PRIME ENGINEERING
INC
CIVIL ENGINEERING • LAND SURVEYING
ENVIRONMENTAL ASSESSMENT

January 8, 2014

JN 1931-01-01

New Bedford Conservation Commission
133 William Street
New Bedford, MA 02740

RE: CARDINAL PLACE

Dear Commission Members,

Enclosed are a revised set of plans. They have been revised based on a December 9 memo from DPI and a December 9 memo from your consultant, Nitsch Engineering. Our responses below are numbered to correspond to their comment numbers.

1. The plans have been revised so no run-off from the development flows toward Sassaquin pond. As shown on the attached exhibits marked Hydrologic Exhibit none of surface or subsurface water from the site flows toward Sassaquin pond, except for the 30 feet wide by 90 feet existing driveway. The revised plans assure that all of the surface and subsurface water from the proposed development will flow southerly toward Route 140. There is no evidence that surface or subsurface water from the site will flow toward Sassaquin pond. The calculations now use the appropriate formulas for critical areas (Attachment B).

2. The requested summaries and calculations are presented in Attachment A through D.

3. On the revised plans the runoff from area 3 flows to the south, away from Sassaquin pond. The runoff will be collected by a trench drain, treated with a Stormceptor and then piped toward Route 140.

4. The Stormceptor sizing calculations are presented in Attachment B.

5, 6 &7. The urban tree box filter within the proposed development has been deleted in favor of a Stormceptor which has been accepted by the Step program. The infiltration system has been changed so there is no back-up.

8. The leach pit detail has been revised.

9. The plans have been revised to provide one foot of free board.

P.O. Box 1088 350 Bedford Street
Lakeville, MA 02347
Tel. (508) 947-0050 Fax (508) 947-2004

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108 Salt Marsh Road
East Sandwich, MA 02537
Tel. (508) 548-5400

10. The infiltration basin has been modified into a bioretention cell, as recommended.

11. The drains under the cellar slab are shown draining toward the wetlands, which have been labeled on the plan. The roof drains have been piped to infiltrators and added to the details. The sizing for these is presented in Attachment C;

12. The operation and maintenance plan has been revised to reflect the fertilizer and pesticide prohibition. The Order of Conditions runs with the land and is, in effect, a deed restriction that survives the Certificate of Compliance.

13. We agree to provide the SWPPP prior to construction.

14. The drainage summary table has been updated.

15. In order to be conservative, the drainage calculations in area A were based on hydrologic soil group B. The rest of the site was run on hydrologic soil group A. The calculations have been revised to use Attachment A.

16. Sheet UT-1 has been revised.

17. The dwellings shown are for overall hydrologic and hydraulic purposes only. Individual Notices of Intent will be submitted once the size of each dwelling is known. The plans have been revised to keep all proposed work outside of the 25 foot no disturb zone.

18. Attachment D expounds on the mounding methodology, the purpose of which is to prove that there is no significant mound 72 hours after the basin has ceased infiltration which is 14 hours after it started to infiltrate.

19. A pipe outlet detail has been added.

We believe that the revised plans, the above responses and the attachments answer all questions raised. We look forward to your favorable review.

Sincerely,
PRIME ENGINEERING, INC.

Richard J. Rheaume

COMMONWEALTH OF MASSACHUSETTS
RICHARD J. RHEAUME
No. 28373
CIVIL
REGISTERED PROFESSIONAL ENGINEER

Richard J. Rheaume, P.E., LSP
Chief Engineer

enc.

ATTACHMENT A

Summaries and Calculations

PRIME ENGINEERING INC

PROJECT:
SHEET NO. OF
CALC'D BY: CHECKED BY:
DATE:

STANDARD 3: RECHARGE VOLUME

USE HYDROLOGIC GROUP "A"
- REQUIRES 0.6" × IMPERVIOUS AREA

IMPERVIOUS AREA = 26,700 S.F.

REQ'D RECHARGE = (26,700 ft²) × (0.6 in) (ft/12in) = 1,335 cf.

RECHARGE PROVIDED:

RETENTION BASIN	:	2,900 cf
LEACHING PITS	:	454 cf
ROOF INFILTRATORS	:	6 × 2 × 63.4 = 760 cf
TOTAL	:	4,014 cf.

CHECK: 4,014 cf provided > 1,335 cf. req'd

OK

STANDARD 4: WATER QUALITY VOLUME (WQV)

STEP 1 (FROM MASS DEP Q Rate - SEPT 10 2013)

USE "1-INCH RULE" (1-INCH × IMPERVIOUS AREA)

DEVICE	IMP. AREA (SF) ×	1-INCH	WQV (C.F.)
STC-1 / BASIN	14,000	1/12	1,167
STC-2 / PITS	2,100	1/12	175
STC-3	1,800	1/12	150

PRIME ENGINEERING INC

PROJECT:
SHEET NO. OF
CALC'D BY: CHECKED BY:
DATE:

STEP 8: Time of concentration (t_c)

	t_c (min)	
STC-1	7.7	(0.128 h)
STC-2	5	(0.083 h)
STC-3	5	(0.083 h)

STEP 9: See FIGURE 3/4 OF GUIDANCE

STEP 10: Determine q_u

q_u (cfs/mi²/in or csm/in)

STC-1	736
STC-2	795
STC-3	795

STEP 11: COMPUTE WQF (Q_a)

$$Q_a = (q_u)(A)(WQV)$$

Device	q_u (csm/in)	A (S.F.)	Convert mi² to ft²	WQV (in)	Q_a
STC-1	736	14,000	$\frac{1\ mi^2}{27878400}$	1"	0.370 cfs
STC-2	795	2,100	$\frac{1}{27878400}$	1"	0.06 cfs
STC-3	795	1,800	$\frac{1}{27878400}$	1"	0.05 cfs

(SEE ATTACHMENT B FOR TREATMENT CALCULATIONS)

Check units

$$\left(\frac{cfs}{mi^2 \cdot in}\right)\left(ft^2\right)\left(\frac{1\ mi^2}{27878400\ ft^2}\right)\left(\frac{in}{in}\right) = cfs \checkmark$$

SIZE FOREBAY OF BASIN

$V = 0.1'' \times$ IMP AREA $= (14{,}000\ S.F.)(0.1'')\left(\frac{ft}{12''}\right) = 116\ C.F.$

VOLUME PROVIDED = 400 C.F. OK

ATTACHMENT B

Stormceptor Sizing Calculations

Stormceptor®

Stormceptor Design Summary

PCSWMM for Stormceptor

Project Information

Date	1/6/2014
Project Name	Ava's Way
Project Number	N/A
Location	STC-1

Designer Information

Company	PRIME ENGINEERING
Contact	EVAN WATSON

Notes

N/A

Drainage Area

Total Area (ac)	0.86
Imperviousness (%)	40

The Stormceptor System model STC 450i achieves the water quality objective removing 86% TSS for a Fine (organics, silts and sand) particle size distribution; providing continuous positive treatment for a stormwater quality flow rate of 0.37 cfs.

Rainfall

Name	HYANNIS
State	MA
ID	3821
Years of Records	1984 to 1997
Latitude	41°24'0"N
Longitude	70°10'47"W

Water Quality Objective

TSS Removal (%)	80
WQ Flow Rate (cfs)	0.37

Upstream Storage

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

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 450i	**86**
STC 900	91
STC 1200	91
STC 1800	91
STC 2400	94
STC 3600	94
STC 4800	95
STC 6000	96
STC 7200	97
STC 11000	98
STC 13000	98
STC 16000	98

Rinker MATERIALS™

Stormceptor®

Particle Size Distribution

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

Fine (organics, silts and sand)

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

Stormceptor Design Notes

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

Inlet and Outlet Pipe Invert Elevations Differences

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

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

Rinker MATERIALS™

Stormceptor®

Stormceptor Design Summary

PCSWMM for Stormceptor

Project Information

Date	1/6/2014
Project Name	Ava's Way
Project Number	N/A
Location	STC-2

Designer Information

Company	PRIME ENGINEERING
Contact	EVAN WATSON

Notes

N/A

Drainage Area

Total Area (ac)	0.11
Imperviousness (%)	43

The Stormceptor System model STC 450i achieves the water quality objective removing 96% TSS for a Fine (organics, silts and sand) particle size distribution; providing continuous positive treatment for a stormwater quality flow rate of 0.06 cfs.

Rainfall

Name	HYANNIS
State	MA
ID	3821
Years of Records	1984 to 1997
Latitude	41°24'0"N
Longitude	70°10'47"W

Water Quality Objective

TSS Removal (%)	80
WQ Flow Rate (cfs)	0.06

Upstream Storage

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

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 450i	**96**
STC 900	98
STC 1200	98
STC 1800	98
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

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Fine (organics, silts and sand)

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20	20	1.3	0.0013					
60	20	1.8	0.0051					
150	20	2.2	0.0354					
400	20	2.65	0.2123					
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Rinker MATERIALS™

Stormceptor®

Stormceptor Design Summary

PCSWMM for Stormceptor

Project Information

Date	1/6/2014
Project Name	Ava's Way
Project Number	N/A
Location	STC-3

Designer Information

Company	PRIME ENGINEERING
Contact	EVAN WATSON

Notes

N/A

Drainage Area

Total Area (ac)	0.06
Imperviousness (%)	70

The Stormceptor System model STC 450i achieves the water quality objective removing 96% TSS for a Fine (organics, silts and sand) particle size distribution; providing continuous positive treatment for a stormwater quality flow rate of 0.05 cfs.

Rainfall

Name	HYANNIS
State	MA
ID	3821
Years of Records	1984 to 1997
Latitude	41°24'0"N
Longitude	70°10'47"W

Water Quality Objective

TSS Removal (%)	80
WQ Flow Rate (cfs)	0.05

Upstream Storage

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

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 450i	**96**
STC 900	98
STC 1200	98
STC 1800	98
STC 2400	99
STC 3600	99
STC 4800	99
STC 6000	99
STC 7200	99
STC 11000	100
STC 13000	100
STC 16000	100

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Particle Size Distribution

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400	20	2.65	0.2123					
2000	20	2.65	0.9417					

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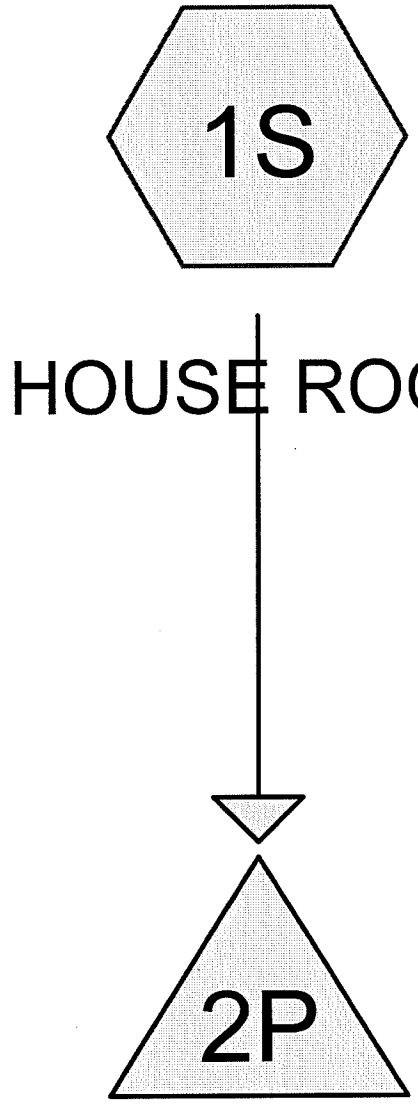
ATTACHMENT C

Infiltrator Sizing Calculations



2 CULTEC 330XLHD

Subcat Reach Pond Link

Routing Diagram for roof
Prepared by Prime Engineering, Inc, Printed 1/7/2014

Summary for Subcatchment 1S: HOUSE ROOF

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

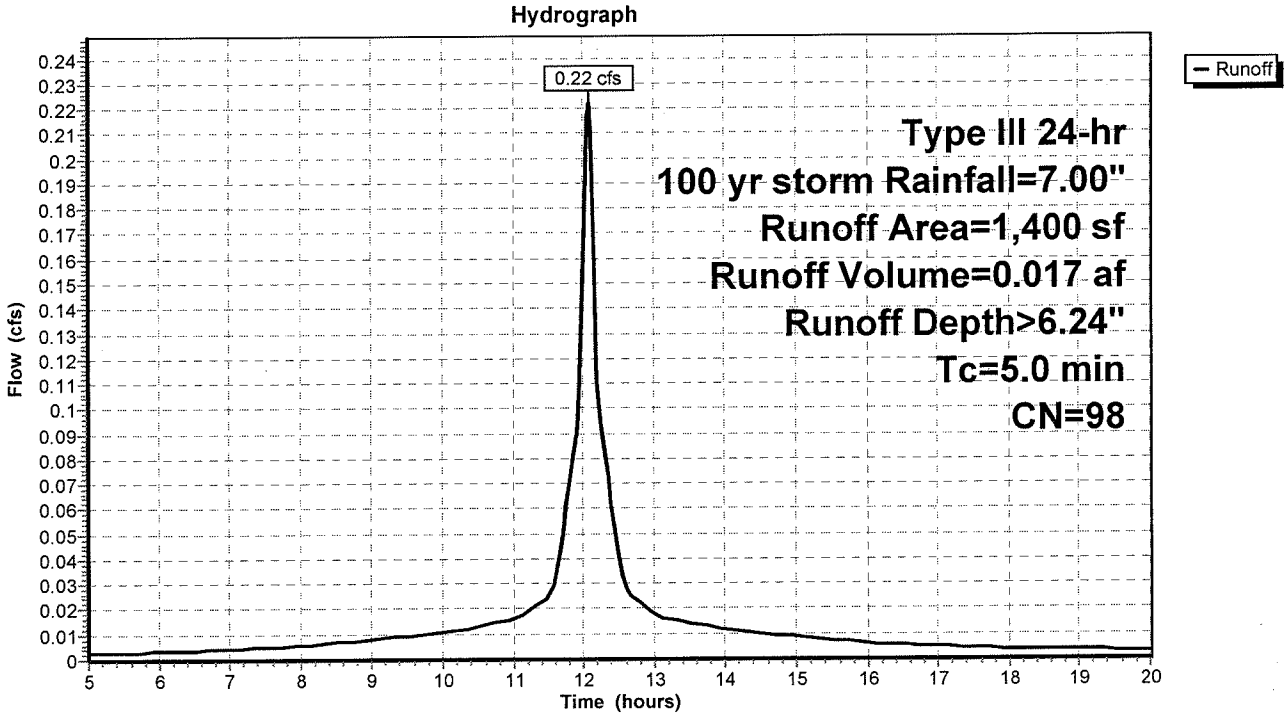
Runoff = 0.22 cfs @ 12.07 hrs, Volume= 0.017 af, Depth> 6.24"

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 storm Rainfall=7.00"

	Area (sf)	CN	Description
*	1,400	98	
	1,400		100.00% Impervious Area

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

Subcatchment 1S: HOUSE ROOF



Summary for Pond 2P: 2 CULTEC 330XLHD

[82] Warning: Early inflow requires earlier time span

Inflow Area = 0.032 ac,100.00% Impervious, Inflow Depth > 6.24" for 100 yr storm event
Inflow = 0.22 cfs @ 12.07 hrs, Volume= 0.017 af
Outflow = 0.02 cfs @ 11.50 hrs, Volume= 0.017 af, Atten= 89%, Lag= 0.0 min
Discarded = 0.02 cfs @ 11.50 hrs, Volume= 0.017 af

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 96.75' @ 12.70 hrs Surf.Area= 0.003 ac Storage= 0.006 af

Plug-Flow detention time= 66.7 min calculated for 0.017 af (100% of inflow)
Center-of-Mass det. time= 66.2 min (799.0 - 732.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	93.50'	0.003 af	**11.67'W x 11.00'L x 3.29'H Field A** 0.010 af Overall - 0.003 af Embedded = 0.007 af x 40.0% Voids
#2A	94.00'	0.003 af	**Cultec R-330XLHD** x 2 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 2 rows
		0.006 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	93.50'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.02 cfs @ 11.50 hrs HW=93.53' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.02 cfs)

Pond 2P: 2 CULTEC 330XLHD - Chamber Wizard Field A

Chamber Model = Cultec R-330XLHD (Cultec Recharger® 330XLHD)
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 2 rows

52.0" Wide + 6.0" Spacing = 58.0" C-C Row Spacing

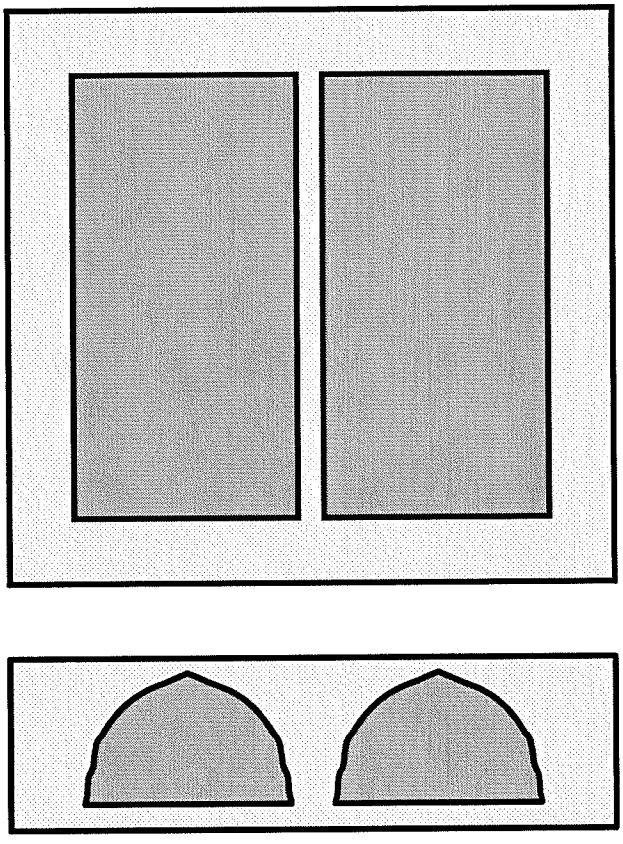
1 Chambers/Row x 7.00' Long +1.50' Row Adjustment = 8.50' Row Length +15.0" End Stone x 2 = 11.00' Base Length
2 Rows x 52.0" Wide + 6.0" Spacing x 1 + 15.0" Side Stone x 2 = 11.67' Base Width
6.0" Base + 30.5" Chamber Height + 3.0" Cover = 3.29' Field Height

2 Chambers x 52.2 cf +1.50' Row Adjustment x 7.45 sf x 2 Rows = 126.7 cf Chamber Storage

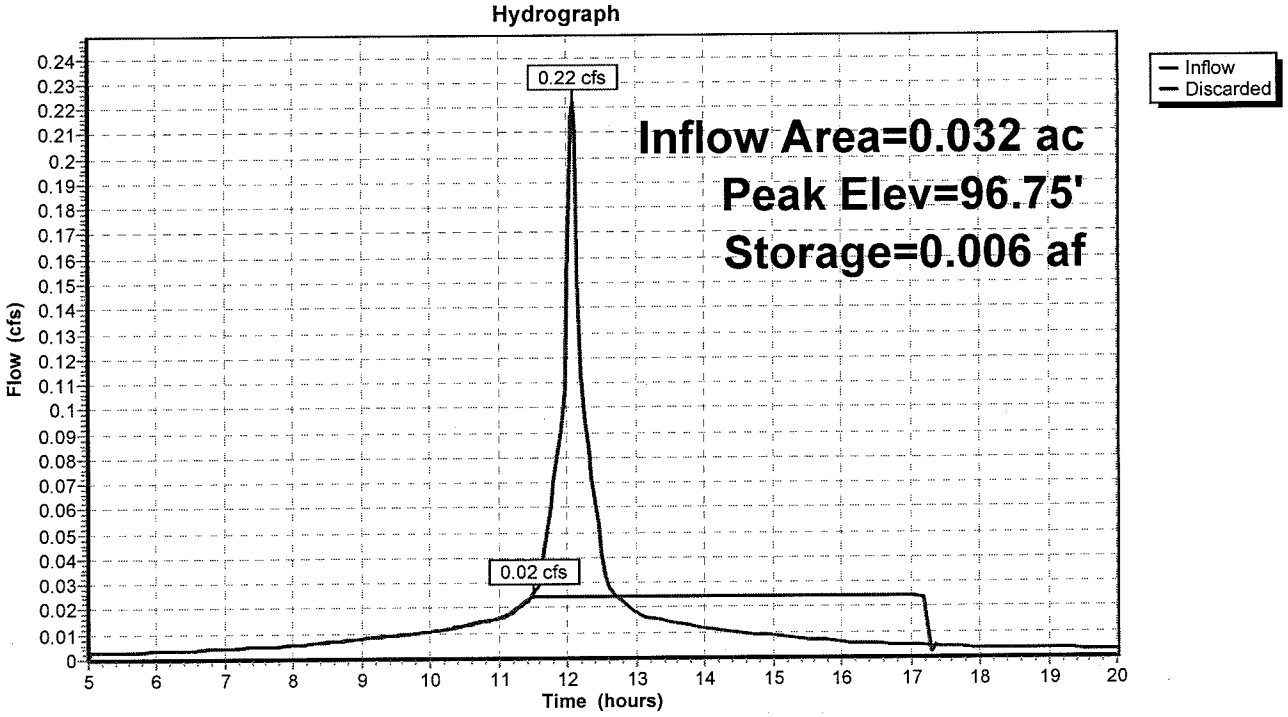
422.4 cf Field - 126.7 cf Chambers = 295.8 cf Stone x 40.0% Voids = 118.3 cf Stone Storage

Chamber Storage + Stone Storage = 245.0 cf = 0.006 af
Overall Storage Efficiency = 58.0%

2 Chambers
15.6 cy Field
11.0 cy Stone



Pond 2P: 2 CULTEC 330XLHD



ATTACHMENT D

Mounding

PRIME ENGINEERING INC

PROJECT:
SHEET NO. OF
CALC'D BY: CHECKED BY:
DATE:

MOUNDING ANALYSIS: EXPLANATION OF INPUTS

USE DIMENSIONS OF ft & hours

Hydraulic Conductivity (K)

- USED INFILTRATION RATE OF 8.27 in/hr, CONVERTED TO 0.6892 ft/hr

RECHARGE RATE (W)

- This mounding analysis calculates the mound beneath the basin to ensure it is drained after 72 hours. It assumes a constant infiltration rate over a set period of time. As shown on the hydrograph, the infiltration rate is not constant since the area of the basin increases with elevation. However, the infiltration rate will always be the same as K. To estimate a constant flow rate, an average area was used (L = 64, W = 28; L x W = 64 x 28 = 1792 sf.

