS DRIVE
	34,840	78	Meadow, non-grazed, HSG D
	42,740	82	Weighted Average
	34,840		81.52% Pervious Area
	7,900		18.48% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0400	0.14		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.40"
0.1	24	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.9	80	0.0500	1.57		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
7.0	154	Total			

Subcatchment 2-PRE: (new Subcat)

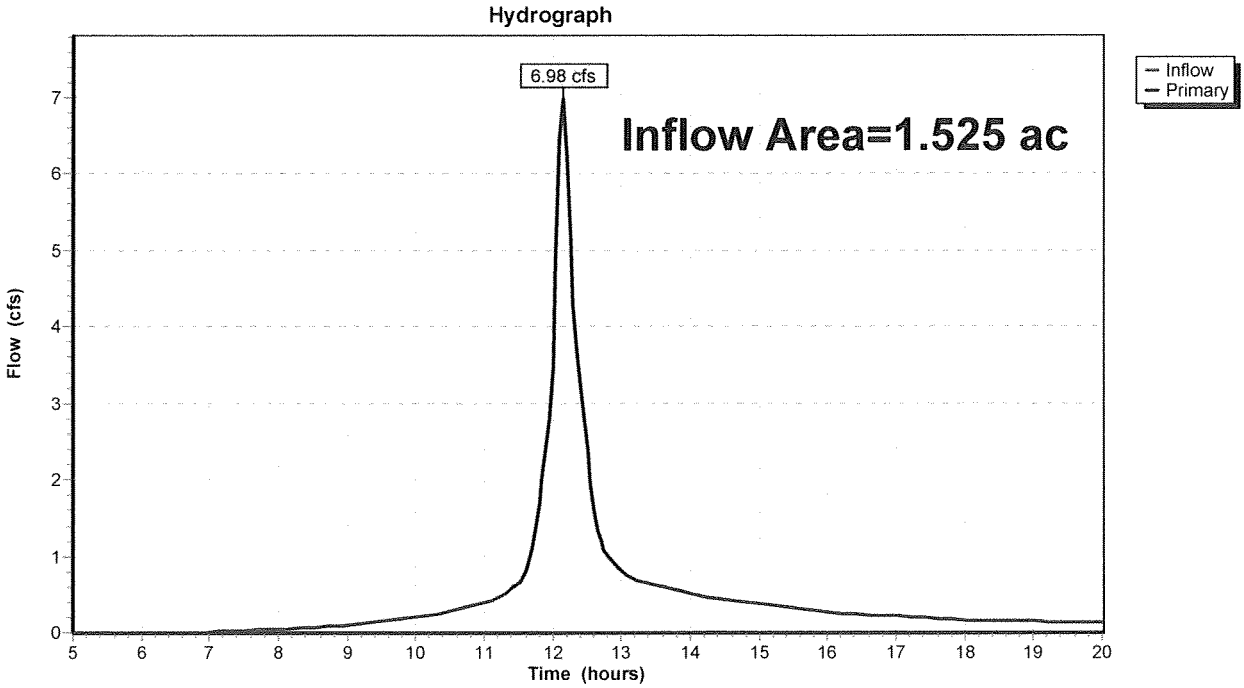


Summary for Pond DP-1:

Inflow Area =	1.525 ac,	0.00% Impervious,	Inflow Depth >	4.30"	for 100 yr event
Inflow =	6.98 cfs @	12.15 hrs,	Volume=	0.546 af	
Primary =	6.98 cfs @	12.15 hrs,	Volume=	0.546 af,	Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond DP-1:

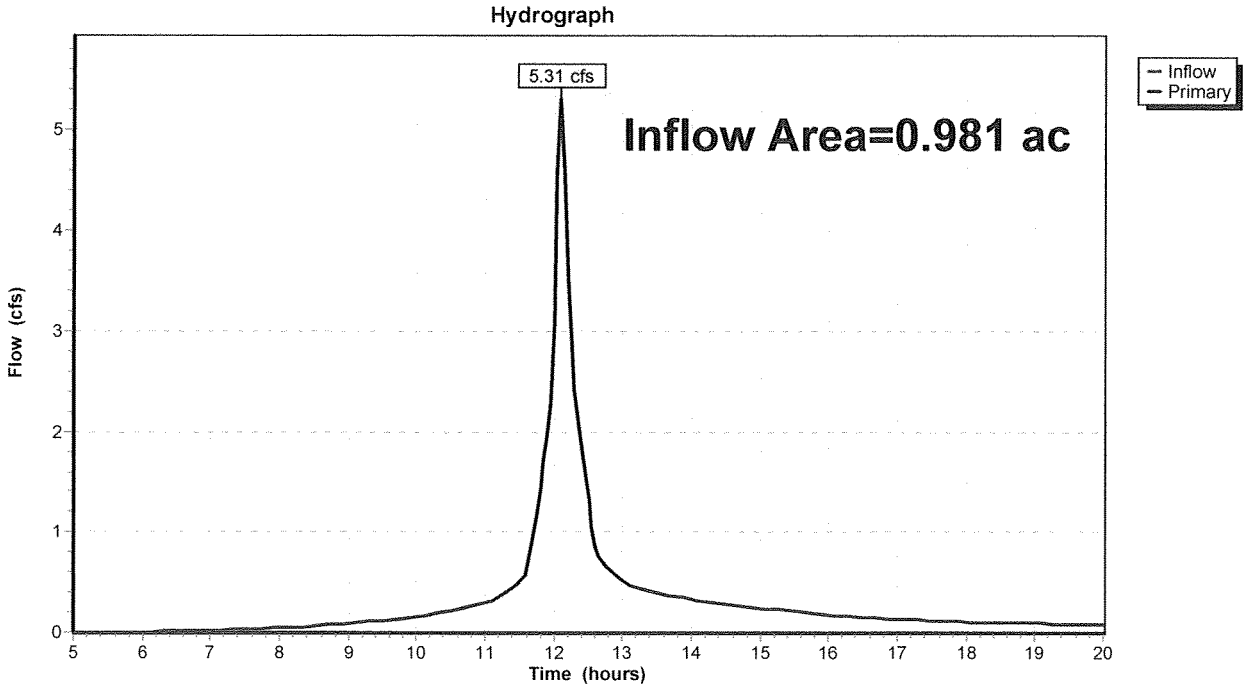


Summary for Pond DP-2:

Inflow Area = 0.981 ac, 18.48% Impervious, Inflow Depth > 4.63" for 100 yr event
Inflow = 5.31 cfs @ 12.10 hrs, Volume= 0.378 af
Primary = 5.31 cfs @ 12.10 hrs, Volume= 0.378 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Pond DP-2:



MAP 36 LOT 15C
N/F
THE WHALER REALTY TRUST
ROBERT W. PARKER

MAP 36 LOT 15F
N/F
STEPHEN &
CHERYL ALVES

MAP 36 LOT 15C
N/F
JD REALTY NOMINEE TRUST
E JAMES LUTZ TRUSTEE

AS CURRENTLY DELINEATED WETLAND

PREVIOUSLY APPROVED WETLANDS LINE

MAP 36 LOT 15
N/F
CARAPACE LLC

25' BUFFER ZONE

PROPOSED REPLICATION AREA

WEST SIDE
EAST SIDE

PROPOSED 10,000 S.F.
BUILDING
SLAB ELEV. = 49.75

125'

80'

CANOPY

36" HDPE PIPE
STORMWATER
STORAGE
(SEE DETAIL)

STONE EDGE

CCB

SGC

MAP 36 LOT 15A
N/F
MICHAEL PANAGAKOS

15" RCP
INV.
ELEV.=42.9

CATCH BASIN
RIM=46.32
INV. 12" RCP (SE)=42.05
INV. 12" RCP (SW)=41.99
INV. 12" RCP (NW)=41.87
INV. 12" RCP (NE)=41.97

CATCH BASIN
RIM=45.50
INV. 12" RCP (SE)=42.18
INV. 12" RCP (SW)=41.94
INV. 12" RCP (E)=42.14
INV. 12" RCP (N)=42.55

BRIDGE STREET

ROUTE 240

1B-POST

UP-1

2-POST

1A-POST

DP-2

N

0 30' 60'
SCALE: 1" = 30'

REV.	DATE	DESCRIPTION	BY	APP.

DRAWING TITLE
POST DEVELOPMENT PLAN

PROJECT
250 BRIDGE STREET
FAIRHAVEN, MASSACHUSETTS

CLIENT
CARAPACE, LLC
FAIRHAVEN, MASSACHUSETTS

- CIVIL ENGINEERING
- LAND SURVEYING
- ENVIRONMENTAL ASSESSMENT

PRIME ENGINEERING INC

P.O. BOX 1088
350 BEDFORD ST.
LAKEVILLE, MA 02347
TEL: 508.947.0050
FAX: 508.947.2004

SCALE: 1" = 30'	
DATE: APRIL 27, 2015	
DRAWN BY: EKW/TRW	
DESIGNED BY: RJR	
CHECKED BY: RJR	SHEET NO. 1
APPROVED BY: RJR	PROJECT NO. 19830101

O:\PROJECTS\Fairhaven\Bridge St\250 Bridge St Carapace LLC\Engineering\250 Bridge St Dealership_base.DWG

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1A-POST: Runoff Area=56,833 sf 100.00% Impervious Runoff Depth>3.16"
Flow Length=271' Tc=6.0 min CN=98 Runoff=4.21 cfs 0.344 af

Subcatchment1B-POST: Runoff Area=26,634 sf 19.81% Impervious Runoff Depth>1.77"
Tc=6.0 min CN=83 Runoff=1.25 cfs 0.090 af

Subcatchment2-POST: Runoff Area=25,518 sf 49.54% Impervious Runoff Depth>2.26"
Tc=6.0 min CN=89 Runoff=1.51 cfs 0.110 af

Pond 1P: UNDERGROUNDSTORAGE Peak Elev=45.97' Storage=5,624 cf Inflow=4.21 cfs 0.344 af
Outflow=1.12 cfs 0.341 af

Pond 2P: (new Pond) Peak Elev=45.63' Storage=259 cf Inflow=1.51 cfs 0.110 af
10.0" Round Culvert n=0.010 L=26.0' S=0.0385 '/' Outflow=1.06 cfs 0.110 af

Pond DP-1: Inflow=1.80 cfs 0.431 af
Primary=1.80 cfs 0.431 af

Pond DP-2: Inflow=1.06 cfs 0.110 af
Primary=1.06 cfs 0.110 af

Total Runoff Area = 2.502 ac Runoff Volume = 0.545 af Average Runoff Depth = 2.61"
31.41% Pervious = 0.786 ac 68.59% Impervious = 1.716 ac

Summary for Subcatchment 1A-POST:

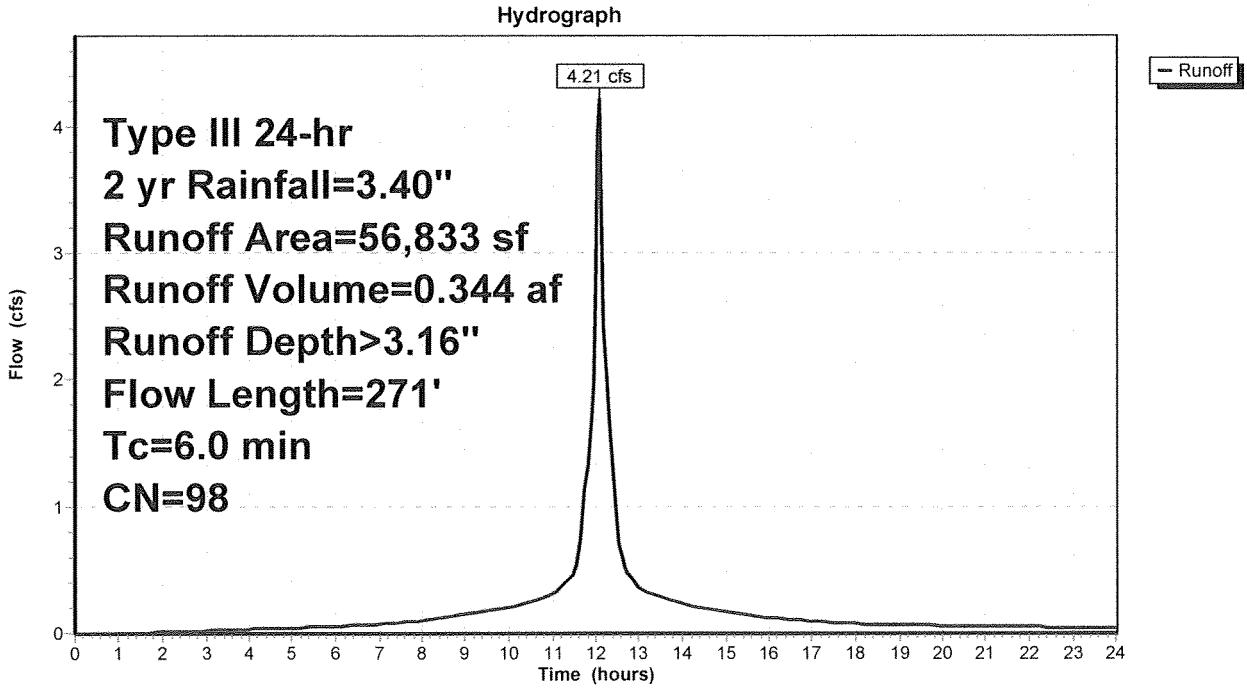
Runoff = 4.21 cfs @ 12.09 hrs, Volume= 0.344 af, Depth> 3.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.40"

	Area (sf)	CN	Description
*	46,833	98	
*	10,000	98	roof
	56,833	98	Weighted Average
	56,833		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0175	1.17		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
1.8	221	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	271	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-POST:



Summary for Subcatchment 1B-POST:

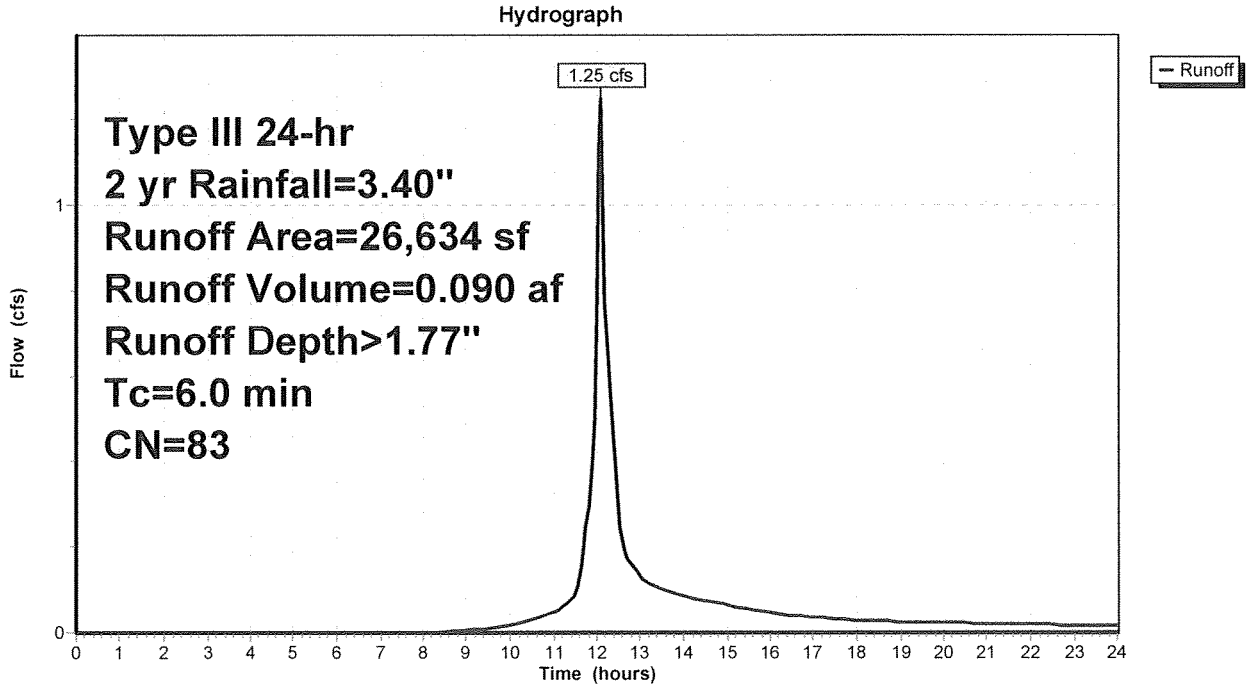
Runoff = 1.25 cfs @ 12.09 hrs, Volume= 0.090 af, Depth> 1.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.40"