Check rate:

$$\left(0.6892 \frac{ft}{hr}\right)(64ft)(28\,ft)\left(\frac{hr}{3600\,sec}\right) = 0.34\,cfs$$

0.34 cfs is about the average inf. rate during the storm and greater than the average for the 14 hours used in the calculation

ATTACHMENT E

Drainage Summary

Proposed
Cardinal Place
New Bedford, Massachusetts

Drainage Summary

2 YR STORM (3.4 in.)

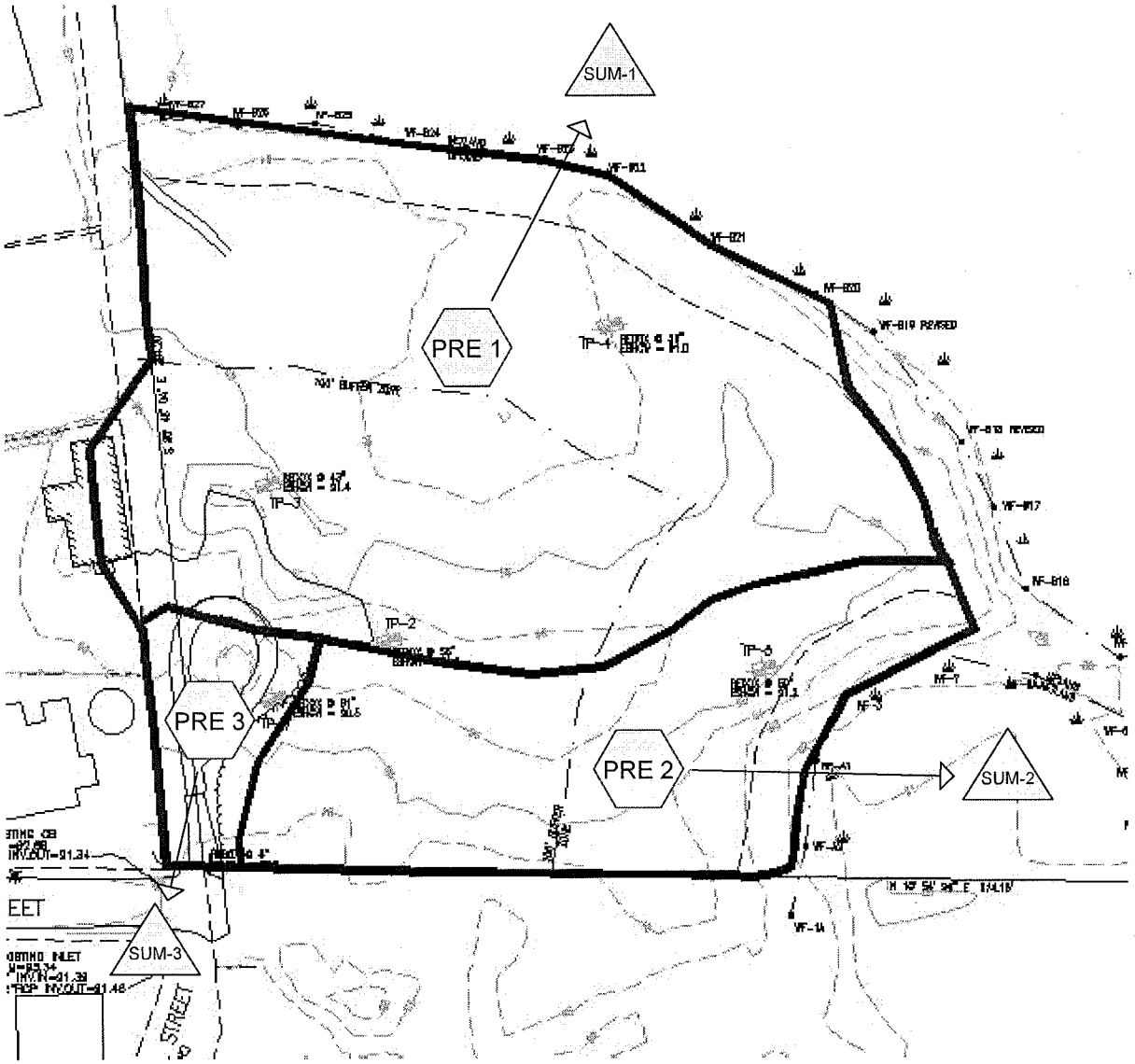
Receptor	Pre Development Q Max (cfs)	Post Development Q Max (cfs)
East (Sum 1)	0	0
South (Sum 2)	0	0
Swallow St. (Sum 3)	0.03	0

10 YR STORM (4.8 in.)

Receptor	Pre Development Q Max (cfs)	Post Development Q Max (cfs)
East (Sum 1)	0.01	0.01
South (Sum 2)	0	0
Swallow St. (Sum 3)	0.12	0.08

100 YR STORM (7.0 in.)

Receptor	Pre Development Q Max (cfs)	Post Development Q Max (cfs)
East (Sum 1)	0.28	0.13
South (Sum 2)	0.09	0.12
Swallow St. (Sum 3)	0.32	0



Subcat Reach Pond Link

Drainage Diagram for PRE-DEVELOPMENT

Prepared by Prime Engineering, Inc 1/7/2014

Subcatchment PRE 1:

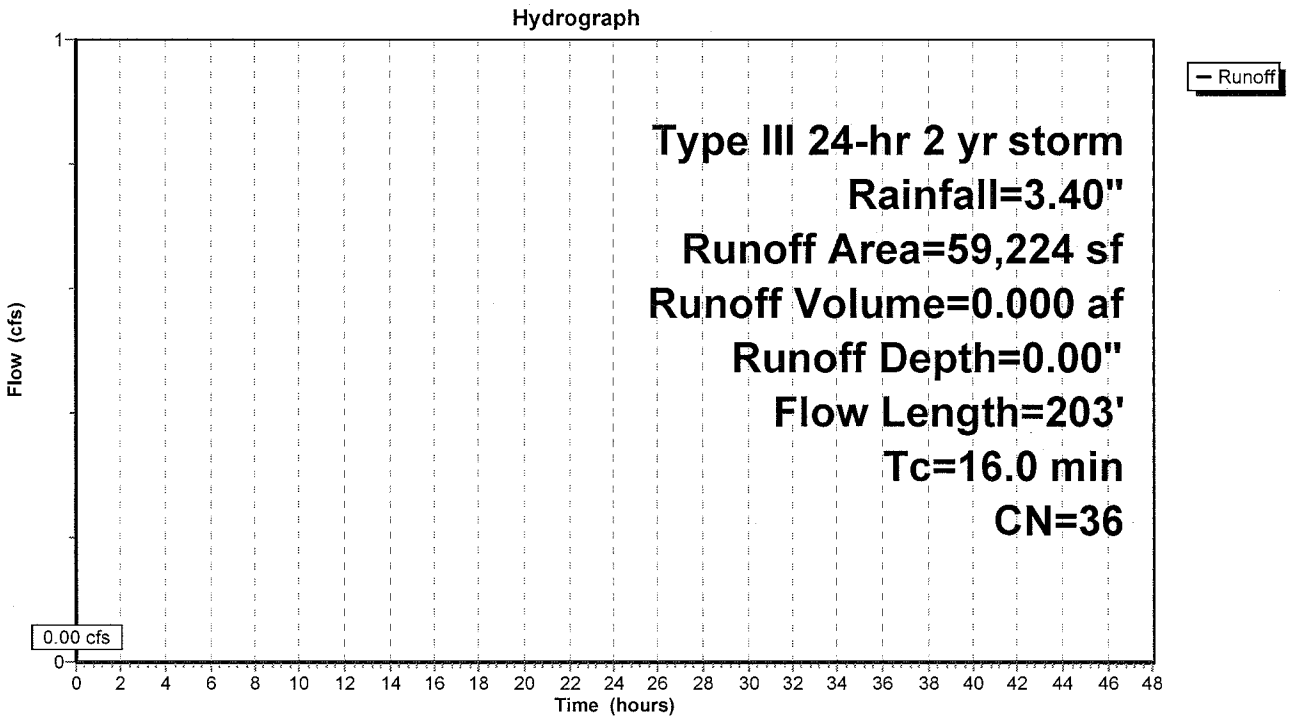
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr storm Rainfall=3.40"

Area (sf)	CN	Description
46,430	36	Woods, Fair, HSG A
2,868	49	50-75% Grass cover, Fair, HSG A
246	76	Gravel roads, HSG A
545	98	roof
9,135	30	Woods, Good, HSG A
59,224	36	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
4.0	153	0.0163	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.0	203	Total			

Subcatchment PRE 1:



Subcatchment PRE 2:

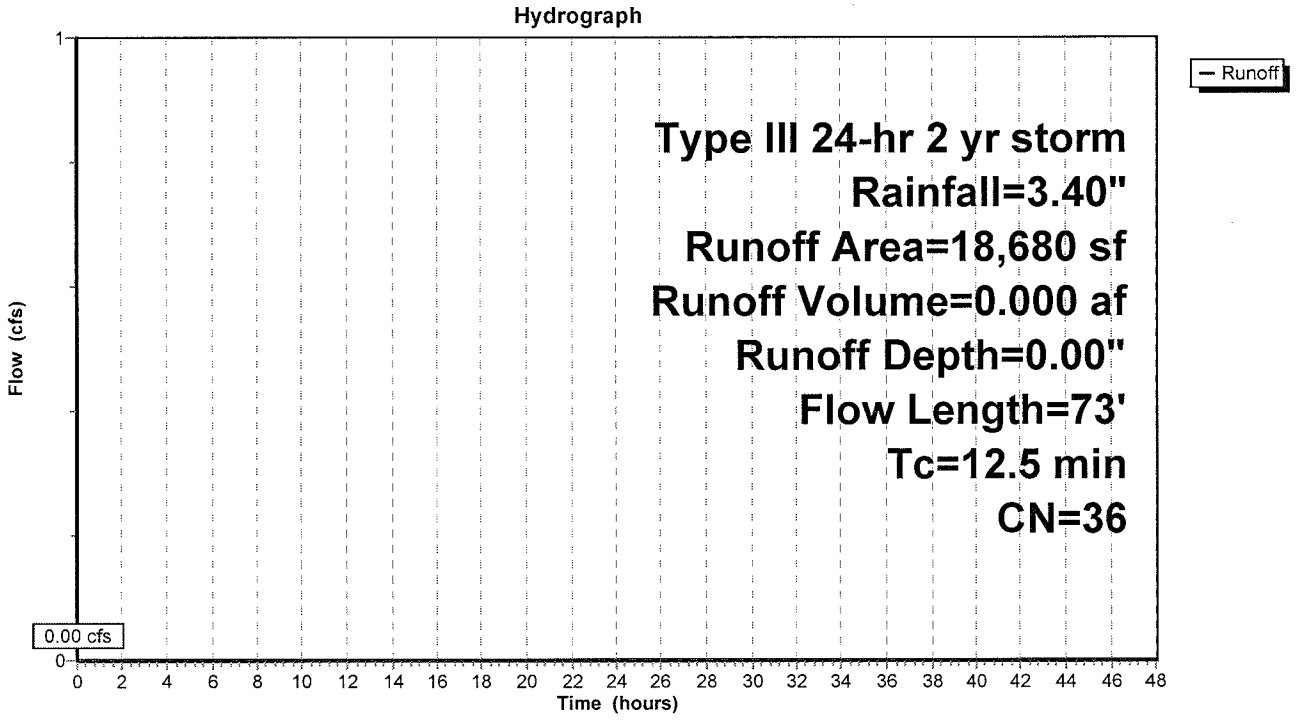
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr storm Rainfall=3.40"

Area (sf)	CN	Description
18,680	36	Woods, Fair, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.5	23	0.0200	0.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	73	Total			

Subcatchment PRE 2:



Subcatchment PRE 3:

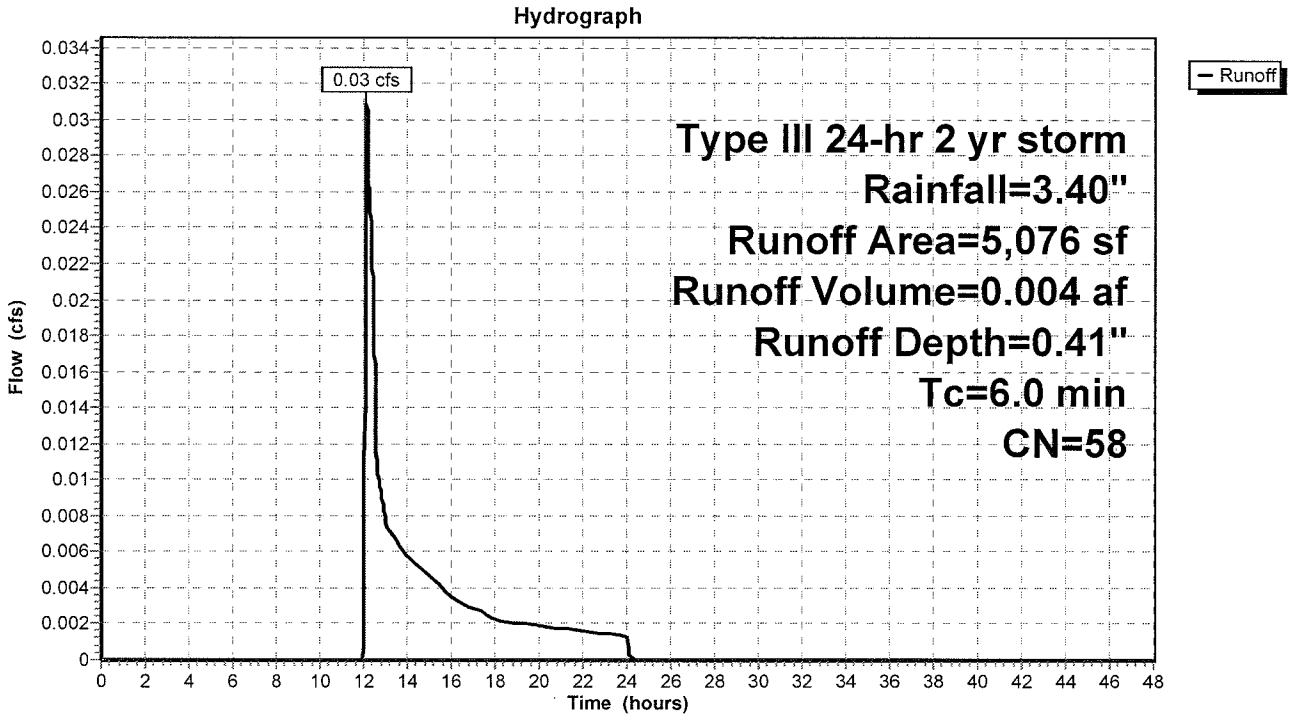
Runoff = 0.03 cfs @ 12.13 hrs, Volume= 0.004 af, Depth= 0.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2 yr storm Rainfall=3.40"

Area (sf)	CN	Description
1,404	76	Gravel roads, HSG A
232	30	Woods, Good, HSG A
805	98	paved
2,635	39	>75% Grass cover, Good, HSG A
5,076	58	Weighted Average

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

Subcatchment PRE 3:

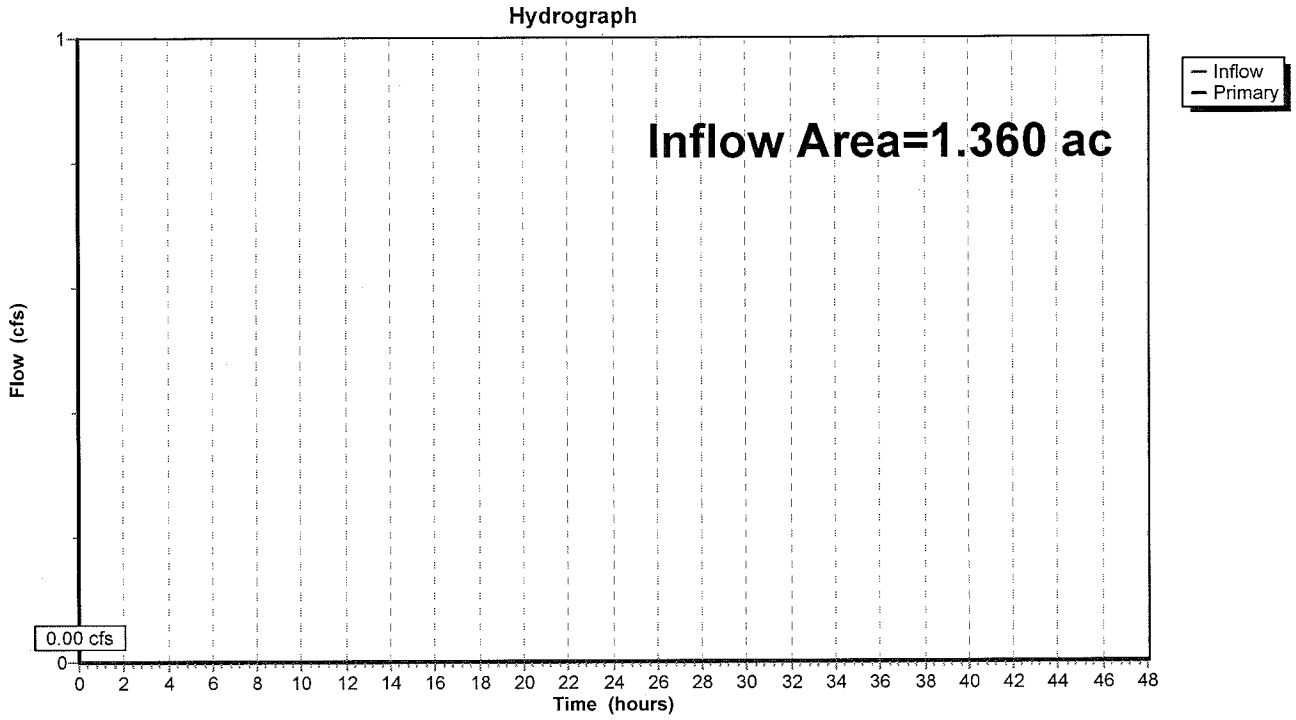


Pond SUM-1:

Inflow Area = 1.360 ac, Inflow Depth = 0.00" for 2 yr storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond SUM-1:

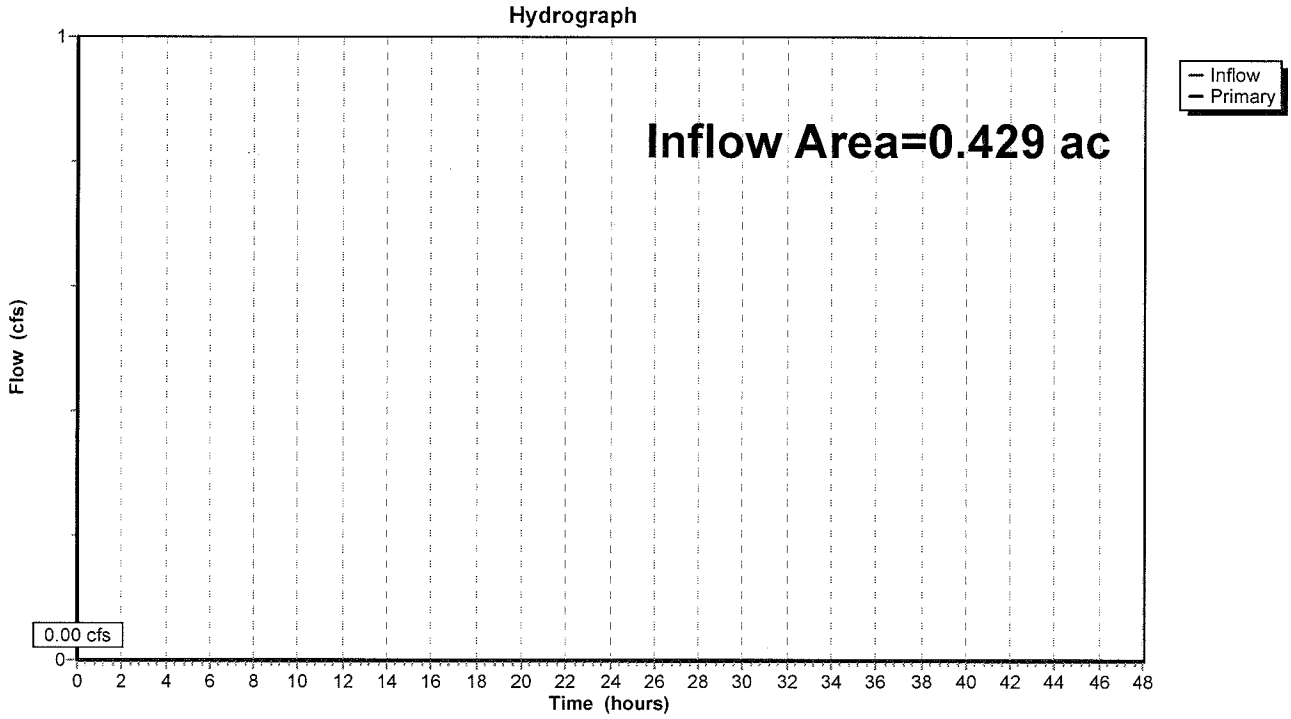


Pond SUM-2:

Inflow Area = 0.429 ac, Inflow Depth = 0.00" for 2 yr storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond SUM-2:

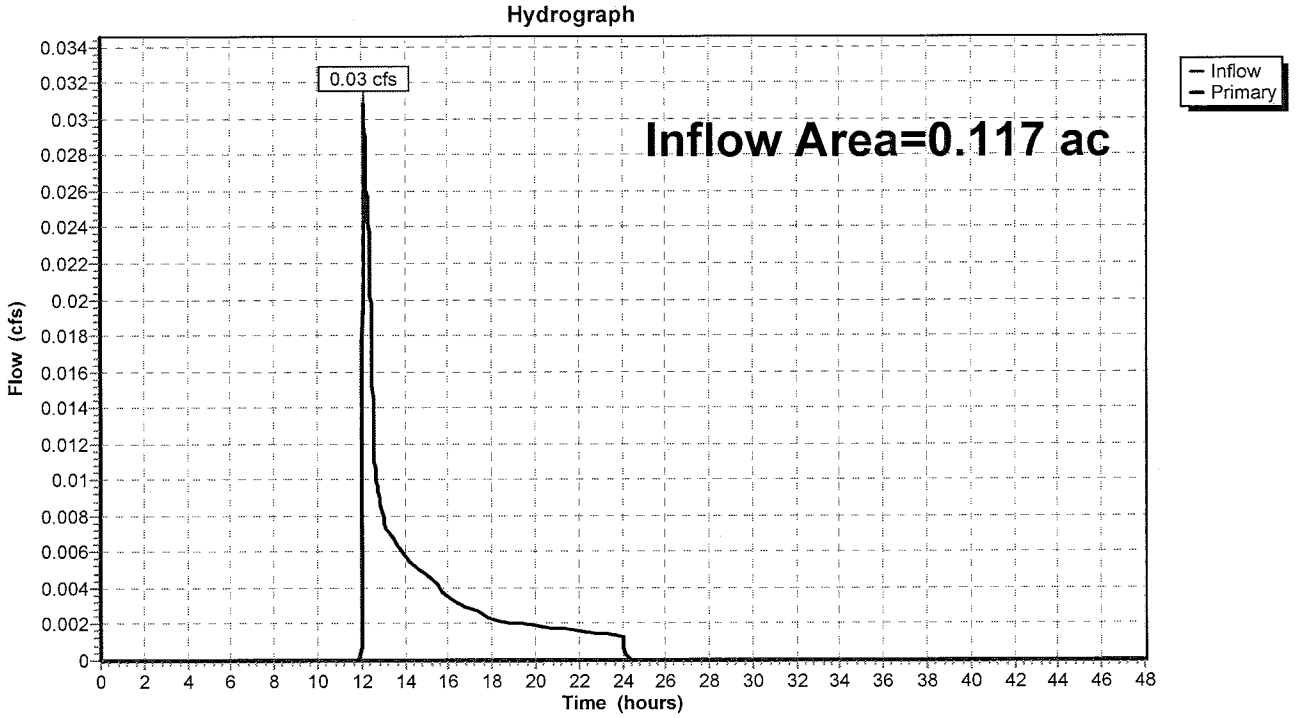


Pond SUM-3:

Inflow Area = 0.117 ac, Inflow Depth = 0.41" for 2 yr storm event
Inflow = 0.03 cfs @ 12.13 hrs, Volume= 0.004 af
Primary = 0.03 cfs @ 12.13 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond SUM-3:



Subcatchment PRE 1:

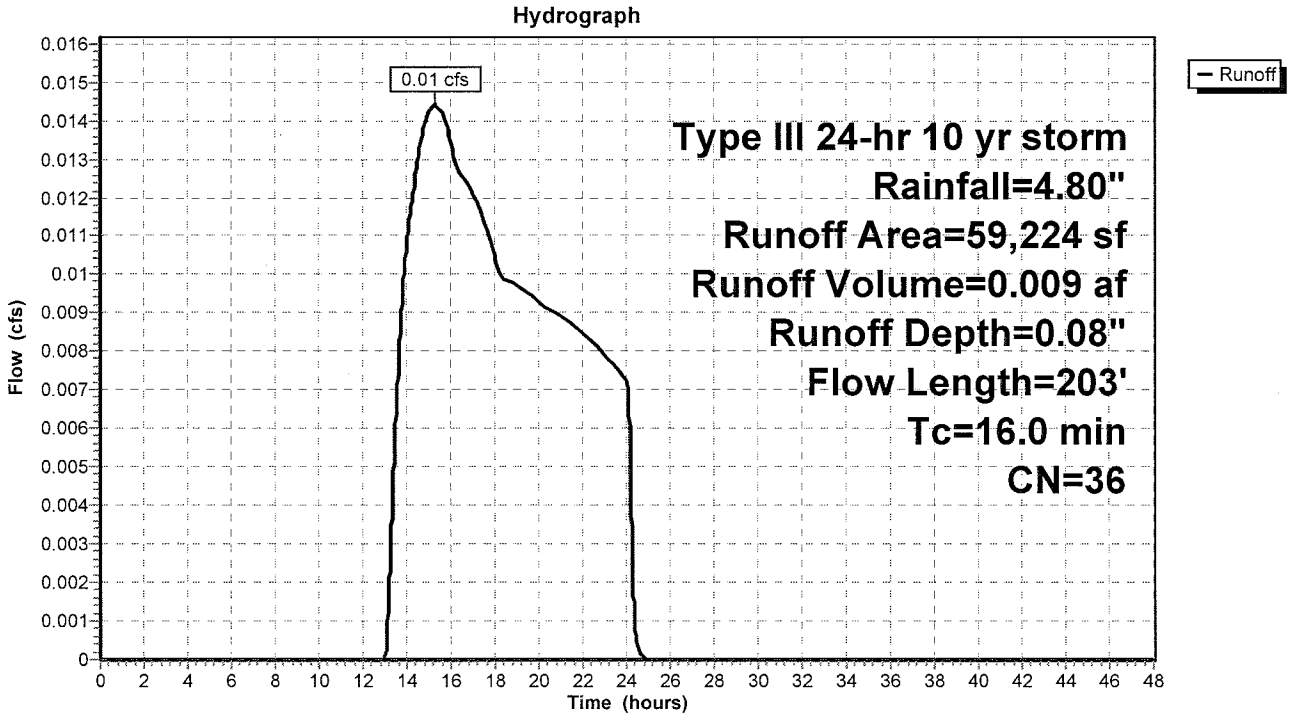
Runoff = 0.01 cfs @ 15.27 hrs, Volume= 0.009 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr storm Rainfall=4.80"

Area (sf)	CN	Description
46,430	36	Woods, Fair, HSG A
2,868	49	50-75% Grass cover, Fair, HSG A
246	76	Gravel roads, HSG A
545	98	roof
9,135	30	Woods, Good, HSG A
59,224	36	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
4.0	153	0.0163	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.0	203	Total			

Subcatchment PRE 1:



Subcatchment PRE 2:

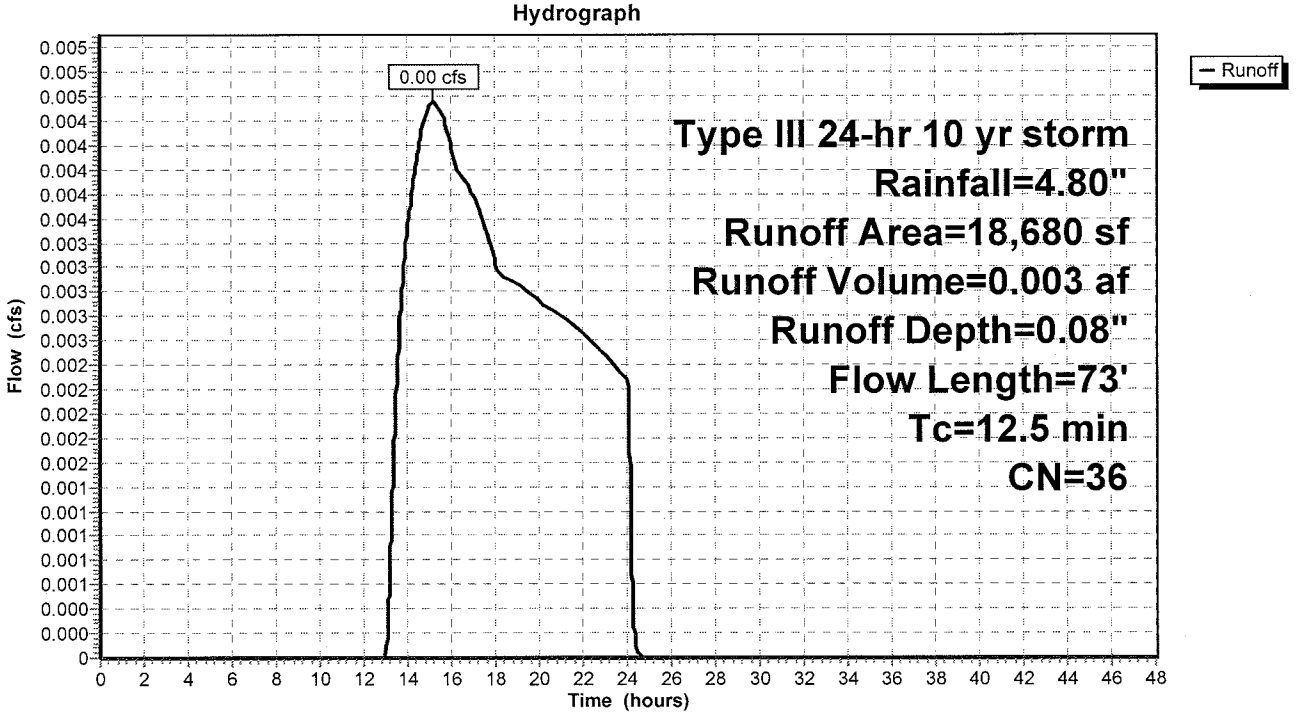
Runoff = 0.00 cfs @ 15.21 hrs, Volume= 0.003 af, Depth= 0.08"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr storm Rainfall=4.80"

Area (sf)	CN	Description
18,680	36	Woods, Fair, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.5	23	0.0200	0.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	73	Total			

Subcatchment PRE 2:



Subcatchment PRE 3:

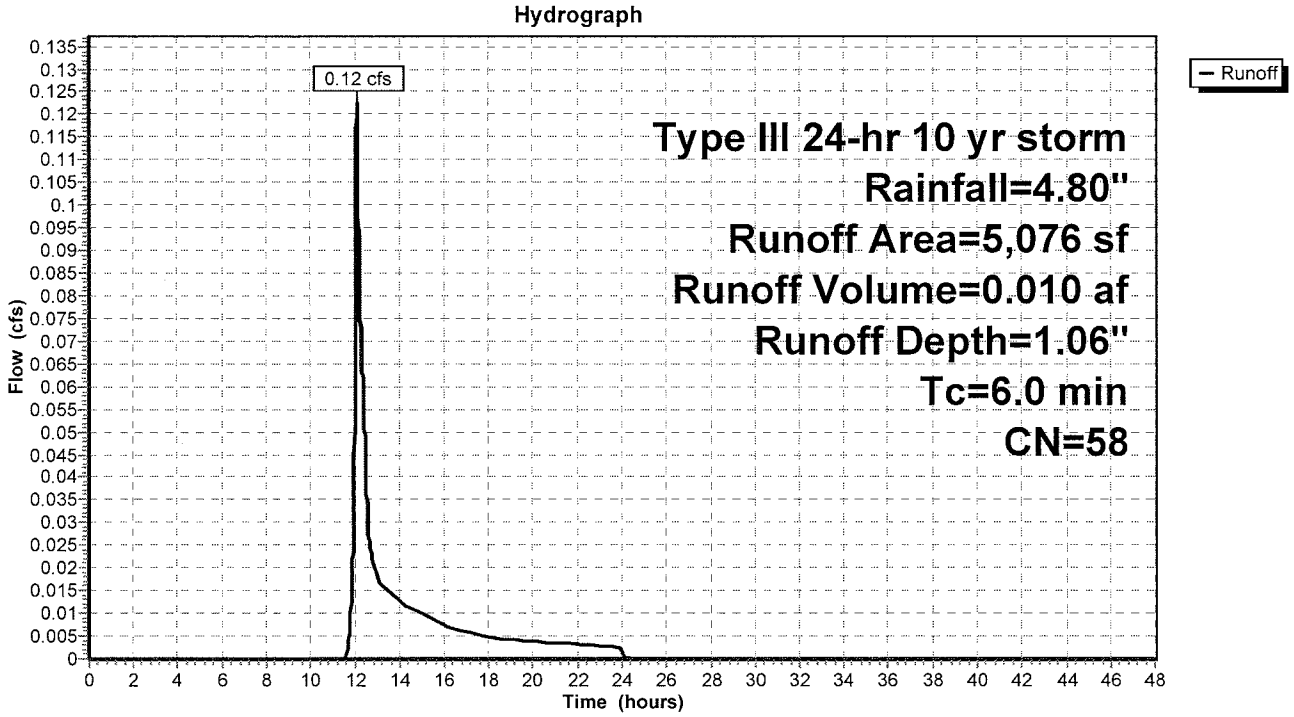
Runoff = 0.12 cfs @ 12.10 hrs, Volume= 0.010 af, Depth= 1.06"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10 yr storm Rainfall=4.80"

Area (sf)	CN	Description
1,404	76	Gravel roads, HSG A
232	30	Woods, Good, HSG A
805	98	paved
2,635	39	>75% Grass cover, Good, HSG A
5,076	58	Weighted Average

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

Subcatchment PRE 3:

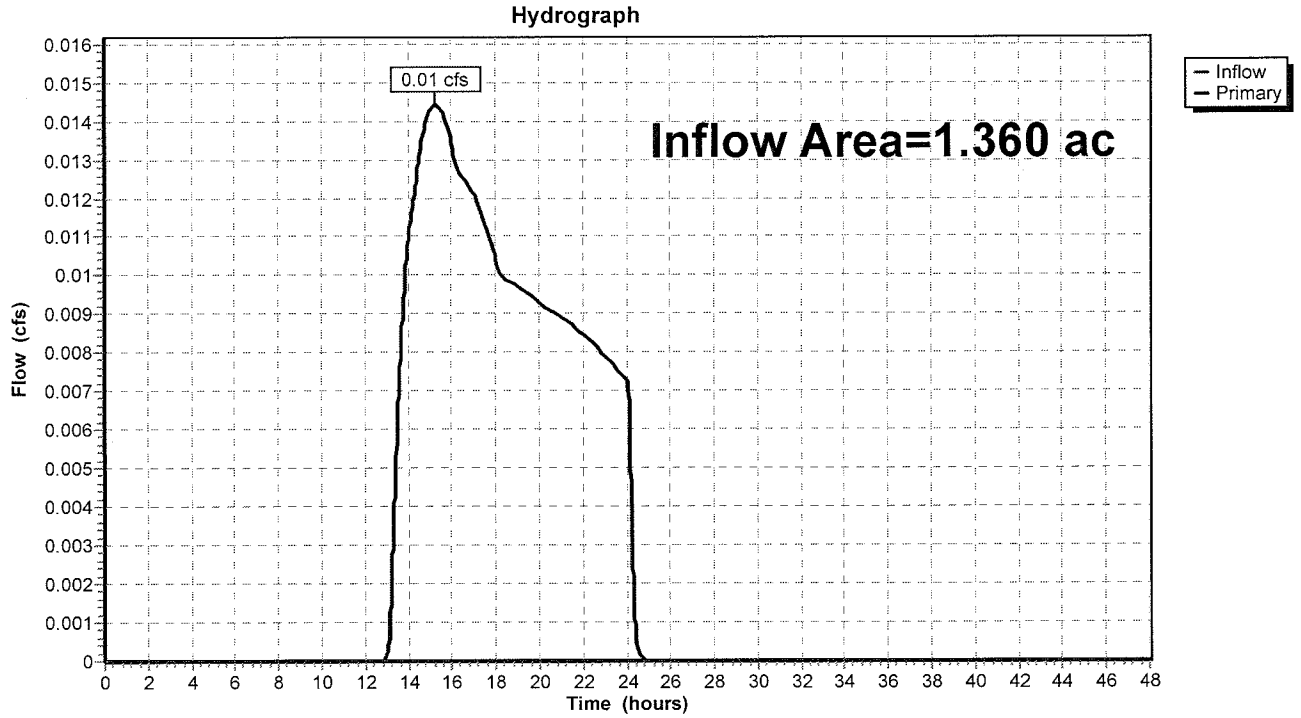


Pond SUM-1:

Inflow Area = 1.360 ac, Inflow Depth = 0.08" for 10 yr storm event
Inflow = 0.01 cfs @ 15.27 hrs, Volume= 0.009 af
Primary = 0.01 cfs @ 15.27 hrs, Volume= 0.009 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond SUM-1:

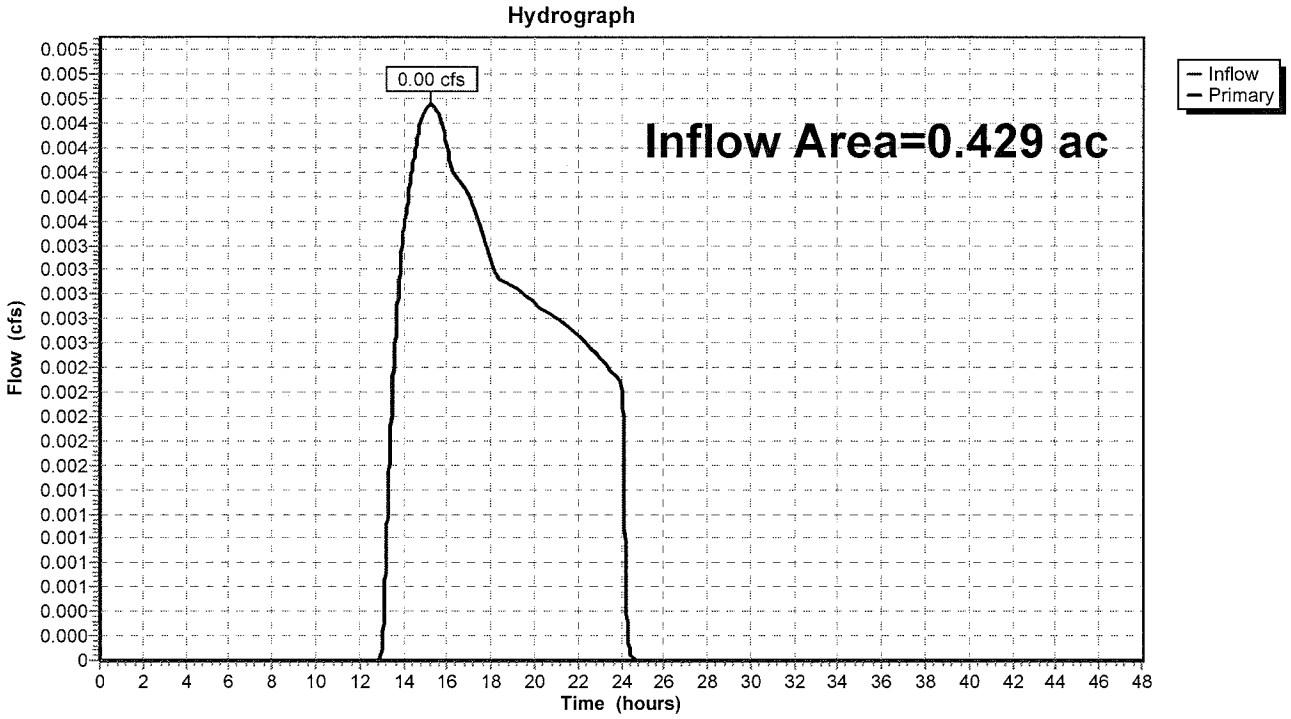


Pond SUM-2:

Inflow Area = 0.429 ac, Inflow Depth = 0.08" for 10 yr storm event
Inflow = 0.00 cfs @ 15.21 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 15.21 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond SUM-2:

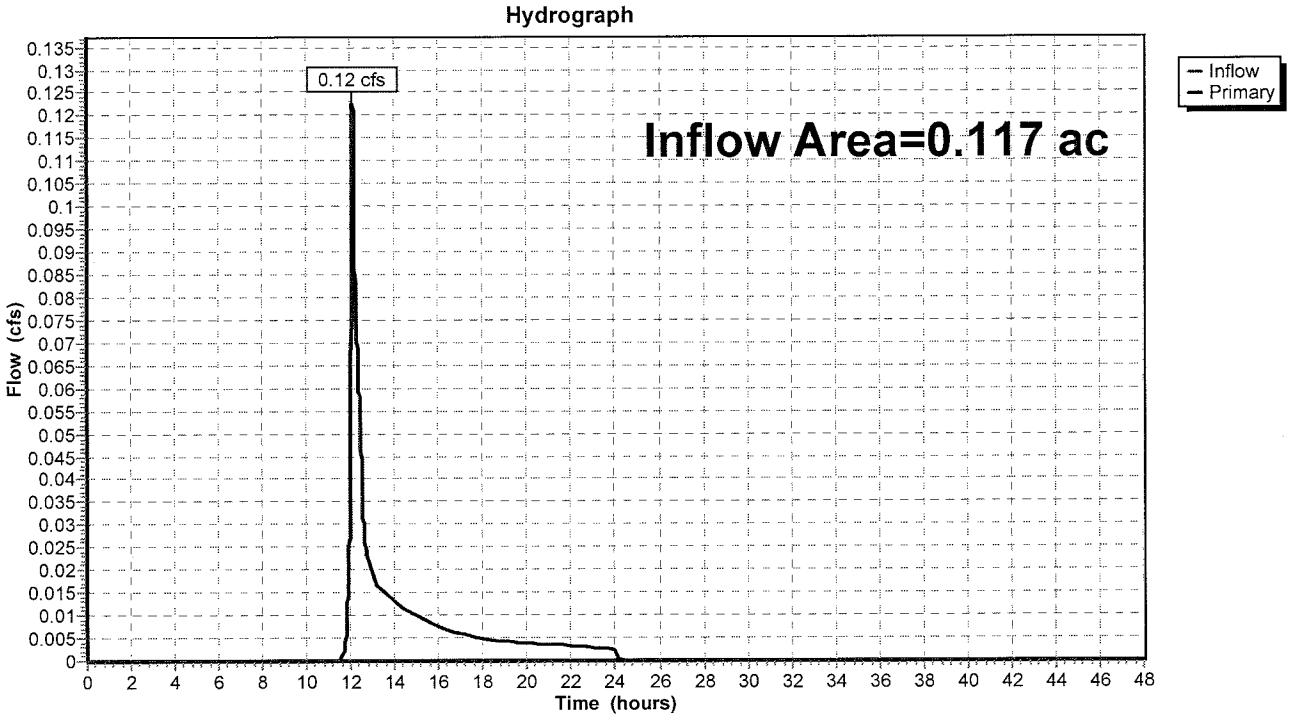


Pond SUM-3:

Inflow Area = 0.117 ac, Inflow Depth = 1.06" for 10 yr storm event
Inflow = 0.12 cfs @ 12.10 hrs, Volume= 0.010 af
Primary = 0.12 cfs @ 12.10 hrs, Volume= 0.010 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond SUM-3:



Subcatchment PRE 1:

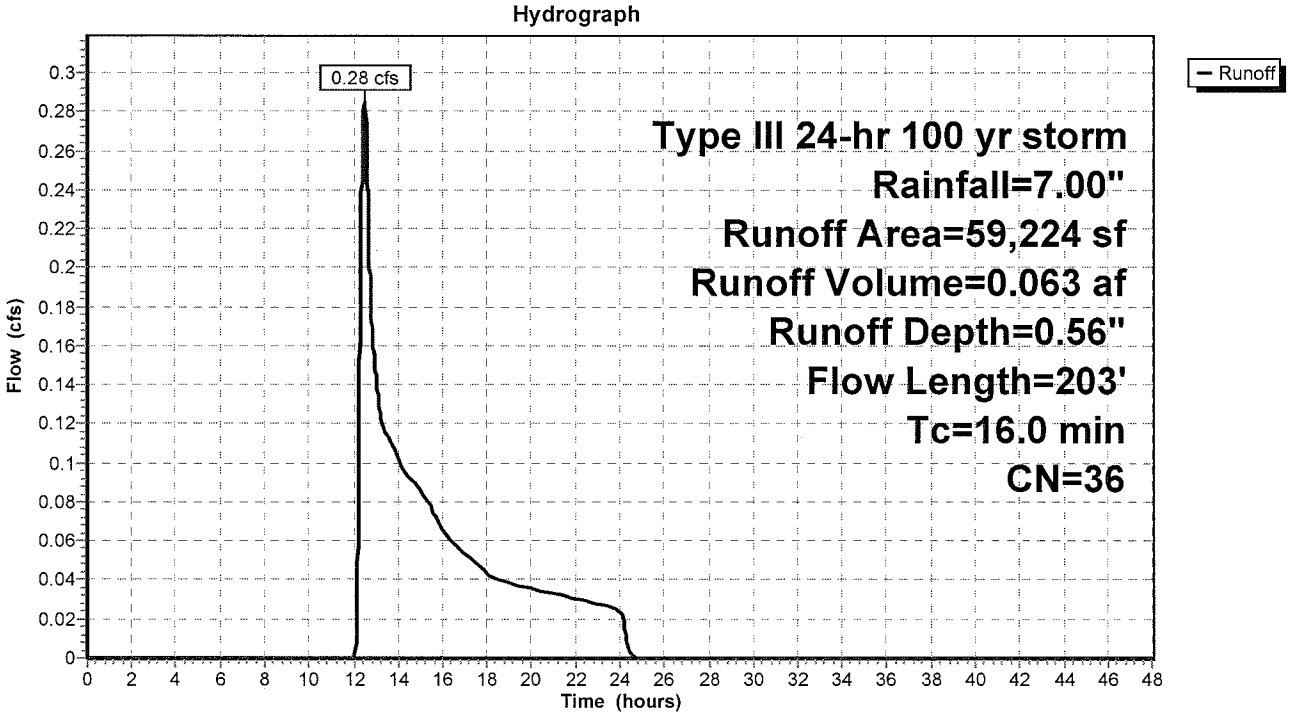
Runoff = 0.28 cfs @ 12.48 hrs, Volume= 0.063 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr storm Rainfall=7.00"

Area (sf)	CN	Description
46,430	36	Woods, Fair, HSG A
2,868	49	50-75% Grass cover, Fair, HSG A
246	76	Gravel roads, HSG A
545	98	roof
9,135	30	Woods, Good, HSG A
59,224	36	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
4.0	153	0.0163	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
16.0	203	Total			

Subcatchment PRE 1:



Subcatchment PRE 2:

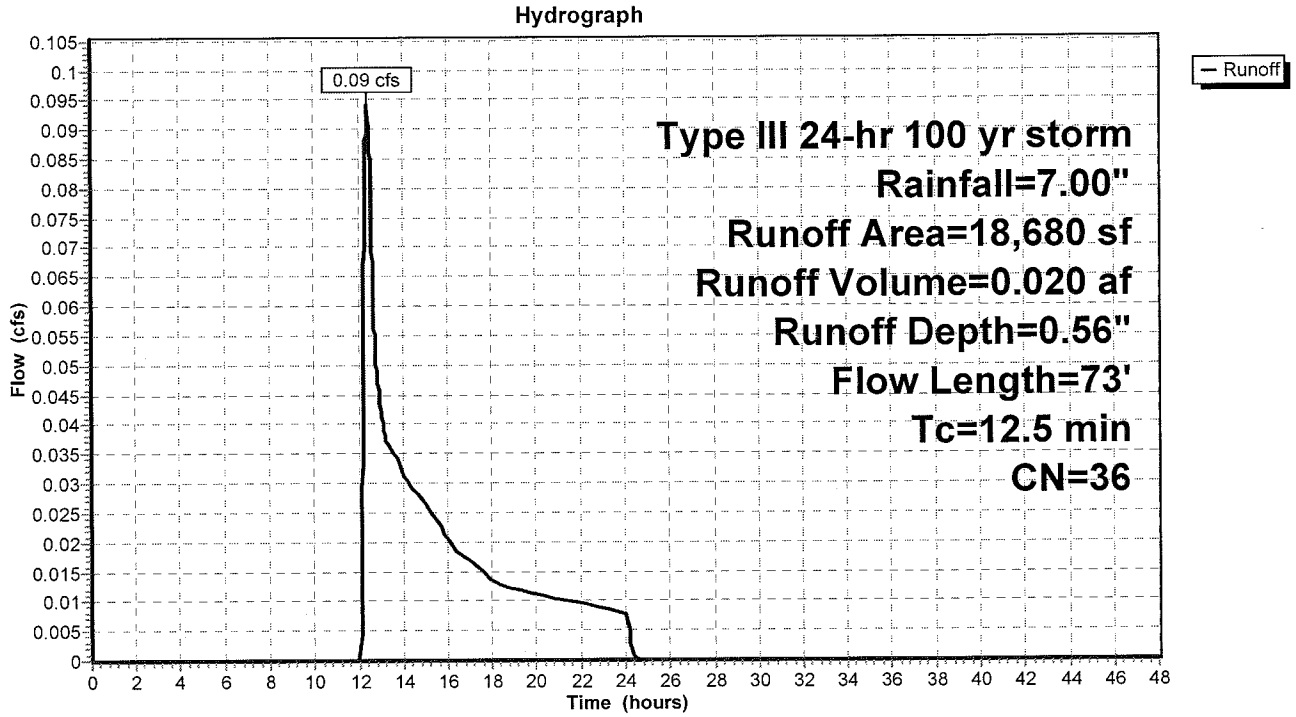
Runoff = 0.09 cfs @ 12.43 hrs, Volume= 0.020 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr storm Rainfall=7.00"

Area (sf)	CN	Description
18,680	36	Woods, Fair, HSG A

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.0	50	0.0200	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.40"
0.5	23	0.0200	0.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	73	Total			

Subcatchment PRE 2:



Subcatchment PRE 3:

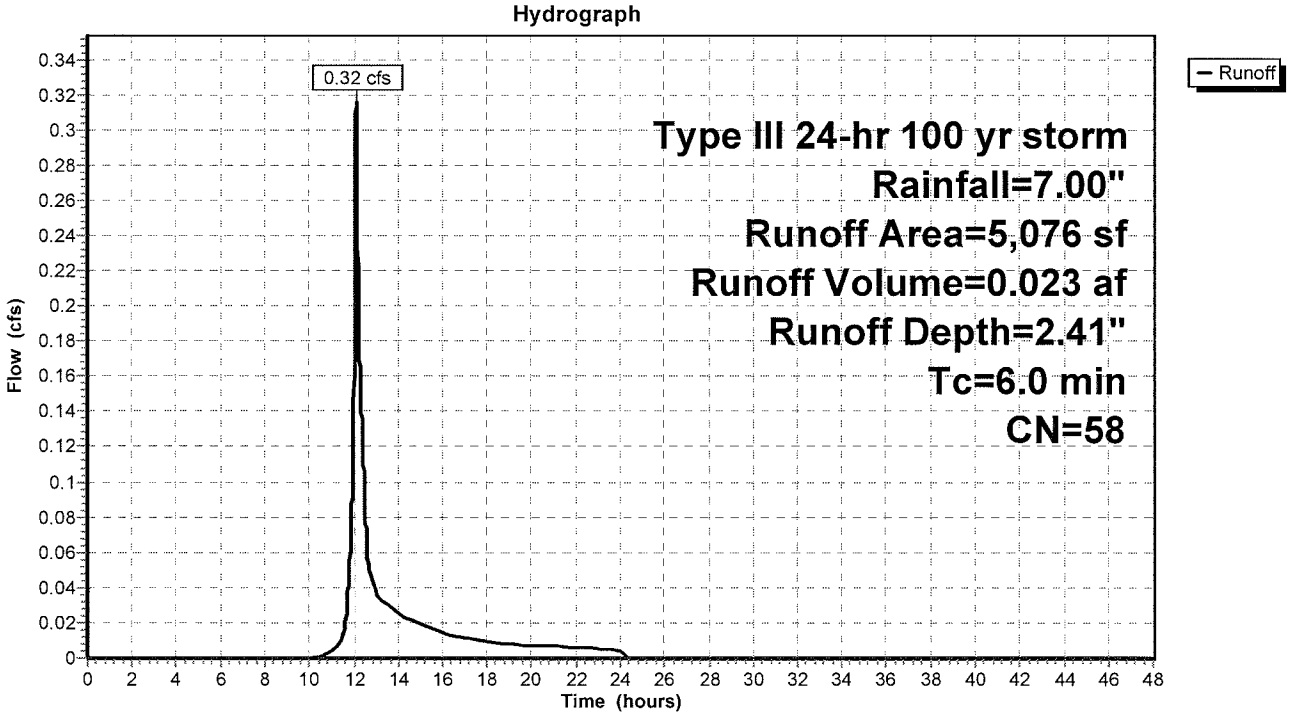
Runoff = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100 yr storm Rainfall=7.00"