Area (sf)	CN	Description
5,276	98	Paved parking, HSG D
7,458	80	>75% Grass cover, Good, HSG D
13,900	78	Meadow, non-grazed, HSG D
26,634	83	Weighted Average
21,358		80.19% Pervious Area
5,276		19.81% Impervious Area

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

Subcatchment 1B-POST:



Summary for Subcatchment 2-POST:

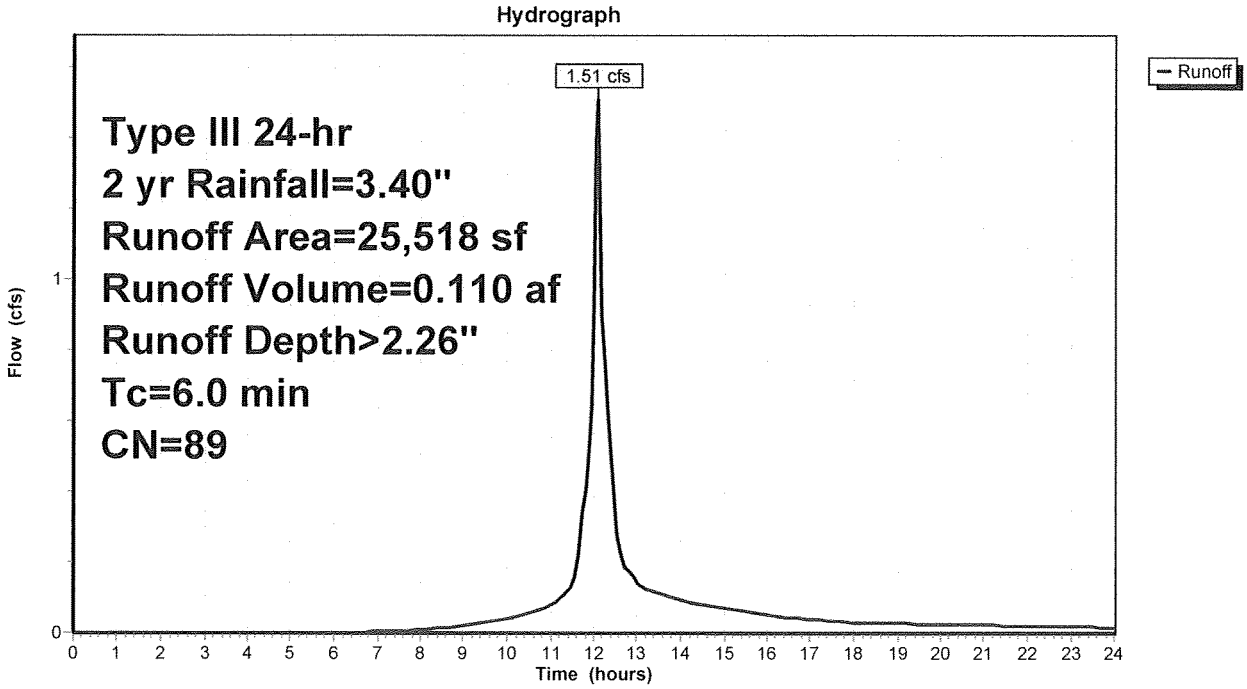
Runoff = 1.51 cfs @ 12.09 hrs, Volume= 0.110 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr Rainfall=3.40"

	Area (sf)	CN	Description
*	12,642	98	PROPOSED PAVEMENT / SIDEWALK
	12,876	80	>75% Grass cover, Good, HSG D
	25,518	89	Weighted Average
	12,876		50.46% Pervious Area
	12,642		49.54% Impervious Area

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

Subcatchment 2-POST:



Summary for Pond 1P: UNDERGROUND STORAGE

Inflow Area = 1.305 ac,100.00% Impervious, Inflow Depth > 3.16" for 2 yr event
Inflow = 4.21 cfs @ 12.09 hrs, Volume= 0.344 af
Outflow = 1.12 cfs @ 12.44 hrs, Volume= 0.341 af, Atten= 73%, Lag= 21.5 min
Primary = 1.12 cfs @ 12.44 hrs, Volume= 0.341 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 43.25' Surf.Area= 2,947 sf Storage= 589 cf
Peak Elev= 45.97' @ 12.44 hrs Surf.Area= 2,947 sf Storage= 5,624 cf (5,034 cf above start)

Plug-Flow detention time= 113.6 min calculated for 0.327 af (95% of inflow)
Center-of-Mass det. time= 65.5 min (820.2 - 754.7)

Volume	Invert	Avail.Storage	Storage Description
#1	43.25'	55 cf	**12.0" Round Pipe Storage** x 2 L= 35.0' S= 0.0100 '/'
#2A	42.75'	3,393 cf	**32.75'W x 90.00'L x 4.50'H Field A** 13,264 cf Overall - 4,781 cf Embedded = 8,483 cf x 40.0% Voids
#3A	43.25'	3,830 cf	**ADS N-12 36** x 24 Inside #2 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.1 cf 6 Rows of 4 Chambers 29.75' Header x 7.10 sf x 2 = 422.4 cf Inside
#4	46.00'	2,590 cf	**Raingarden (Southern) (Prismatic)**Listed below (Recalc)
#5	46.00'	1,139 cf	**Raingarden (Northern) (Prismatic)**Listed below (Recalc)
		11,008 cf	Total Available Storage

Storage Group A created with Chamber Wizard

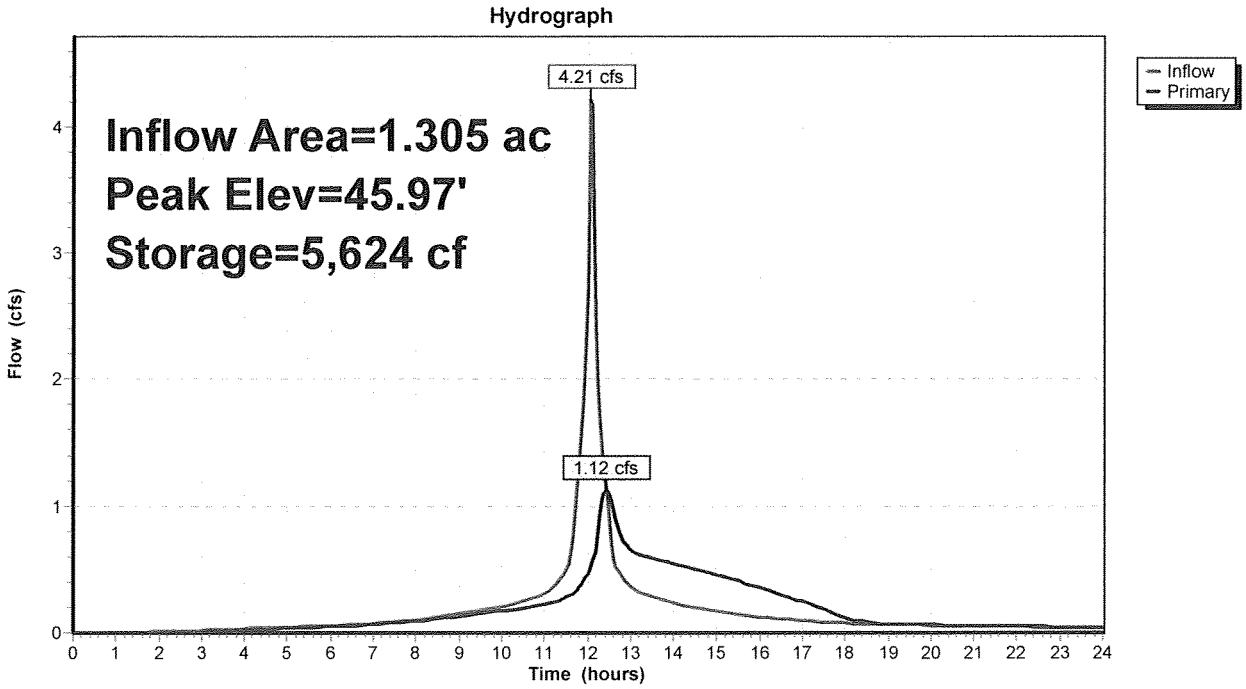
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	642	0	0
47.00	1,079	861	861
47.75	3,533	1,730	2,590

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	260	0	0
47.00	550	405	405
47.75	1,407	734	1,139

Device	Routing	Invert	Outlet Devices	
#1	Primary	43.25'	**4.0" Vert. Orifice/Grate**	C= 0.600
#2	Primary	45.58'	**8.0" Vert. Orifice/Grate**	C= 0.600

Primary OutFlow Max=1.12 cfs @ 12.44 hrs HW=45.97' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.67 cfs @ 7.69 fps)
└─**2=Orifice/Grate** (Orifice Controls 0.44 cfs @ 2.12 fps)

Pond 1P: UNDERGROUND STORAGE



Summary for Pond 2P: (new Pond)

Inflow Area = 0.586 ac, 49.54% Impervious, Inflow Depth > 2.26" for 2 yr event
Inflow = 1.51 cfs @ 12.09 hrs, Volume= 0.110 af
Outflow = 1.06 cfs @ 12.18 hrs, Volume= 0.110 af, Atten= 30%, Lag= 5.1 min
Primary = 1.06 cfs @ 12.18 hrs, Volume= 0.110 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 45.63' @ 12.18 hrs Surf.Area= 2,063 sf Storage= 259 cf

Plug-Flow detention time= 1.3 min calculated for 0.110 af (100% of inflow)
Center-of-Mass det. time= 1.2 min (809.4 - 808.2)

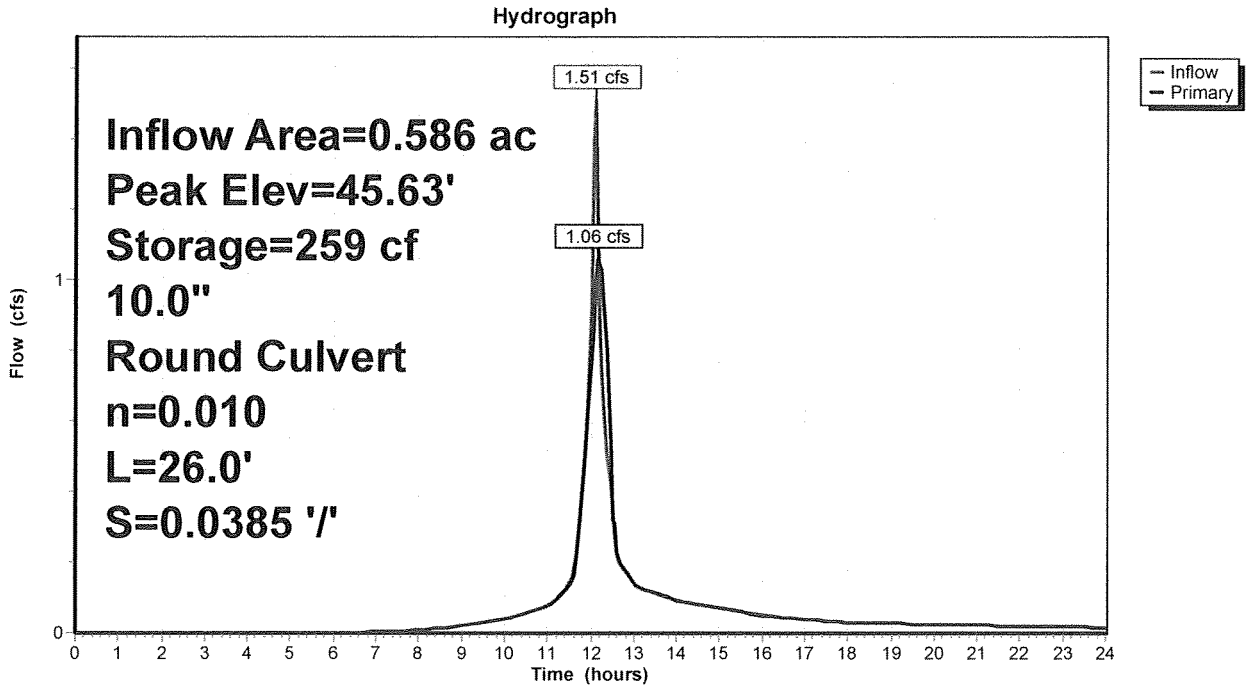
Volume	Invert	Avail.Storage	Storage Description
#1	45.50'	4,419 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	1,883	0	0
46.00	2,570	1,113	1,113
47.00	4,042	3,306	4,419

Device	Routing	Invert	Outlet Devices
#1	Primary	45.00'	**10.0" Round Culvert** L= 26.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 45.00' / 44.00' S= 0.0385 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=1.05 cfs @ 12.18 hrs HW=45.63' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.05 cfs @ 2.38 fps)

Pond 2P: (new Pond)

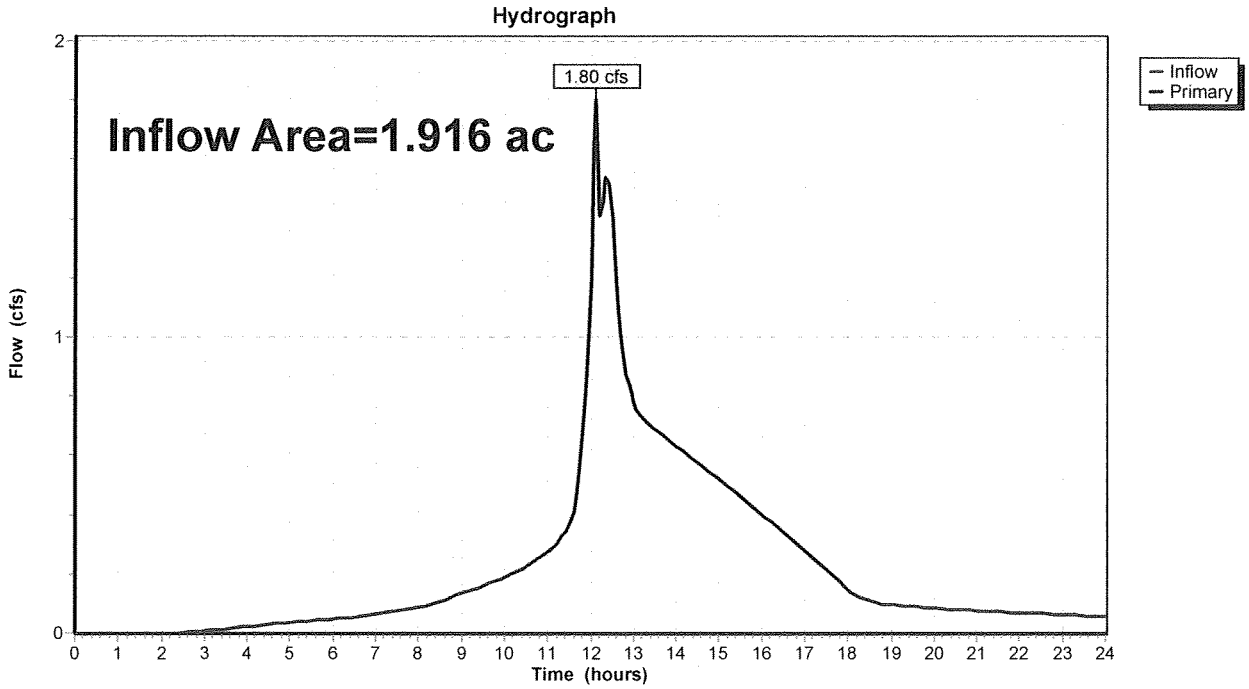


Summary for Pond DP-1:

Inflow Area = 1.916 ac, 74.41% Impervious, Inflow Depth > 2.70" for 2 yr event
Inflow = 1.80 cfs @ 12.10 hrs, Volume= 0.431 af
Primary = 1.80 cfs @ 12.10 hrs, Volume= 0.431 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond DP-1:

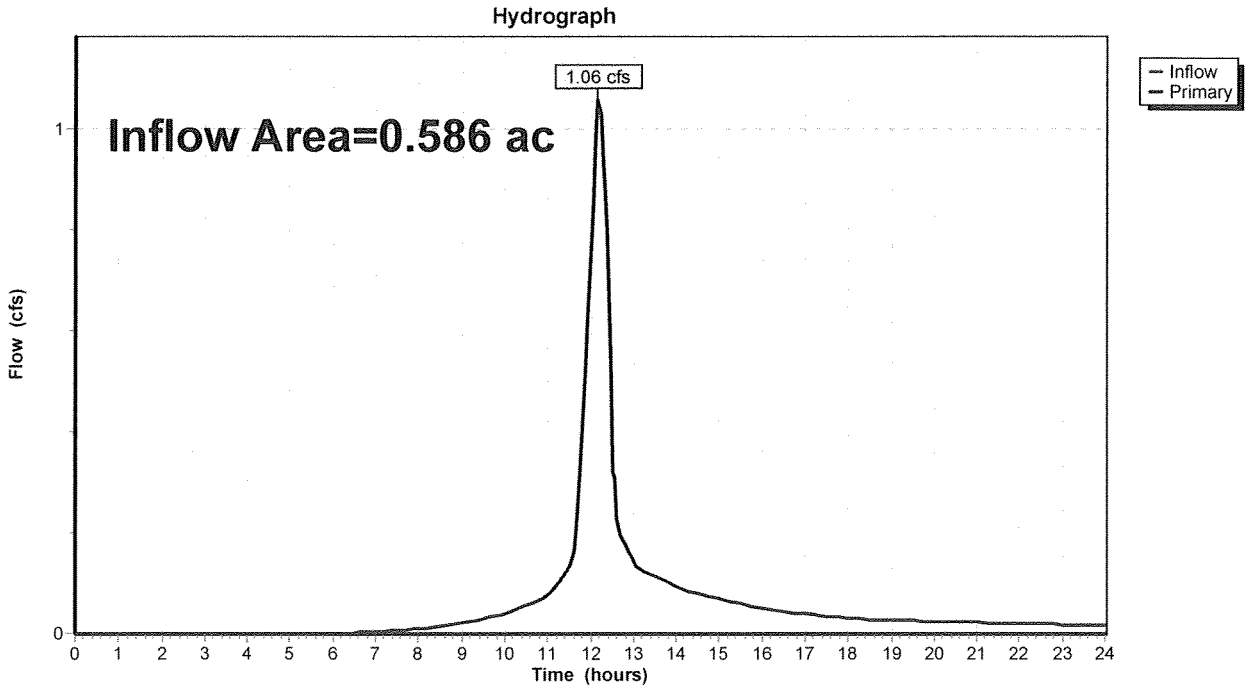


Summary for Pond DP-2:

Inflow Area = 0.586 ac, 49.54% Impervious, Inflow Depth > 2.26" for 2 yr event
Inflow = 1.06 cfs @ 12.18 hrs, Volume= 0.110 af
Primary = 1.06 cfs @ 12.18 hrs, Volume= 0.110 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond DP-2:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1A-POST: Runoff Area=56,833 sf 100.00% Impervious Runoff Depth>4.56"
Flow Length=271' Tc=6.0 min CN=98 Runoff=5.98 cfs 0.496 af

Subcatchment1B-POST: Runoff Area=26,634 sf 19.81% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=83 Runoff=2.09 cfs 0.152 af

Subcatchment2-POST: Runoff Area=25,518 sf 49.54% Impervious Runoff Depth>3.58"
Tc=6.0 min CN=89 Runoff=2.34 cfs 0.175 af

Pond 1P: UNDERGROUNDSTORAGE Peak Elev=46.59' Storage=7,180 cf Inflow=5.98 cfs 0.496 af
Outflow=2.13 cfs 0.492 af

Pond 2P: (new Pond) Peak Elev=45.80' Storage=635 cf Inflow=2.34 cfs 0.175 af
10.0" Round Culvert n=0.010 L=26.0' S=0.0385 '/' Outflow=1.45 cfs 0.175 af

Pond DP-1: Inflow=3.44 cfs 0.645 af
Primary=3.44 cfs 0.645 af

Pond DP-2: Inflow=1.45 cfs 0.175 af
Primary=1.45 cfs 0.175 af

Total Runoff Area = 2.502 ac Runoff Volume = 0.823 af Average Runoff Depth = 3.95"
31.41% Pervious = 0.786 ac 68.59% Impervious = 1.716 ac

Summary for Subcatchment 1A-POST:

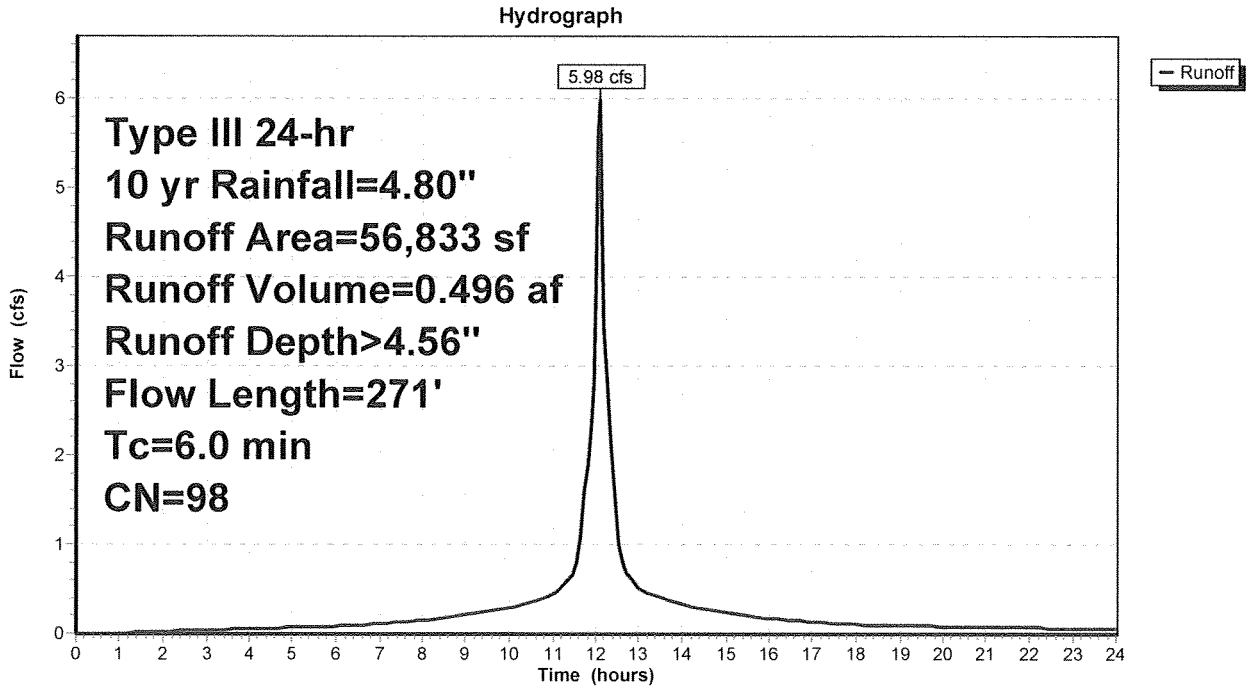
Runoff = 5.98 cfs @ 12.09 hrs, Volume= 0.496 af, Depth> 4.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.80"

	Area (sf)	CN	Description
*	46,833	98	
*	10,000	98	roof
	56,833	98	Weighted Average
	56,833		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0175	1.17		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
1.8	221	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	271	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-POST:



Summary for Subcatchment 1B-POST:

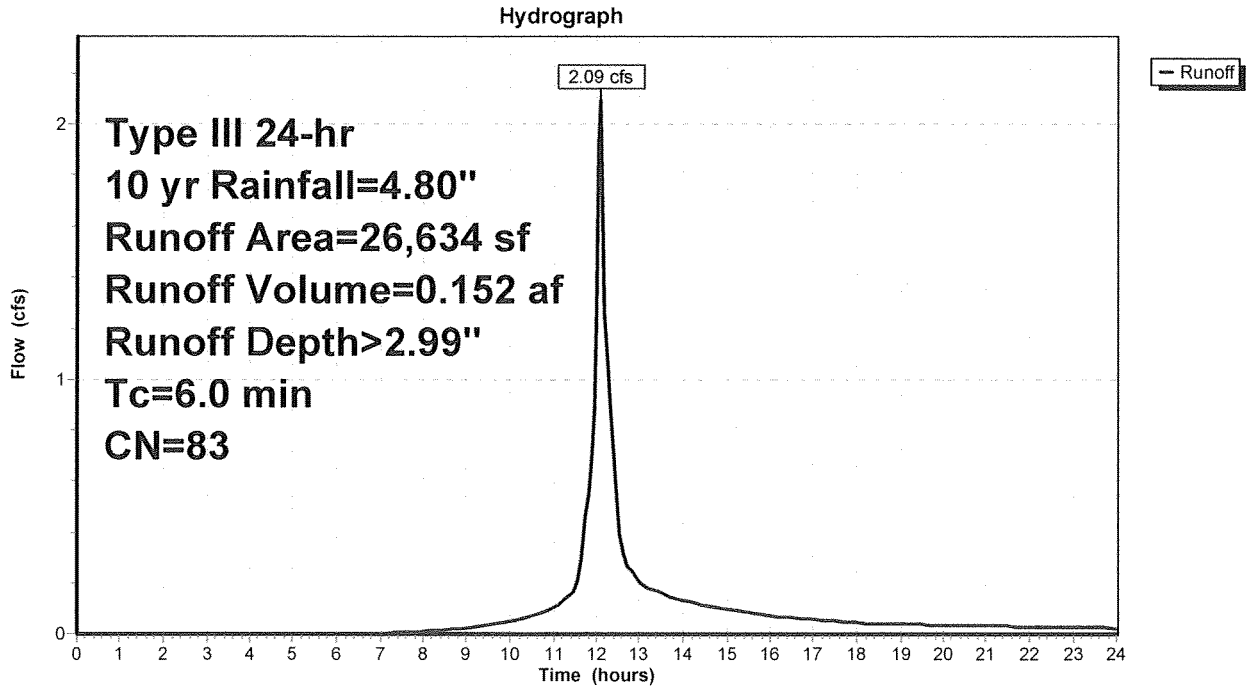
Runoff = 2.09 cfs @ 12.09 hrs, Volume= 0.152 af, Depth> 2.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.80"

Area (sf)	CN	Description
5,276	98	Paved parking, HSG D
7,458	80	>75% Grass cover, Good, HSG D
13,900	78	Meadow, non-grazed, HSG D
26,634	83	Weighted Average
21,358		80.19% Pervious Area
5,276		19.81% Impervious Area

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

Subcatchment 1B-POST:



Summary for Subcatchment 2-POST:

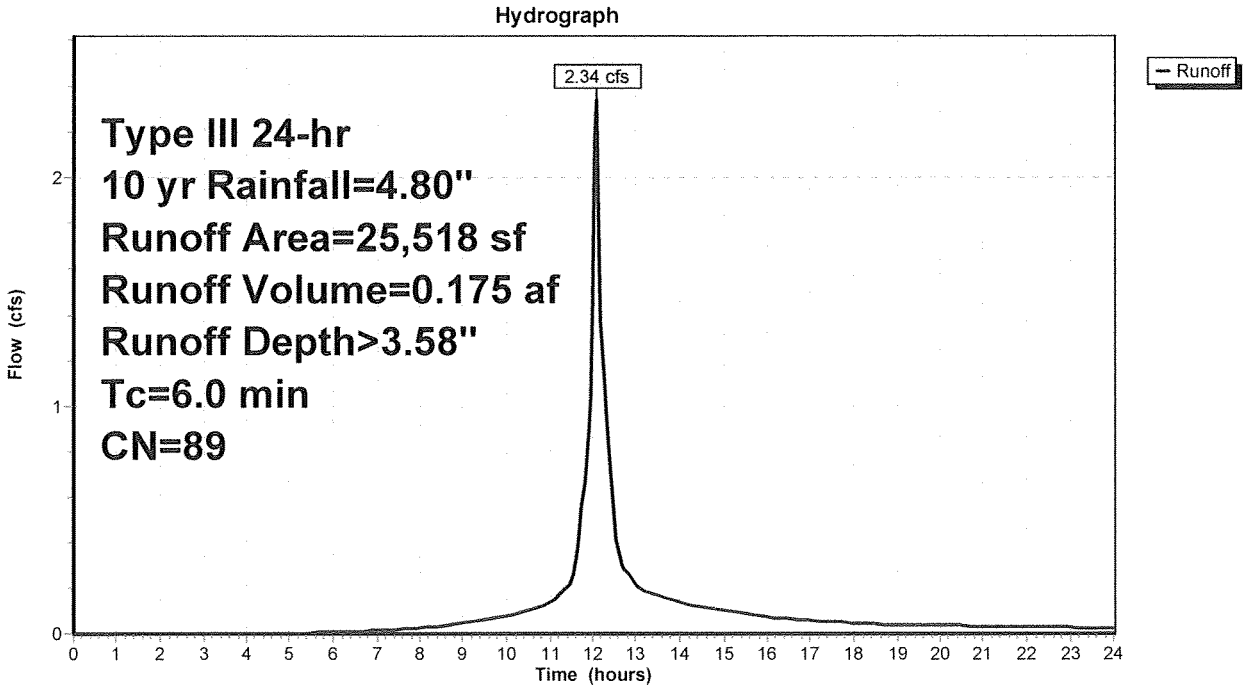
Runoff = 2.34 cfs @ 12.09 hrs, Volume= 0.175 af, Depth> 3.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr Rainfall=4.80"

	Area (sf)	CN	Description
*	12,642	98	PROPOSED PAVEMENT / SIDEWALK
	12,876	80	>75% Grass cover, Good, HSG D
	25,518	89	Weighted Average
	12,876		50.46% Pervious Area
	12,642		49.54% Impervious Area

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

Subcatchment 2-POST:



Summary for Pond 1P: UNDERGROUND STORAGE

Inflow Area = 1.305 ac,100.00% Impervious, Inflow Depth > 4.56" for 10 yr event
Inflow = 5.98 cfs @ 12.09 hrs, Volume= 0.496 af
Outflow = 2.13 cfs @ 12.35 hrs, Volume= 0.492 af, Atten= 64%, Lag= 15.7 min
Primary = 2.13 cfs @ 12.35 hrs, Volume= 0.492 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 43.25' Surf.Area= 2,947 sf Storage= 589 cf
Peak Elev= 46.59' @ 12.35 hrs Surf.Area= 4,275 sf Storage= 7,180 cf (6,591 cf above start)

Plug-Flow detention time= 97.7 min calculated for 0.479 af (97% of inflow)
Center-of-Mass det. time= 61.0 min (809.2 - 748.3)

Volume	Invert	Avail.Storage	Storage Description
#1	43.25'	55 cf	**12.0" Round Pipe Storage** x 2 L= 35.0' S= 0.0100 '/'
#2A	42.75'	3,393 cf	**32.75'W x 90.00'L x 4.50'H Field A** 13,264 cf Overall - 4,781 cf Embedded = 8,483 cf x 40.0% Voids
#3A	43.25'	3,830 cf	**ADS N-12 36** x 24 Inside #2 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.1 cf 6 Rows of 4 Chambers 29.75' Header x 7.10 sf x 2 = 422.4 cf Inside
#4	46.00'	2,590 cf	**Raingarden (Southern) (Prismatic)**Listed below (Recalc)
#5	46.00'	1,139 cf	**Raingarden (Northern) (Prismatic)**Listed below (Recalc)
		11,008 cf	Total Available Storage

Storage Group A created with Chamber Wizard

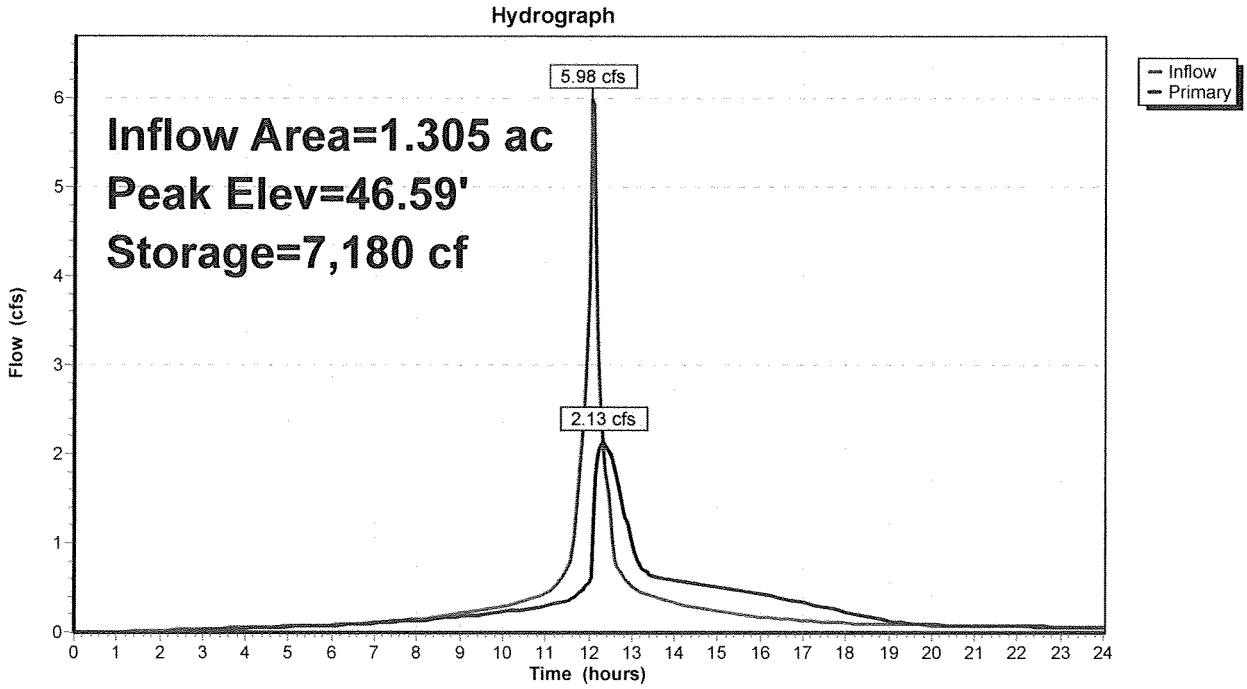
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	642	0	0
47.00	1,079	861	861
47.75	3,533	1,730	2,590

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	260	0	0
47.00	550	405	405
47.75	1,407	734	1,139

Device	Routing	Invert	Outlet Devices	
#1	Primary	43.25'	**4.0" Vert. Orifice/Grate**	C= 0.600
#2	Primary	45.58'	**8.0" Vert. Orifice/Grate**	C= 0.600

Primary OutFlow Max=2.13 cfs @ 12.35 hrs HW=46.58' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.75 cfs @ 8.57 fps)
└─**2=Orifice/Grate** (Orifice Controls 1.38 cfs @ 3.95 fps)

Pond 1P: UNDERGROUND STORAGE



Summary for Pond 2P: (new Pond)

Inflow Area =	0.586 ac, 49.54% Impervious, Inflow Depth > 3.58" for 10 yr event				
Inflow =	2.34 cfs @	12.09 hrs, Volume=	0.175 af		
Outflow =	1.45 cfs @	12.20 hrs, Volume=	0.175 af,	Atten= 38%,	Lag= 6.6 min
Primary =	1.45 cfs @	12.20 hrs, Volume=	0.175 af		

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 45.80' @ 12.20 hrs Surf.Area= 2,300 sf Storage= 635 cf

Plug-Flow detention time= 2.3 min calculated for 0.175 af (100% of inflow)
Center-of-Mass det. time= 2.2 min (797.6 - 795.3)

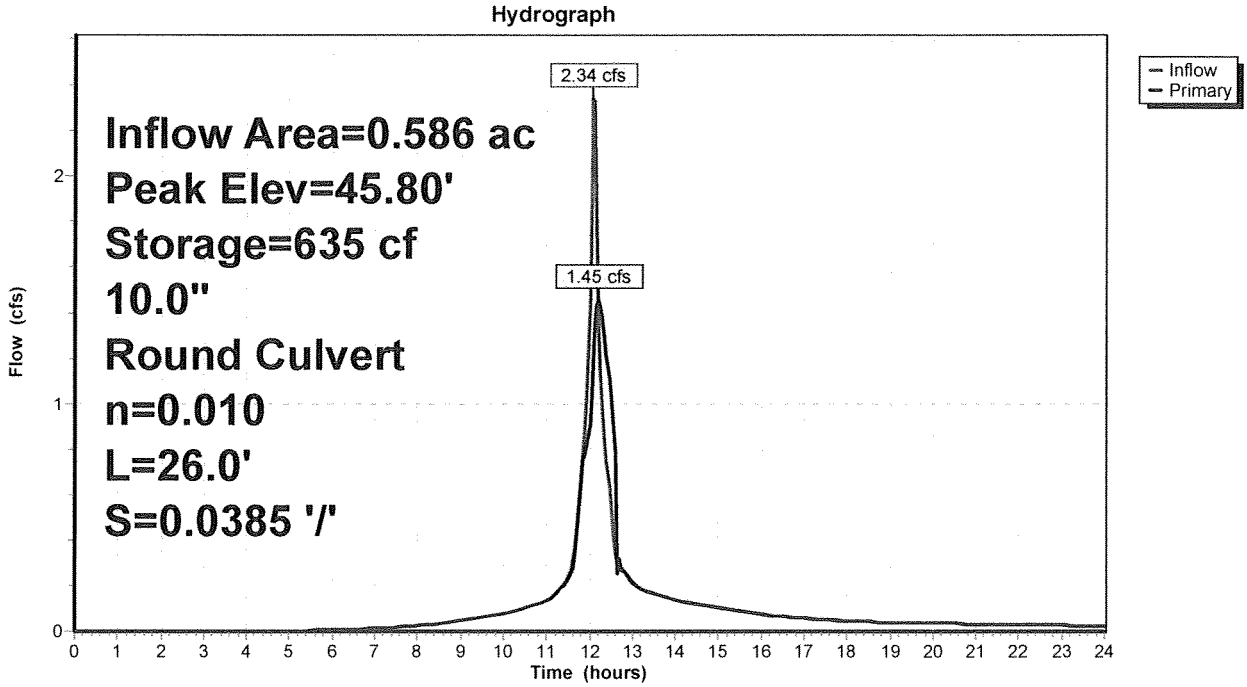
Volume	Invert	Avail.Storage	Storage Description
#1	45.50'	4,419 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	1,883	0	0
46.00	2,570	1,113	1,113
47.00	4,042	3,306	4,419

Device	Routing	Invert	Outlet Devices
#1	Primary	45.00'	**10.0" Round Culvert** L= 26.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 45.00' / 44.00' S= 0.0385 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=1.45 cfs @ 12.20 hrs HW=45.80' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.45 cfs @ 2.69 fps)

Pond 2P: (new Pond)

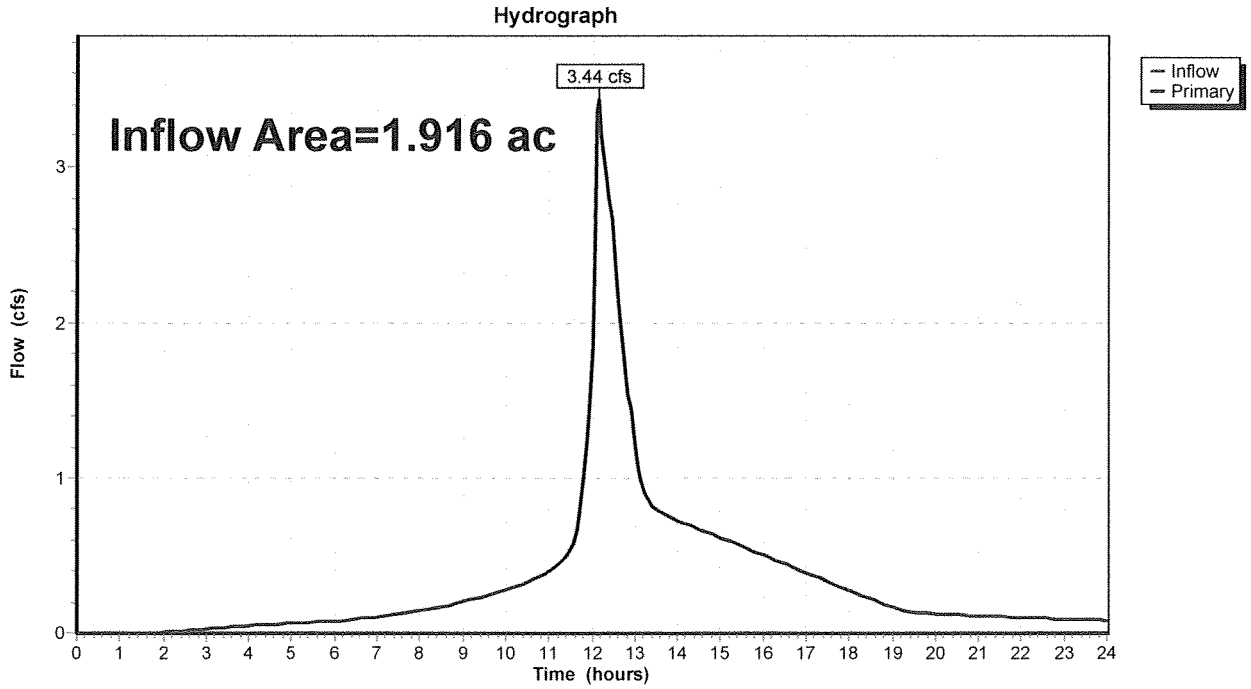


Summary for Pond DP-1:

Inflow Area = 1.916 ac, 74.41% Impervious, Inflow Depth > 4.04" for 10 yr event
Inflow = 3.44 cfs @ 12.14 hrs, Volume= 0.645 af
Primary = 3.44 cfs @ 12.14 hrs, Volume= 0.645 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond DP-1:

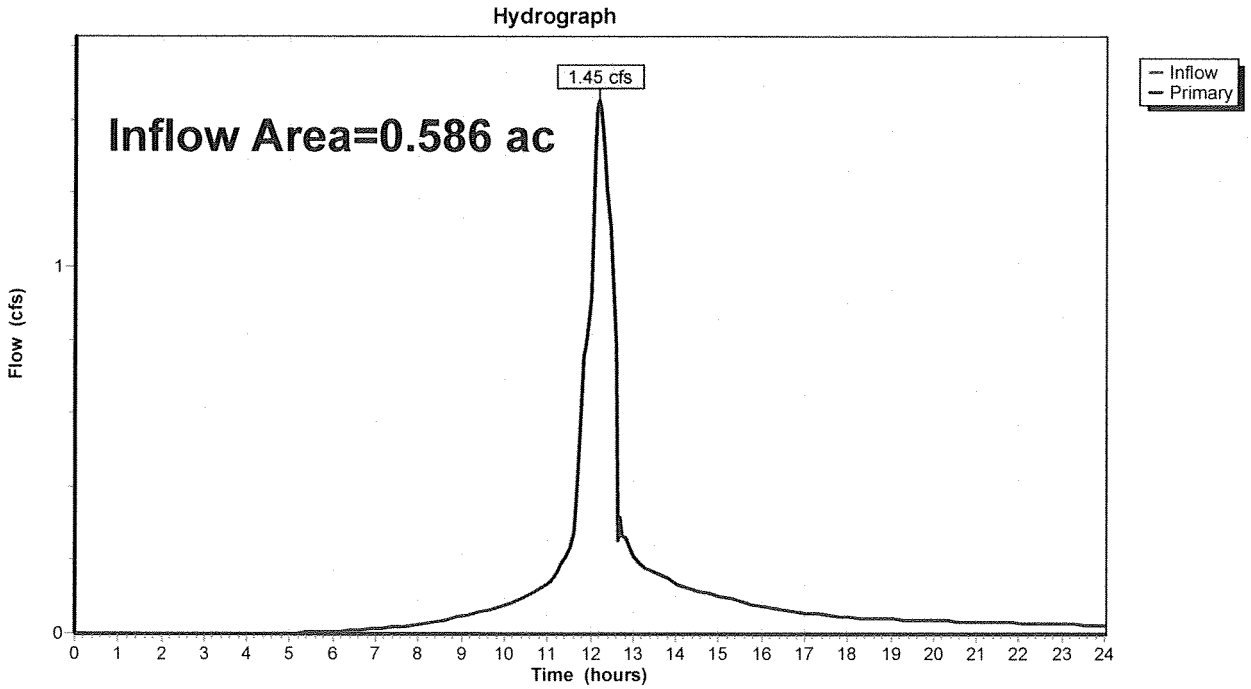


Summary for Pond DP-2:

Inflow Area =	0.586 ac, 49.54% Impervious, Inflow Depth > 3.58" for 10 yr event			
Inflow =	1.45 cfs @ 12.20 hrs, Volume=	0.175 af		
Primary =	1.45 cfs @ 12.20 hrs, Volume=	0.175 af, Atten= 0%, Lag= 0.0 min		

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond DP-2:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1A-POST: Runoff Area=56,833 sf 100.00% Impervious Runoff Depth>5.36"
Flow Length=271' Tc=6.0 min CN=98 Runoff=6.99 cfs 0.583 af

Subcatchment1B-POST: Runoff Area=26,634 sf 19.81% Impervious Runoff Depth>3.72"
Tc=6.0 min CN=83 Runoff=2.59 cfs 0.189 af

Subcatchment2-POST: Runoff Area=25,518 sf 49.54% Impervious Runoff Depth>4.35"
Tc=6.0 min CN=89 Runoff=2.82 cfs 0.212 af

Pond 1P: UNDERGROUNDSTORAGE Peak Elev=46.99' Storage=8,213 cf Inflow=6.99 cfs 0.583 af
Outflow=2.54 cfs 0.579 af

Pond 2P: (new Pond) Peak Elev=45.92' Storage=900 cf Inflow=2.82 cfs 0.212 af
10.0" Round Culvert n=0.010 L=26.0' S=0.0385 '/' Outflow=1.64 cfs 0.212 af

Pond DP-1: Inflow=4.52 cfs 0.768 af
Primary=4.52 cfs 0.768 af

Pond DP-2: Inflow=1.64 cfs 0.212 af
Primary=1.64 cfs 0.212 af

Total Runoff Area = 2.502 ac Runoff Volume = 0.984 af Average Runoff Depth = 4.72"
31.41% Pervious = 0.786 ac 68.59% Impervious = 1.716 ac

Summary for Subcatchment 1A-POST:

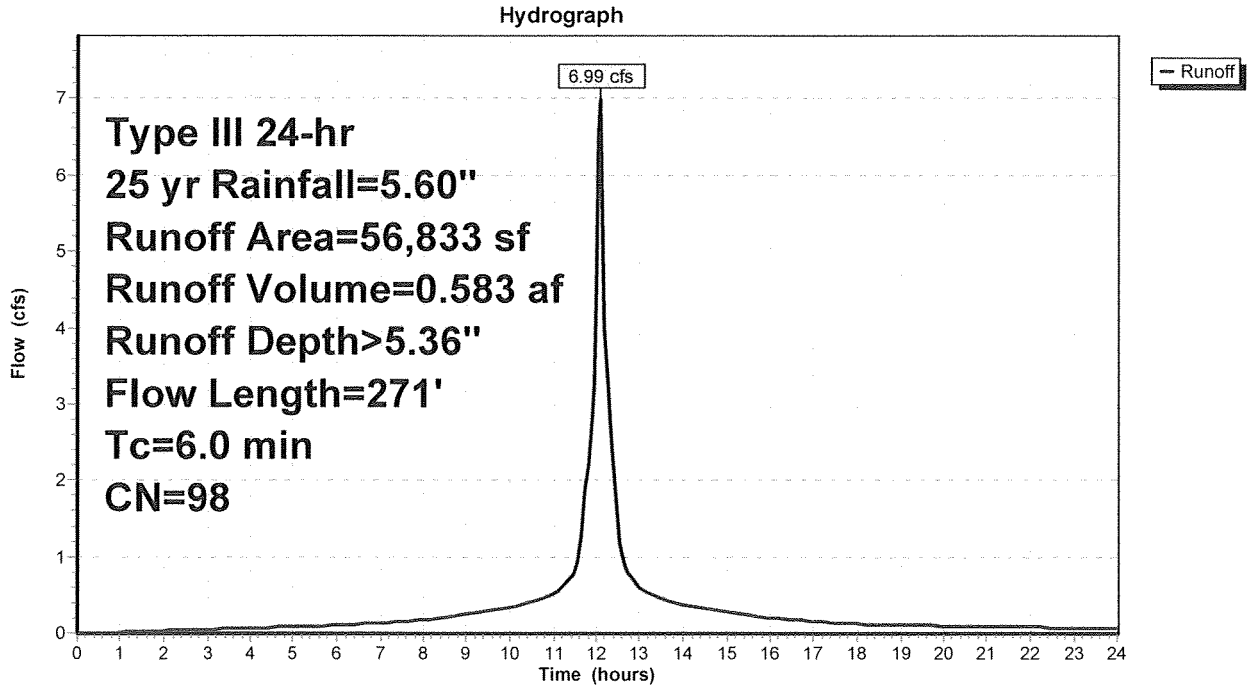
Runoff = 6.99 cfs @ 12.09 hrs, Volume= 0.583 af, Depth> 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.60"

	Area (sf)	CN	Description
*	46,833	98	
*	10,000	98	roof
	56,833	98	Weighted Average
	56,833		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0175	1.17		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
1.8	221	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	271	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-POST:



Summary for Subcatchment 1B-POST:

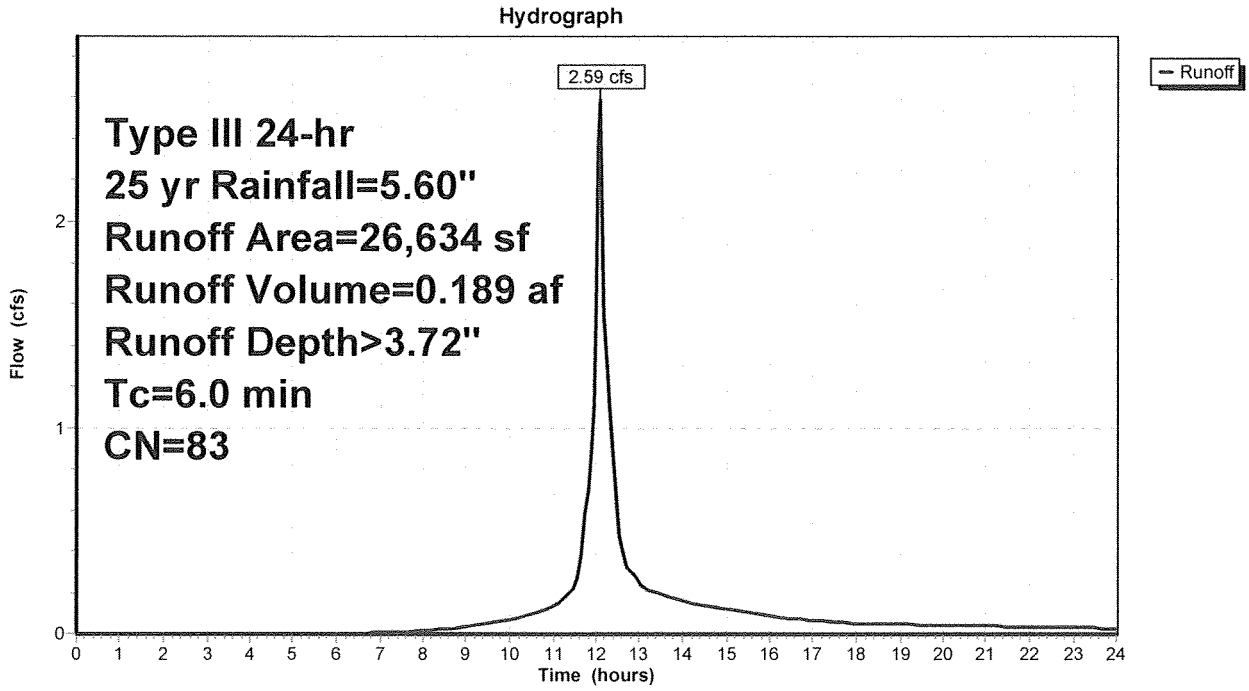
Runoff = 2.59 cfs @ 12.09 hrs, Volume= 0.189 af, Depth> 3.72"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.60"

Area (sf)	CN	Description
5,276	98	Paved parking, HSG D
7,458	80	>75% Grass cover, Good, HSG D
13,900	78	Meadow, non-grazed, HSG D
26,634	83	Weighted Average
21,358		80.19% Pervious Area
5,276		19.81% Impervious Area

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

Subcatchment 1B-POST:



Summary for Subcatchment 2-POST:

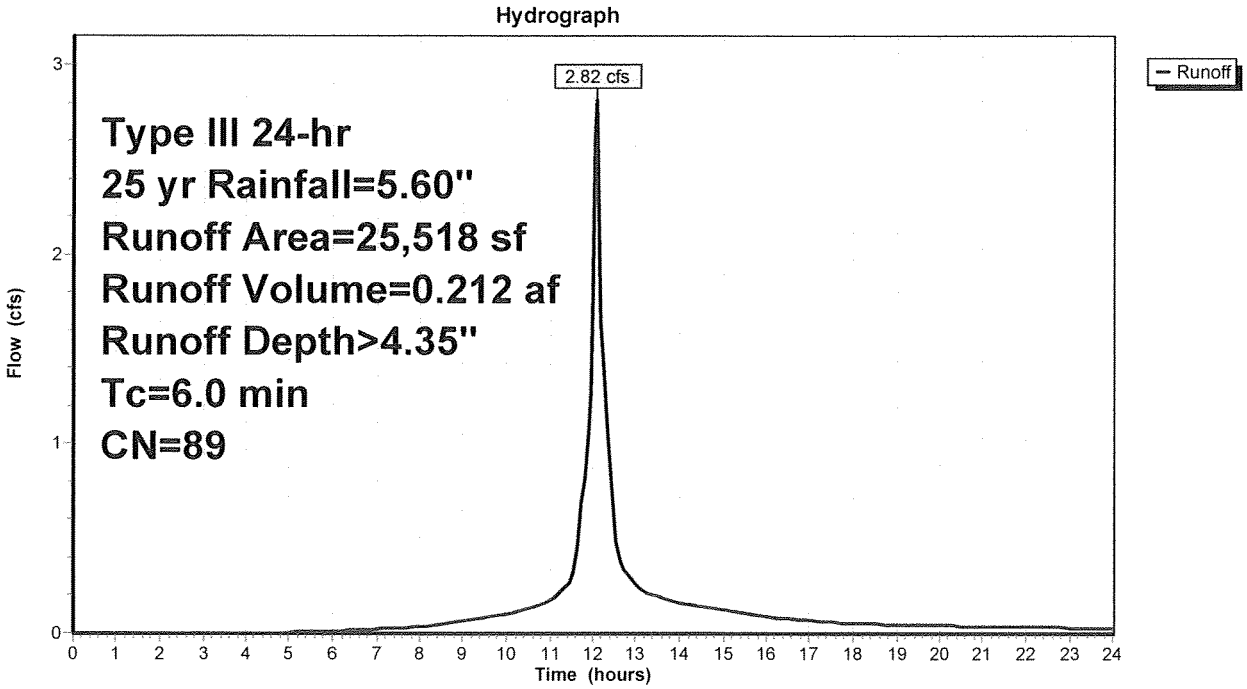
Runoff = 2.82 cfs @ 12.09 hrs, Volume= 0.212 af, Depth> 4.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 yr Rainfall=5.60"

	Area (sf)	CN	Description
*	12,642	98	PROPOSED PAVEMENT / SIDEWALK
	12,876	80	>75% Grass cover, Good, HSG D
	25,518	89	Weighted Average
	12,876		50.46% Pervious Area
	12,642		49.54% Impervious Area

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

Subcatchment 2-POST:



Summary for Pond 1P: UNDERGROUND STORAGE

Inflow Area =	1.305 ac,100.00% Impervious, Inflow Depth > 5.36" for 25 yr event				
Inflow =	6.99 cfs @ 12.09 hrs, Volume=	0.583 af			
Outflow =	2.54 cfs @ 12.34 hrs, Volume=	0.579 af, Atten= 64%, Lag= 15.2 min			
Primary =	2.54 cfs @ 12.34 hrs, Volume=	0.579 af			

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 43.25' Surf.Area= 2,947 sf Storage= 589 cf
Peak Elev= 46.99' @ 12.34 hrs Surf.Area= 4,567 sf Storage= 8,213 cf (7,623 cf above start)

Plug-Flow detention time= 92.3 min calculated for 0.565 af (97% of inflow)
Center-of-Mass det. time= 59.8 min (805.6 - 745.8)

Volume	Invert	Avail.Storage	Storage Description
#1	43.25'	55 cf	**12.0" Round Pipe Storage** x 2 L= 35.0' S= 0.0100 '/'
#2A	42.75'	3,393 cf	**32.75'W x 90.00'L x 4.50'H Field A** 13,264 cf Overall - 4,781 cf Embedded = 8,483 cf x 40.0% Voids
#3A	43.25'	3,830 cf	**ADS N-12 36** x 24 Inside #2 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.1 cf 6 Rows of 4 Chambers 29.75' Header x 7.10 sf x 2 = 422.4 cf Inside
#4	46.00'	2,590 cf	**Raingarden (Southern) (Prismatic)**Listed below (Recalc)
#5	46.00'	1,139 cf	**Raingarden (Northern) (Prismatic)**Listed below (Recalc)
		11,008 cf	Total Available Storage

Storage Group A created with Chamber Wizard

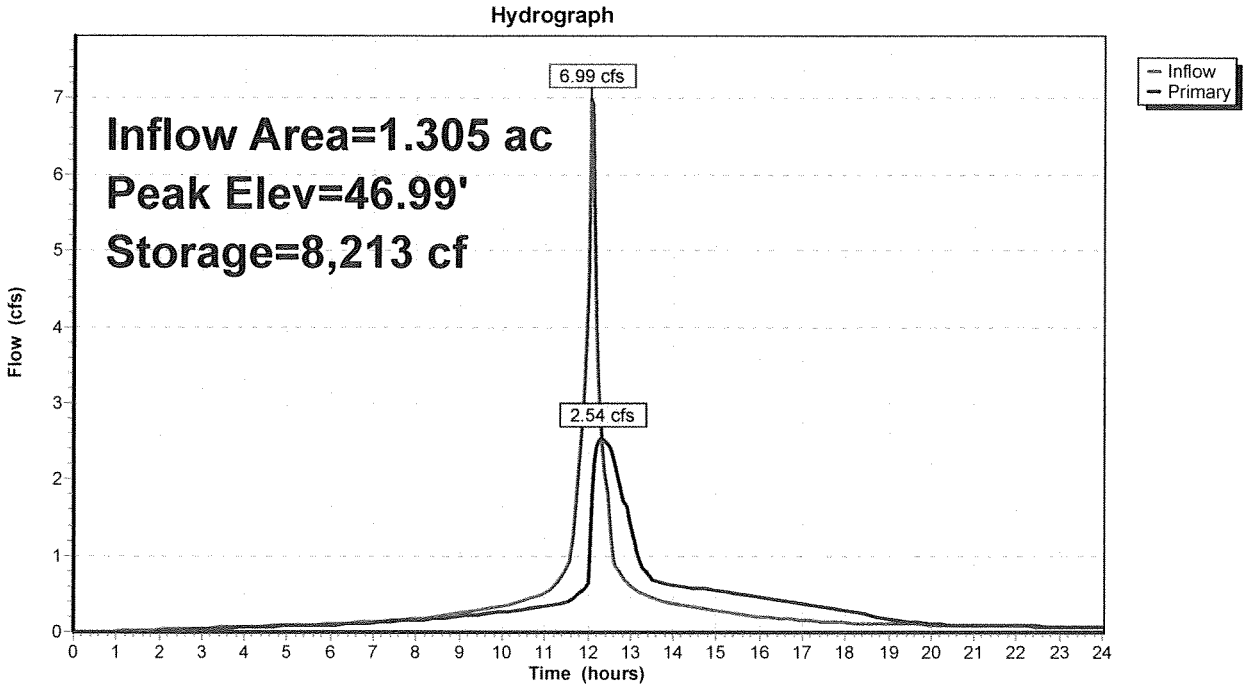
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	642	0	0
47.00	1,079	861	861
47.75	3,533	1,730	2,590

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	260	0	0
47.00	550	405	405
47.75	1,407	734	1,139

Device	Routing	Invert	Outlet Devices	
#1	Primary	43.25'	**4.0" Vert. Orifice/Grate**	C= 0.600
#2	Primary	45.58'	**8.0" Vert. Orifice/Grate**	C= 0.600