Area (sf)	CN	Description
1,404	76	Gravel roads, HSG A
232	30	Woods, Good, HSG A
805	98	paved
2,635	39	>75% Grass cover, Good, HSG A
5,076	58	Weighted Average

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

Subcatchment PRE 3:

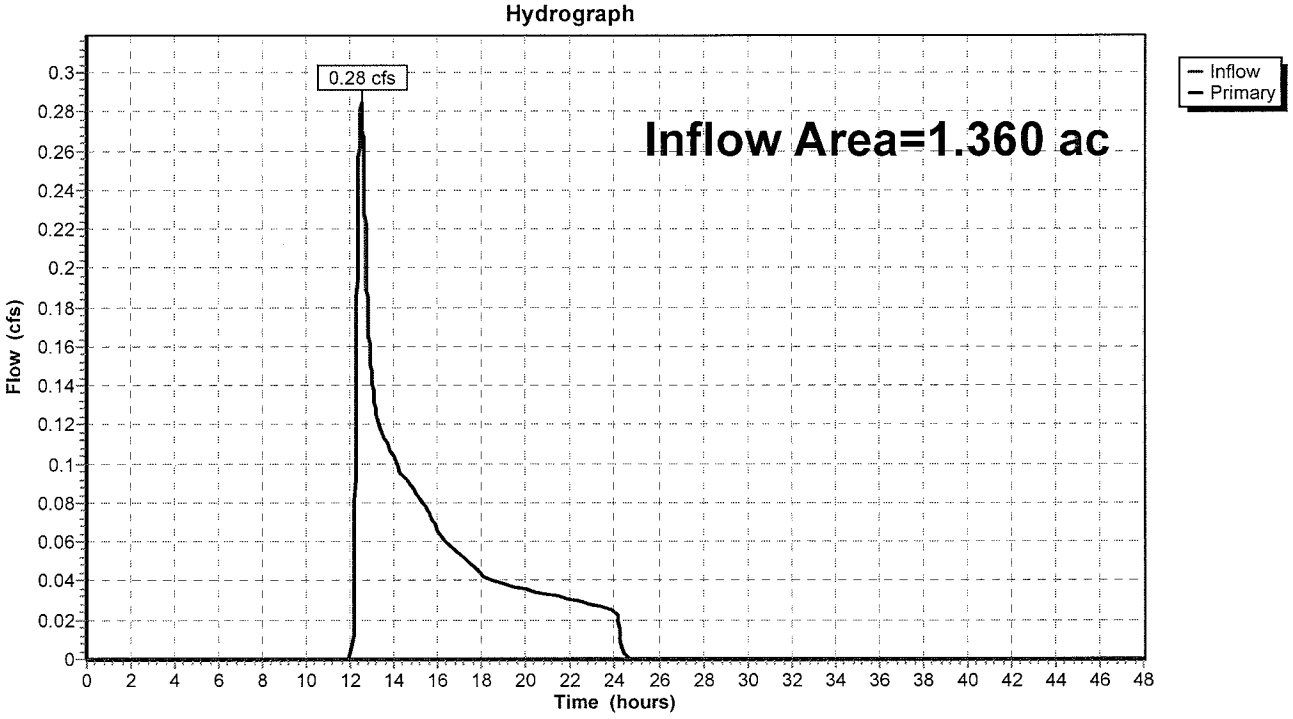


Pond SUM-1:

Inflow Area = 1.360 ac, Inflow Depth = 0.56" for 100 yr storm event
Inflow = 0.28 cfs @ 12.48 hrs, Volume= 0.063 af
Primary = 0.28 cfs @ 12.48 hrs, Volume= 0.063 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond SUM-1:

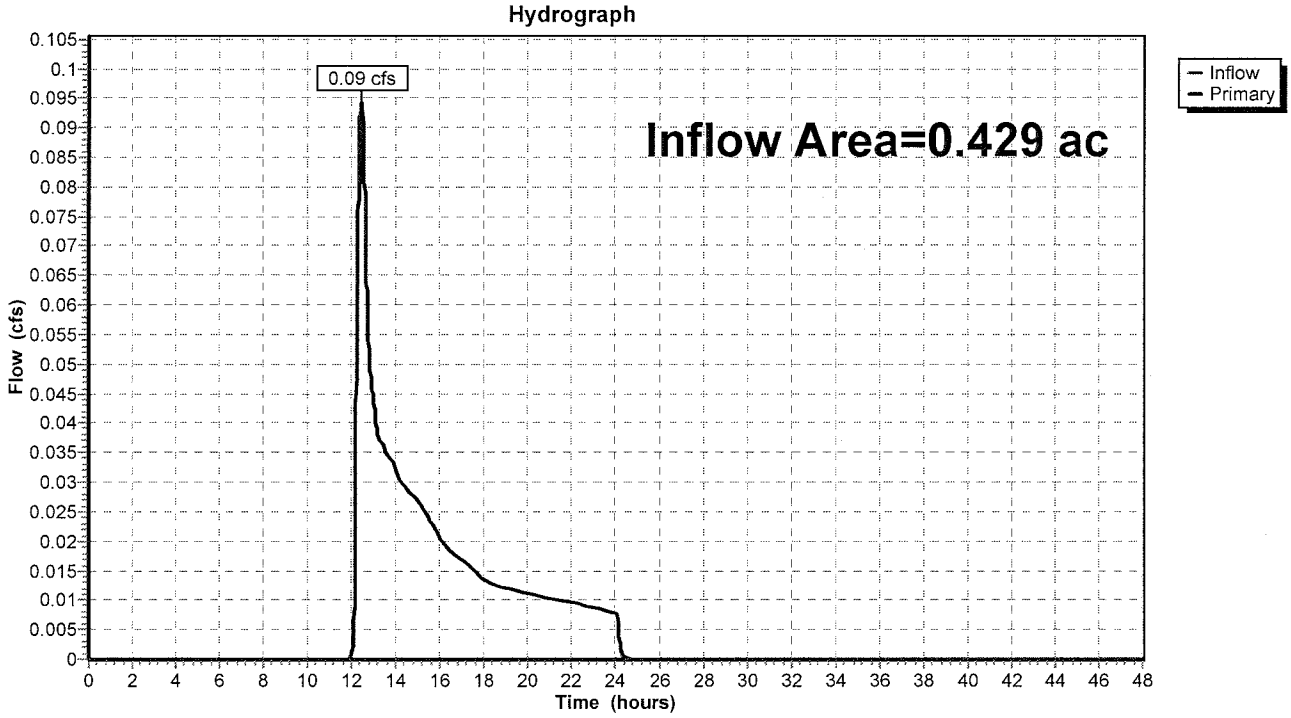


Pond SUM-2:

Inflow Area = 0.429 ac, Inflow Depth = 0.56" for 100 yr storm event
Inflow = 0.09 cfs @ 12.43 hrs, Volume= 0.020 af
Primary = 0.09 cfs @ 12.43 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond SUM-2:

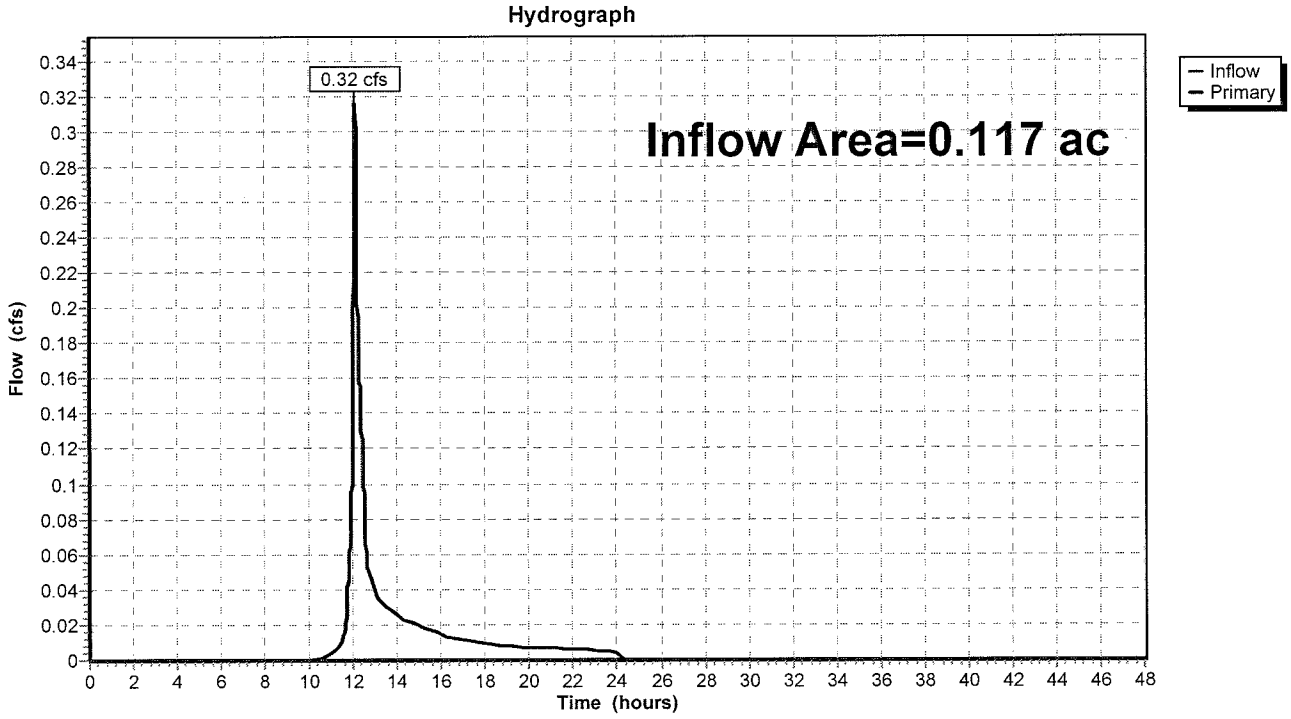


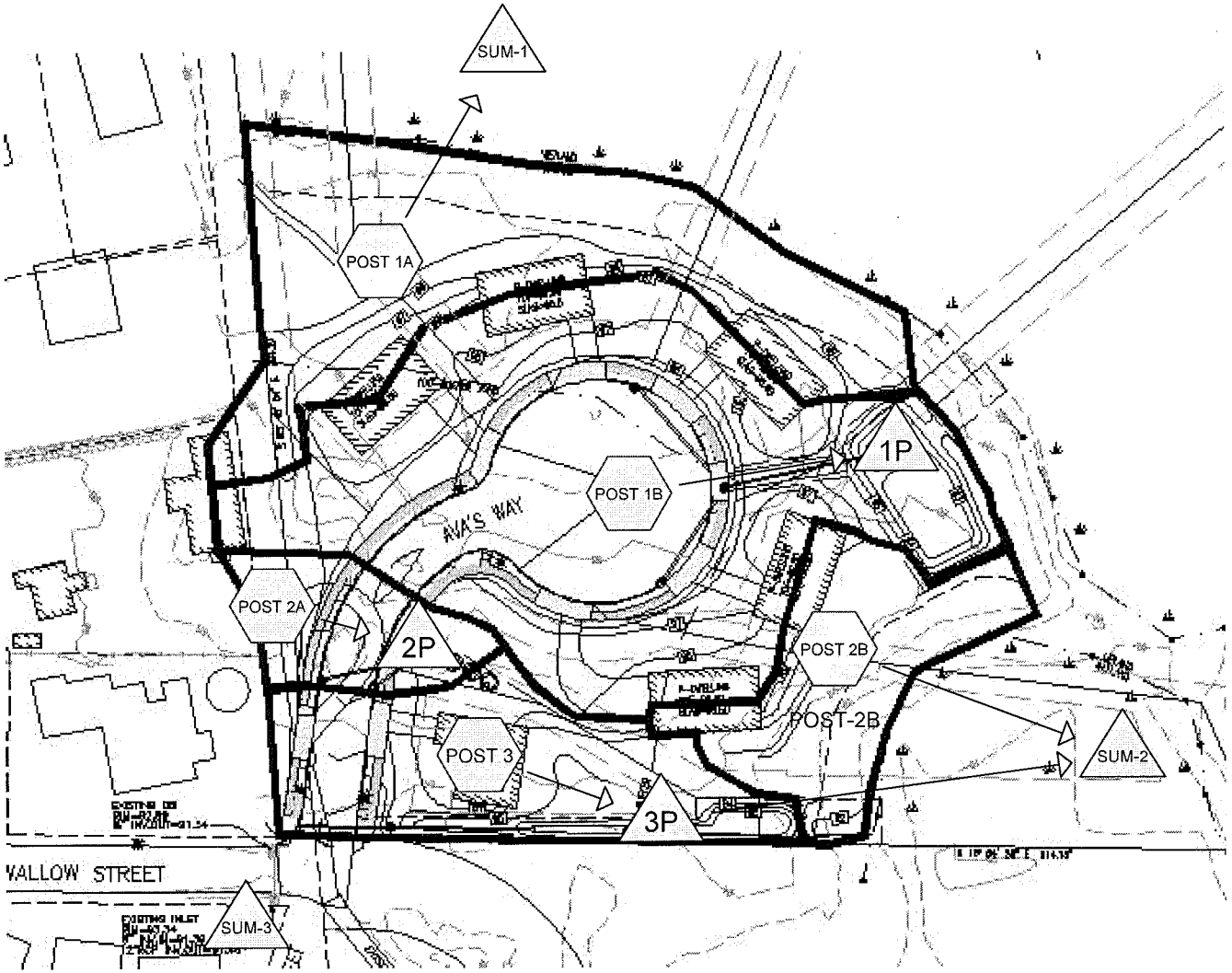
Pond SUM-3:

Inflow Area = 0.117 ac, Inflow Depth = 2.41" for 100 yr storm event
Inflow = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af
Primary = 0.32 cfs @ 12.09 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs

Pond SUM-3:





Subcat Reach Pond Link

Drainage Diagram for POST-development

Prepared by Prime Engineering, Inc 1/7/2014

Subcatchment POST 1A:

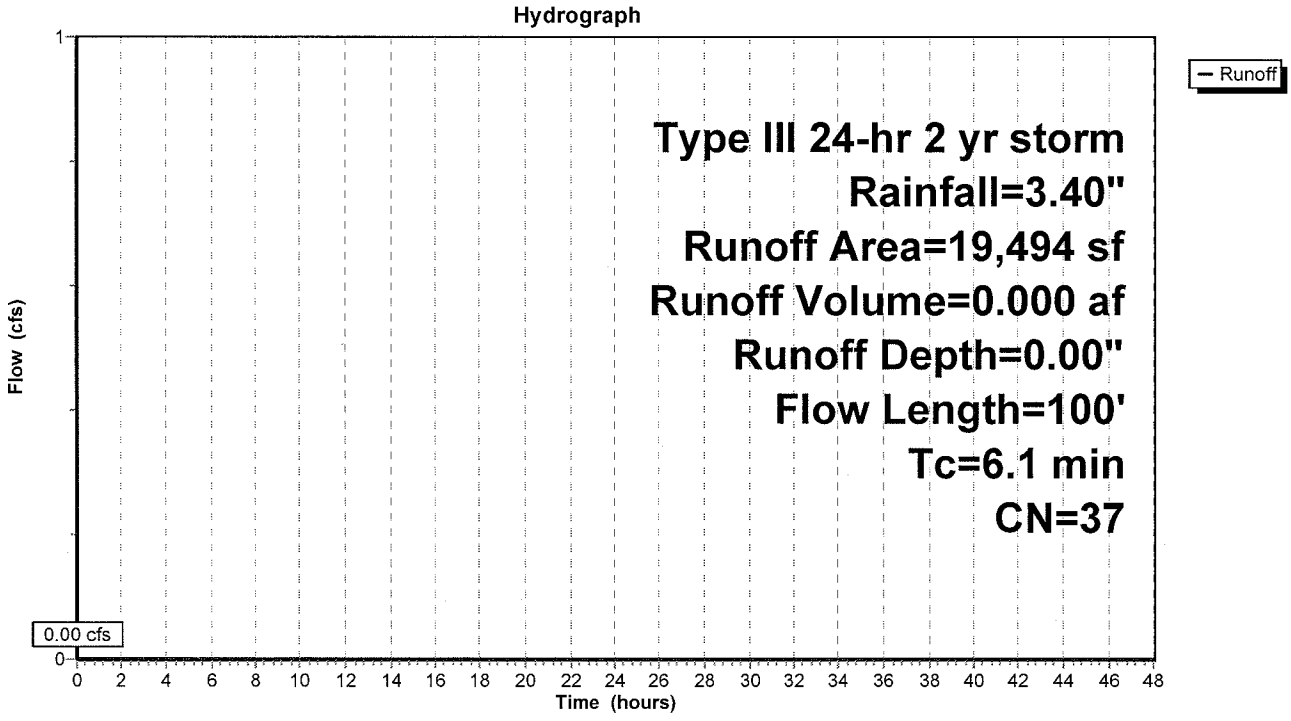
Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr storm Rainfall=3.40"

Area (sf)	CN	Description
0	98	2647 roof (sent to inf)
9,587	39	>75% Grass cover, Good, HSG A
9,907	36	Woods, Fair, HSG A
19,494	37	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0300	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.40"
1.5	50	0.0130	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.1	100	Total			

Subcatchment POST 1A:



Subcatchment POST 1B:

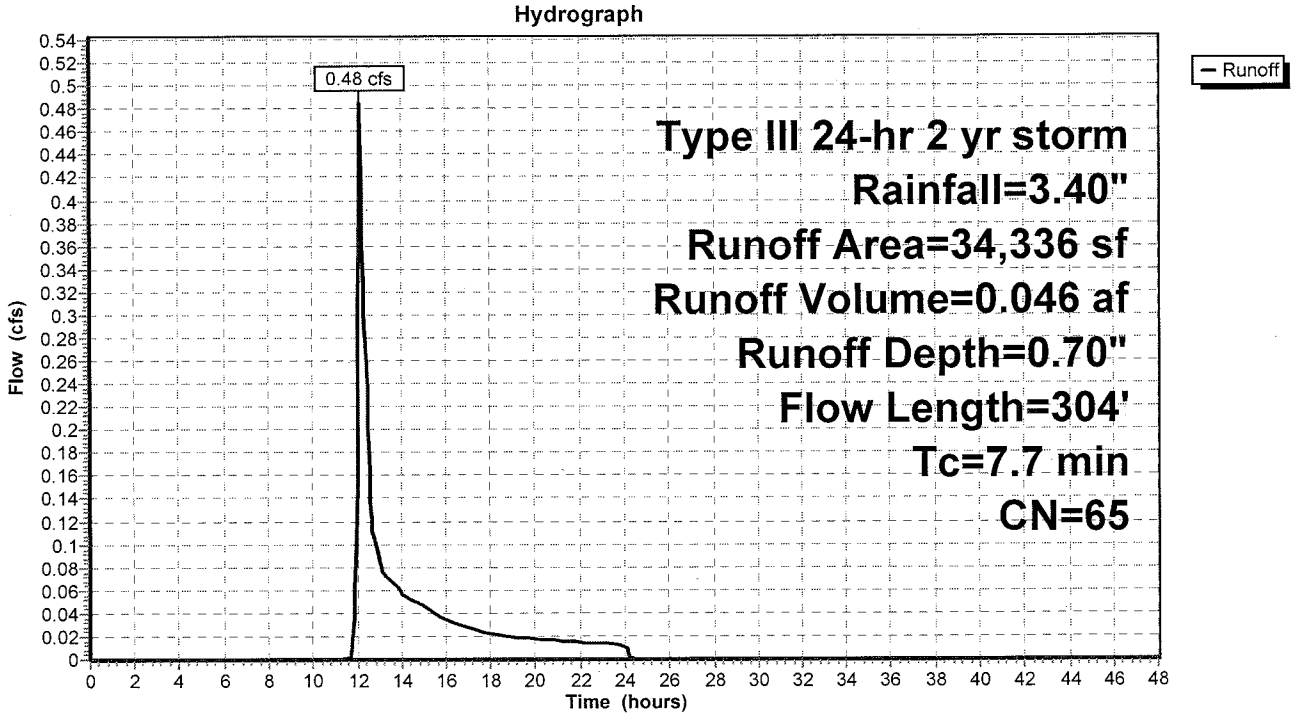
Runoff = 0.48 cfs @ 12.14 hrs, Volume= 0.046 af, Depth= 0.70"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr storm Rainfall=3.40"

Area (sf)	CN	Description
0	98	3360 SF roof (sent to infiltrator)
10,514	98	Paved roads w/curbs & sewers
2,361	98	Driveways
1,784	98	Basin
332	98	Existing Roof
19,345	39	>75% Grass cover, Good, HSG A
34,336	65	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	37	0.0080	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.40"
0.9	131	0.0145	2.4		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	136	0.0080	4.1	3.19	**Circular Channel (pipe),** Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
7.7	304	Total			

Subcatchment POST 1B:



Subcatchment POST 2A:

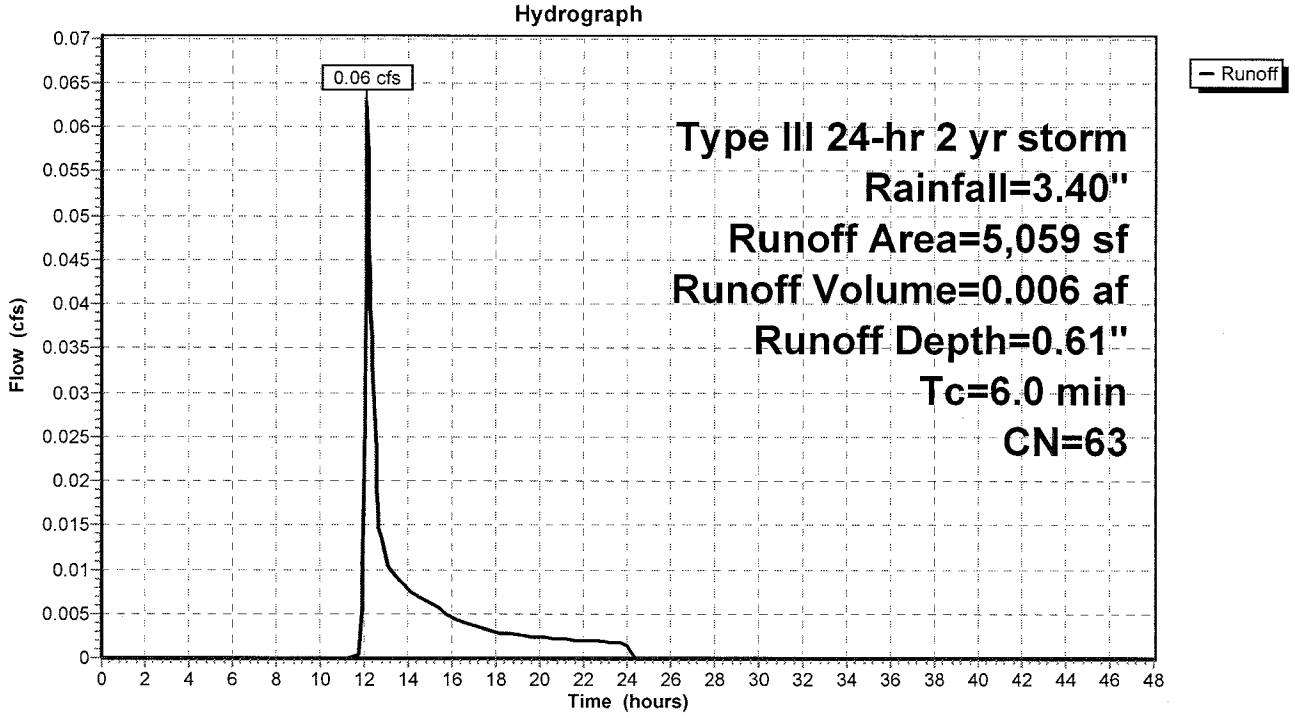
Runoff = 0.06 cfs @ 12.11 hrs, Volume= 0.006 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr storm Rainfall=3.40"

Area (sf)	CN	Description
2,099	98	Paved roads w/curbs & sewers
2,960	39	>75% Grass cover, Good, HSG A
5,059	63	Weighted Average

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

Subcatchment POST 2A:



Subcatchment POST 2B: POST-2B

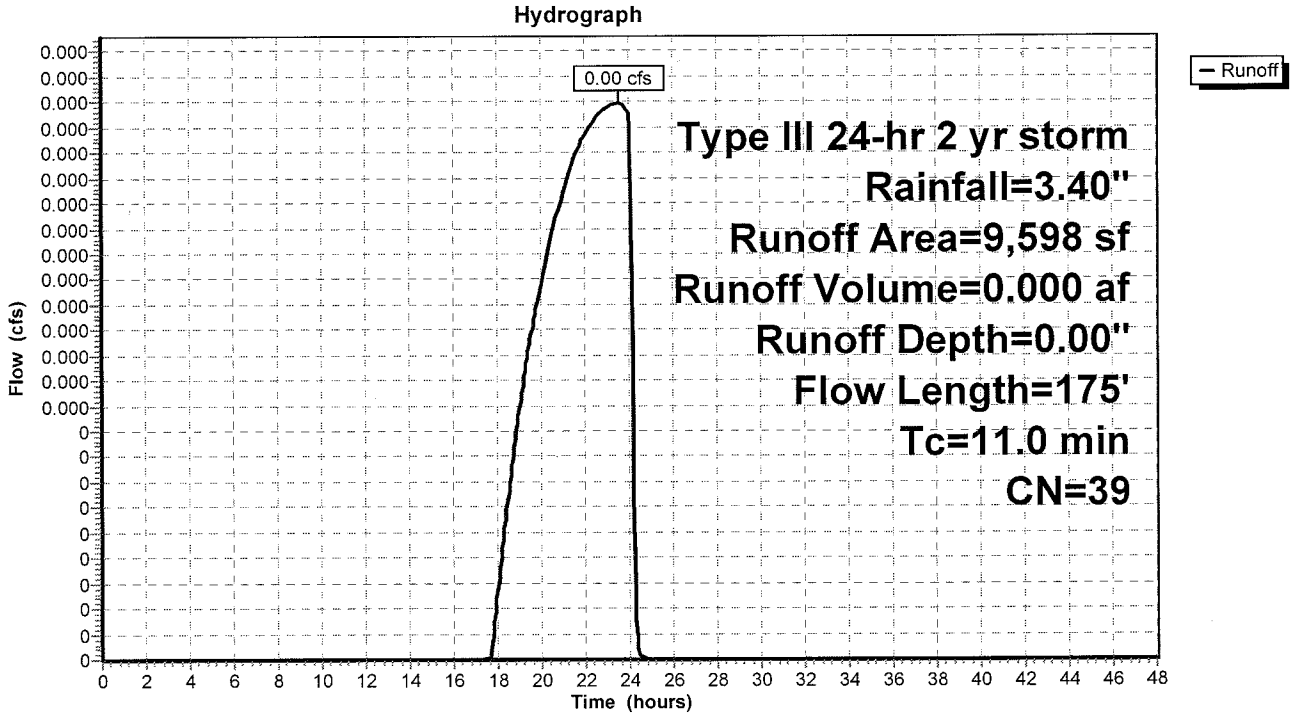
Runoff = 0.00 cfs @ 23.51 hrs, Volume= 0.000 af, Depth= 0.00"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr storm Rainfall=3.40"

Area (sf)	CN	Description
0	98	2,481 SF Roofs (sent to infiltrator)
9,598	39	>75% Grass cover, Good, HSG A
9,598	39	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0050	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.40"
1.5	125	0.0400	1.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.0	175	Total			

Subcatchment POST 2B: POST-2B



Subcatchment POST 3:

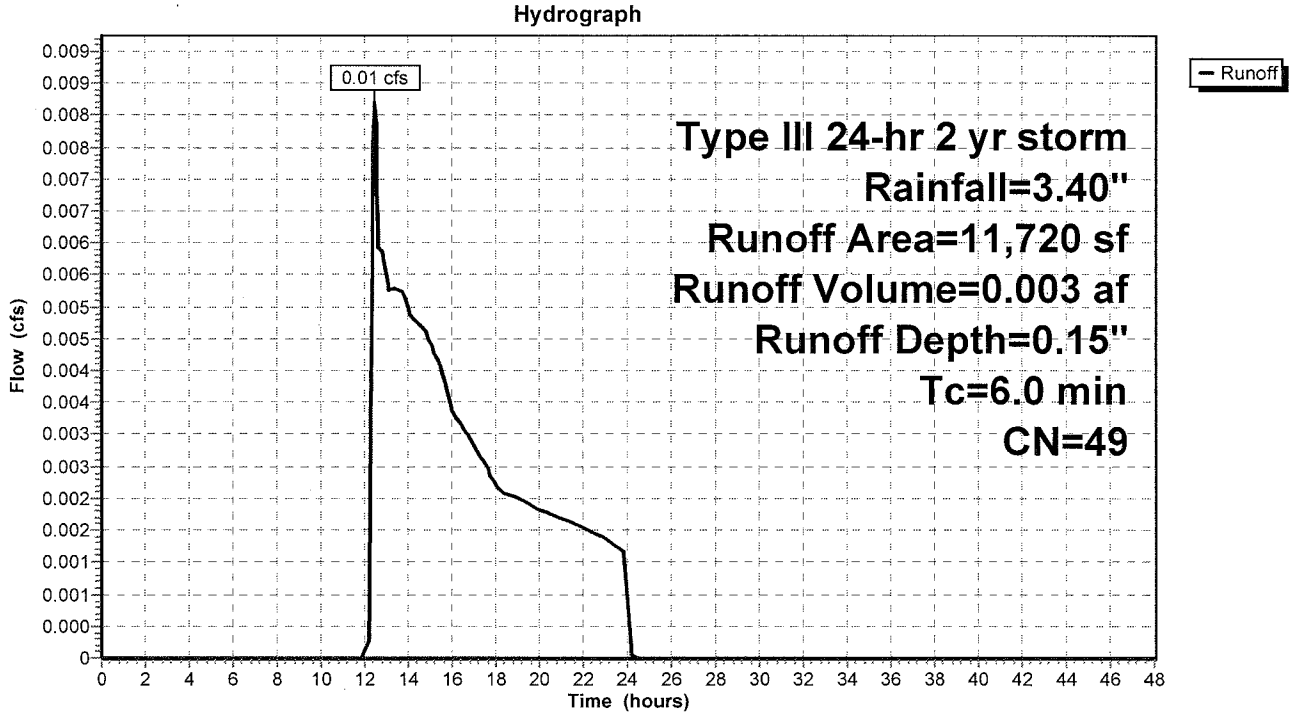
Runoff = 0.01 cfs @ 12.46 hrs, Volume= 0.003 af, Depth= 0.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 yr storm Rainfall=3.40"

Area (sf)	CN	Description
1,753	98	PAVED AND SIDEWALK
747	39	>75% Grass cover, Good, HSG A
0	98	1176 ROOF INFILTRATED
180	98	DRIVEWAY
9,040	39	>75% Grass cover, Good, HSG A
11,720	49	Weighted Average

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

Subcatchment POST 3:



Pond 1P:

Inflow Area = 0.788 ac, Inflow Depth = 0.70" for 2 yr storm event
Inflow = 0.48 cfs @ 12.14 hrs, Volume= 0.046 af
Outflow = 0.31 cfs @ 12.32 hrs, Volume= 0.046 af, Atten= 35%, Lag= 11.2 min
Discarded = 0.31 cfs @ 12.32 hrs, Volume= 0.046 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 93.07' @ 12.32 hrs Surf.Area= 1,639 sf Storage= 118 cf
Plug-Flow detention time= 2.6 min calculated for 0.046 af (100% of inflow)
Center-of-Mass det. time= 2.6 min (893.8 - 891.2)

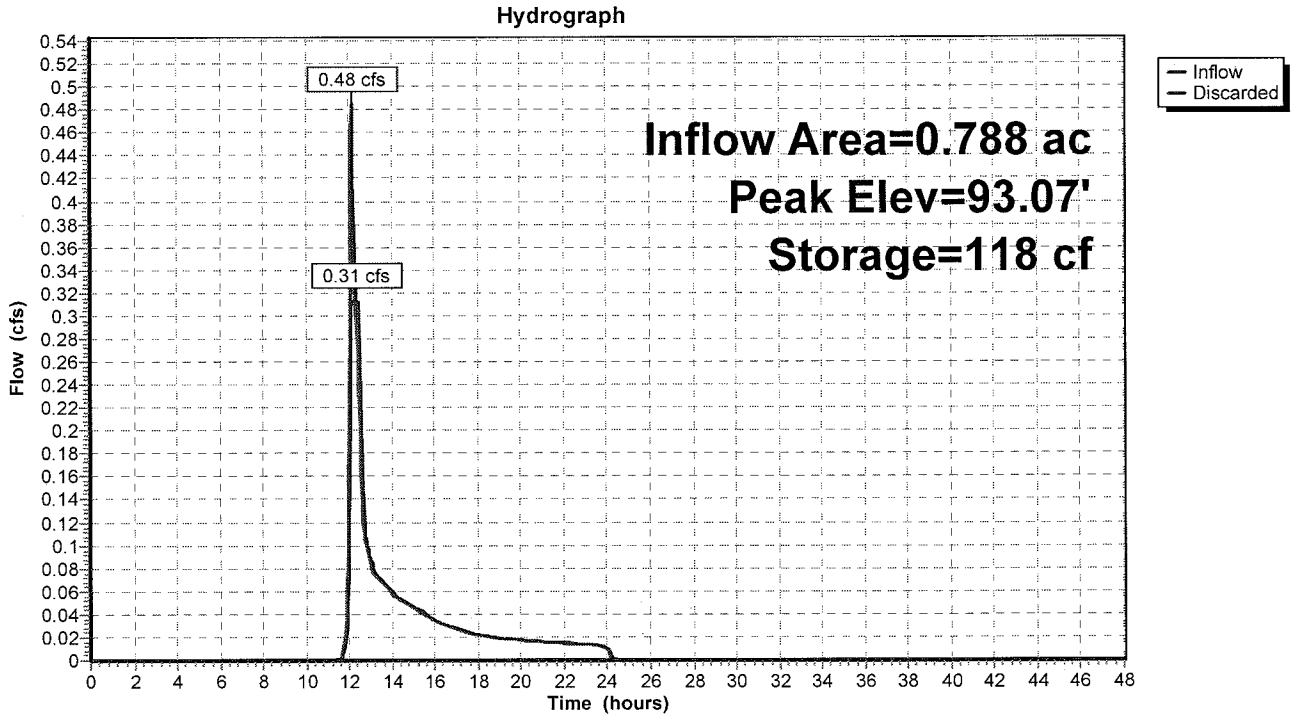
Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	4,305 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
93.00	1,600	0	0
94.00	2,138	1,869	1,869
95.00	2,733	2,436	4,305

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.31 cfs @ 12.32 hrs HW=93.07' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.31 cfs)

Pond 1P:



Pond 2P:

Inflow Area = 0.116 ac, Inflow Depth = 0.61" for 2 yr storm event
Inflow = 0.06 cfs @ 12.11 hrs, Volume= 0.006 af
Outflow = 0.05 cfs @ 12.15 hrs, Volume= 0.006 af, Atten= 23%, Lag= 2.2 min
Discarded = 0.05 cfs @ 12.15 hrs, Volume= 0.006 af

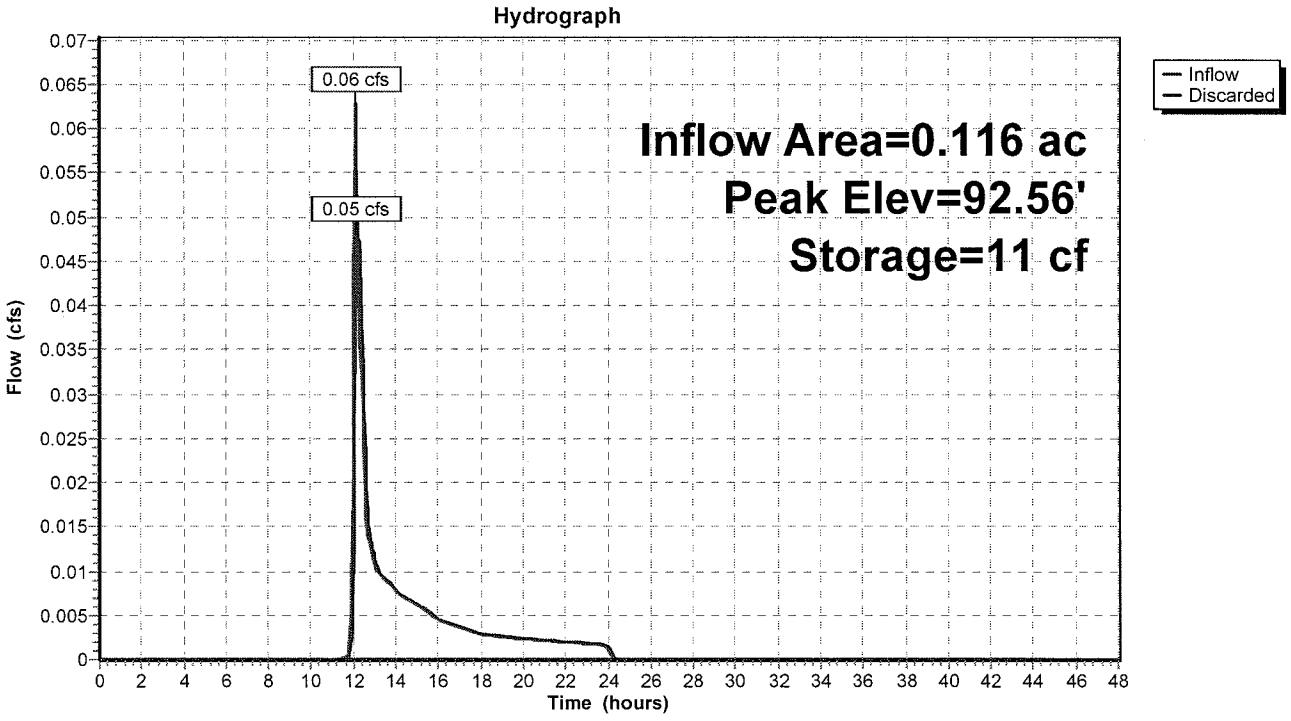
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 92.56' @ 12.20 hrs Surf.Area= 251 sf Storage= 11 cf
Plug-Flow detention time= 3.0 min calculated for 0.006 af (100% of inflow)
Center-of-Mass det. time= 3.0 min (901.0 - 898.0)

Volume	Invert	Avail.Storage	Storage Description
#1	92.50'	226 cf	**8.00'D x 4.50'H Vertical Cone/Cylinder** x 5 1,131 cf Overall - 565 cf Embedded = 565 cf x 40.0% Voids
#2	92.50'	565 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 5 Inside #1
		792 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 12.15 hrs HW=92.56' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.05 cfs)

Pond 2P:



Pond 3P:

Inflow Area = 0.269 ac, Inflow Depth = 0.15" for 2 yr storm event
Inflow = 0.01 cfs @ 12.46 hrs, Volume= 0.003 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 92.31' @ 24.40 hrs Surf.Area= 522 sf Storage= 145 cf
Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

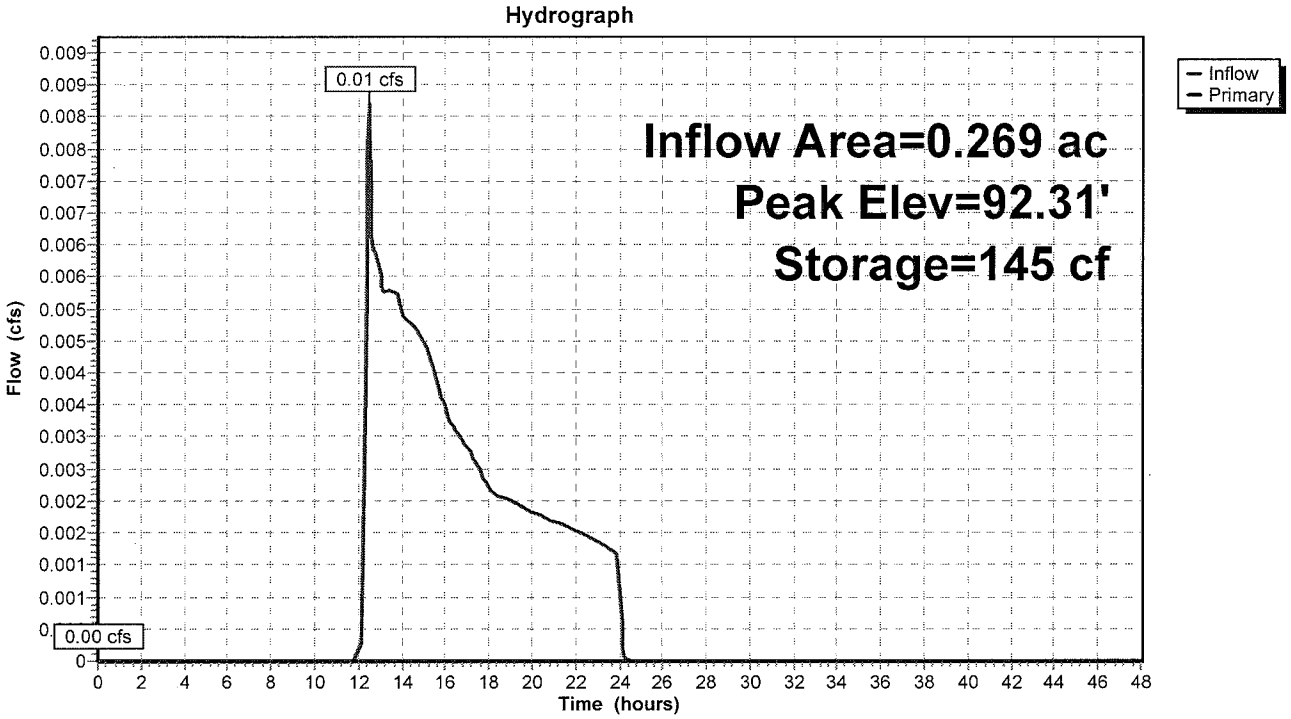
Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	590 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
92.00	411	0	0
93.00	768	590	590

Device	Routing	Invert	Outlet Devices
#1	Primary	92.95'	**4.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.00' (Free Discharge)
1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond 3P:

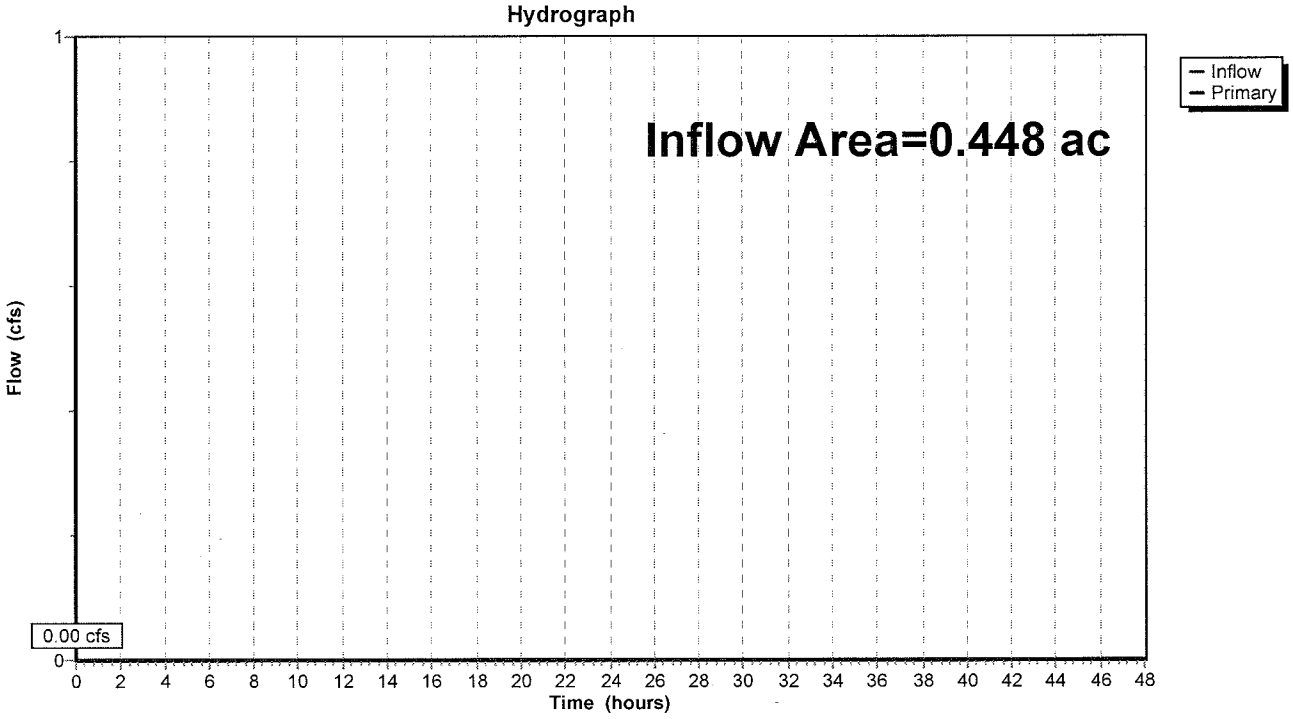

Hydrograph
Inflow Area=0.269 ac
Peak Elev=92.31'
Storage=145 cf
0.01 cfs
0.00 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0.009
0.009
0.008
0.008
0.007
0.007
0.006
0.006
0.005
0.005
0.004
0.004
0.003
0.003
0.002
0.002
0.001
0.001
0
0
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Pond SUM-1:

Inflow Area = 0.448 ac, Inflow Depth = 0.00" for 2 yr storm event
Inflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond SUM-1:

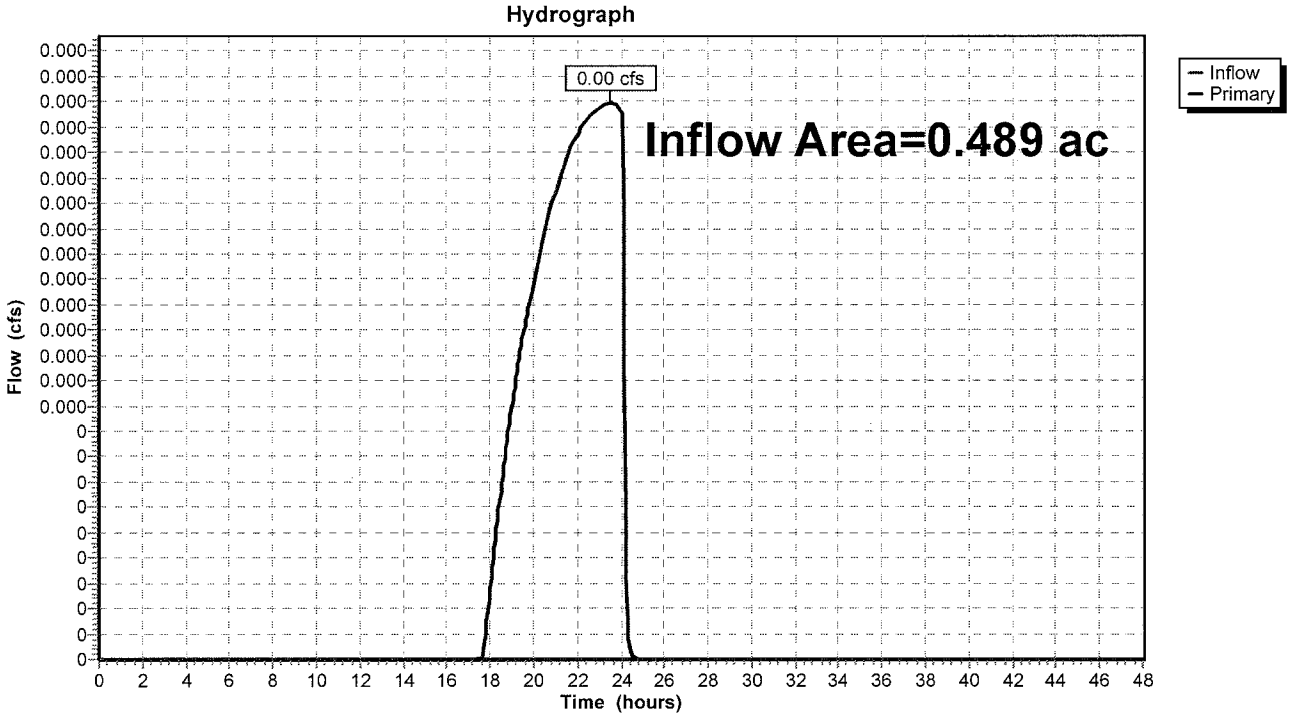


Pond SUM-2:

Inflow Area = 0.489 ac, Inflow Depth = 0.00" for 2 yr storm event
Inflow = 0.00 cfs @ 23.51 hrs, Volume= 0.000 af
Primary = 0.00 cfs @ 23.51 hrs, Volume= 0.000 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

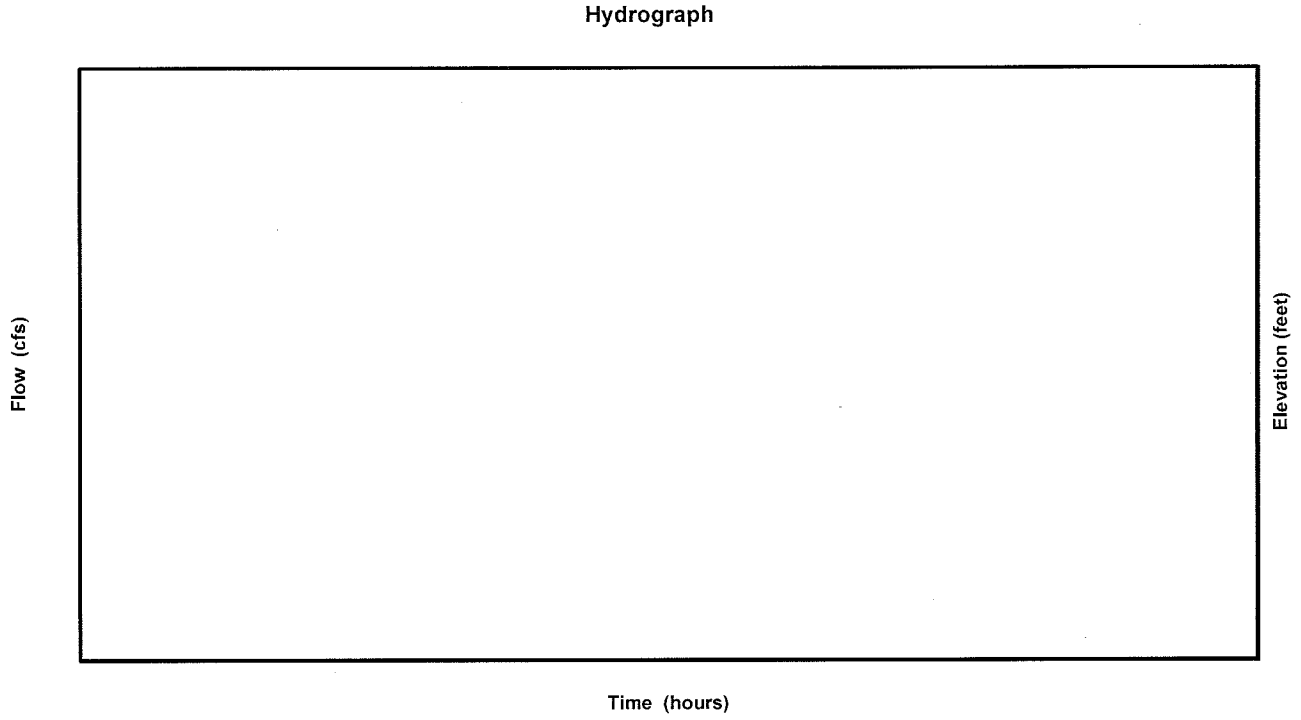
Pond SUM-2:



Pond SUM-3:

Routing by Stor-Ind method

Pond SUM-3:



Subcatchment POST 1A:

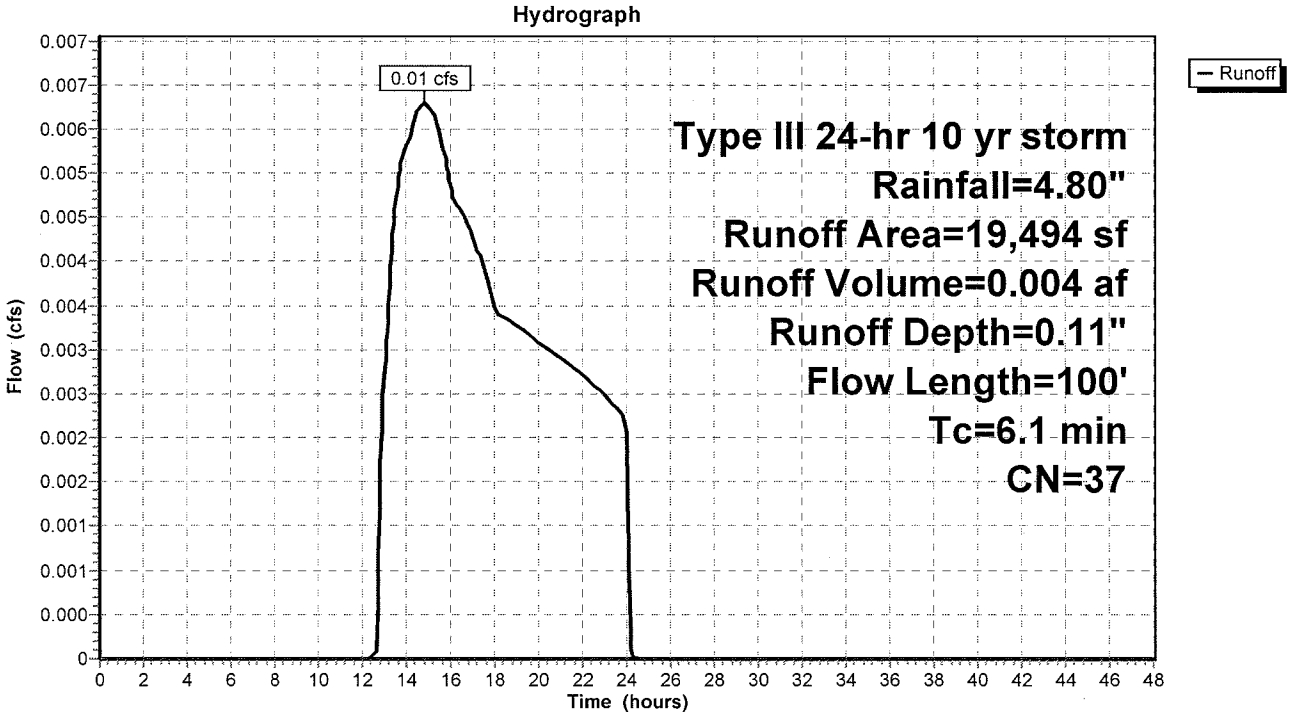
Runoff = 0.01 cfs @ 14.83 hrs, Volume= 0.004 af, Depth= 0.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr storm Rainfall=4.80"

Area (sf)	CN	Description
0	98	2647 roof (sent to inf)
9,587	39	>75% Grass cover, Good, HSG A
9,907	36	Woods, Fair, HSG A
19,494	37	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0300	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.40"
1.5	50	0.0130	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.1	100	Total			

Subcatchment POST 1A:



Subcatchment POST 1B:

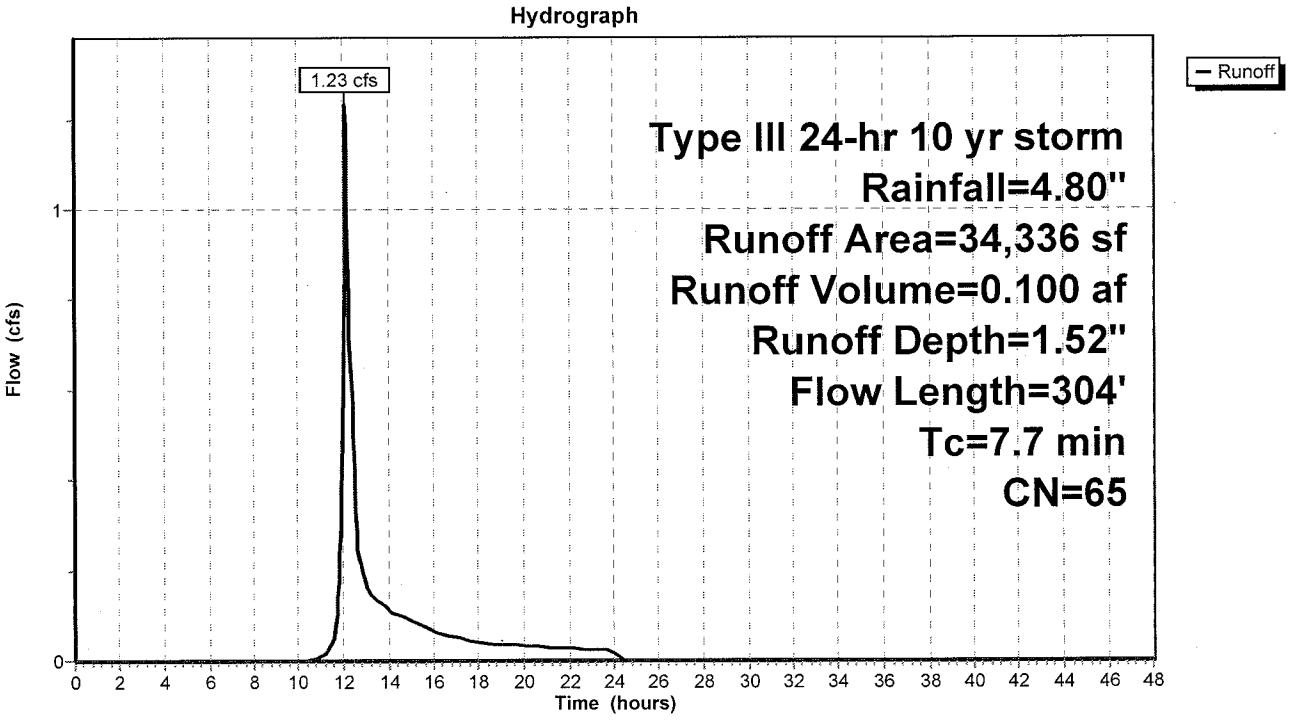
Runoff = 1.23 cfs @ 12.12 hrs, Volume= 0.100 af, Depth= 1.52"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr storm Rainfall=4.80"

Area (sf)	CN	Description
0	98	3360 SF roof (sent to infiltrator)
10,514	98	Paved roads w/curbs & sewers
2,361	98	Driveways
1,784	98	Basin
332	98	Existing Roof
19,345	39	>75% Grass cover, Good, HSG A
34,336	65	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	37	0.0080	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.40"
0.9	131	0.0145	2.4		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	136	0.0080	4.1	3.19	**Circular Channel (pipe),** Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
7.7	304	Total			

Subcatchment POST 1B:



Subcatchment POST 2A:

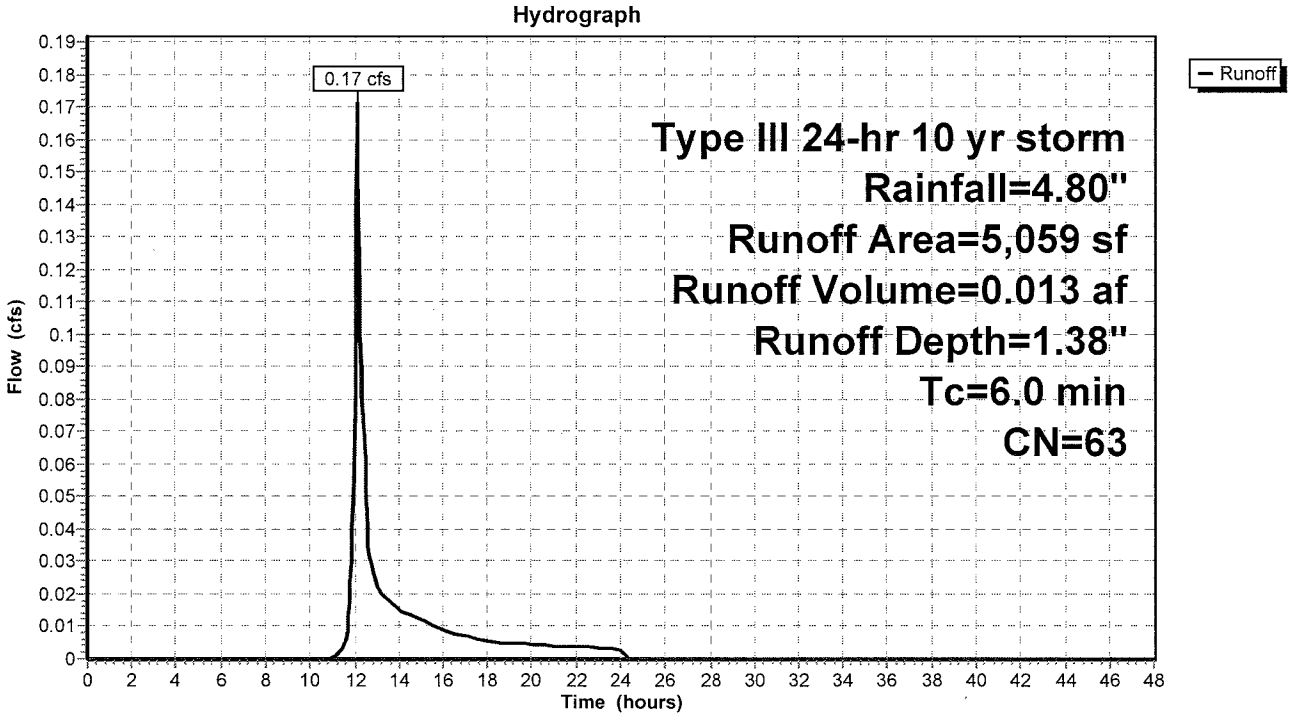
Runoff = 0.17 cfs @ 12.10 hrs, Volume= 0.013 af, Depth= 1.38"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr storm Rainfall=4.80"

Area (sf)	CN	Description
2,099	98	Paved roads w/curbs & sewers
2,960	39	>75% Grass cover, Good, HSG A
5,059	63	Weighted Average

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

Subcatchment POST 2A:



Subcatchment POST 2B: POST-2B

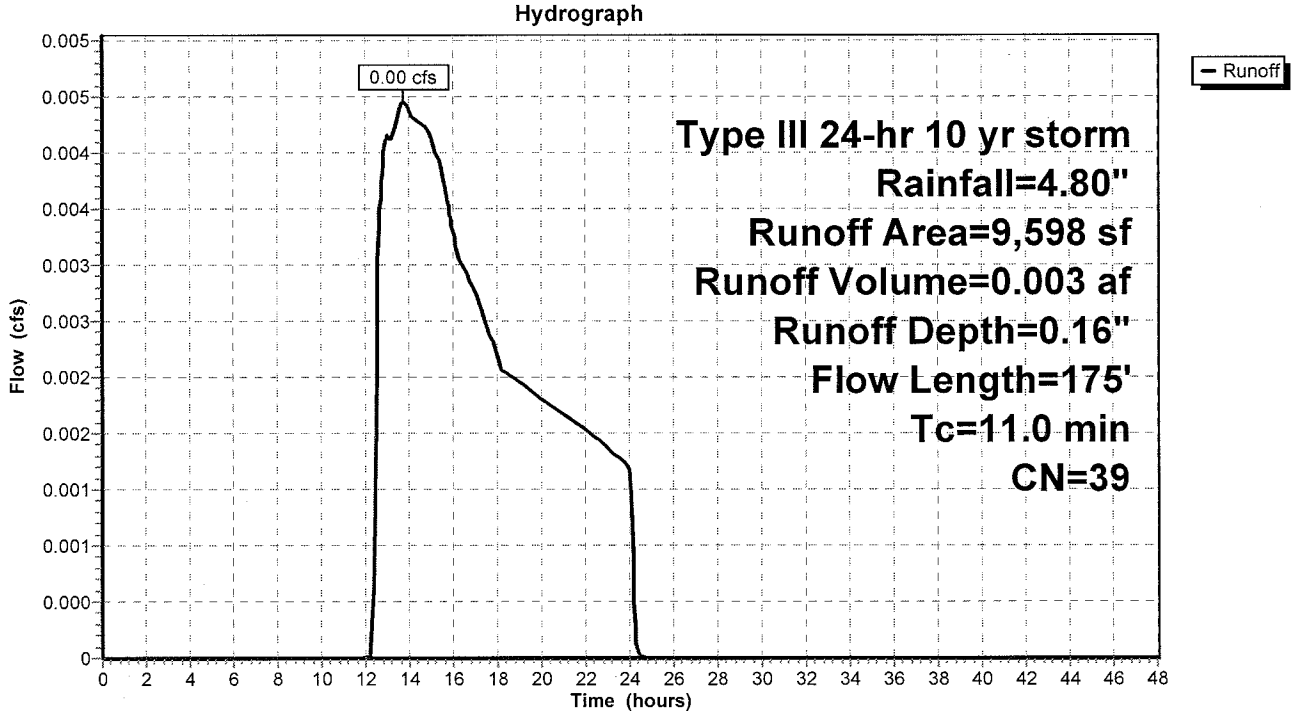
Runoff = 0.00 cfs @ 13.75 hrs, Volume= 0.003 af, Depth= 0.16"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr storm Rainfall=4.80"

Area (sf)	CN	Description
0	98	2,481 SF Roofs (sent to infiltrator)
9,598	39	>75% Grass cover, Good, HSG A
9,598	39	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0050	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.40"
1.5	125	0.0400	1.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.0	175	Total			

Subcatchment POST 2B: POST-2B



Subcatchment POST 3:

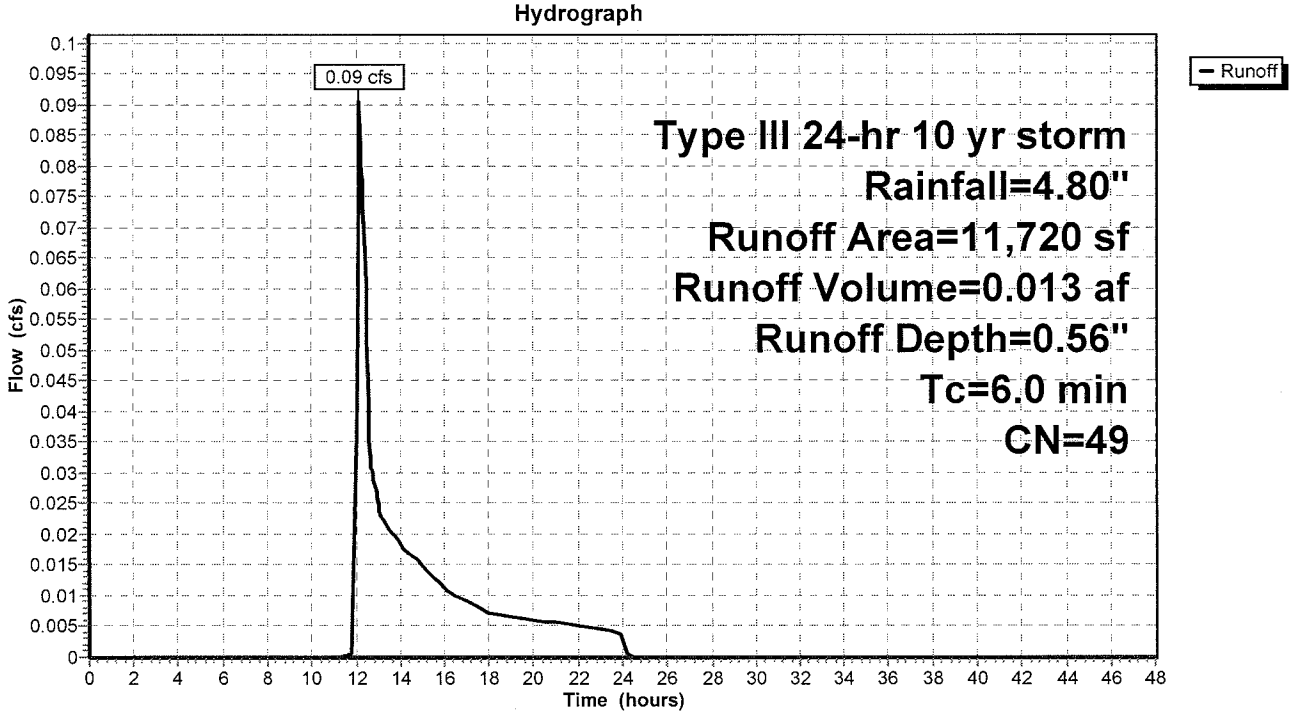
Runoff = 0.09 cfs @ 12.15 hrs, Volume= 0.013 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 10 yr storm Rainfall=4.80"

Area (sf)	CN	Description
1,753	98	PAVED AND SIDEWALK
747	39	>75% Grass cover, Good, HSG A
0	98	1176 ROOF INFILTRATED
180	98	DRIVEWAY
9,040	39	>75% Grass cover, Good, HSG A
11,720	49	Weighted Average

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

Subcatchment POST 3:



Pond 1P:

Inflow Area = 0.788 ac, Inflow Depth = 1.52" for 10 yr storm event
Inflow = 1.23 cfs @ 12.12 hrs, Volume= 0.100 af
Outflow = 0.36 cfs @ 12.54 hrs, Volume= 0.100 af, Atten= 71%, Lag= 25.2 min
Discarded = 0.36 cfs @ 12.54 hrs, Volume= 0.100 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 93.51' @ 12.54 hrs Surf.Area= 1,876 sf Storage= 891 cf
Plug-Flow detention time= 14.9 min calculated for 0.100 af (100% of inflow)
Center-of-Mass det. time= 14.9 min (879.9 - 865.0)

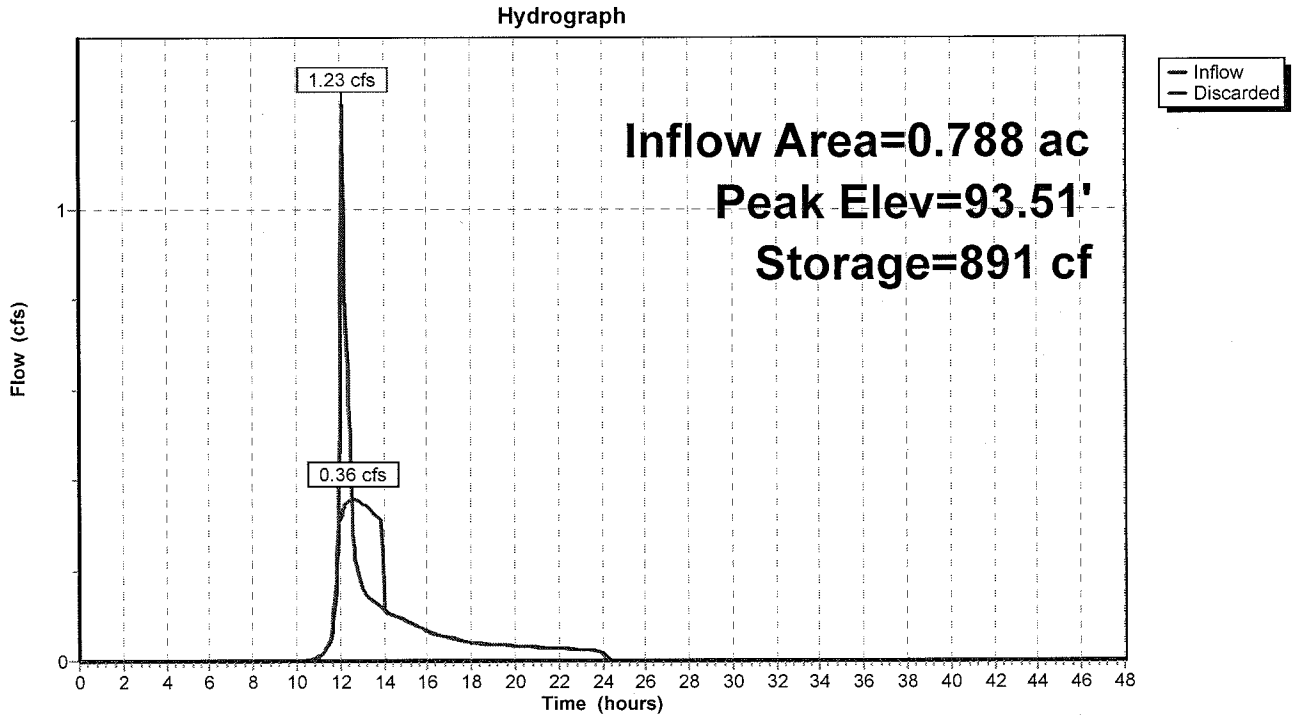
Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	4,305 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
93.00	1,600	0	0
94.00	2,138	1,869	1,869
95.00	2,733	2,436	4,305

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.36 cfs @ 12.54 hrs HW=93.51' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.36 cfs)

Pond 1P:



Pond 2P:

Inflow Area = 0.116 ac, Inflow Depth = 1.38" for 10 yr storm event
Inflow = 0.17 cfs @ 12.10 hrs, Volume= 0.013 af
Outflow = 0.05 cfs @ 12.00 hrs, Volume= 0.013 af, Atten= 72%, Lag= 0.0 min
Discarded = 0.05 cfs @ 12.00 hrs, Volume= 0.013 af

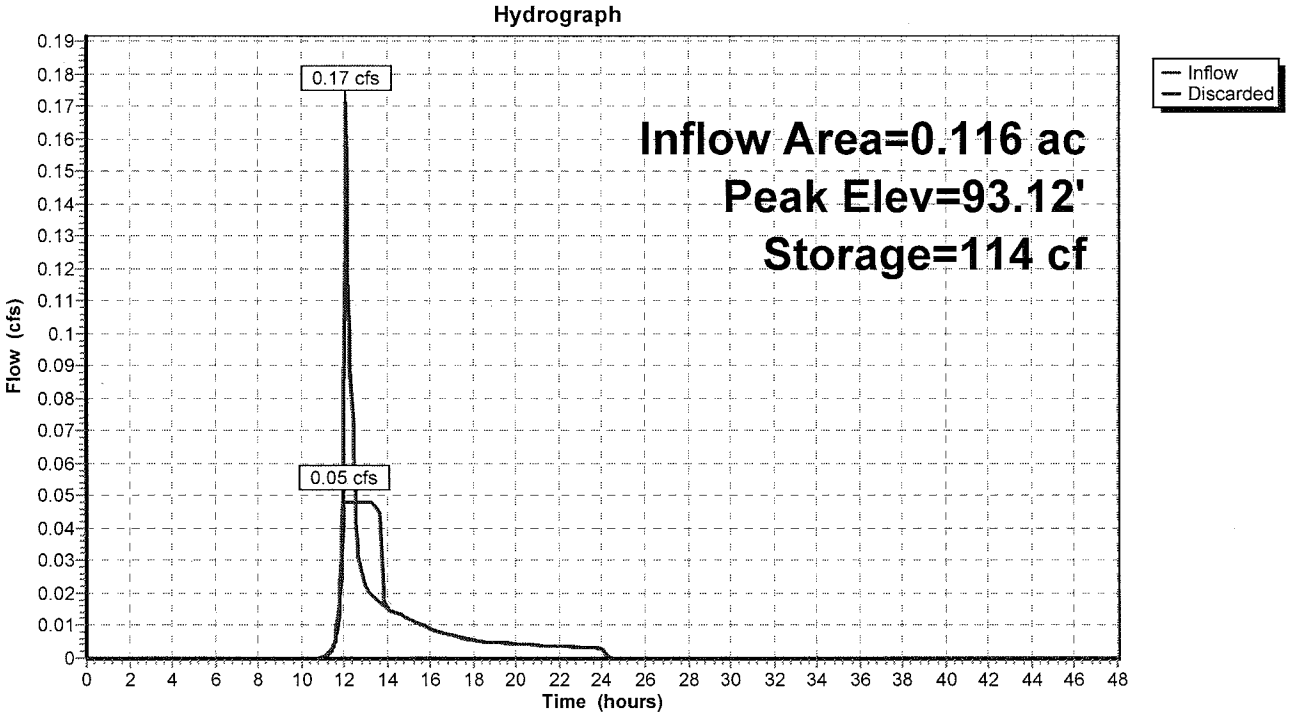
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 93.12' @ 12.52 hrs Surf.Area= 251 sf Storage= 114 cf
Plug-Flow detention time= 14.1 min calculated for 0.013 af (100% of inflow)
Center-of-Mass det. time= 14.1 min (883.3 - 869.2)