Primary OutFlow Max=2.53 cfs @ 12.34 hrs HW=46.99' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.79 cfs @ 9.10 fps)
└─**2=Orifice/Grate** (Orifice Controls 1.74 cfs @ 4.98 fps)

Pond 1P: UNDERGROUND STORAGE



Summary for Pond 2P: (new Pond)

Inflow Area =	0.586 ac, 49.54% Impervious, Inflow Depth > 4.35" for 25 yr event				
Inflow =	2.82 cfs @	12.09 hrs, Volume=	0.212 af		
Outflow =	1.64 cfs @	12.21 hrs, Volume=	0.212 af,	Atten= 42%,	Lag= 7.3 min
Primary =	1.64 cfs @	12.21 hrs, Volume=	0.212 af		

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 45.92' @ 12.21 hrs Surf.Area= 2,453 sf Storage= 900 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 2.9 min (792.9 - 790.0)

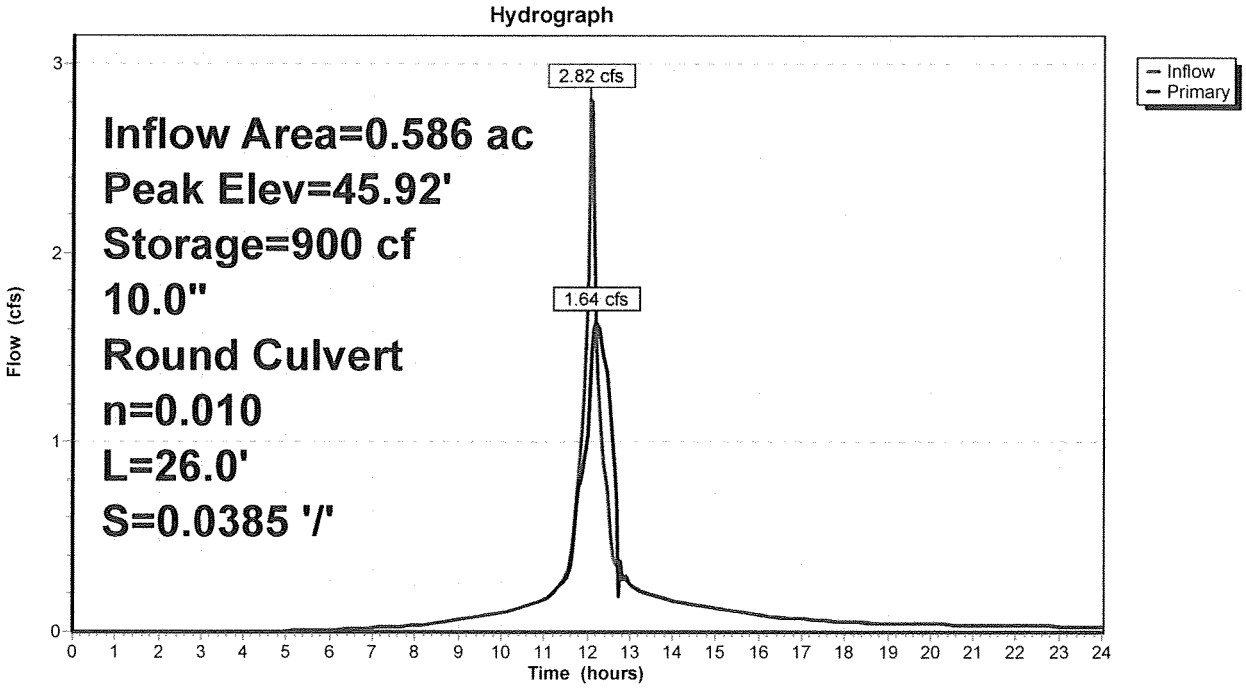
Volume	Invert	Avail.Storage	Storage Description
#1	45.50'	4,419 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	1,883	0	0
46.00	2,570	1,113	1,113
47.00	4,042	3,306	4,419

Device	Routing	Invert	Outlet Devices
#1	Primary	45.00'	**10.0" Round Culvert** L= 26.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 45.00' / 44.00' S= 0.0385 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=1.63 cfs @ 12.21 hrs HW=45.91' (Free Discharge)
└─**1=Culvert** (Inlet Controls 1.63 cfs @ 2.99 fps)

Pond 2P: (new Pond)

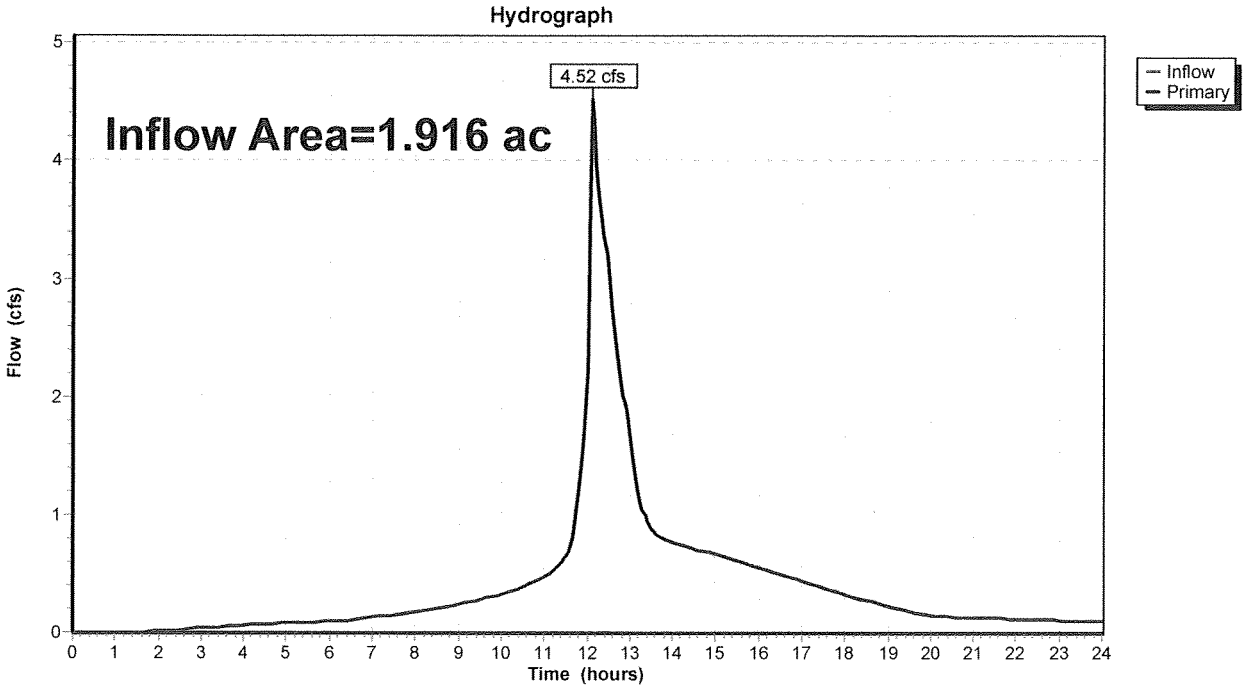


Summary for Pond DP-1:

Inflow Area = 1.916 ac, 74.41% Impervious, Inflow Depth > 4.81" for 25 yr event
Inflow = 4.52 cfs @ 12.12 hrs, Volume= 0.768 af
Primary = 4.52 cfs @ 12.12 hrs, Volume= 0.768 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond DP-1:

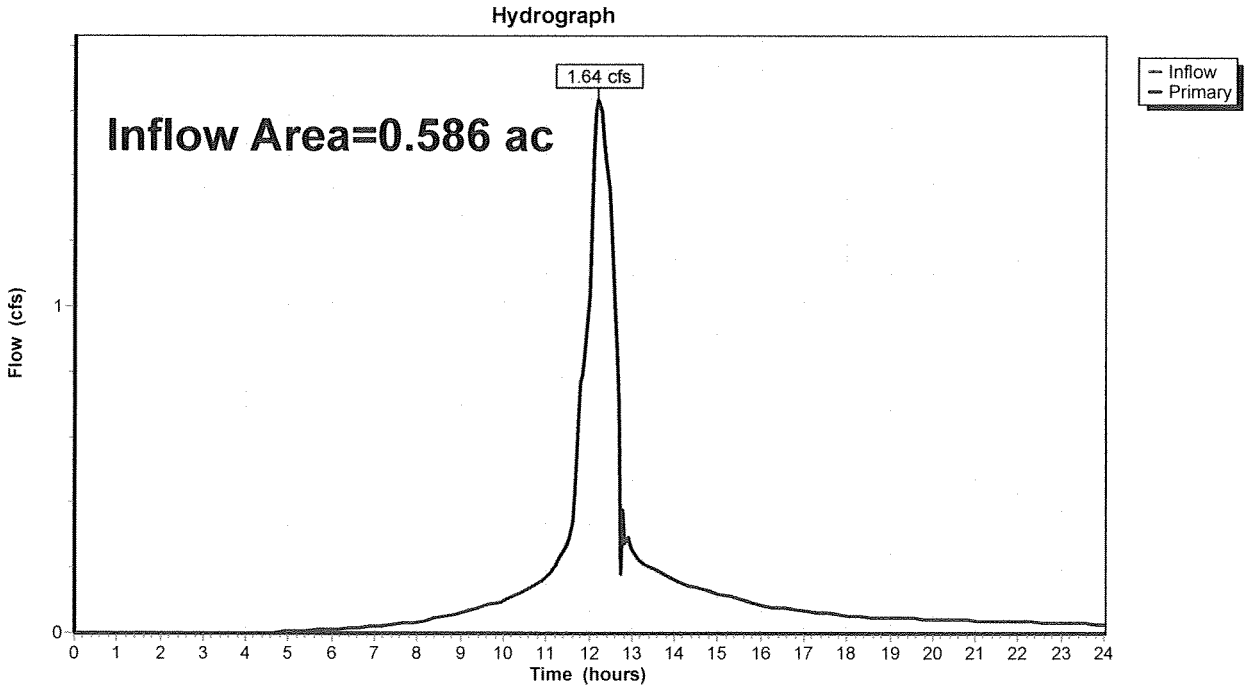


Summary for Pond DP-2:

Inflow Area = 0.586 ac, 49.54% Impervious, Inflow Depth > 4.35" for 25 yr event
Inflow = 1.64 cfs @ 12.21 hrs, Volume= 0.212 af
Primary = 1.64 cfs @ 12.21 hrs, Volume= 0.212 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond DP-2:



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind method - Pond routing by Stor-Ind method

Subcatchment1A-POST: Runoff Area=56,833 sf 100.00% Impervious Runoff Depth>6.76"
Flow Length=271' Tc=6.0 min CN=98 Runoff=8.75 cfs 0.735 af

Subcatchment1B-POST: Runoff Area=26,634 sf 19.81% Impervious Runoff Depth>5.02"
Tc=6.0 min CN=83 Runoff=3.46 cfs 0.256 af

Subcatchment2-POST: Runoff Area=25,518 sf 49.54% Impervious Runoff Depth>5.70"
Tc=6.0 min CN=89 Runoff=3.64 cfs 0.278 af

Pond 1P: UNDERGROUNDSTORAGE Peak Elev=47.57' Storage=10,198 cf Inflow=8.75 cfs 0.735 af
Outflow=3.02 cfs 0.730 af

Pond 2P: (new Pond) Peak Elev=46.11' Storage=1,415 cf Inflow=3.64 cfs 0.278 af
10.0" Round Culvert n=0.010 L=26.0' S=0.0385 '/' Outflow=1.93 cfs 0.278 af

Pond DP-1: Inflow=5.99 cfs 0.986 af
Primary=5.99 cfs 0.986 af

Pond DP-2: Inflow=1.93 cfs 0.278 af
Primary=1.93 cfs 0.278 af

Total Runoff Area = 2.502 ac Runoff Volume = 1.269 af Average Runoff Depth = 6.09"
31.41% Pervious = 0.786 ac 68.59% Impervious = 1.716 ac

Summary for Subcatchment 1A-POST:

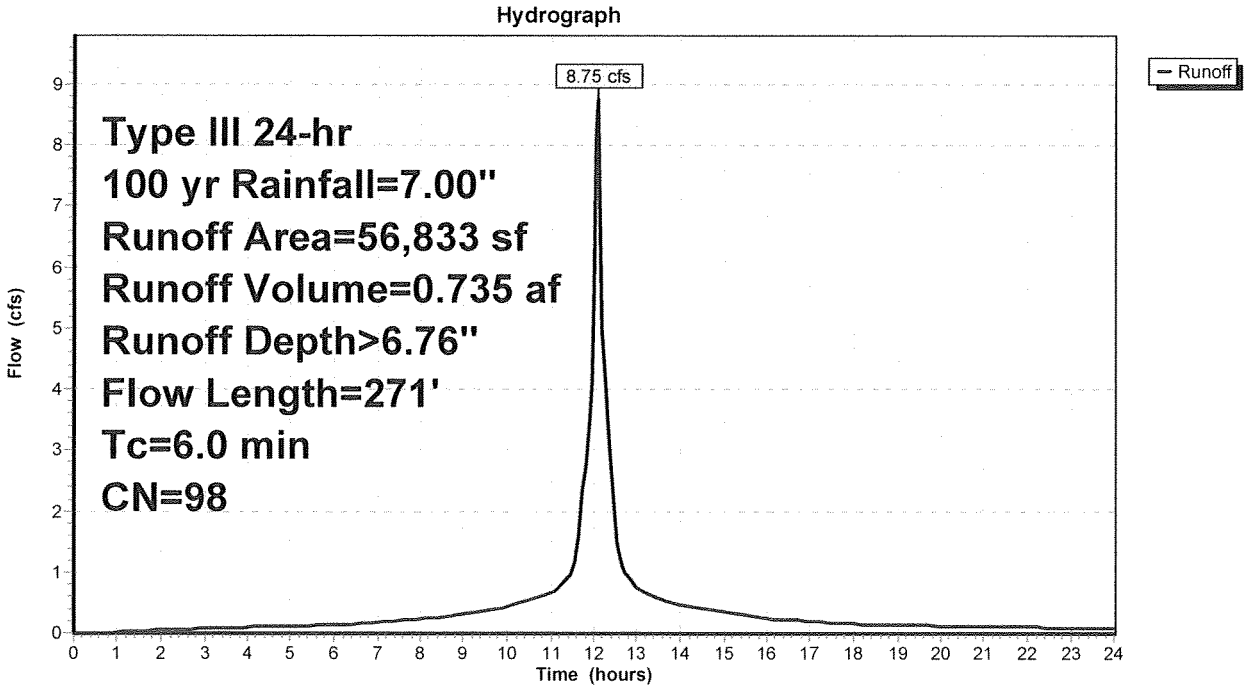
Runoff = 8.75 cfs @ 12.09 hrs, Volume= 0.735 af, Depth> 6.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	46,833	98	
*	10,000	98	roof
	56,833	98	Weighted Average
	56,833		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0175	1.17		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 3.40"
1.8	221	0.0100	2.03		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
2.5	271	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 1A-POST:



Summary for Subcatchment 1B-POST:

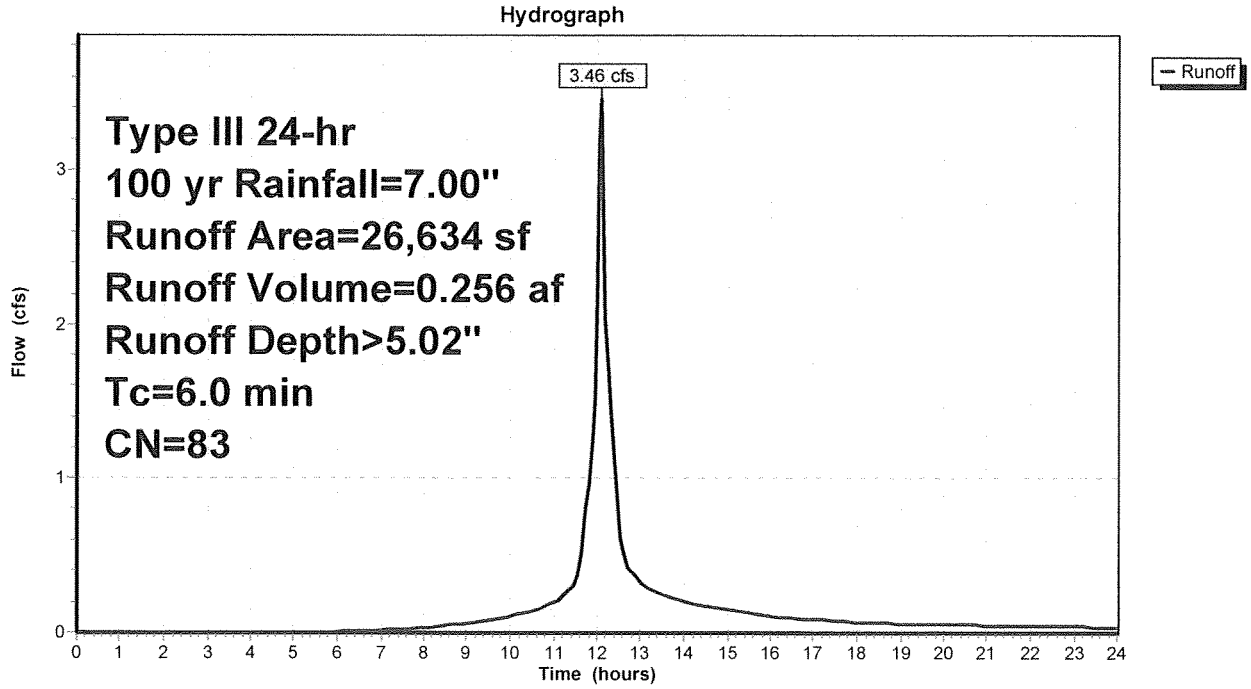
Runoff = 3.46 cfs @ 12.09 hrs, Volume= 0.256 af, Depth> 5.02"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

Area (sf)	CN	Description
5,276	98	Paved parking, HSG D
7,458	80	>75% Grass cover, Good, HSG D
13,900	78	Meadow, non-grazed, HSG D
26,634	83	Weighted Average
21,358		80.19% Pervious Area
5,276		19.81% Impervious Area

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

Subcatchment 1B-POST:



Summary for Subcatchment 2-POST:

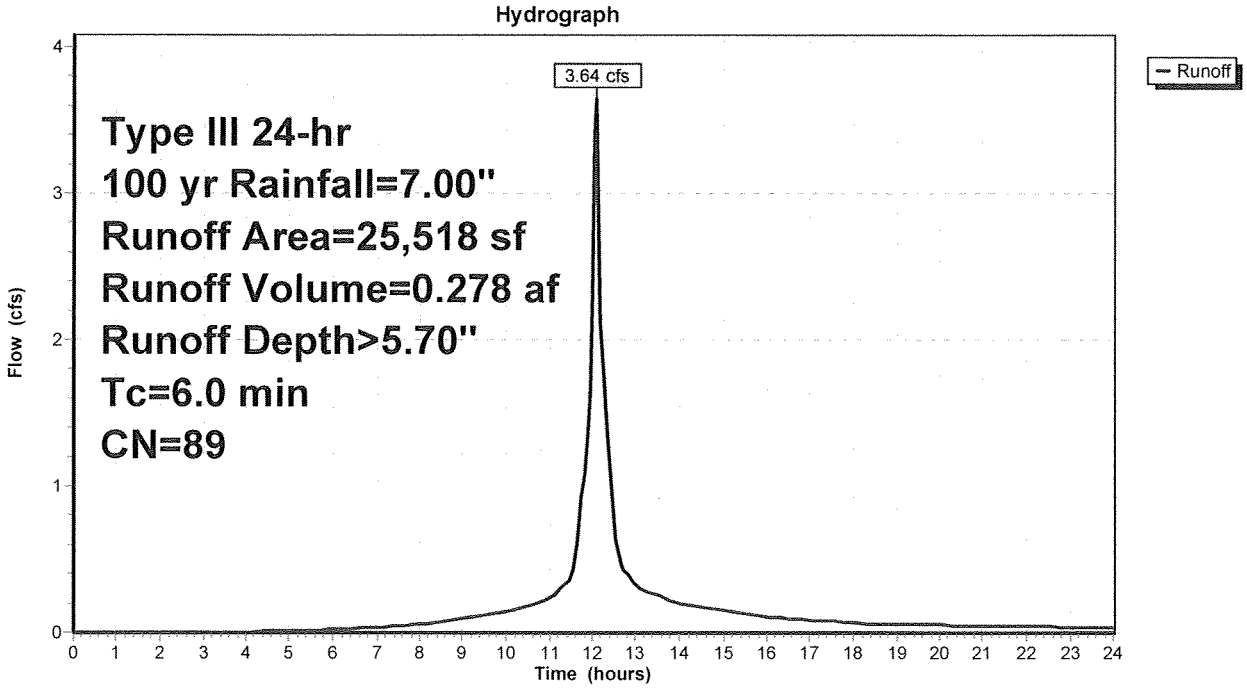
Runoff = 3.64 cfs @ 12.09 hrs, Volume= 0.278 af, Depth> 5.70"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr Rainfall=7.00"

	Area (sf)	CN	Description
*	12,642	98	PROPOSED PAVEMENT / SIDEWALK
	12,876	80	>75% Grass cover, Good, HSG D
	25,518	89	Weighted Average
	12,876		50.46% Pervious Area
	12,642		49.54% Impervious Area

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

Subcatchment 2-POST:



Summary for Pond 1P: UNDERGROUND STORAGE

Inflow Area = 1.305 ac,100.00% Impervious, Inflow Depth > 6.76" for 100 yr event
Inflow = 8.75 cfs @ 12.09 hrs, Volume= 0.735 af
Outflow = 3.02 cfs @ 12.36 hrs, Volume= 0.730 af, Atten= 65%, Lag= 16.3 min
Primary = 3.02 cfs @ 12.36 hrs, Volume= 0.730 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Starting Elev= 43.25' Surf.Area= 2,947 sf Storage= 589 cf
Peak Elev= 47.57' @ 12.36 hrs Surf.Area= 7,101 sf Storage= 10,198 cf (9,608 cf above start)

Plug-Flow detention time= 86.6 min calculated for 0.717 af (98% of inflow)
Center-of-Mass det. time= 59.5 min (802.0 - 742.5)

Volume	Invert	Avail.Storage	Storage Description
#1	43.25'	55 cf	**12.0" Round Pipe Storage** x 2 L= 35.0' S= 0.0100 '/'
#2A	42.75'	3,393 cf	**32.75'W x 90.00'L x 4.50'H Field A** 13,264 cf Overall - 4,781 cf Embedded = 8,483 cf x 40.0% Voids
#3A	43.25'	3,830 cf	**ADS N-12 36** x 24 Inside #2 Inside= 36.1"W x 36.1"H => 7.10 sf x 20.00'L = 142.0 cf Outside= 42.0"W x 42.0"H => 8.86 sf x 20.00'L = 177.1 cf 6 Rows of 4 Chambers 29.75' Header x 7.10 sf x 2 = 422.4 cf Inside
#4	46.00'	2,590 cf	**Raingarden (Southern) (Prismatic)**Listed below (Recalc)
#5	46.00'	1,139 cf	**Raingarden (Northern) (Prismatic)**Listed below (Recalc)
		11,008 cf	Total Available Storage

Storage Group A created with Chamber Wizard

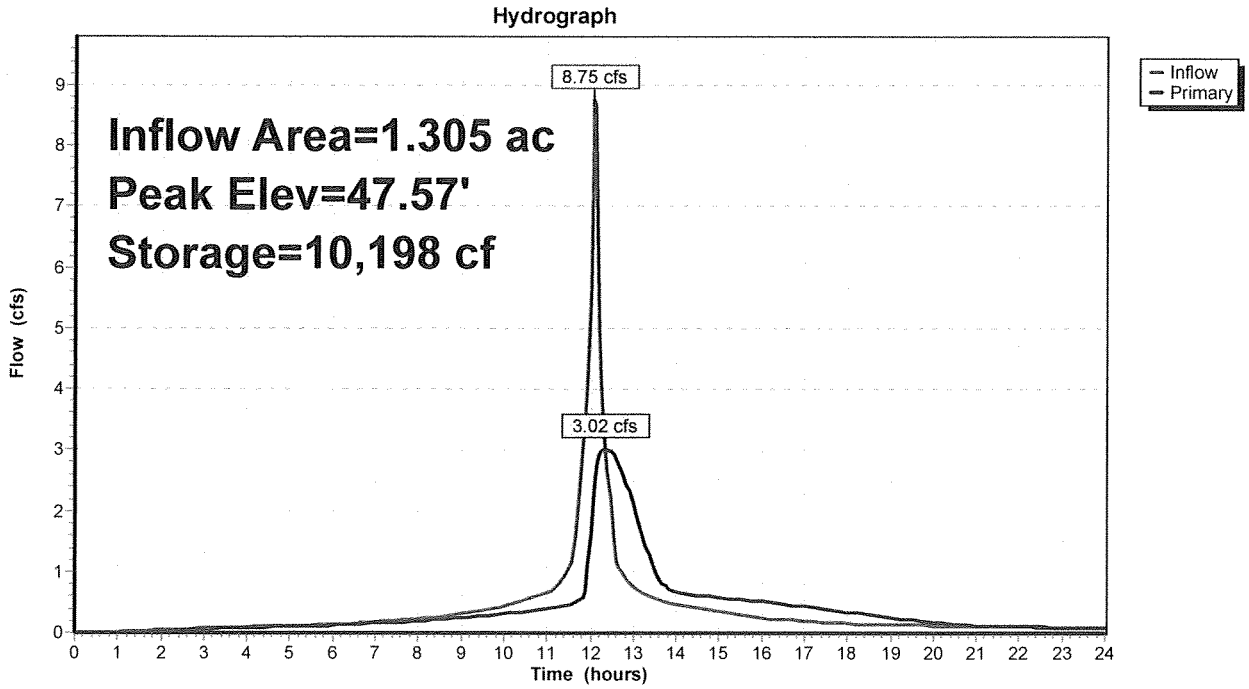
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	642	0	0
47.00	1,079	861	861
47.75	3,533	1,730	2,590

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
46.00	260	0	0
47.00	550	405	405
47.75	1,407	734	1,139

Device	Routing	Invert	Outlet Devices	
#1	Primary	43.25'	**4.0" Vert. Orifice/Grate**	C= 0.600
#2	Primary	45.58'	**8.0" Vert. Orifice/Grate**	C= 0.600

Primary OutFlow Max=3.02 cfs @ 12.36 hrs HW=47.57' (Free Discharge)
└─**1=Orifice/Grate** (Orifice Controls 0.86 cfs @ 9.81 fps)
└─**2=Orifice/Grate** (Orifice Controls 2.16 cfs @ 6.20 fps)

Pond 1P: UNDERGROUND STORAGE



Summary for Pond 2P: (new Pond)

Inflow Area = 0.586 ac, 49.54% Impervious, Inflow Depth > 5.70" for 100 yr event
Inflow = 3.64 cfs @ 12.09 hrs, Volume= 0.278 af
Outflow = 1.93 cfs @ 12.22 hrs, Volume= 0.278 af, Atten= 47%, Lag= 8.2 min
Primary = 1.93 cfs @ 12.22 hrs, Volume= 0.278 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 46.11' @ 12.22 hrs Surf.Area= 2,737 sf Storage= 1,415 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 4.0 min (786.7 - 782.7)

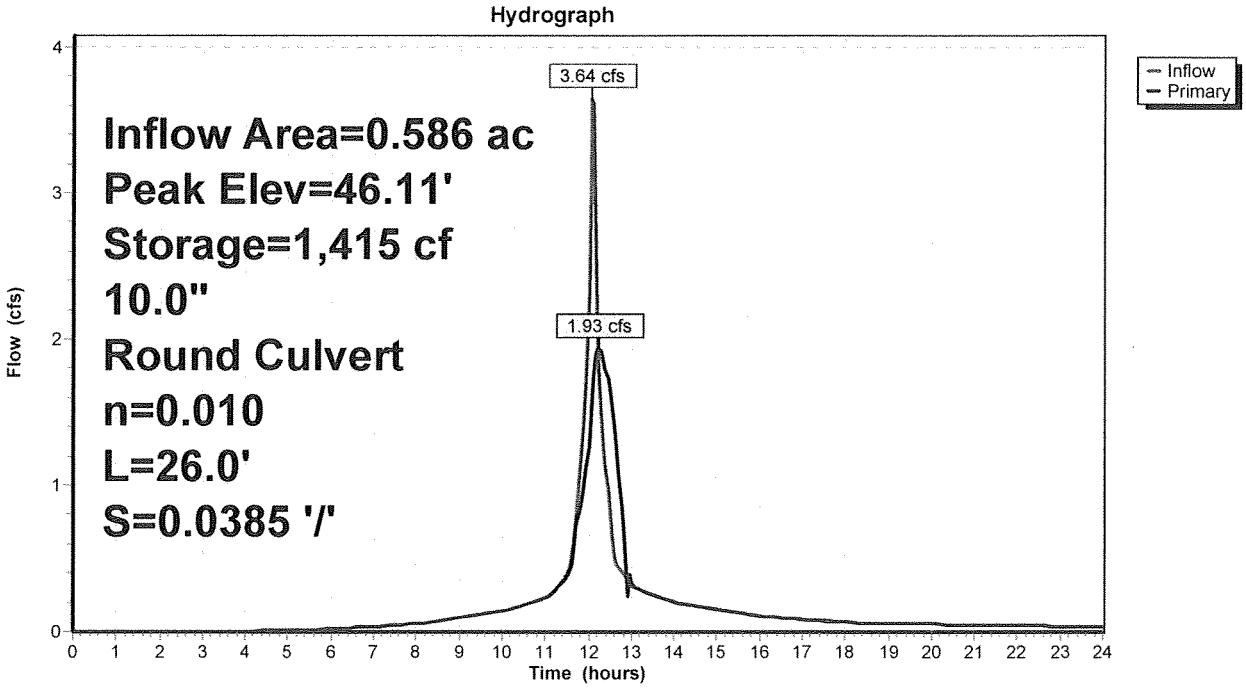
Volume	Invert	Avail.Storage	Storage Description
#1	45.50'	4,419 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
45.50	1,883	0	0
46.00	2,570	1,113	1,113
47.00	4,042	3,306	4,419

Device	Routing	Invert	Outlet Devices
#1	Primary	45.00'	**10.0" Round Culvert** L= 26.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 45.00' / 44.00' S= 0.0385 '/' Cc= 0.900 n= 0.010, Flow Area= 0.55 sf

Primary OutFlow Max=1.93 cfs @ 12.22 hrs HW=46.11' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.93 cfs @ 3.53 fps)

Pond 2P: (new Pond)

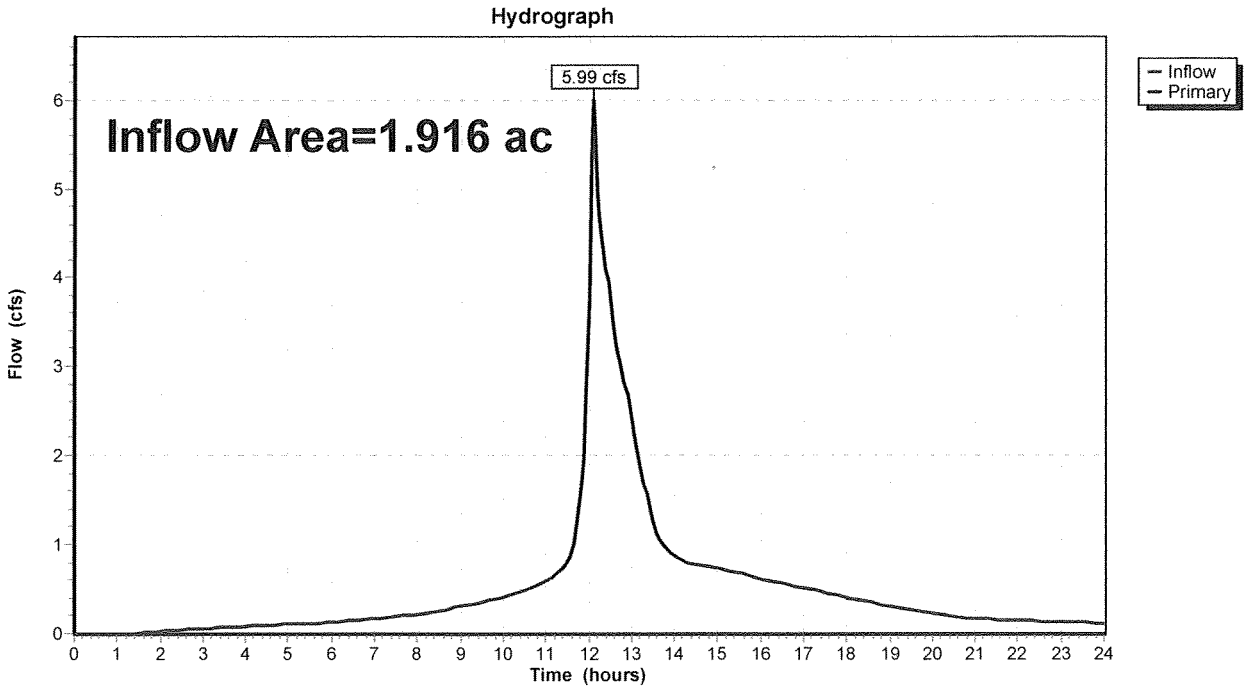


Summary for Pond DP-1:

Inflow Area = 1.916 ac, 74.41% Impervious, Inflow Depth > 6.18" for 100 yr event
Inflow = 5.99 cfs @ 12.11 hrs, Volume= 0.986 af
Primary = 5.99 cfs @ 12.11 hrs, Volume= 0.986 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond DP-1:

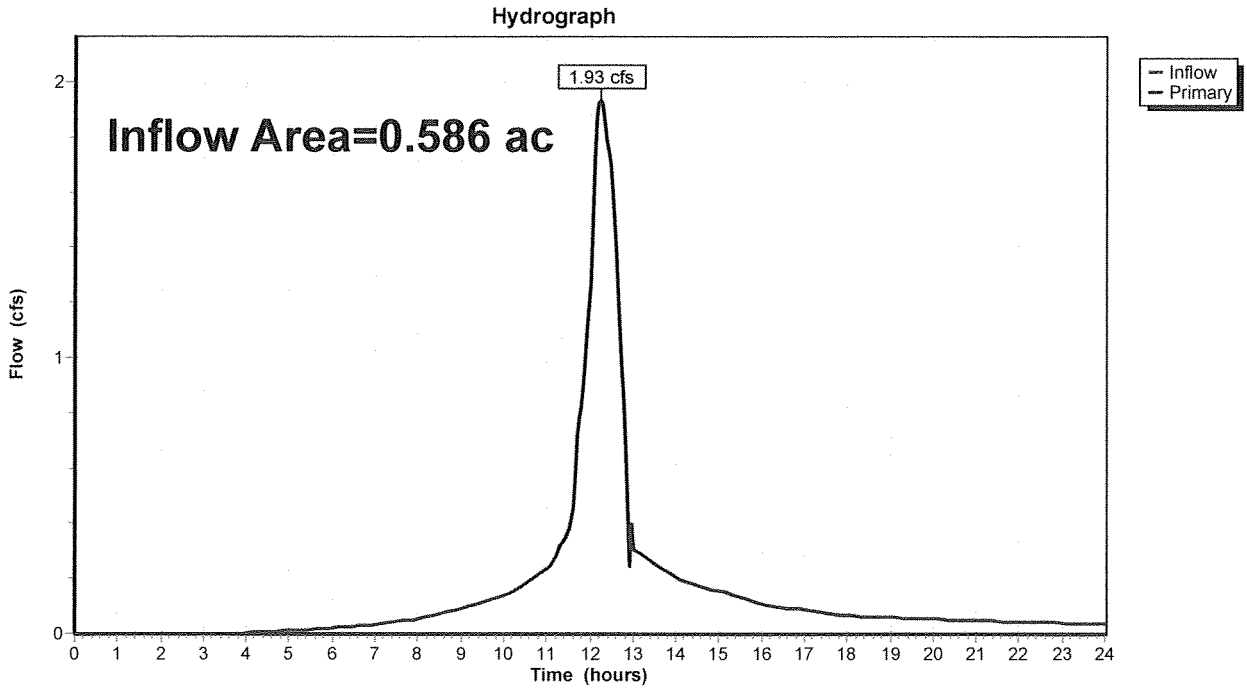


Summary for Pond DP-2:

Inflow Area = 0.586 ac, 49.54% Impervious, Inflow Depth > 5.70" for 100 yr event
Inflow = 1.93 cfs @ 12.22 hrs, Volume= 0.278 af
Primary = 1.93 cfs @ 12.22 hrs, Volume= 0.278 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond DP-2:



Print this page

Owner Information

Map/Block/Lot: 098 / 013/
Property Address
1692 SOUTH COUNTY ROAD
Village: Marstons Mills
Town Sewer At Address: No
GIS Zoning Value: RF
Owner Name as of 1/1/18:
ROWLAND, MARGARET H
PO BOX 679

OSTERVILLE, MA. 02655
Co-Owner Name

Assessed Values

	Appraised Value	Assessed Value
Building Value	$ 171,200	$ 171,200
Extra Features	$ 69,400	$ 69,400
Outbuildings	$ 12,900	$ 12,900
Land Value	$ 152,900	$ 152,900
Totals	**$ 406,400**	**$ 406,400**

Past Comparisons
2018 - $ 392,600
2017 - $ 383,100
2016 - $ 381,400
2015 - $ 384,100

2014 - $ 384,400
2013 - $ 391,200
2012 - $ 385,400
2011 - $ 373,800
2010 - $ 377,800
2009 - $ 398,600

Tax Information

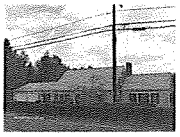
C.O.M.M. FD Tax (Commercial)	$ 0
C.O.M.M. FD Tax (Residential)	$ 723.39
Community Preservation Act Tax	$ 87.82
Town Tax (Commercial)	$ 0
Town Tax (Residential)	$ 2,927.24
	$ 3,738.45

Residential Exemption Received= $98,270

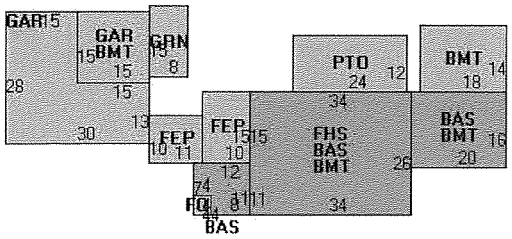
Sales History

Owner:	Sale Date	Book/Page:	Sale Price:
ROWLAND, MARGARET H	2015-10-30	29236/ 330	$0
ROWLAND, EDWARD S JR & MARGARET H	2005-01-07	19423/ 47	$490000
BROWN, EARL T & DOROTHY C	1971-09-20	1530/ 189	$0

Photos



Sketches



As Built Cards: Click card # to view: Card #1 | Card #2 |

B2N	Barn-any 2nd story area	**FPC**	Open Porch Concrete Floor	**REF**	Reference Only
BAS	First Floor, Living Area	**FTS**	Third Story Living Area (Finished)	**SOL**	Solarium
BMT	Basement Area (Unfinished)	**FUS**	Second Story Living Area (Finished)	**SPE**	Pool Enclosure
BRN	Barn	**GAR**	Garage	**TQS**	Three Quarters Story (Finished)
CAN	Canopy	**GAZ**	Gazebo	**UAT**	Attic Area (Unfinished)
CLP	Loading Platform	**GRN**	Greenhouse	**UHS**	Half Story (Unfinished)
FAT	Attic Area (Finished)	**GXT**	Garage Extension Front	**UST**	Utility Area (Unfinished)
FCP	Carport	**KEN**	Kennel	**UTQ**	Three Quarters Story (Unfinished)
FEP	Enclosed Porch	**MZ1**	Mezzanine, Unfinished	**UUA**	Unfinished Utility Attic
FHS	Half Story (Finished)	**PRG**	Pergola	**UUS**	Full Upper 2nd Story (Unfinished)
FOP	Open or Screened in Porch	**PRT**	Portico	**WDK**	Wood Deck
		PTO	Patio		

Construction Details

Building		Details		Land	
Building value	$ 171,200	**Bedrooms**	3 Bedrooms	**USE CODE**	1010
Replacement Cost	$241,077	**Bathrooms**	3 Full-1 Half	**Lot Size (Acres)**	1.09
Model	Residential	**Total Rooms**	7	**Appraised Value**	$ 152,900
Style	Cape Cod	**Heat Fuel**	Gas	**Assessed Value**	$ 152,900
Grade	Average	**Heat Type**	Hot Water		
Year Built	1964	**AC Type**	Central		
Effective depreciation	29	**Interior Floors**	HardwoodCarpet		
Stories	1 1/2 Stories	**Interior Walls**	Drywall		
Living Area sq/ft	1,762	**Exterior Walls**	Wood Shingle		
Gross Area sq/ft	5,409	**Roof Structure**	Gable/Hip		
		Roof Cover	Asph/F Gls/Cmp		

Outbuildings and Extra Features

Code	Description	Units/SQ ft	Appraised Value	Assessed Value
FEP	Enclosed porch-roof,ceiling	260	$ 10,200	$ 10,200
BFA	Bsmt Fin-Avg	768	$ 9,500	$ 9,500
FPO	Ext FP Opening	1	$ 1,300	$ 1,300
GRN1	Greenhouse-Res	120	$ 3,900	$ 3,900
PAT1	Patio- Average	288	$ 1,300	$ 1,300
GAR	Attached Garage	840	$ 16,000	$ 16,000
FOP	Open Porch-roof-ceiling	16	$ 1,000	$ 1,000

FPL2	Fireplace 1.5 stories	1	$ 4,000	$ 4,000
CAB1	Cabin-Minimal	120	$ 4,800	$ 4,800
BMT	Basement-Unfinished	1681	$ 27,400	$ 27,400
BRG2	Bridge-Ped-Wd-Low Cost	180	$ 2,900	$ 2,900

PRIME ENGINEERING INC

Input Values

K Values for grate R-3405-A with a transverse gutter slope of 2%	
LONGITUDINAL SLOPE (%)	K FOR R-3405-A
1	19
1.5	20.75
2	22.5
2.5	24.25
3	26
3.5	27.25
4	28.5
4.5	29.5
5	30.5
5.5	31.5
6	32.5

K Values for grate R-3455-A with a transverse gutter slope of 2%	
LONGITUDINAL SLOPE (%)	K FOR R-3405-A
1	19
1.5	22
2	25
2.5	26.5
3	28
3.5	29.5
4	31
4.5	31.75
5	32.5
5.5	33.25
6	34

ROADWAY PROPERTIES	
Roughness Coefficient of Bituminous Asphalt	-
Transverse Slope of Roadway	-
Slope of Curbing (if CC Berm)	-
Composite Transverse Slope (Eq. 4-7 of HEC-22)	-

Geometric Values for grate R-3405-A	
Square Dimention (in.)	23.6
Free Area (sq. ft.)	1.3

GUTTER DEPTH OF FLOW

$$D = \left(\frac{QN}{0.56Z\sqrt{S}}\right)^{\frac{3}{8}}$$

Q = Channel flow (cfs)
Z = Reciprocal of transverse slope (ft/ft)
S = Longitudinal Slope
N = Roughness Coefficient
D = Depth (ft)

GUTTER CAPACITY OF GRATE

$$Q = KD^{\frac{5}{3}}$$

Q = Grate capacity (cfs)
K = Grate coef. from "Inlet Grate Capacities Manual"
D = Depth of flow in feet (from previous equation)

ORIFICE FLOW EQUATION

$$Q = .6A\sqrt{2gh}$$

Q = Capacity (cfs)
A = Free open area (sq. ft.)
g = Acceleration of Gravity (32.2 ft/s^2)
h = Head (ft.)

WEIR EQUATION

$$Q = 3.3P(h)^{\frac{3}{2}}$$

Q = Capacity (cfs)
P = Perimeter (ft.)
h = Head (ft.)

PRIME ENGINEERING INC

CATCH BASINS IN DEPRESSIONS

STRUCTURE	CONTRIBUTING FLOW (cfs)	CARRYOVER FLOW (cfs)	TOTAL FLOW (cfs)	SIDES ON CURB	(S)INGLE OR (D)OUBLE	P (ft)	HEAD OVER GRATE (ft)	ORIFICE		WEIR		MAX CAPACITY (cfs)	ACTUAL DEPTH (ft)	OVERFLOW (cfs)	OVERFLOW TO
								Q_{MAX} (cfs)	H (ft)	Q_{MAX} (cfs)	H (ft)				
RAINGARDEN 1	5.25	0.00	5.25	0	S	7.9	1.30	7.14	0.70	38.52	0.34	7.14 cfs	0.70 ft.	0.00	-
RAINGARDEN 2	3.50	0.00	3.50	0	S	7.9	1.30	7.14	0.31	38.52	0.26	7.14 cfs	0.31 ft.	0.00	-

INSTRUCTIONS:
1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Version 1, Automated: Mar. 4, 2008

Location: 1A-POST, 1B-POST, 2-POST

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Bioretention Area	**0.90**	**1.00**	**0.90**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**
	0.00	**0.10**	**0.00**	**0.10**

Total TSS Removal = **90%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: 250 BRIDGE STREET
Prepared By: EKW
Date: 7/2/2015

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed
1. From MassDEP Stormwater Handbook Vol. 1

Mass. Dept. of Environmental Protection

PRIME ENGINEERING INC

PROJECT: 250 BRIDGE ST
SHEET NO. 1 OF 1
CALC'D BY: EJCW CHECKED BY:
DATE: 7/2/15

Calculate WQ

Raingarden 1

30,000 s.f. IMPERVIOUS AREA

$(30{,}000 \text{ sf})\left(\frac{0.5\text{in}}{12\text{in/ft}}\right) = 1{,}250$ c.f. req'd volume

Volume provided = 1,900 c.f. OK.

Raingarden 2

16,833 s.f. IMPERVIOUS AREA

$(16{,}833)\left(\frac{0.5}{12}\right) = 701$ cf req'd volume

Volume provided = 930 cf OK

Raingarden 3

12,642 s.f. IMPERVIOUS AREA

$(12{,}642)\left(\frac{0.5}{12}\right) = 526$ c.f. req'd

Volume provided = 2,313 cf OK