Volume	Invert	Avail.Storage	Storage Description
#1	92.50'	226 cf	**8.00'D x 4.50'H Vertical Cone/Cylinder** x 5 1,131 cf Overall - 565 cf Embedded = 565 cf x 40.0% Voids
#2	92.50'	565 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 5 Inside #1
		792 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 12.00 hrs HW=92.56' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.05 cfs)

Pond 2P:



Pond 3P:

Inflow Area = 0.269 ac, Inflow Depth = 0.56" for 10 yr storm event
Inflow = 0.09 cfs @ 12.15 hrs, Volume= 0.013 af
Outflow = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 92.95' @ 24.40 hrs Surf.Area= 749 sf Storage= 550 cf
Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

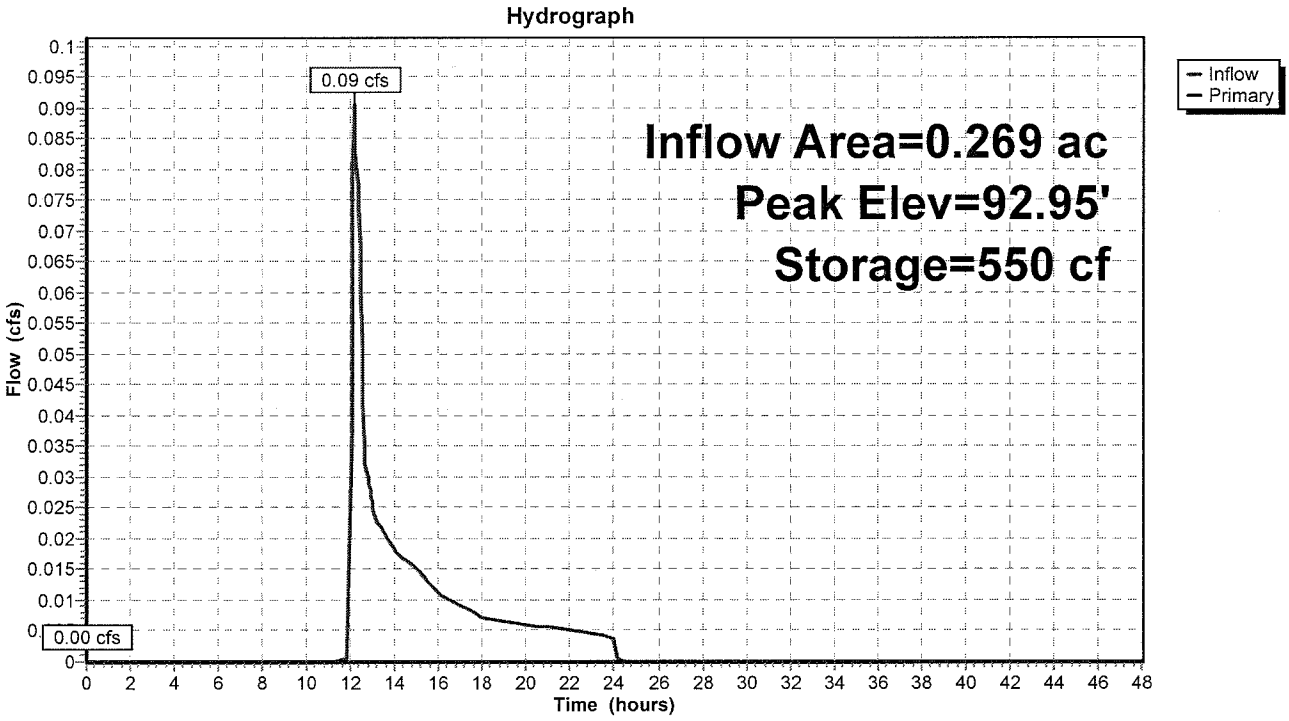
Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	590 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
92.00	411	0	0
93.00	768	590	590

Device	Routing	Invert	Outlet Devices
#1	Primary	92.95'	**4.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=92.00' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond 3P:

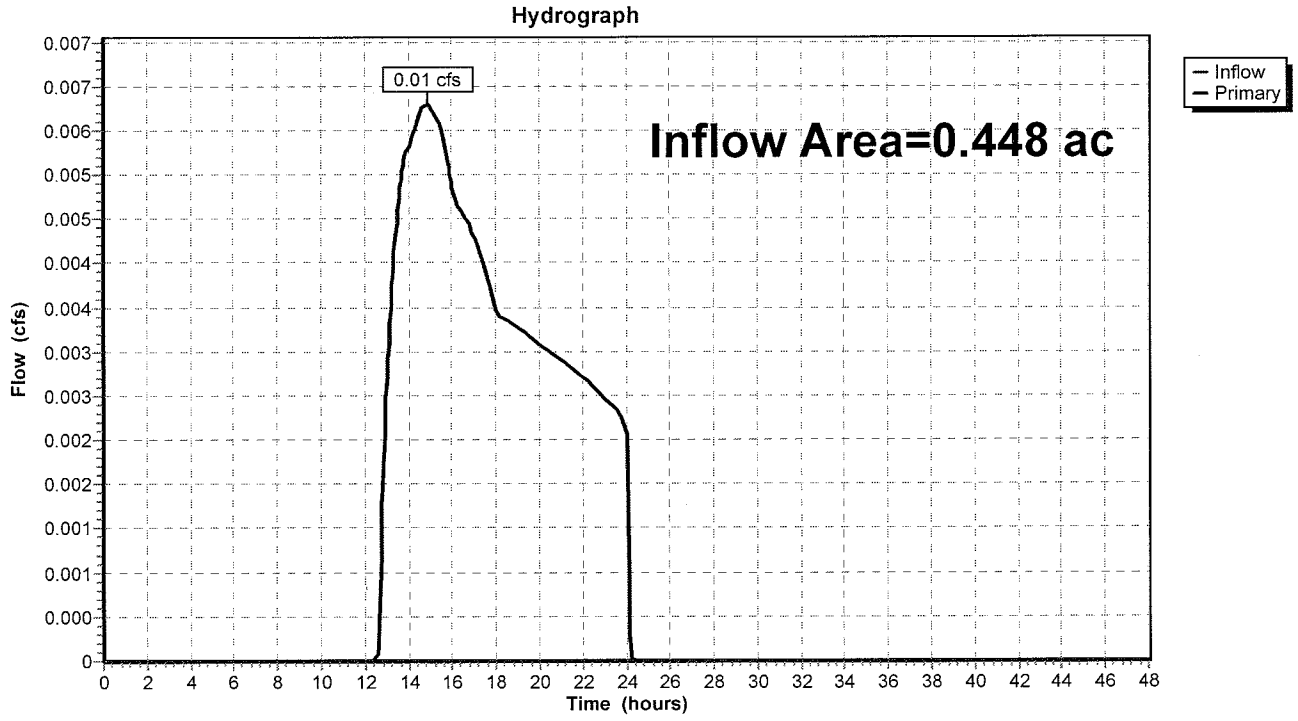

Hydrograph
Inflow Area=0.269 ac
Peak Elev=92.95'
Storage=550 cf
0.09 cfs
0.00 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Pond SUM-1:

Inflow Area = 0.448 ac, Inflow Depth = 0.11" for 10 yr storm event
Inflow = 0.01 cfs @ 14.83 hrs, Volume= 0.004 af
Primary = 0.01 cfs @ 14.83 hrs, Volume= 0.004 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond SUM-1:

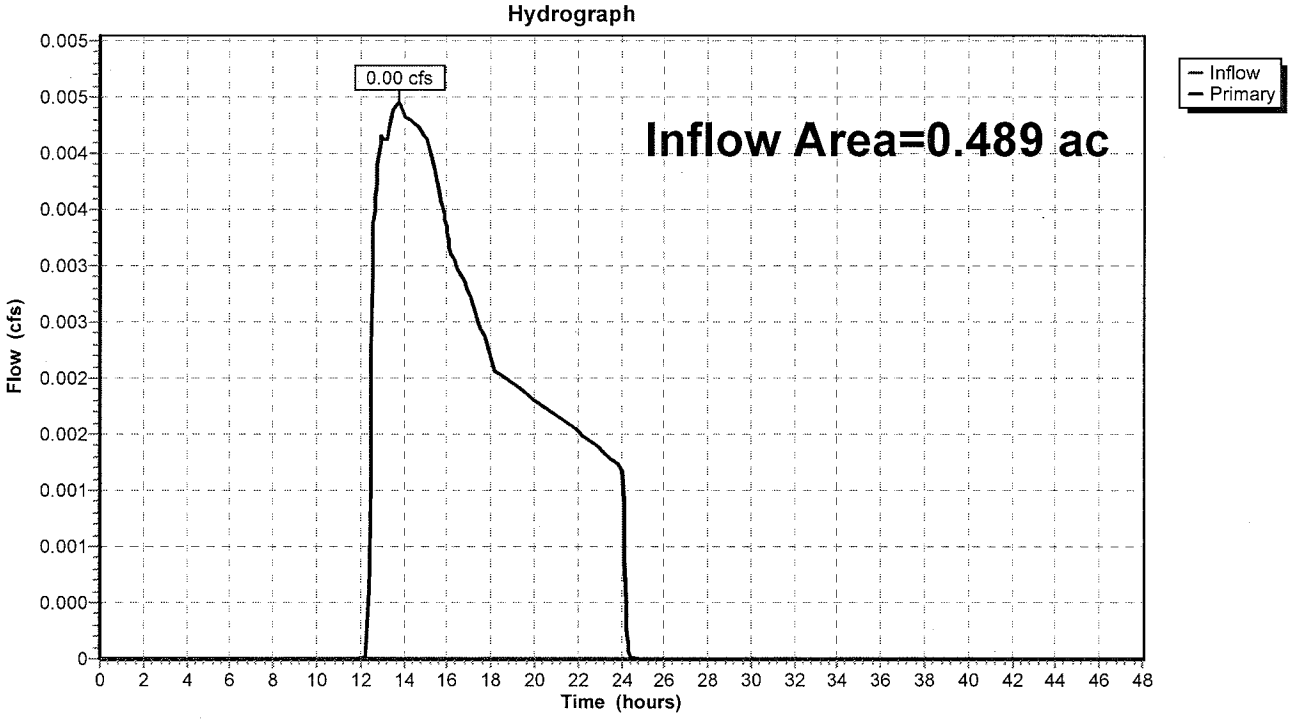


Pond SUM-2:

Inflow Area = 0.489 ac, Inflow Depth = 0.07" for 10 yr storm event
Inflow = 0.00 cfs @ 13.75 hrs, Volume= 0.003 af
Primary = 0.00 cfs @ 13.75 hrs, Volume= 0.003 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

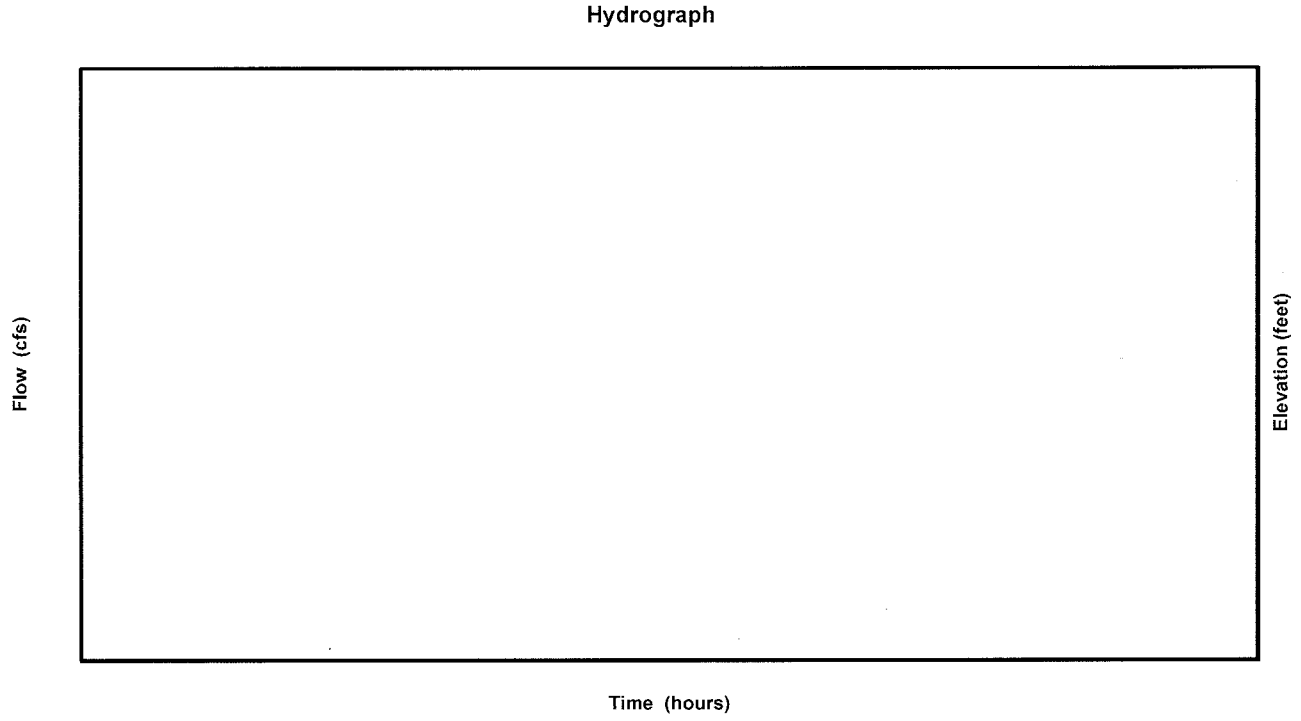
Pond SUM-2:



Pond SUM-3:

Routing by Stor-Ind method

Pond SUM-3:



Subcatchment POST 1A:

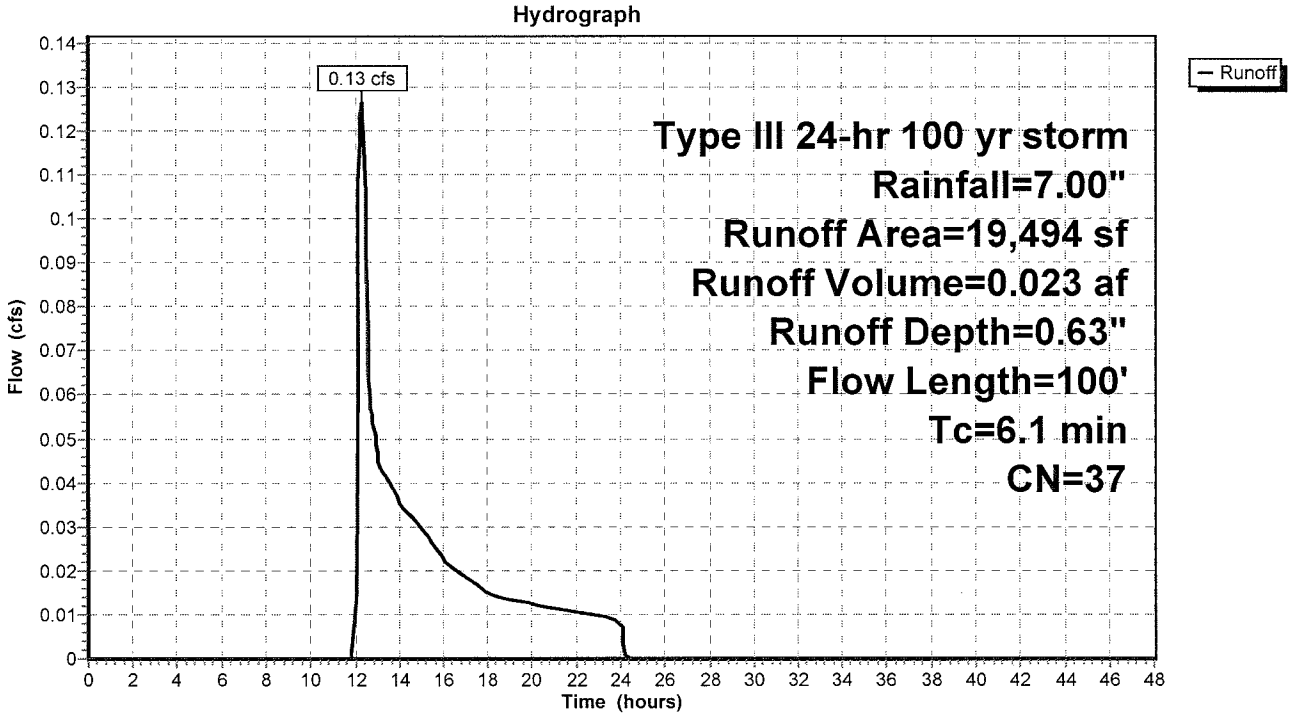
Runoff = 0.13 cfs @ 12.30 hrs, Volume= 0.023 af, Depth= 0.63"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr storm Rainfall=7.00"

Area (sf)	CN	Description
0	98	2647 roof (sent to inf)
9,587	39	>75% Grass cover, Good, HSG A
9,907	36	Woods, Fair, HSG A
19,494	37	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	50	0.0300	0.2		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.40"
1.5	50	0.0130	0.6		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
6.1	100	Total			

Subcatchment POST 1A:



Subcatchment POST 1B:

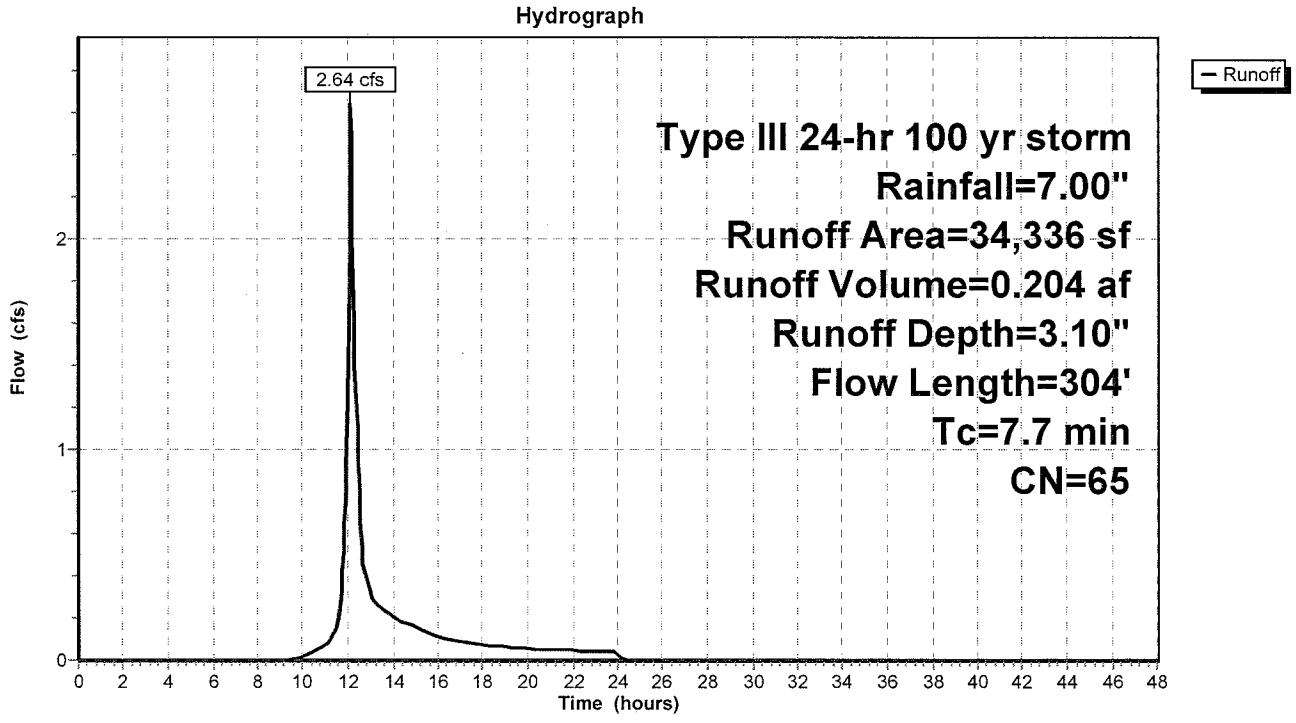
Runoff = 2.64 cfs @ 12.12 hrs, Volume= 0.204 af, Depth= 3.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr storm Rainfall=7.00"

Area (sf)	CN	Description
0	98	3360 SF roof (sent to infiltrator)
10,514	98	Paved roads w/curbs & sewers
2,361	98	Driveways
1,784	98	Basin
332	98	Existing Roof
19,345	39	>75% Grass cover, Good, HSG A
34,336	65	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.2	37	0.0080	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.40"
0.9	131	0.0145	2.4		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
0.6	136	0.0080	4.1	3.19	**Circular Channel (pipe),** Diam= 12.0" Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013
7.7	304	Total			

Subcatchment POST 1B:



Subcatchment POST 2A:

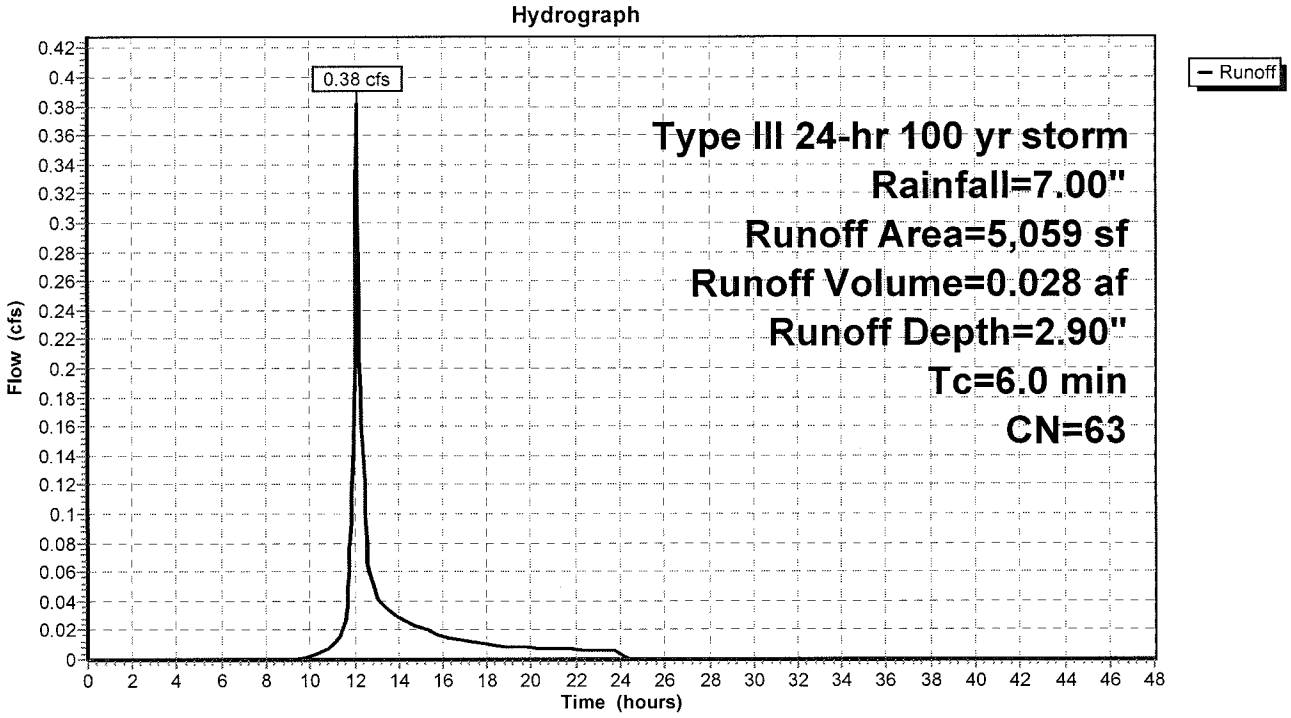
Runoff = 0.38 cfs @ 12.10 hrs, Volume= 0.028 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr storm Rainfall=7.00"

Area (sf)	CN	Description
2,099	98	Paved roads w/curbs & sewers
2,960	39	>75% Grass cover, Good, HSG A
5,059	63	Weighted Average

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

Subcatchment POST 2A:



Subcatchment POST 2B: POST-2B

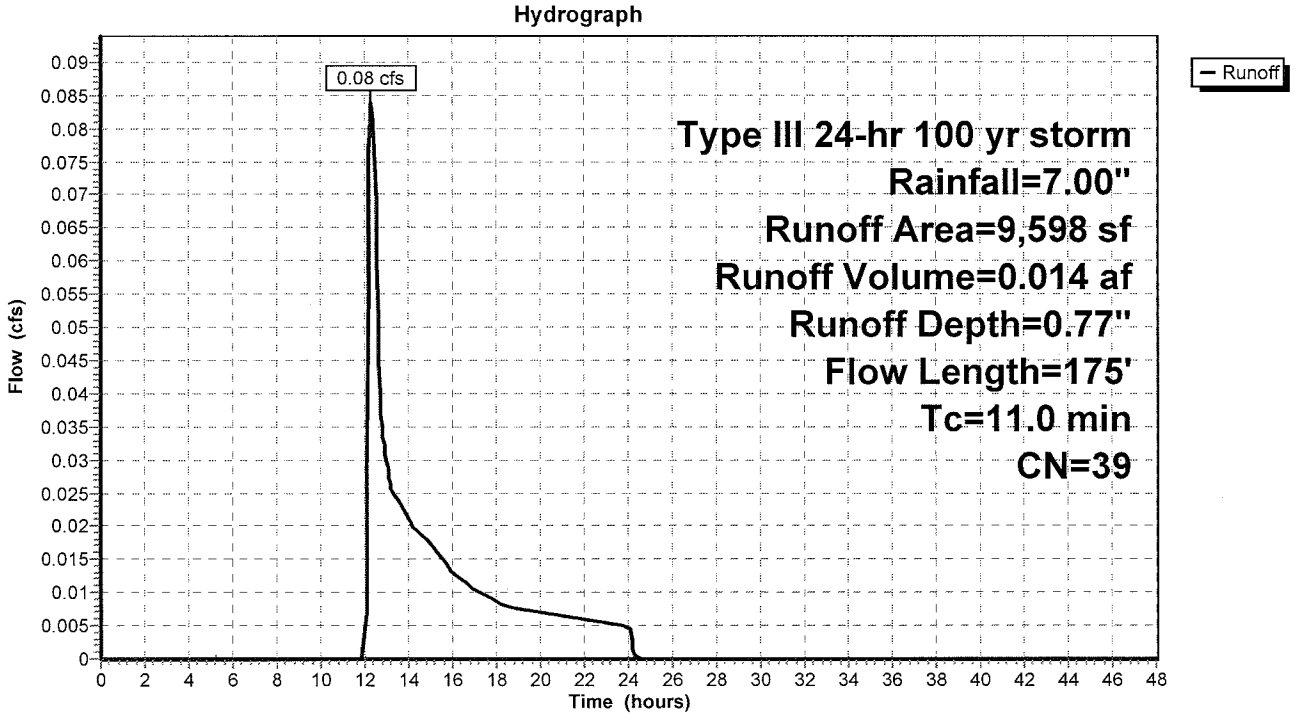
Runoff = 0.08 cfs @ 12.31 hrs, Volume= 0.014 af, Depth= 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr storm Rainfall=7.00"

Area (sf)	CN	Description
0	98	2,481 SF Roofs (sent to infiltrator)
9,598	39	>75% Grass cover, Good, HSG A
9,598	39	Weighted Average

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	50	0.0050	0.1		**Sheet Flow,** Grass: Short n= 0.150 P2= 3.40"
1.5	125	0.0400	1.4		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
11.0	175	Total			

Subcatchment POST 2B: POST-2B



Subcatchment POST 3:

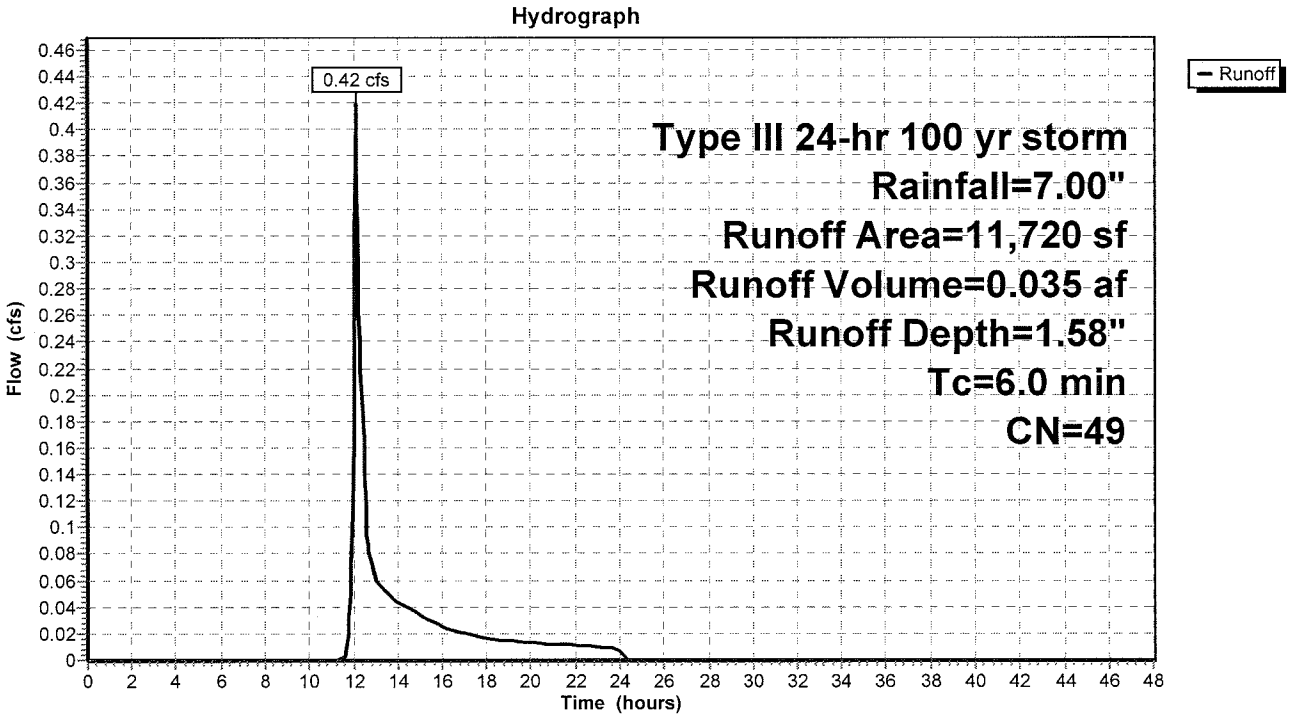
Runoff = 0.42 cfs @ 12.11 hrs, Volume= 0.035 af, Depth= 1.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 100 yr storm Rainfall=7.00"

Area (sf)	CN	Description
1,753	98	PAVED AND SIDEWALK
747	39	>75% Grass cover, Good, HSG A
0	98	1176 ROOF INFILTRATED
180	98	DRIVEWAY
9,040	39	>75% Grass cover, Good, HSG A
11,720	49	Weighted Average

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

Subcatchment POST 3:



Pond 1P:

Inflow Area = 0.788 ac, Inflow Depth = 3.10" for 100 yr storm event
Inflow = 2.64 cfs @ 12.12 hrs, Volume= 0.204 af
Outflow = 0.46 cfs @ 12.66 hrs, Volume= 0.204 af, Atten= 83%, Lag= 32.9 min
Discarded = 0.46 cfs @ 12.66 hrs, Volume= 0.204 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 94.40' @ 12.66 hrs Surf.Area= 2,378 sf Storage= 2,778 cf
Plug-Flow detention time= 49.6 min calculated for 0.204 af (100% of inflow)
Center-of-Mass det. time= 49.5 min (893.0 - 843.5)

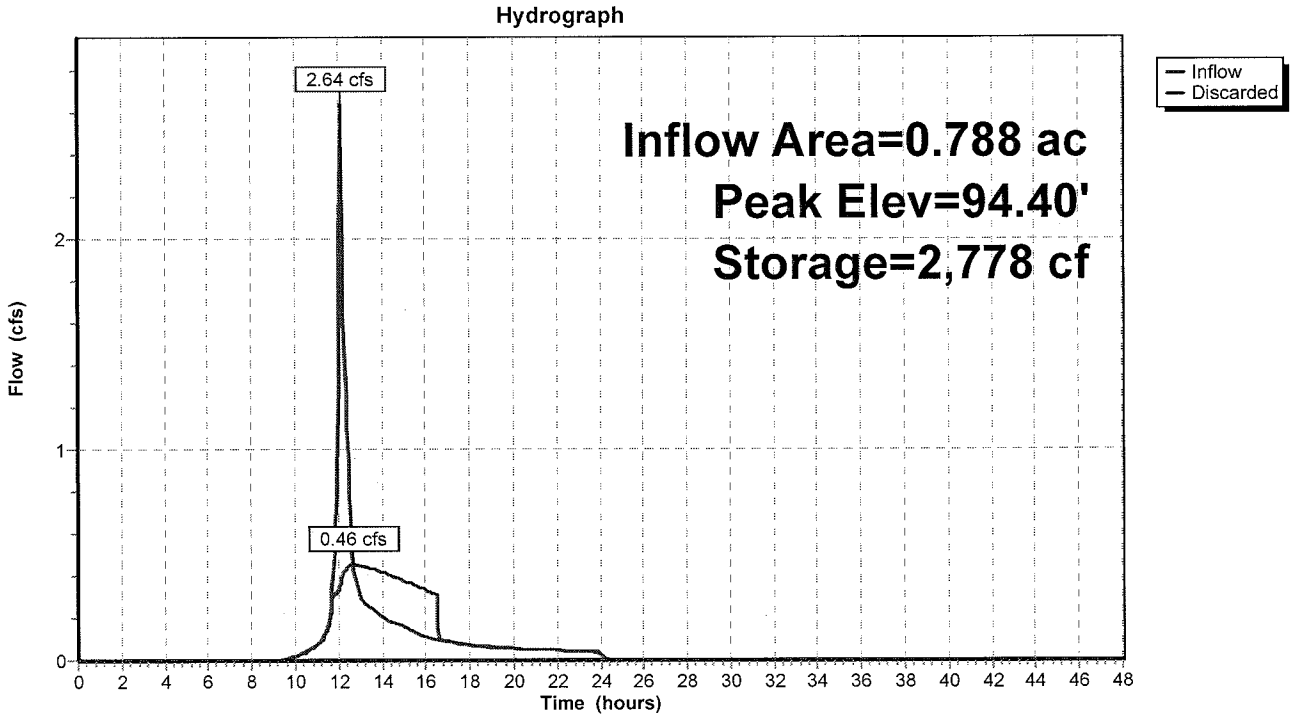
Volume	Invert	Avail.Storage	Storage Description
#1	93.00'	4,305 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
93.00	1,600	0	0
94.00	2,138	1,869	1,869
95.00	2,733	2,436	4,305

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.46 cfs @ 12.66 hrs HW=94.40' (Free Discharge)
↑**1=Exfiltration** (Exfiltration Controls 0.46 cfs)

Pond 1P:



Pond 2P:

Inflow Area = 0.116 ac, Inflow Depth = 2.90" for 100 yr storm event
Inflow = 0.38 cfs @ 12.10 hrs, Volume= 0.028 af
Outflow = 0.05 cfs @ 11.75 hrs, Volume= 0.028 af, Atten= 87%, Lag= 0.0 min
Discarded = 0.05 cfs @ 11.75 hrs, Volume= 0.028 af

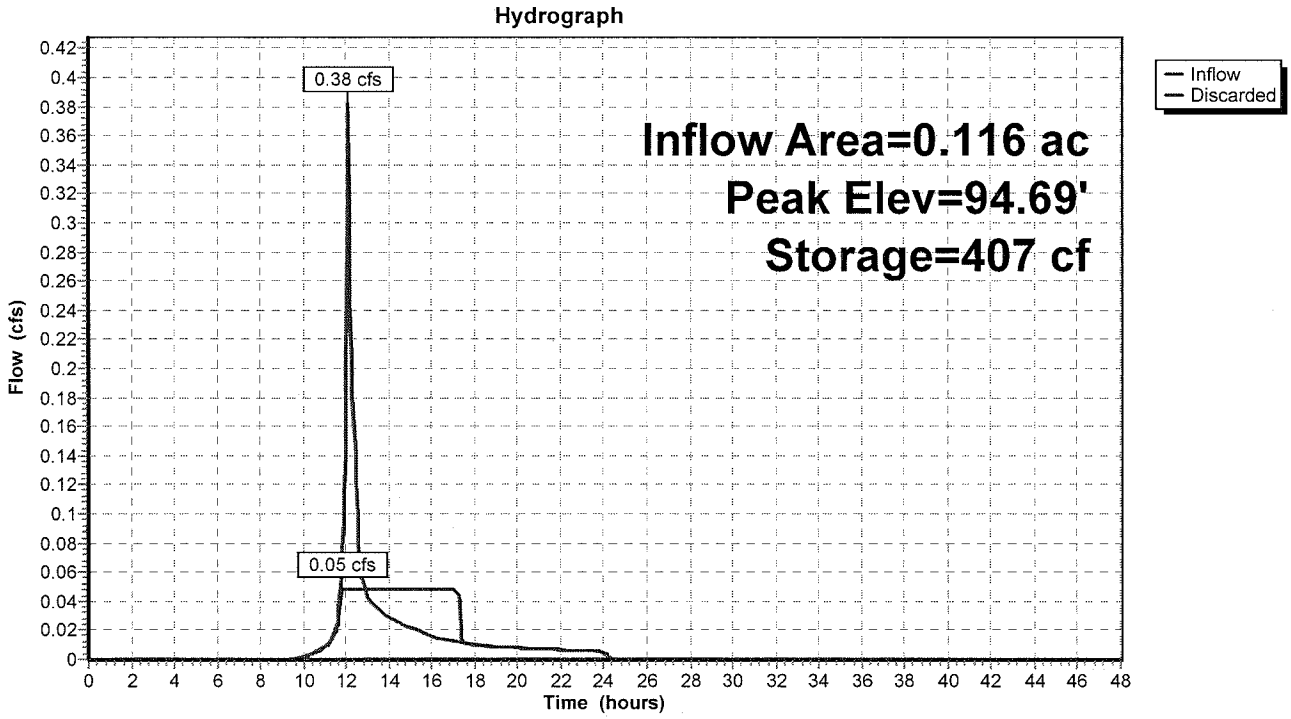
Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 94.69' @ 12.89 hrs Surf.Area= 251 sf Storage= 407 cf
Plug-Flow detention time= 68.5 min calculated for 0.028 af (100% of inflow)
Center-of-Mass det. time= 68.5 min (915.0 - 846.5)

Volume	Invert	Avail.Storage	Storage Description
#1	92.50'	226 cf	**8.00'D x 4.50'H Vertical Cone/Cylinder** x 5 1,131 cf Overall - 565 cf Embedded = 565 cf x 40.0% Voids
#2	92.50'	565 cf	**6.00'D x 4.00'H Vertical Cone/Cylinder** x 5 Inside #1
		792 cf	Total Available Storage

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.05 cfs @ 11.75 hrs HW=92.55' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.05 cfs)

Pond 2P:



Pond 3P:

Inflow Area = 0.269 ac, Inflow Depth = 1.58" for 100 yr storm event
Inflow = 0.42 cfs @ 12.11 hrs, Volume= 0.035 af
Outflow = 0.08 cfs @ 12.72 hrs, Volume= 0.023 af, Atten= 81%, Lag= 36.5 min
Primary = 0.08 cfs @ 12.72 hrs, Volume= 0.023 af

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 92.99' @ 12.72 hrs Surf.Area= 765 sf Storage= 583 cf
Plug-Flow detention time= 215.7 min calculated for 0.023 af (64% of inflow)
Center-of-Mass det. time= 94.8 min (978.9 - 884.1)

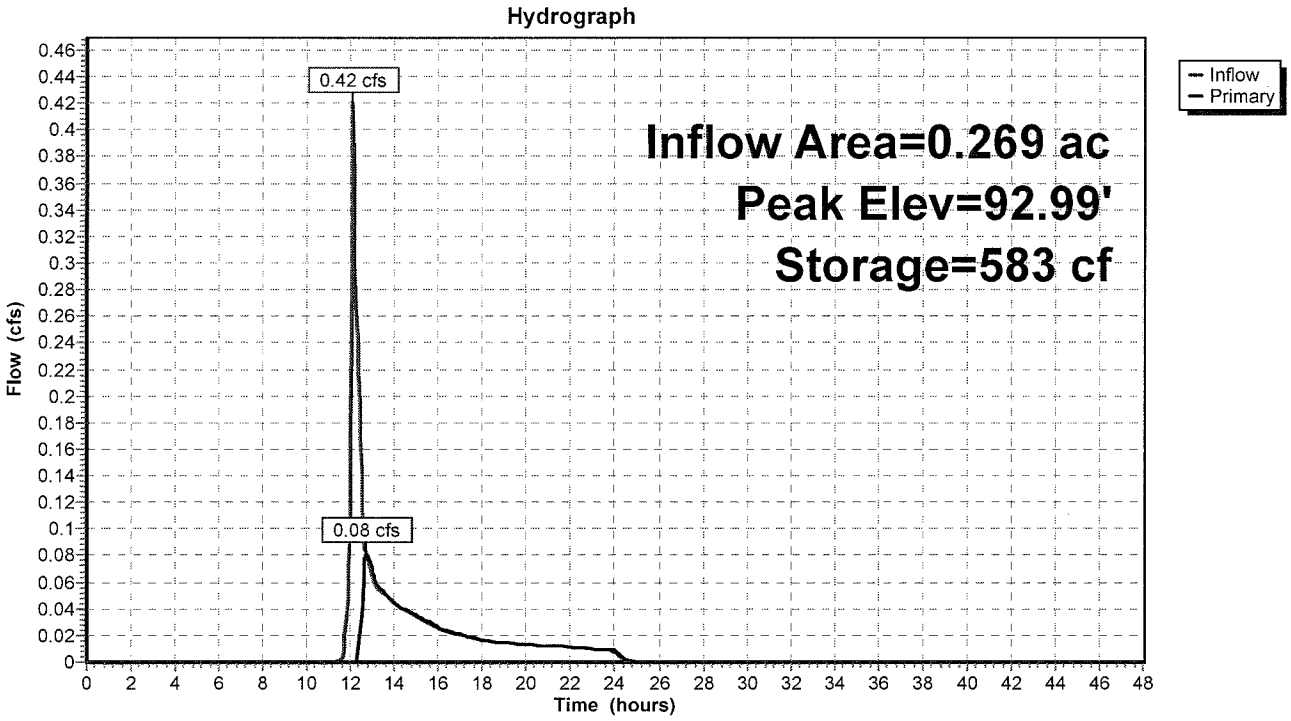
Volume	Invert	Avail.Storage	Storage Description
#1	92.00'	590 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
92.00	411	0	0
93.00	768	590	590

Device	Routing	Invert	Outlet Devices
#1	Primary	92.95'	**4.0' long x 4.0' 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) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=0.08 cfs @ 12.72 hrs HW=92.99' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 0.08 cfs @ 0.5 fps)

Pond 3P:

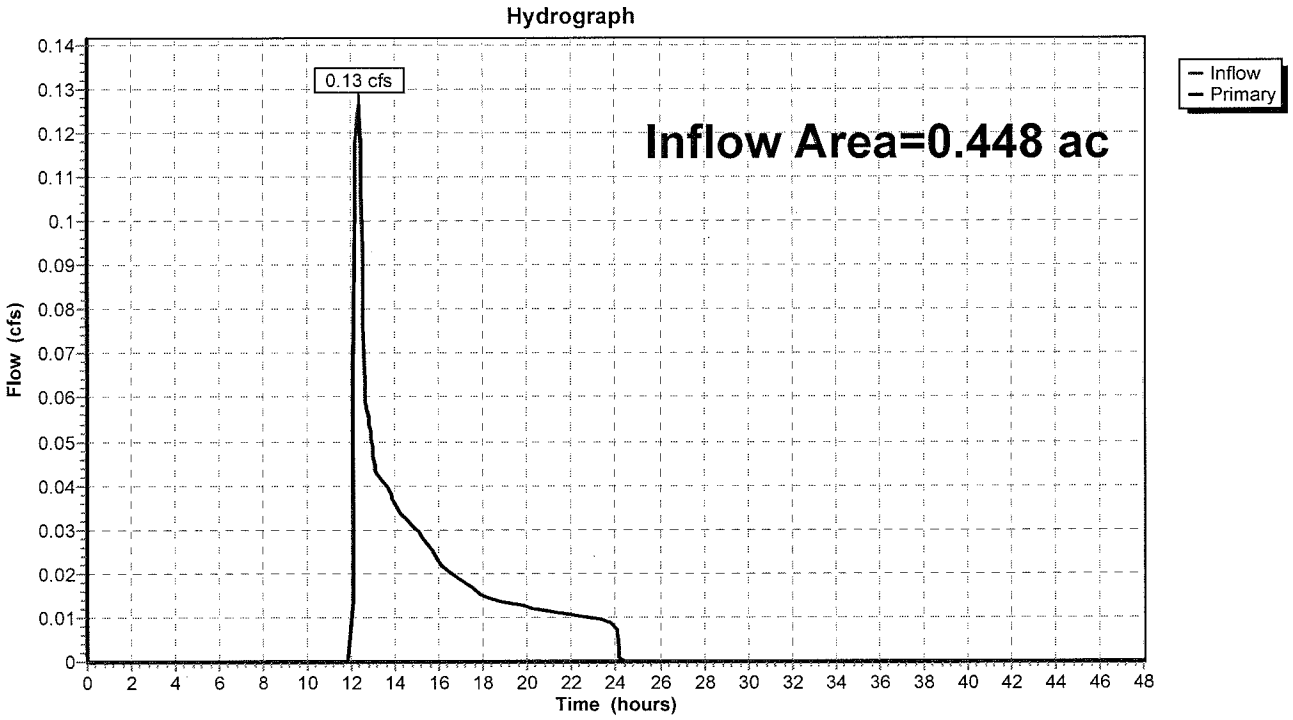

Hydrograph
Inflow Area=0.269 ac
Peak Elev=92.99'
Storage=583 cf
0.42 cfs
0.08 cfs
Inflow
Primary
Flow (cfs)
Time (hours)
0 0.02 0.04 0.06 0.08 0.1 0.12 0.14 0.16 0.18 0.2 0.22 0.24 0.26 0.28 0.3 0.32 0.34 0.36 0.38 0.4 0.42 0.44 0.46
0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48

Pond SUM-1:

Inflow Area = 0.448 ac, Inflow Depth = 0.63" for 100 yr storm event
Inflow = 0.13 cfs @ 12.30 hrs, Volume= 0.023 af
Primary = 0.13 cfs @ 12.30 hrs, Volume= 0.023 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond SUM-1:

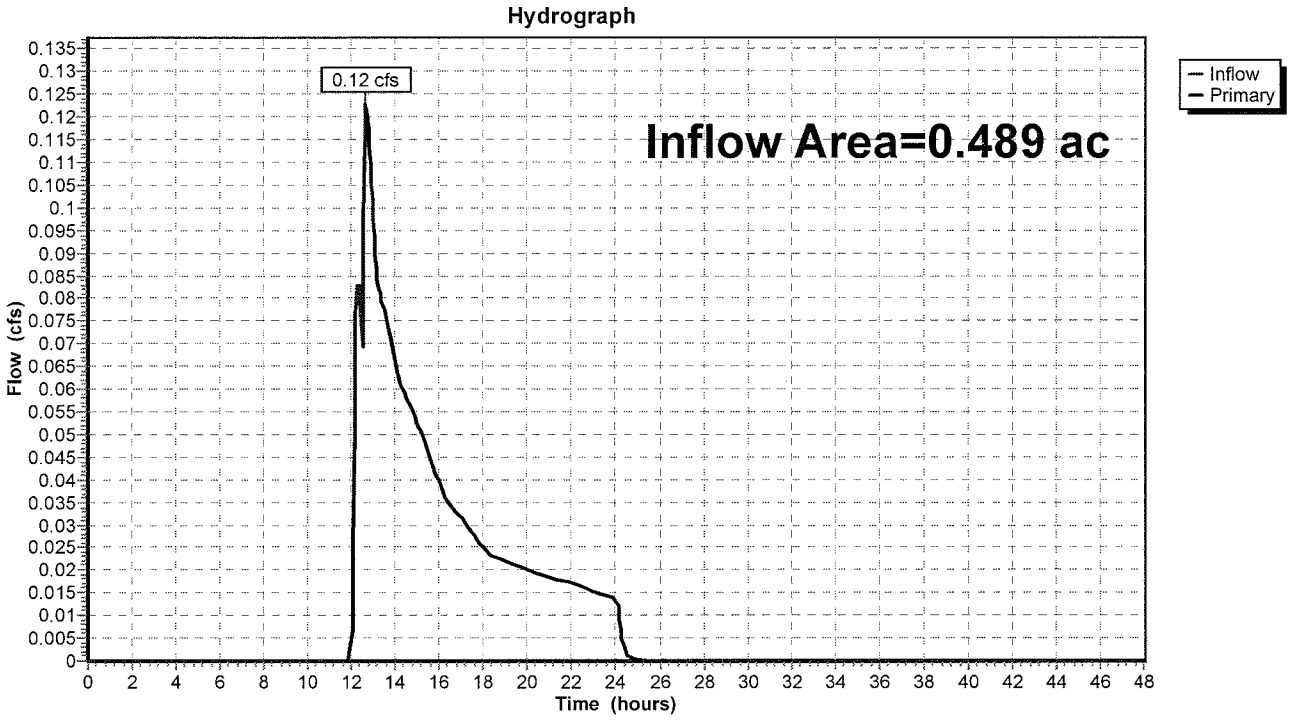


Pond SUM-2:

Inflow Area = 0.489 ac, Inflow Depth = 0.90" for 100 yr storm event
Inflow = 0.12 cfs @ 12.65 hrs, Volume= 0.037 af
Primary = 0.12 cfs @ 12.65 hrs, Volume= 0.037 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs

Pond SUM-2:



Pond SUM-3:

Routing by Stor-Ind method

Pond SUM-3: