

Stormwater Management System Report Addendum 2

LOGAL, LLC

PROPOSED SITE IMPROVEMENTS

**100 DUCHAINE BOULEVARD
NEW BEDFORD, MASSACHUSETTS**

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Project No. 1998

FIELD
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Section 1

Hydrologic Overview

1.0 HYDROLOGIC OVERVIEW

1.1 Purpose of Addendum

The purpose of this Addendum is to address comments received from the Conservation Commission consultant. Revisions to the calculations included modification to the pre-development analysis to eliminate the woods-grass designation in the CN calculations. The post-development analysis has also been revised to address concerns from the consultant and also address revision to the design, including the elimination of a portion of the work to the existing driveway adjacent to the new parking lot. Please refer to the Correspondences located in Appendix D for additional information related to the consultant's concerns and our responses.

1.3 Pre-Development Hydrologic Summary

A summary of the updated pre development hydrologic conditions for the 2, 10, 25, and 100-year storm events is submitted in Table 1.3 below.

Table 1.3 – Pre Development Hydrologic Summary

Storm Event	Analysis Point AP-1 Rate of Flow (c.f.s.)	Analysis Point AP-2 Rate of Flow (c.f.s.)	Analysis Point AP-3 Rate of Flow (c.f.s.)	Analysis Point AP-4 Rate of Flow (c.f.s.)	Analysis Point AP-5 Rate of Flow (c.f.s.)
2-year storm	2.62	2.60	11.76	3.22	7.43
10-year storm	3.65	4.55	17.57	5.17	11.11
25-year storm	4.28	5.81	21.13	6.39	13.36
100-year storm	5.39	8.07	27.33	8.55	17.28

1.4 Post Development Hydrologic Summary

A summary of the updated post-development hydrologic conditions for the 2, 10, 25, and 100-year storm events is submitted in Table 1.4 below.

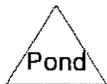
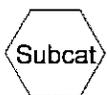
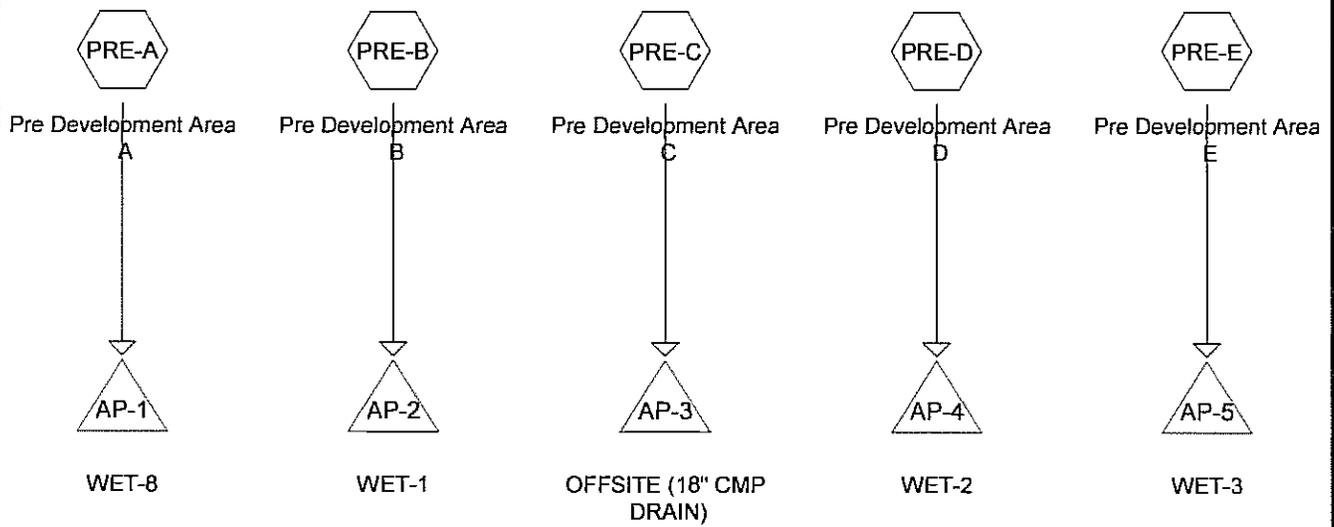
Table 1.4 – Post Development Hydrologic Summary

Storm Event	Analysis Point AP-1 Rate of Flow (c.f.s.)	Analysis Point AP-2 Rate of Flow (c.f.s.)	Analysis Point AP-3 Rate of Flow (c.f.s.)	Analysis Point AP-4 Rate of Flow (c.f.s.)	Analysis Point AP-5 Rate of Flow (c.f.s.)
2-year storm	N/A	1.39	9.70	2.30	6.34
10-year storm	N/A	2.61	14.10	3.76	9.57
25-year storm	N/A	3.50	16.70	4.74	11.36
100-year storm	N/A	7.91	21.75	7.82	15.25

The hydrologic analysis indicates that the stormwater management system design for the site meets or reduces peak runoff rates for the 2, 10, 25, and 100 year, 24 hour, Type III storm events from the pre developed levels at the subject analysis points. The analysis shows that the proposed re-development of this project area will not result in an increase in the rates of runoff to the respective analysis points.

Section 2

Updated Pre Development Hydrologic Analysis



Routing Diagram for 1998-PRE-WS-REV 1
 Prepared by Field Engineering Co. Inc., Printed 6/6/2014
 HydroCAD® 10.00-12 s/n 01897 © 2014 HydroCAD Software Solutions LLC

1998-PRE-WS-REV 1

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
150,667	74	>75% Grass cover, Good, HSG C (PRE-A, PRE-B, PRE-C, PRE-D, PRE-E)
175,173	98	Paved parking, HSG C (PRE-A, PRE-B, PRE-C, PRE-D, PRE-E)
92,367	98	Roofs, HSG C (PRE-C, PRE-D)
65,077	70	Woods, Good, HSG C (PRE-B, PRE-C, PRE-E)
483,284	87	TOTAL AREA

Summary for Subcatchment PRE-C: Pre Development Area C

Runoff = 11.76 cfs @ 12.09 hrs, Volume= 36,832 cf, Depth= 2.36"

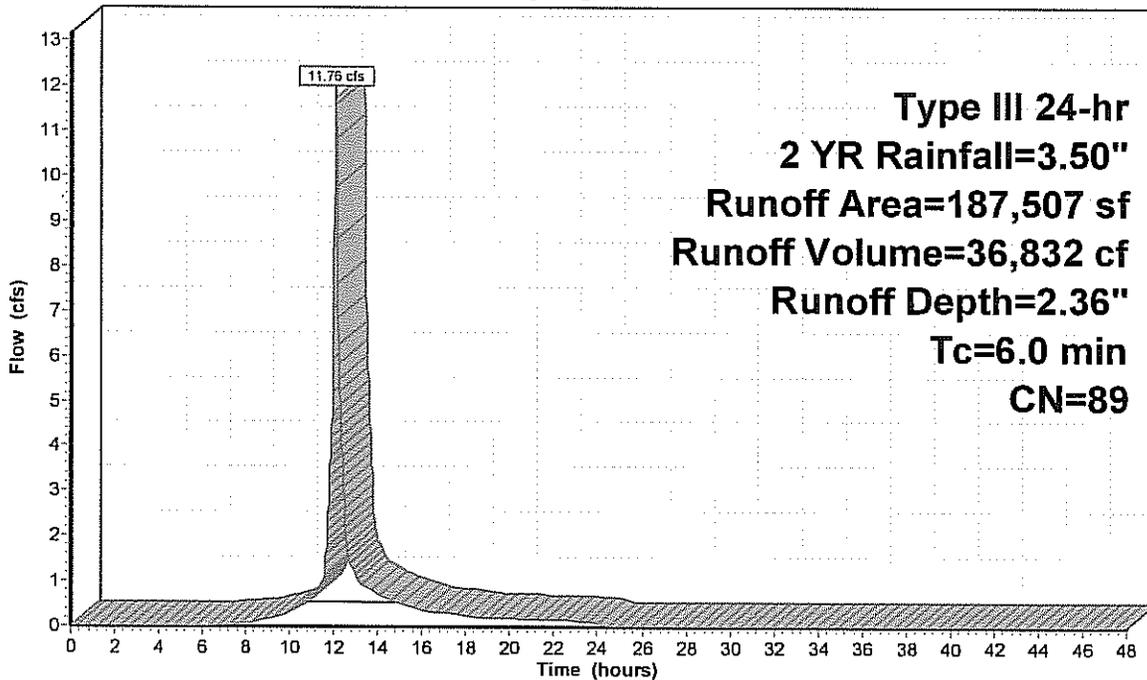
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
37,512	98	Paved parking, HSG C
77,417	98	Roofs, HSG C
68,595	74	>75% Grass cover, Good, HSG C
3,983	70	Woods, Good, HSG C
187,507	89	Weighted Average
72,578		38.71% Pervious Area
114,929		61.29% Impervious Area

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

Subcatchment PRE-C: Pre Development Area C

Hydrograph



Runoff

**Type III 24-hr
 2 YR Rainfall=3.50"
 Runoff Area=187,507 sf
 Runoff Volume=36,832 cf
 Runoff Depth=2.36"
 Tc=6.0 min
 CN=89**

Summary for Subcatchment PRE-A: Pre Development Area A

Runoff = 2.62 cfs @ 12.08 hrs, Volume= 8,764 cf, Depth= 3.05"

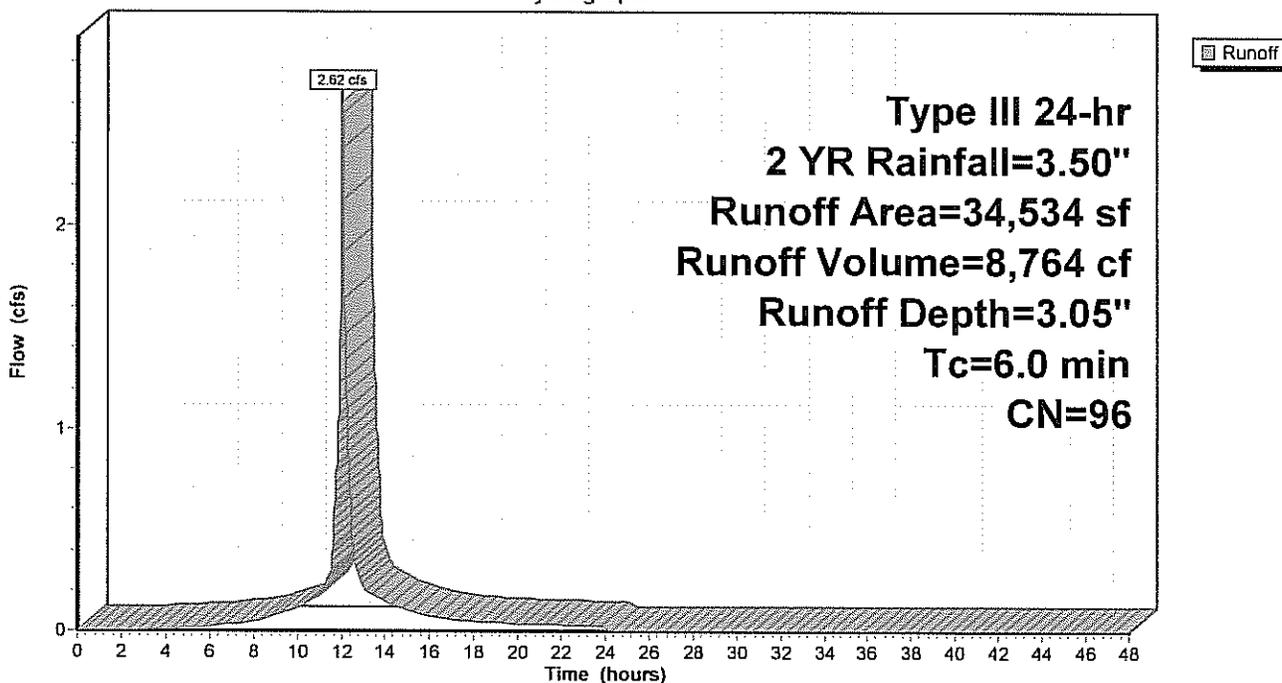
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
31,441	98	Paved parking, HSG C
3,093	74	>75% Grass cover, Good, HSG C
34,534	96	Weighted Average
3,093		8.96% Pervious Area
31,441		91.04% Impervious Area

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

Subcatchment PRE-A: Pre Development Area A

Hydrograph



Summary for Subcatchment PRE-B: Pre Development Area B

Runoff = 2.60 cfs @ 12.09 hrs, Volume= 8,225 cf, Depth= 1.43"

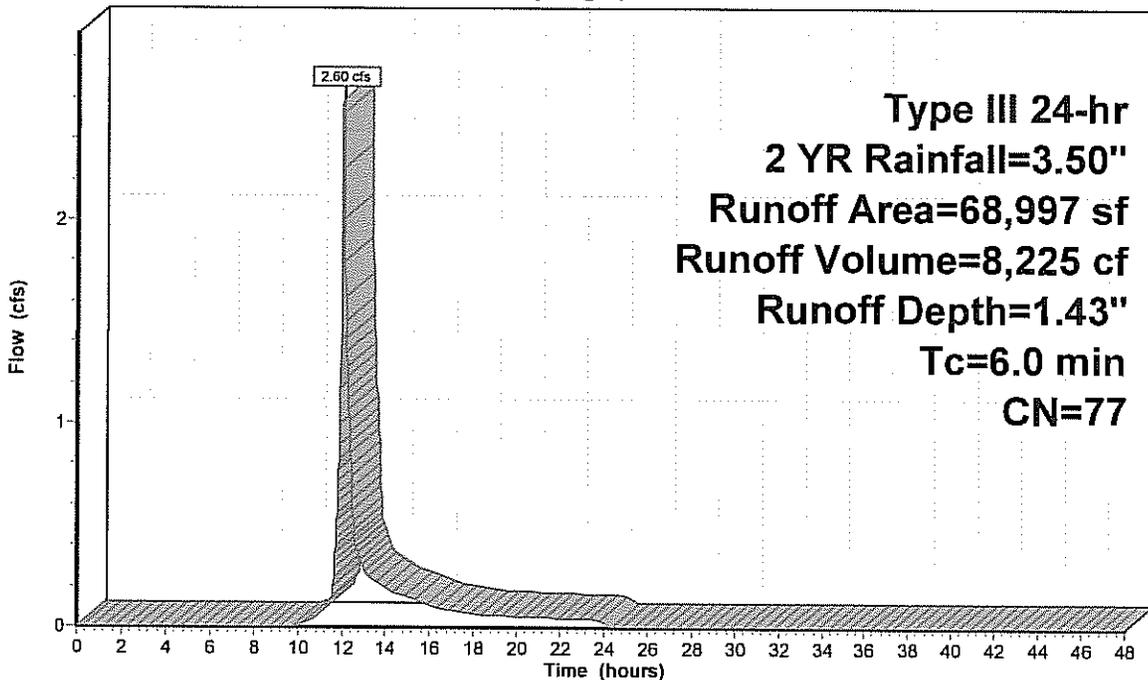
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
11,997	98	Paved parking, HSG C
28,874	74	>75% Grass cover, Good, HSG C
28,126	70	Woods, Good, HSG C
68,997	77	Weighted Average
57,000		82.61% Pervious Area
11,997		17.39% Impervious Area

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

Subcatchment PRE-B: Pre Development Area B

Hydrograph



Summary for Subcatchment PRE-D: Pre Development Area D

Runoff = 3.22 cfs @ 12.14 hrs, Volume= 11,413 cf, Depth= 1.86"

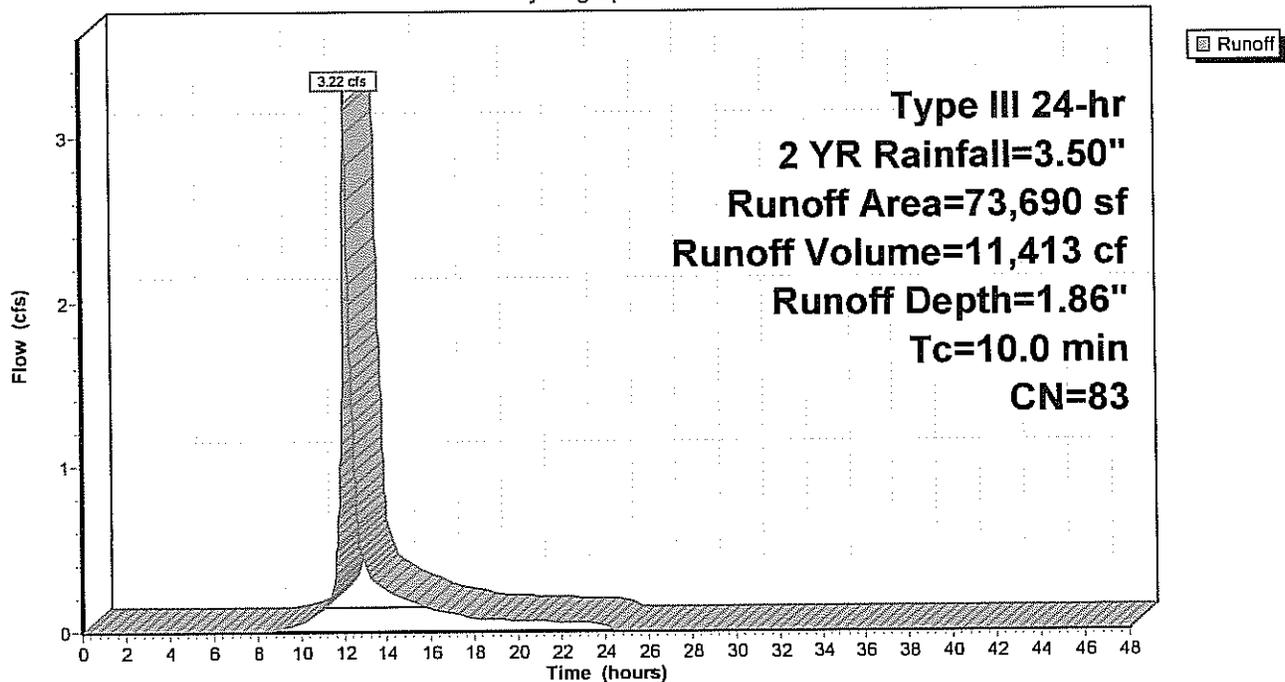
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
13,635	98	Paved parking, HSG C
45,105	74	>75% Grass cover, Good, HSG C
14,950	98	Roofs, HSG C
73,690	83	Weighted Average
45,105		61.21% Pervious Area
28,585		38.79% Impervious Area

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

Subcatchment PRE-D: Pre Development Area D

Hydrograph



Summary for Subcatchment PRE-E: Pre Development Area E

Runoff = 7.43 cfs @ 12.09 hrs, Volume= 23,288 cf, Depth= 2.36"

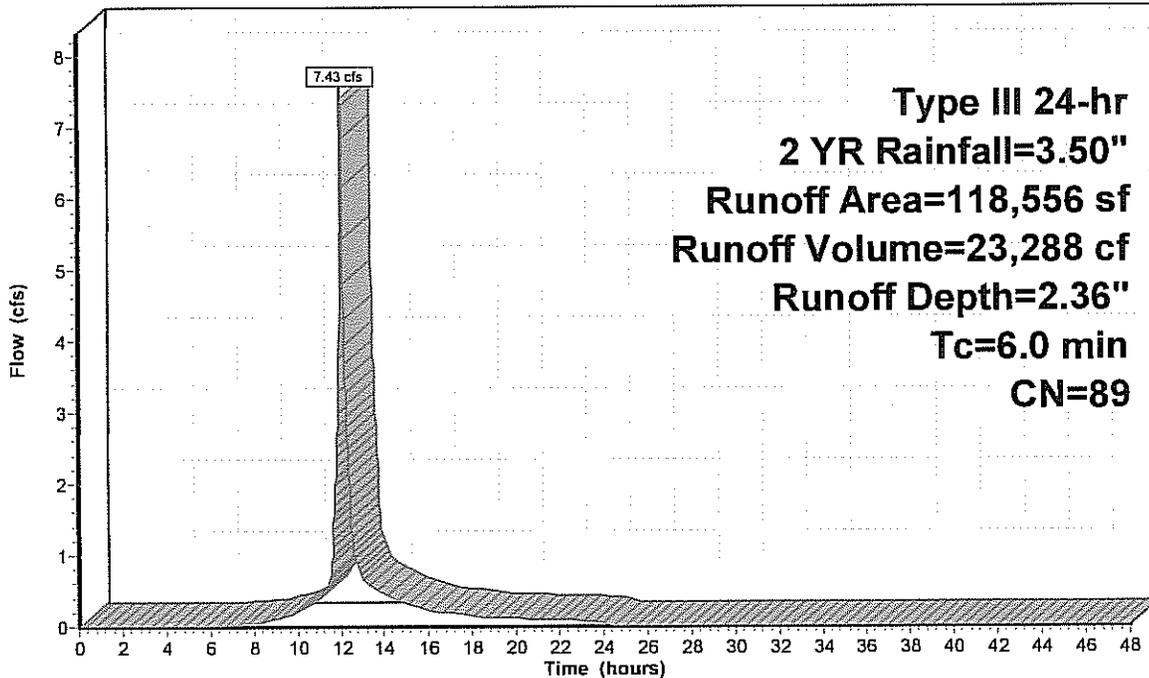
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
80,588	98	Paved parking, HSG C
32,968	70	Woods, Good, HSG C
5,000	74	>75% Grass cover, Good, HSG C
118,556	89	Weighted Average
37,968		32.03% Pervious Area
80,588		67.97% Impervious Area

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

Subcatchment PRE-E: Pre Development Area E

Hydrograph



Runoff

**Type III 24-hr
 2 YR Rainfall=3.50"
 Runoff Area=118,556 sf
 Runoff Volume=23,288 cf
 Runoff Depth=2.36"
 Tc=6.0 min
 CN=89**

Summary for Pond AP-1: WET-8

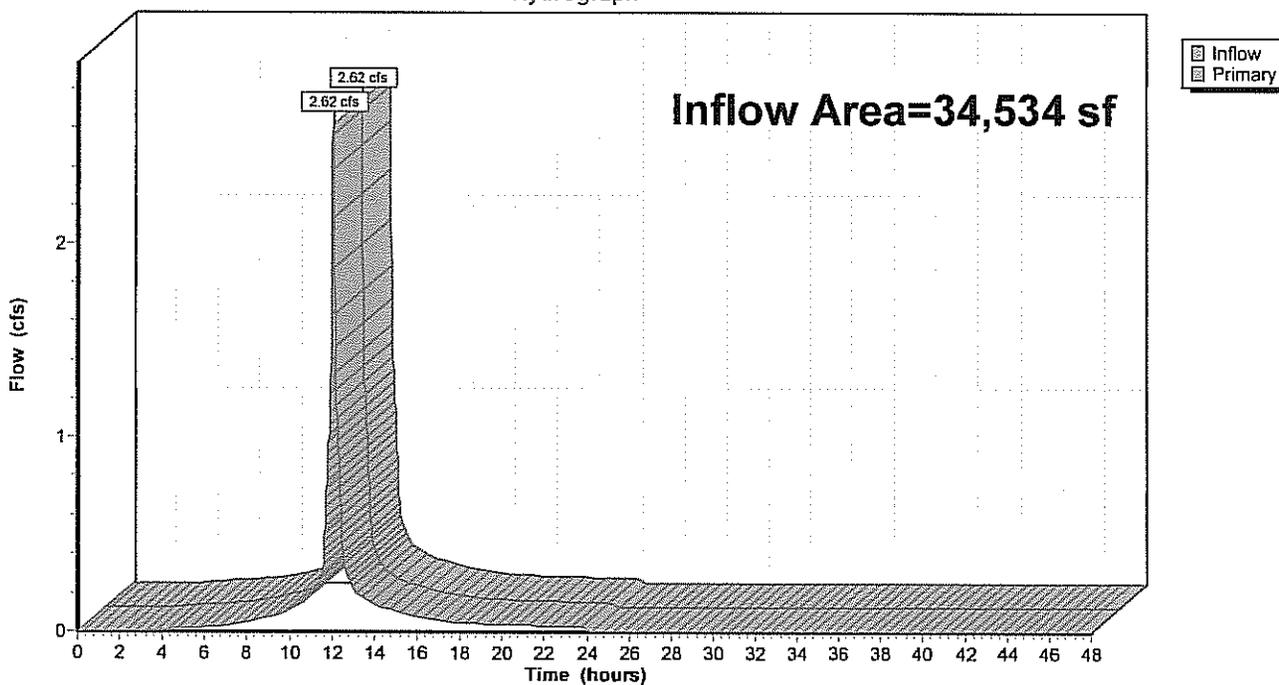
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 34,534 sf, 91.04% Impervious, Inflow Depth = 3.05" for 2 YR event
Inflow = 2.62 cfs @ 12.08 hrs, Volume= 8,764 cf
Primary = 2.62 cfs @ 12.08 hrs, Volume= 8,764 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-1: WET-8

Hydrograph



Summary for Pond AP-2: WET-1

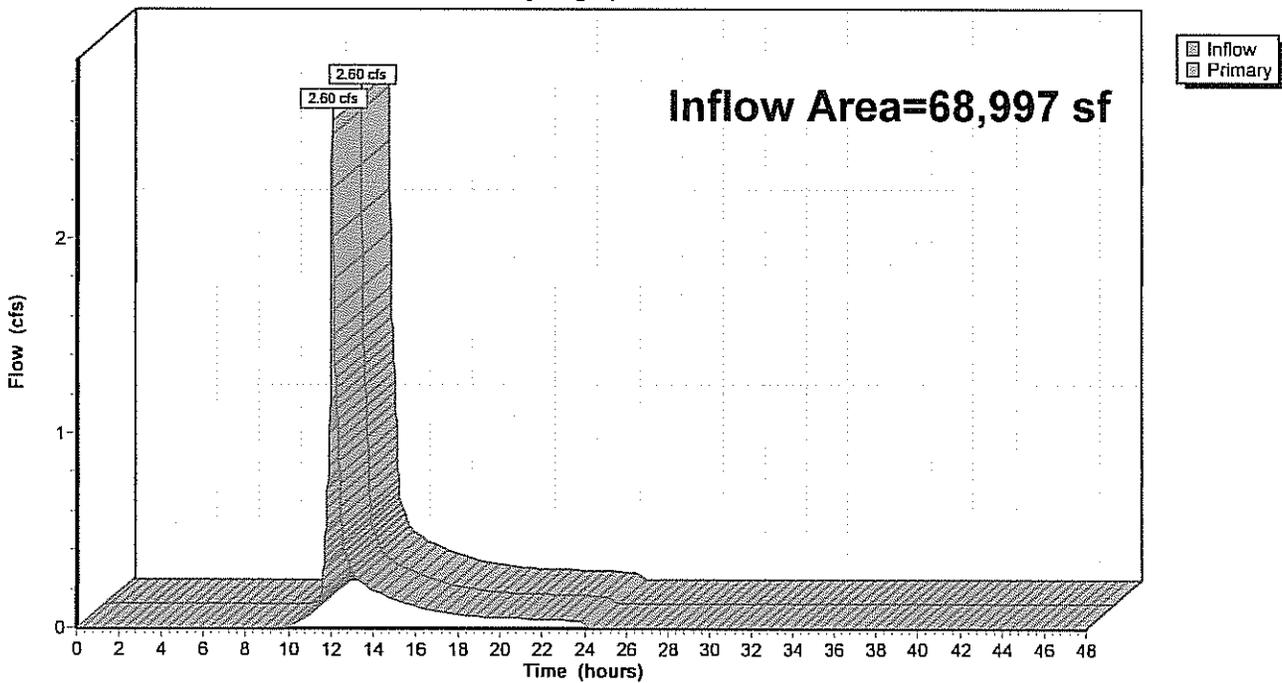
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 68,997 sf, 17.39% Impervious, Inflow Depth = 1.43" for 2 YR event
Inflow = 2.60 cfs @ 12.09 hrs, Volume= 8,225 cf
Primary = 2.60 cfs @ 12.09 hrs, Volume= 8,225 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-2: WET-1

Hydrograph



Summary for Pond AP-3: OFFSITE (18" CMP DRAIN)

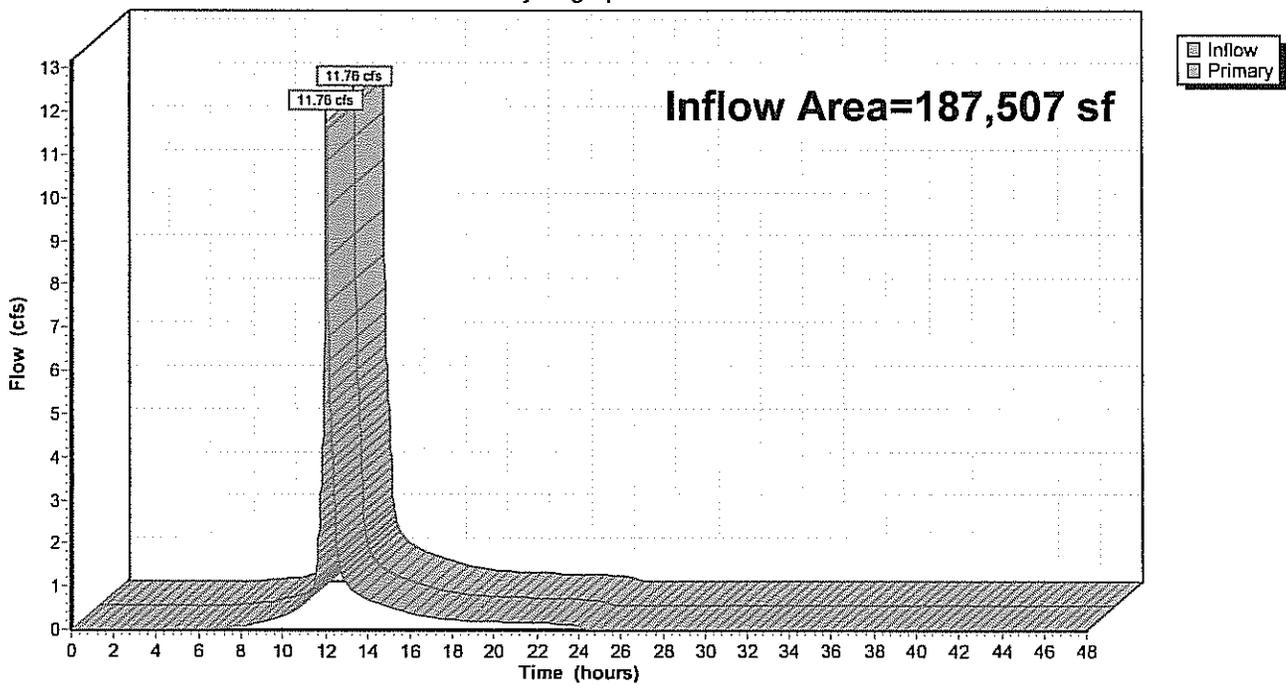
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 187,507 sf, 61.29% Impervious, Inflow Depth = 2.36" for 2 YR event
Inflow = 11.76 cfs @ 12.09 hrs, Volume= 36,832 cf
Primary = 11.76 cfs @ 12.09 hrs, Volume= 36,832 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-3: OFFSITE (18" CMP DRAIN)

Hydrograph



Summary for Pond AP-4: WET-2

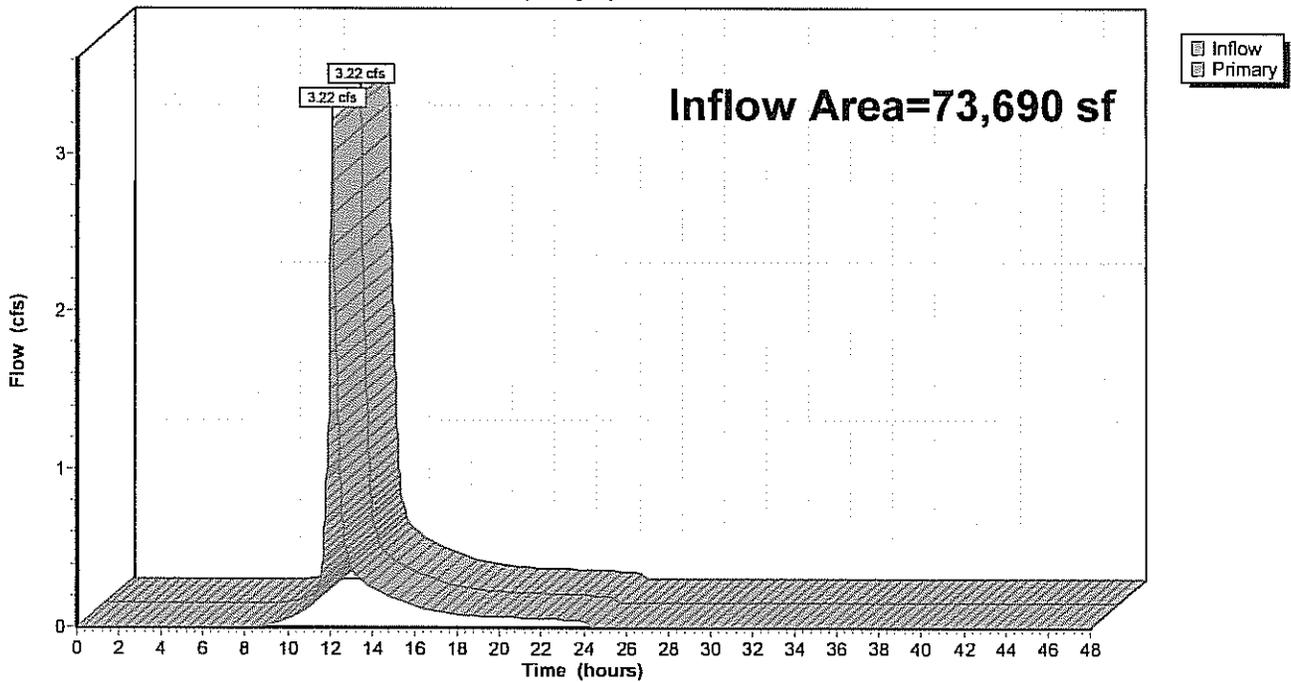
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 73,690 sf, 38.79% Impervious, Inflow Depth = 1.86" for 2 YR event
Inflow = 3.22 cfs @ 12.14 hrs, Volume= 11,413 cf
Primary = 3.22 cfs @ 12.14 hrs, Volume= 11,413 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-4: WET-2

Hydrograph



Summary for Pond AP-5: WET-3

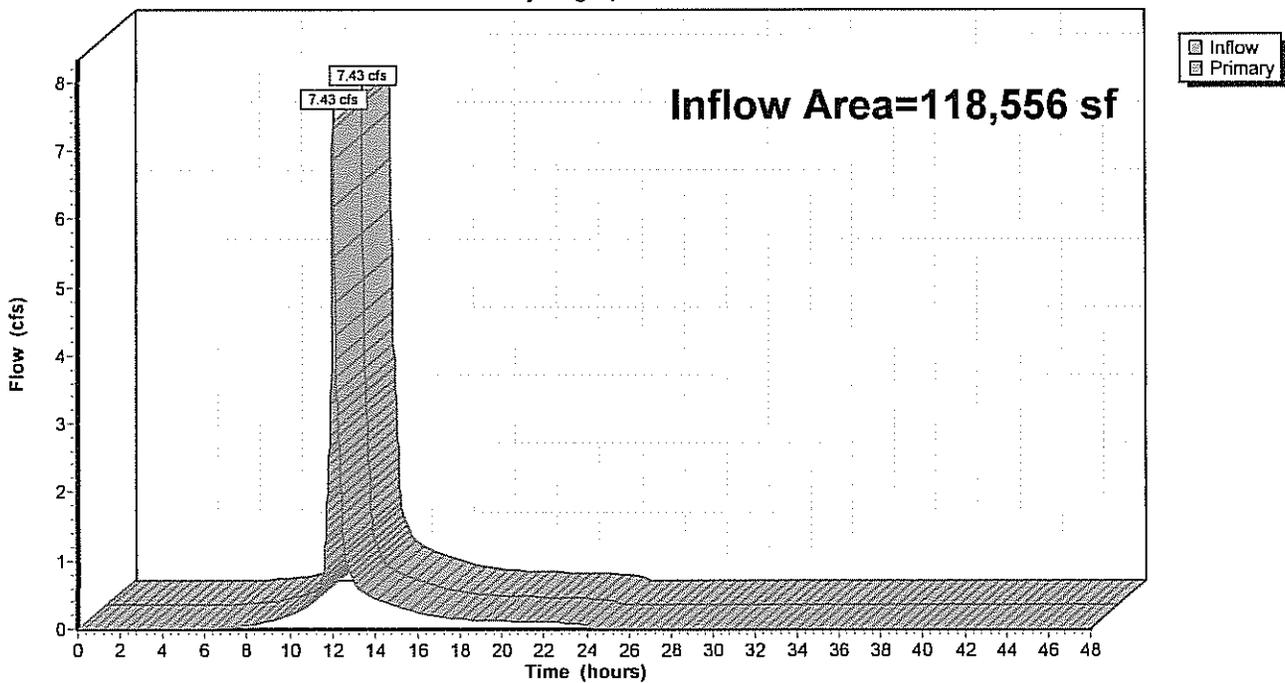
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,556 sf, 67.97% Impervious, Inflow Depth = 2.36" for 2 YR event
Inflow = 7.43 cfs @ 12.09 hrs, Volume= 23,288 cf
Primary = 7.43 cfs @ 12.09 hrs, Volume= 23,288 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-5: WET-3

Hydrograph



Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PRE-A: Pre Development	Runoff Area=34,534 sf 91.04% Impervious	Runoff Depth=4.33"
	Tc=6.0 min CN=96	Runoff=3.65 cfs 12,472 cf
Subcatchment PRE-B: Pre Development	Runoff Area=68,997 sf 17.39% Impervious	Runoff Depth=2.46"
	Tc=6.0 min CN=77	Runoff=4.55 cfs 14,125 cf
Subcatchment PRE-C: Pre Development	Runoff Area=187,507 sf 61.29% Impervious	Runoff Depth=3.58"
	Tc=6.0 min CN=89	Runoff=17.57 cfs 55,951 cf
Subcatchment PRE-D: Pre Development	Runoff Area=73,690 sf 38.79% Impervious	Runoff Depth=2.99"
	Tc=10.0 min CN=83	Runoff=5.17 cfs 18,384 cf
Subcatchment PRE-E: Pre Development	Runoff Area=118,556 sf 67.97% Impervious	Runoff Depth=3.58"
	Tc=6.0 min CN=89	Runoff=11.11 cfs 35,377 cf
Pond AP-1: WET-8		Inflow=3.65 cfs 12,472 cf
		Primary=3.65 cfs 12,472 cf
Pond AP-2: WET-1		Inflow=4.55 cfs 14,125 cf
		Primary=4.55 cfs 14,125 cf
Pond AP-3: OFFSITE (18" CMP DRAIN)		Inflow=17.57 cfs 55,951 cf
		Primary=17.57 cfs 55,951 cf
Pond AP-4: WET-2		Inflow=5.17 cfs 18,384 cf
		Primary=5.17 cfs 18,384 cf
Pond AP-5: WET-3		Inflow=11.11 cfs 35,377 cf
		Primary=11.11 cfs 35,377 cf

Total Runoff Area = 483,284 sf Runoff Volume = 136,308 cf Average Runoff Depth = 3.38"
44.64% Pervious = 215,744 sf 55.36% Impervious = 267,540 sf

Summary for Subcatchment PRE-A: Pre Development Area A

Runoff = 3.65 cfs @ 12.08 hrs, Volume= 12,472 cf, Depth= 4.33"

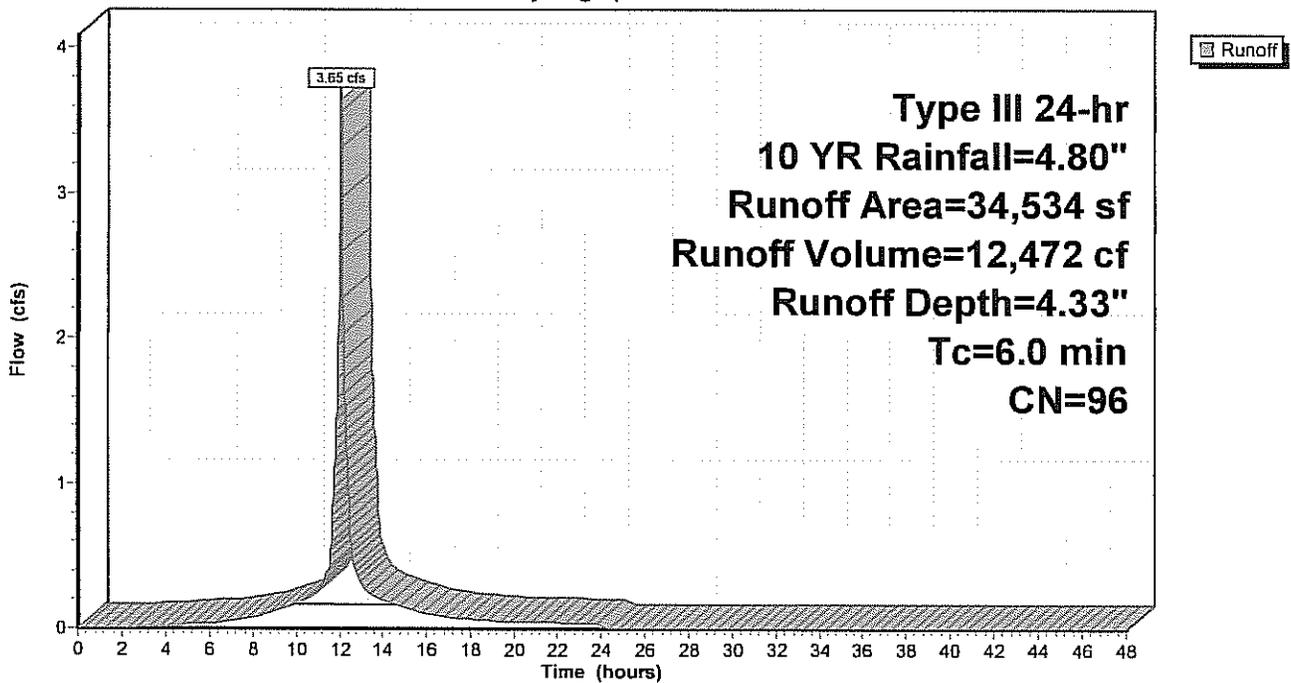
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
31,441	98	Paved parking, HSG C
3,093	74	>75% Grass cover, Good, HSG C
34,534	96	Weighted Average
3,093		8.96% Pervious Area
31,441		91.04% Impervious Area

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

Subcatchment PRE-A: Pre Development Area A

Hydrograph



Summary for Subcatchment PRE-B: Pre Development Area B

Runoff = 4.55 cfs @ 12.09 hrs, Volume= 14,125 cf, Depth= 2.46"

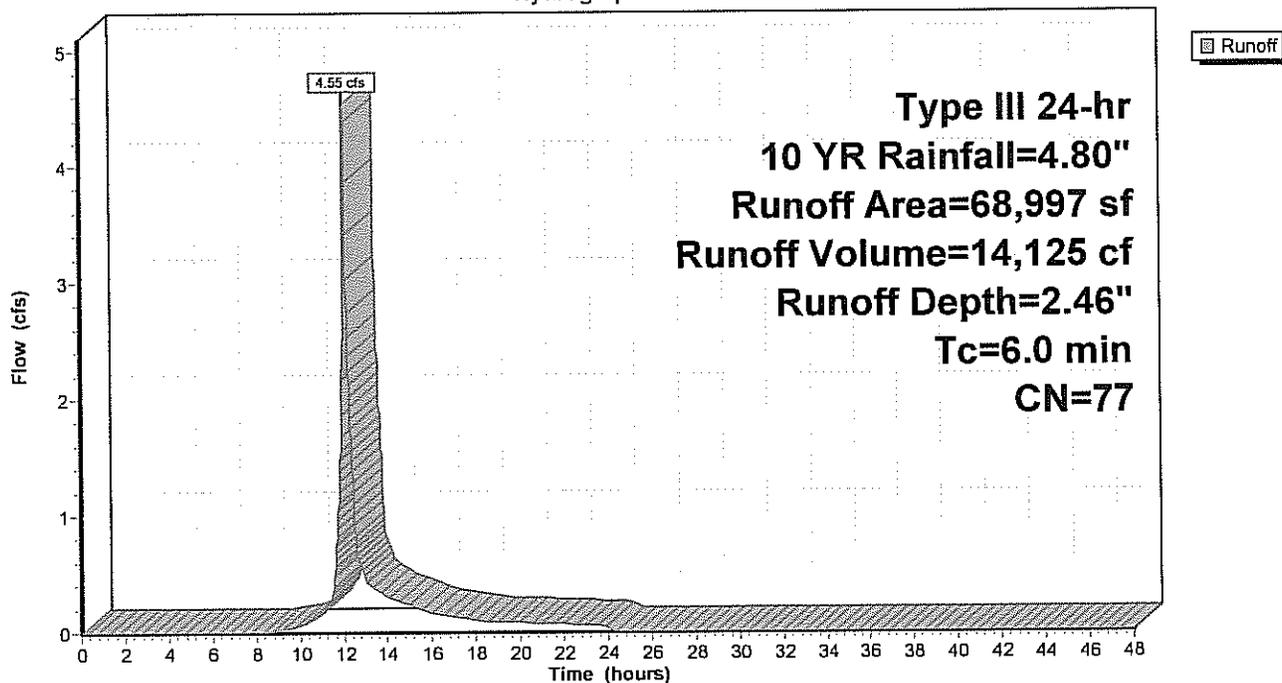
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
11,997	98	Paved parking, HSG C
28,874	74	>75% Grass cover, Good, HSG C
28,126	70	Woods, Good, HSG C
68,997	77	Weighted Average
57,000		82.61% Pervious Area
11,997		17.39% Impervious Area

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

Subcatchment PRE-B: Pre Development Area B

Hydrograph



Summary for Subcatchment PRE-C: Pre Development Area C

Runoff = 17.57 cfs @ 12.09 hrs, Volume= 55,951 cf, Depth= 3.58"

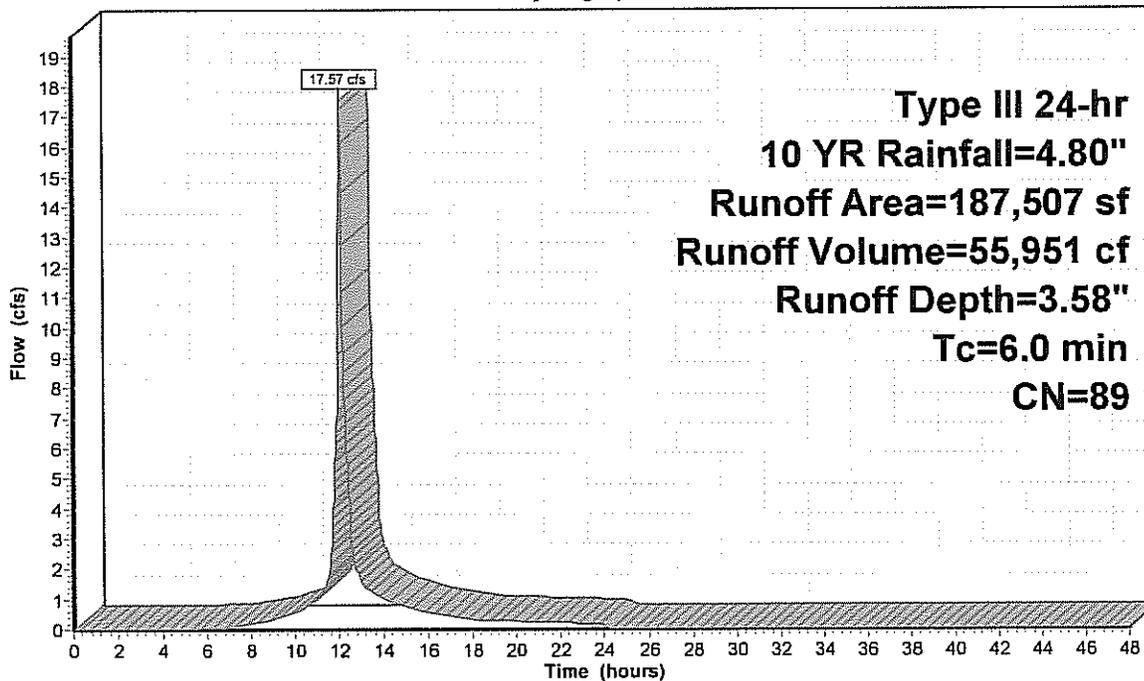
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
37,512	98	Paved parking, HSG C
77,417	98	Roofs, HSG C
68,595	74	>75% Grass cover, Good, HSG C
3,983	70	Woods, Good, HSG C
187,507	89	Weighted Average
72,578		38.71% Pervious Area
114,929		61.29% Impervious Area

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

Subcatchment PRE-C: Pre Development Area C

Hydrograph



Summary for Subcatchment PRE-D: Pre Development Area D

Runoff = 5.17 cfs @ 12.14 hrs, Volume= 18,384 cf, Depth= 2.99"

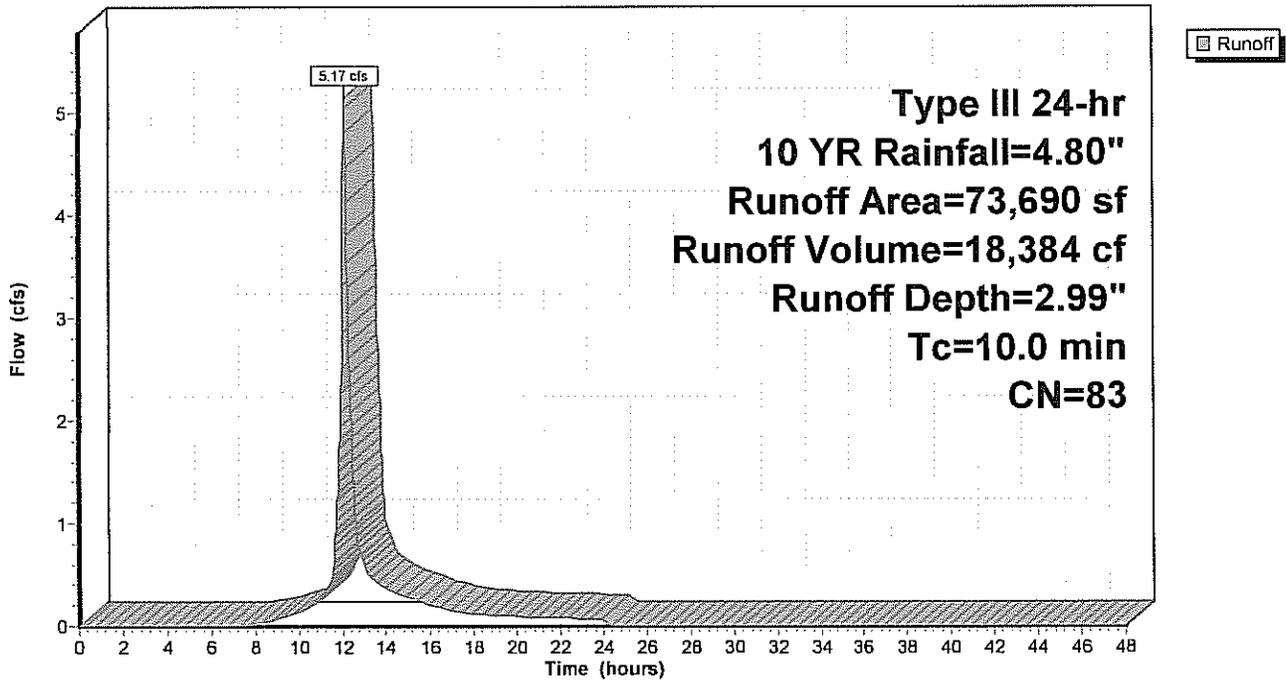
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
13,635	98	Paved parking, HSG C
45,105	74	>75% Grass cover, Good, HSG C
14,950	98	Roofs, HSG C
73,690	83	Weighted Average
45,105		61.21% Pervious Area
28,585		38.79% Impervious Area

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

Subcatchment PRE-D: Pre Development Area D

Hydrograph



Summary for Pond AP-1: WET-8

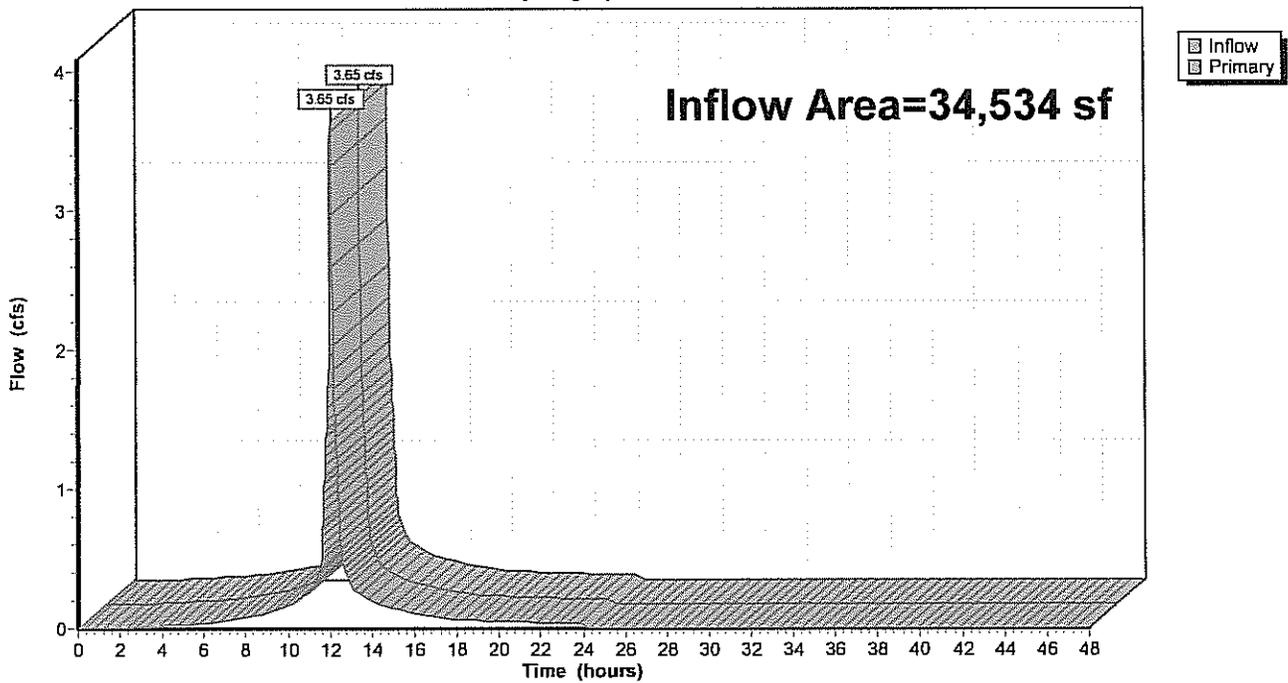
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 34,534 sf, 91.04% Impervious, Inflow Depth = 4.33" for 10 YR event
Inflow = 3.65 cfs @ 12.08 hrs, Volume= 12,472 cf
Primary = 3.65 cfs @ 12.08 hrs, Volume= 12,472 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-1: WET-8

Hydrograph



Summary for Subcatchment PRE-E: Pre Development Area E

Runoff = 11.11 cfs @ 12.09 hrs, Volume= 35,377 cf, Depth= 3.58"

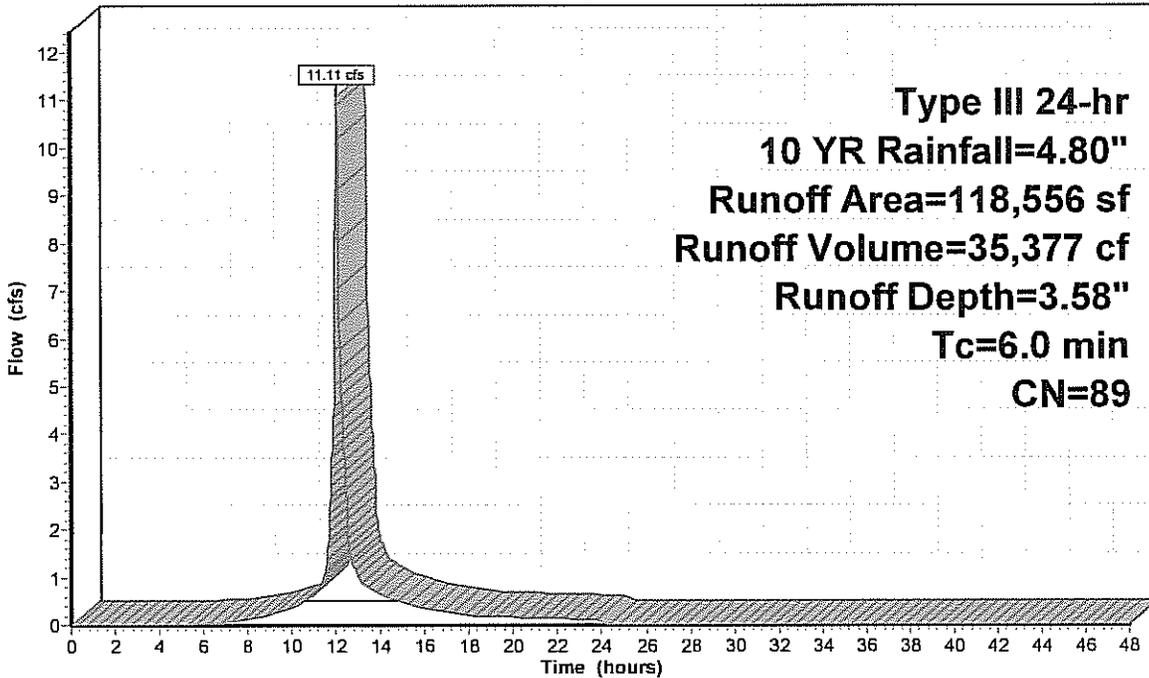
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
80,588	98	Paved parking, HSG C
32,968	70	Woods, Good, HSG C
5,000	74	>75% Grass cover, Good, HSG C
118,556	89	Weighted Average
37,968		32.03% Pervious Area
80,588		67.97% Impervious Area

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

Subcatchment PRE-E: Pre Development Area E

Hydrograph



Summary for Pond AP-2: WET-1

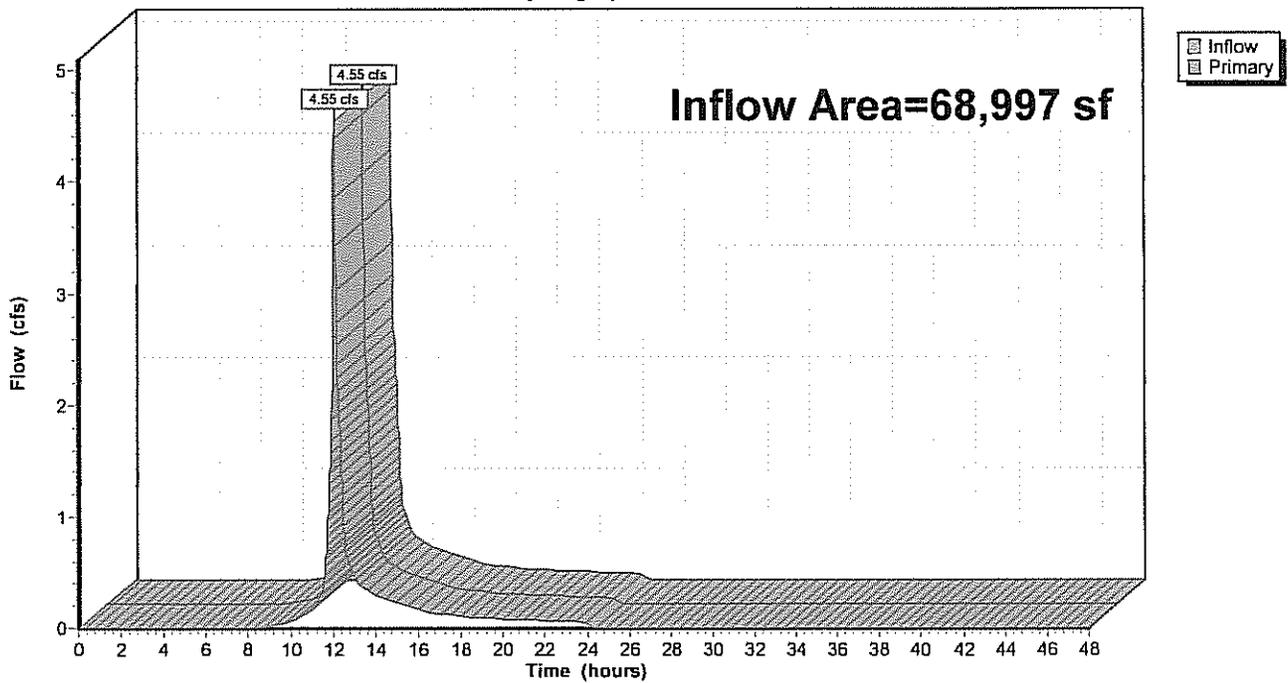
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 68,997 sf, 17.39% Impervious, Inflow Depth = 2.46" for 10 YR event
Inflow = 4.55 cfs @ 12.09 hrs, Volume= 14,125 cf
Primary = 4.55 cfs @ 12.09 hrs, Volume= 14,125 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-2: WET-1

Hydrograph



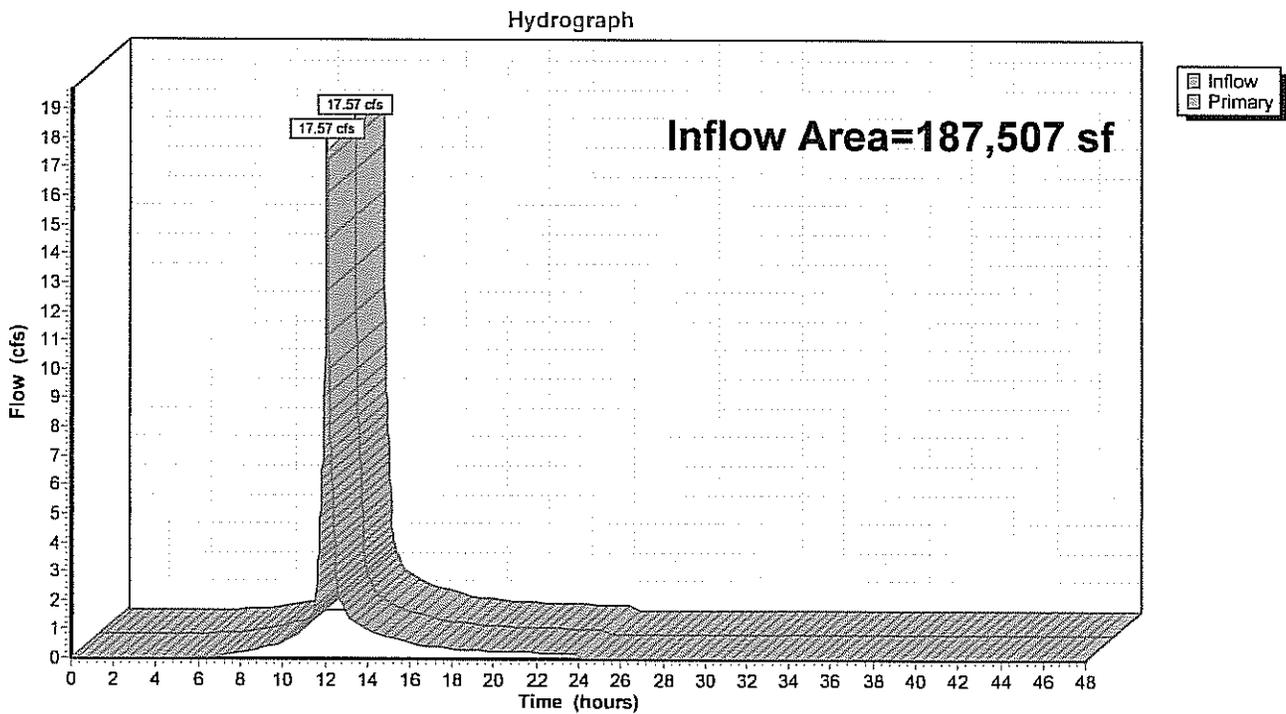
Summary for Pond AP-3: OFFSITE (18" CMP DRAIN)

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 187,507 sf, 61.29% Impervious, Inflow Depth = 3.58" for 10 YR event
Inflow = 17.57 cfs @ 12.09 hrs, Volume= 55,951 cf
Primary = 17.57 cfs @ 12.09 hrs, Volume= 55,951 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-3: OFFSITE (18" CMP DRAIN)



Summary for Pond AP-4: WET-2

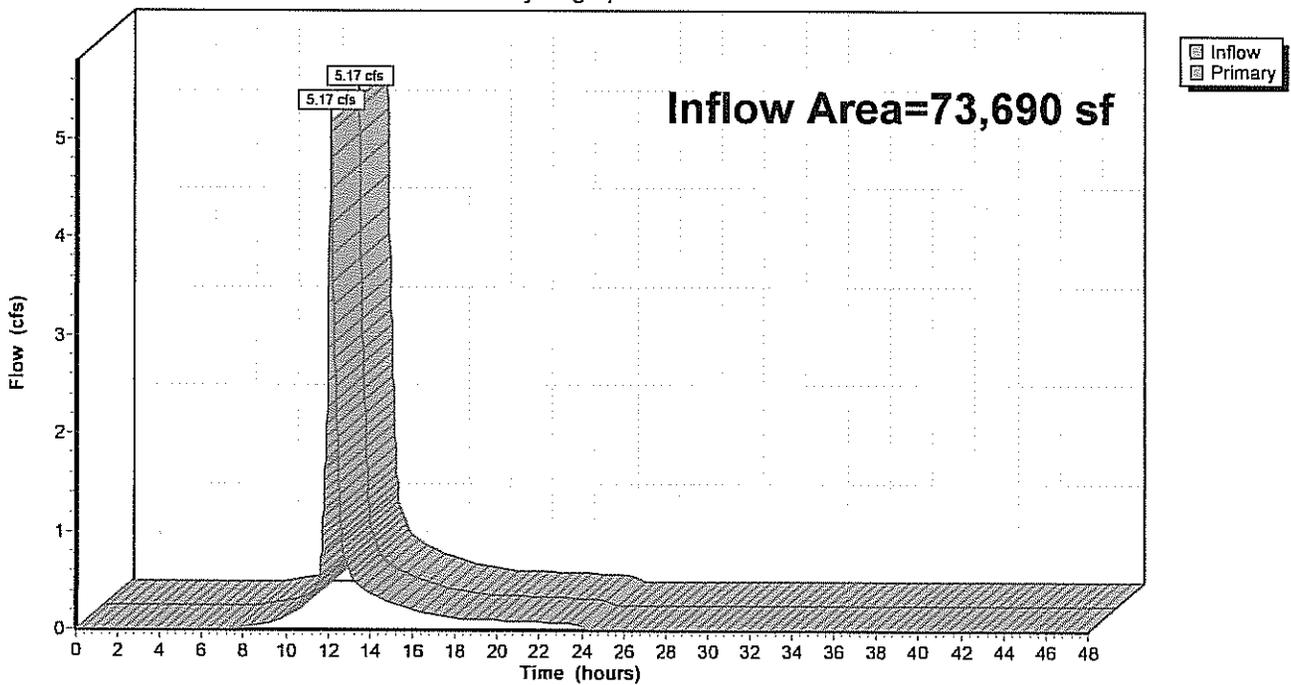
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 73,690 sf, 38.79% Impervious, Inflow Depth = 2.99" for 10 YR event
Inflow = 5.17 cfs @ 12.14 hrs, Volume= 18,384 cf
Primary = 5.17 cfs @ 12.14 hrs, Volume= 18,384 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-4: WET-2

Hydrograph



Summary for Pond AP-5: WET-3

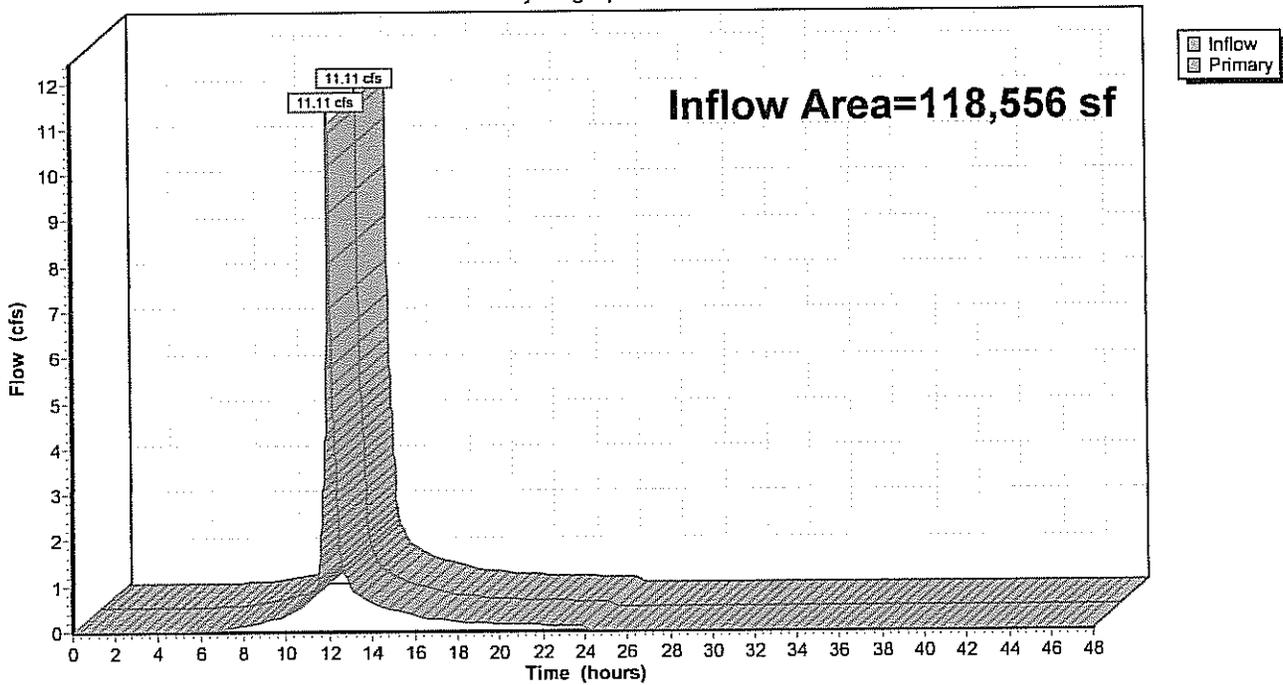
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,556 sf, 67.97% Impervious, Inflow Depth = 3.58" for 10 YR event
Inflow = 11.11 cfs @ 12.09 hrs, Volume= 35,377 cf
Primary = 11.11 cfs @ 12.09 hrs, Volume= 35,377 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-5: WET-3

Hydrograph



Summary for Subcatchment PRE-A: Pre Development Area A

Runoff = 4.28 cfs @ 12.08 hrs, Volume= 14,761 cf, Depth= 5.13"

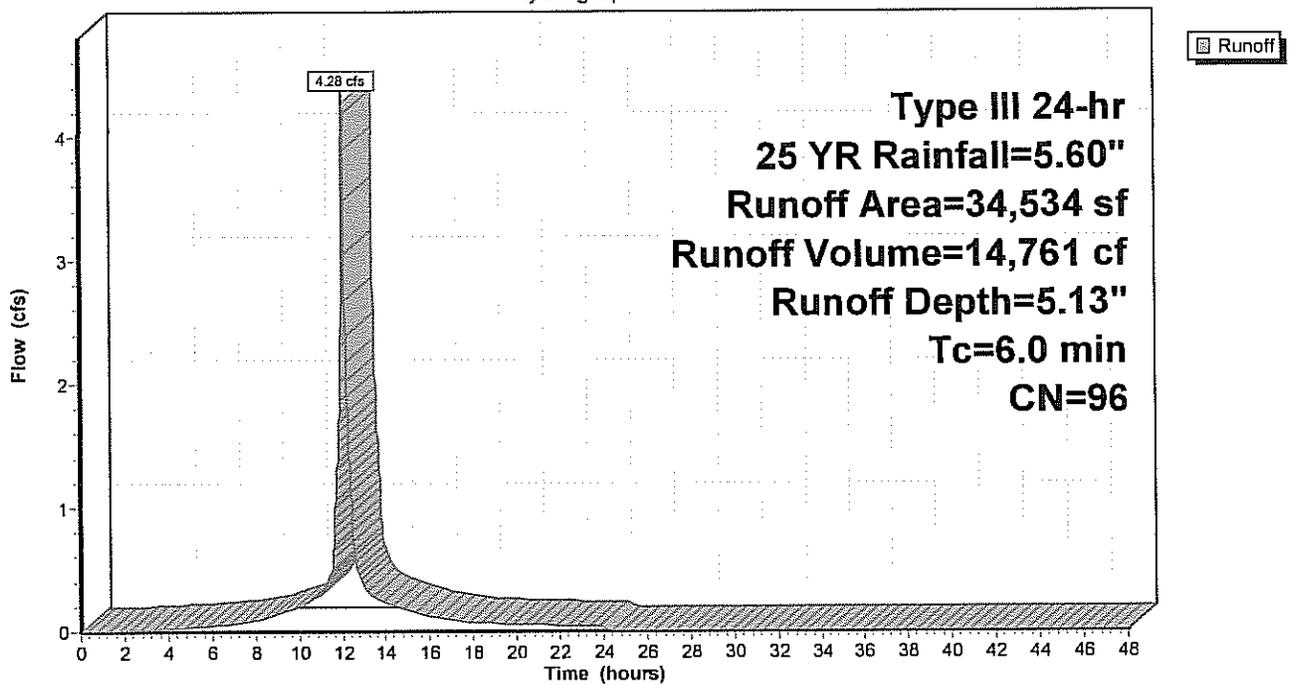
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
31,441	98	Paved parking, HSG C
3,093	74	>75% Grass cover, Good, HSG C
34,534	96	Weighted Average
3,093		8.96% Pervious Area
31,441		91.04% Impervious Area

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

Subcatchment PRE-A: Pre Development Area A

Hydrograph



Summary for Subcatchment PRE-B: Pre Development Area B

Runoff = 5.81 cfs @ 12.09 hrs, Volume= 18,010 cf, Depth= 3.13"

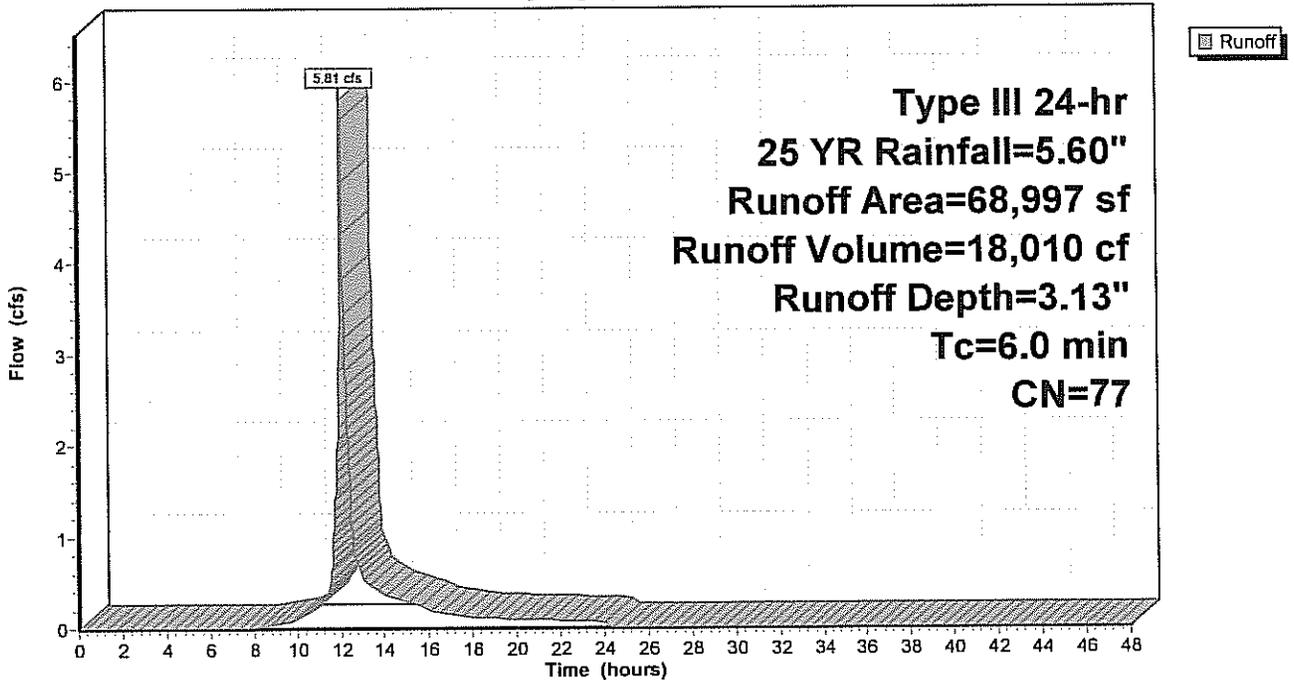
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
11,997	98	Paved parking, HSG C
28,874	74	>75% Grass cover, Good, HSG C
28,126	70	Woods, Good, HSG C
68,997	77	Weighted Average
57,000		82.61% Pervious Area
11,997		17.39% Impervious Area

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

Subcatchment PRE-B: Pre Development Area B

Hydrograph



Summary for Subcatchment PRE-C: Pre Development Area C

Runoff = 21.13 cfs @ 12.09 hrs, Volume= 67,951 cf, Depth= 4.35"

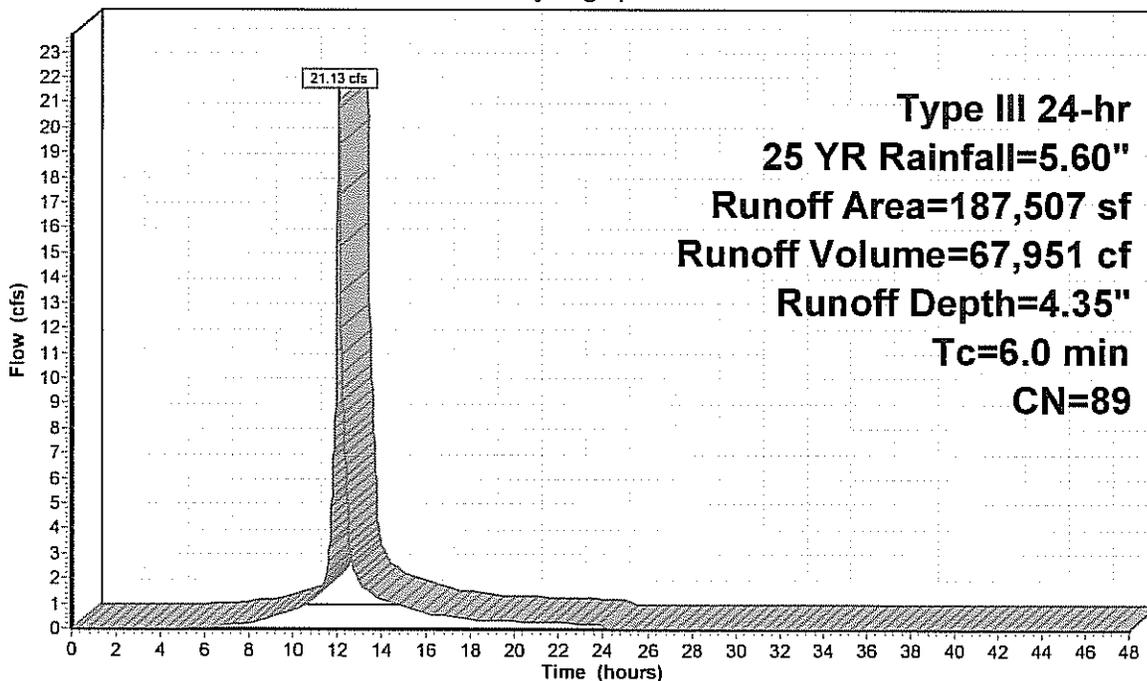
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
37,512	98	Paved parking, HSG C
77,417	98	Roofs, HSG C
68,595	74	>75% Grass cover, Good, HSG C
3,983	70	Woods, Good, HSG C
187,507	89	Weighted Average
72,578		38.71% Pervious Area
114,929		61.29% Impervious Area

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

Subcatchment PRE-C: Pre Development Area C

Hydrograph



Runoff

Summary for Subcatchment PRE-D: Pre Development Area D

Runoff = 6.39 cfs @ 12.14 hrs, Volume= 22,854 cf, Depth= 3.72"

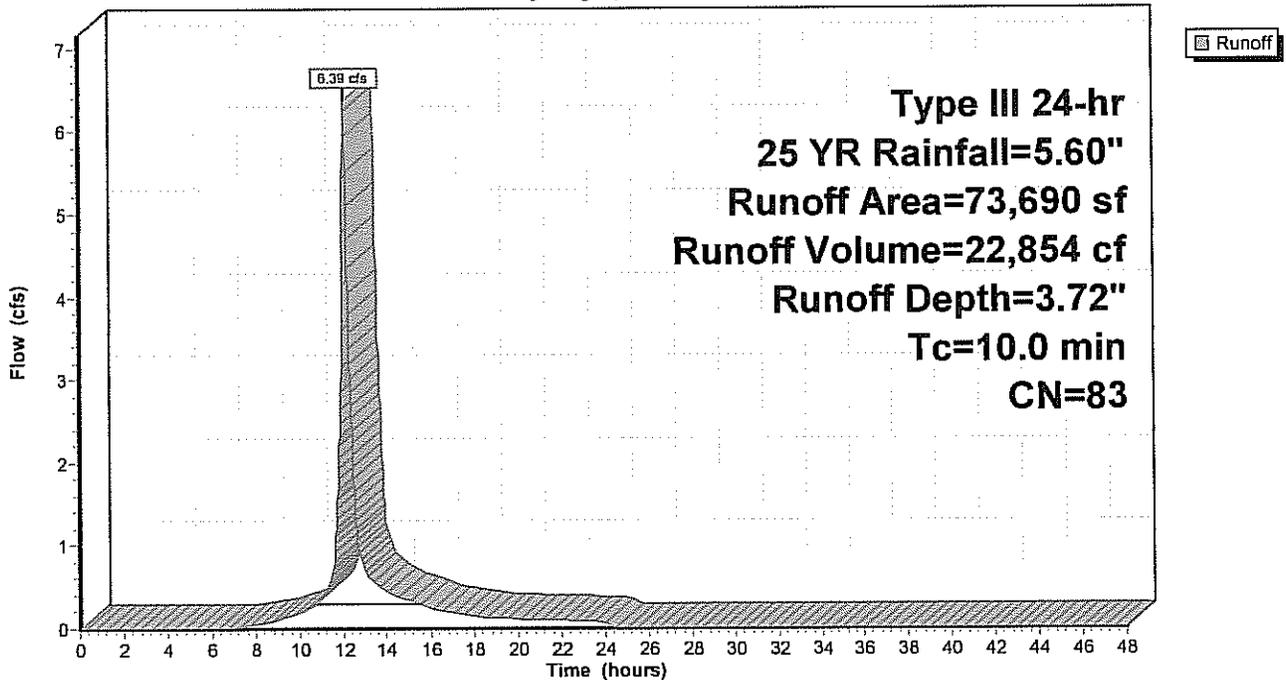
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
13,635	98	Paved parking, HSG C
45,105	74	>75% Grass cover, Good, HSG C
14,950	98	Roofs, HSG C
73,690	83	Weighted Average
45,105		61.21% Pervious Area
28,585		38.79% Impervious Area

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

Subcatchment PRE-D: Pre Development Area D

Hydrograph



Summary for Subcatchment PRE-E: Pre Development Area E

Runoff = 13.36 cfs @ 12.09 hrs, Volume= 42,964 cf, Depth= 4.35"

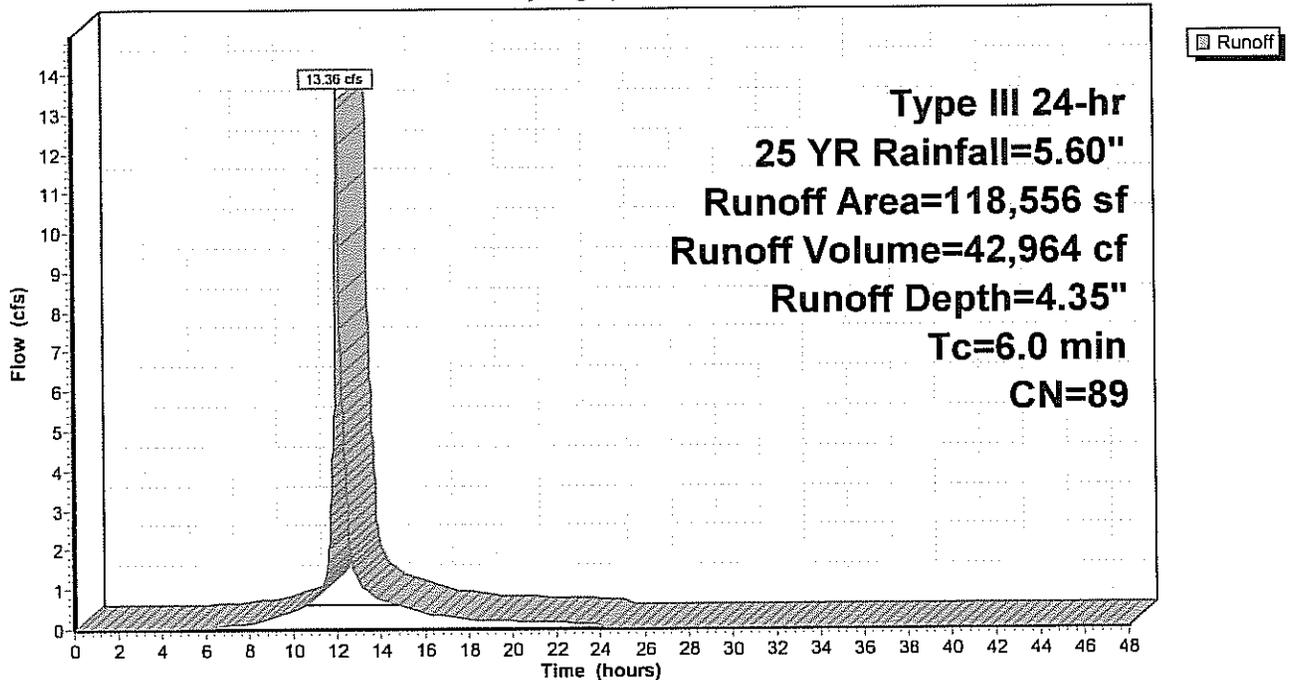
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
80,588	98	Paved parking, HSG C
32,968	70	Woods, Good, HSG C
5,000	74	>75% Grass cover, Good, HSG C
118,556	89	Weighted Average
37,968		32.03% Pervious Area
80,588		67.97% Impervious Area

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

Subcatchment PRE-E: Pre Development Area E

Hydrograph



Summary for Pond AP-1: WET-8

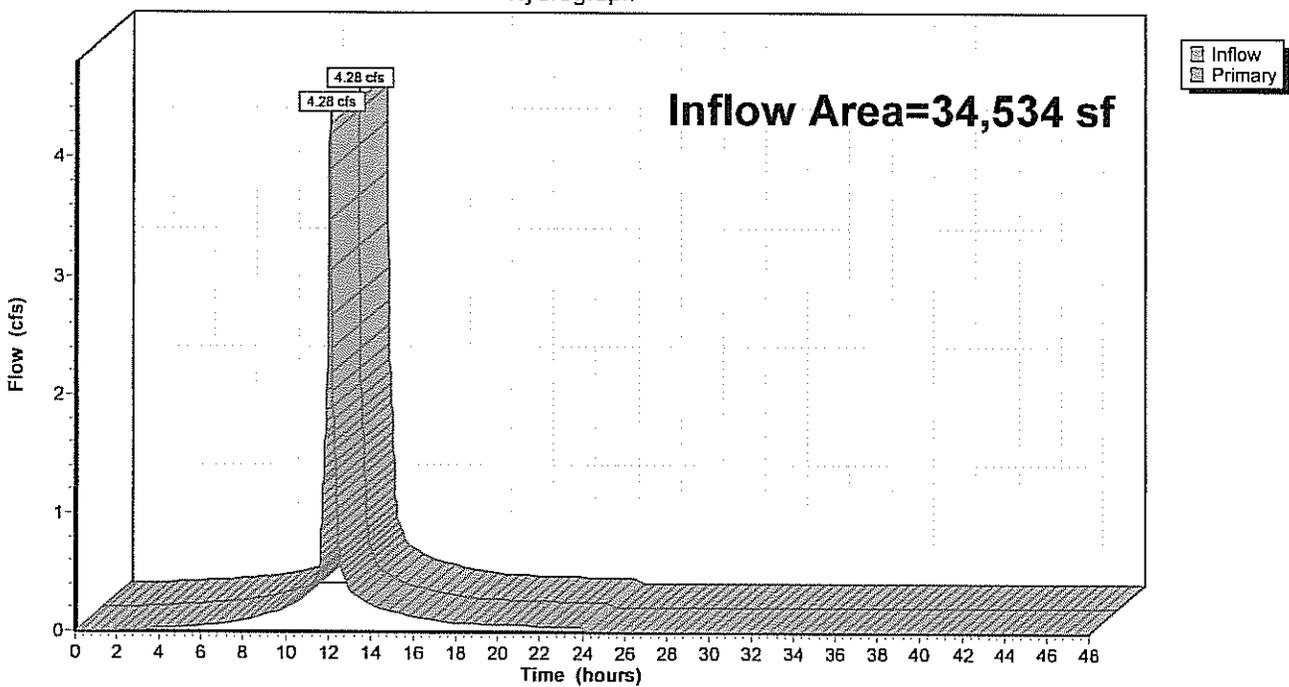
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 34,534 sf, 91.04% Impervious, Inflow Depth = 5.13" for 25 YR event
Inflow = 4.28 cfs @ 12.08 hrs, Volume= 14,761 cf
Primary = 4.28 cfs @ 12.08 hrs, Volume= 14,761 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-1: WET-8

Hydrograph



Summary for Pond AP-2: WET-1

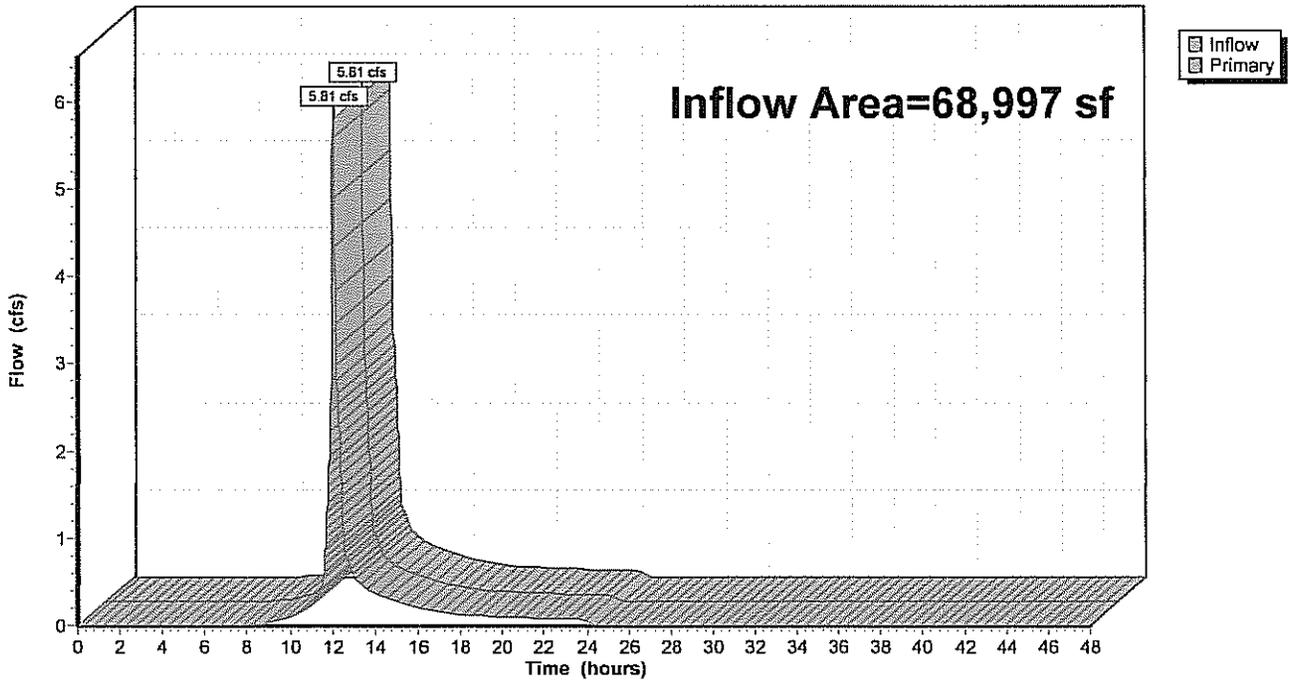
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 68,997 sf, 17.39% Impervious, Inflow Depth = 3.13" for 25 YR event
Inflow = 5.81 cfs @ 12.09 hrs, Volume= 18,010 cf
Primary = 5.81 cfs @ 12.09 hrs, Volume= 18,010 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-2: WET-1

Hydrograph



Summary for Pond AP-3: OFFSITE (18" CMP DRAIN)

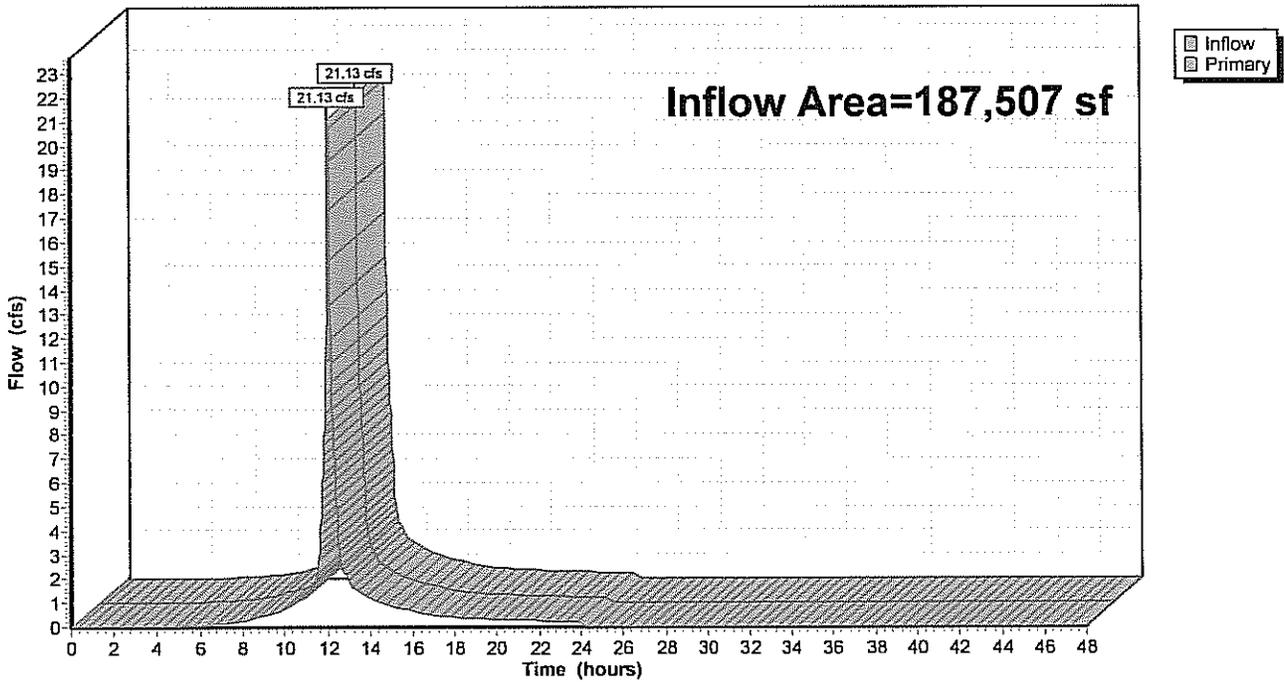
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 187,507 sf, 61.29% Impervious, Inflow Depth = 4.35" for 25 YR event
Inflow = 21.13 cfs @ 12.09 hrs, Volume= 67,951 cf
Primary = 21.13 cfs @ 12.09 hrs, Volume= 67,951 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-3: OFFSITE (18" CMP DRAIN)

Hydrograph

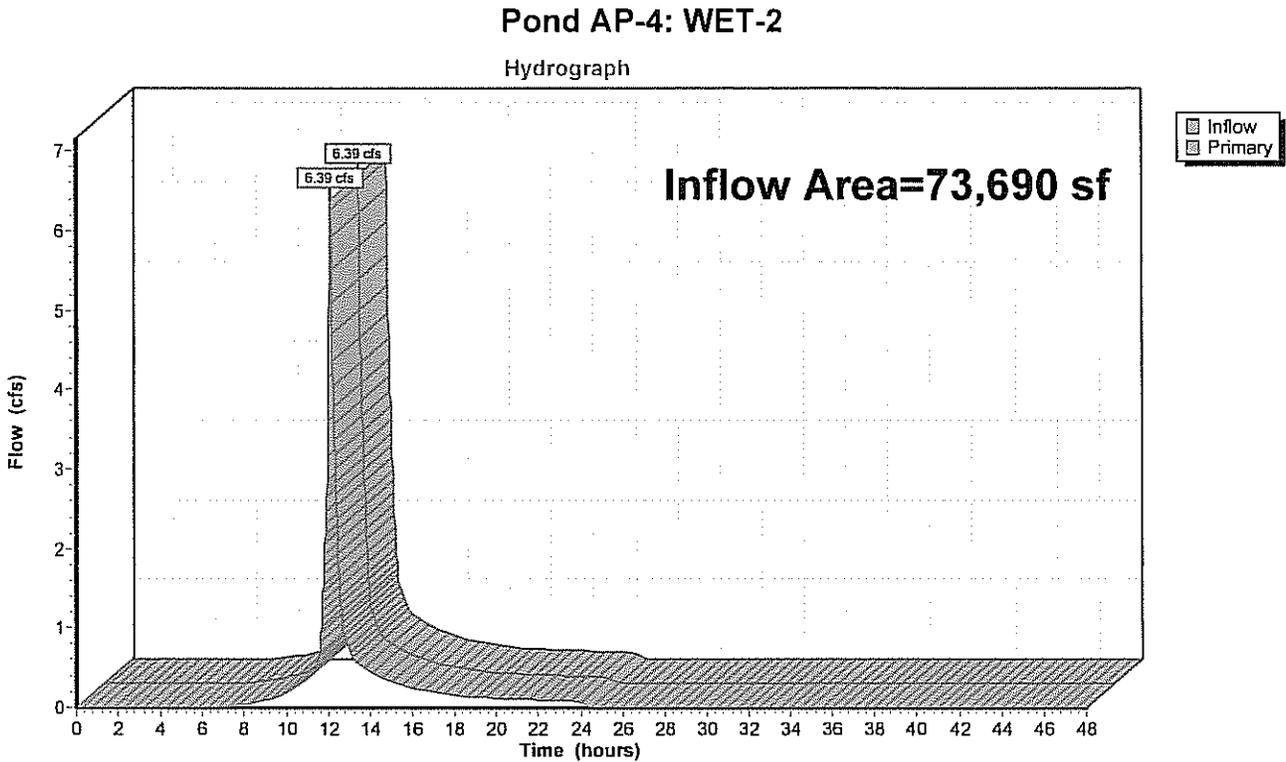


Summary for Pond AP-4: WET-2

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 73,690 sf, 38.79% Impervious, Inflow Depth = 3.72" for 25 YR event
Inflow = 6.39 cfs @ 12.14 hrs, Volume= 22,854 cf
Primary = 6.39 cfs @ 12.14 hrs, Volume= 22,854 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs



Summary for Pond AP-5: WET-3

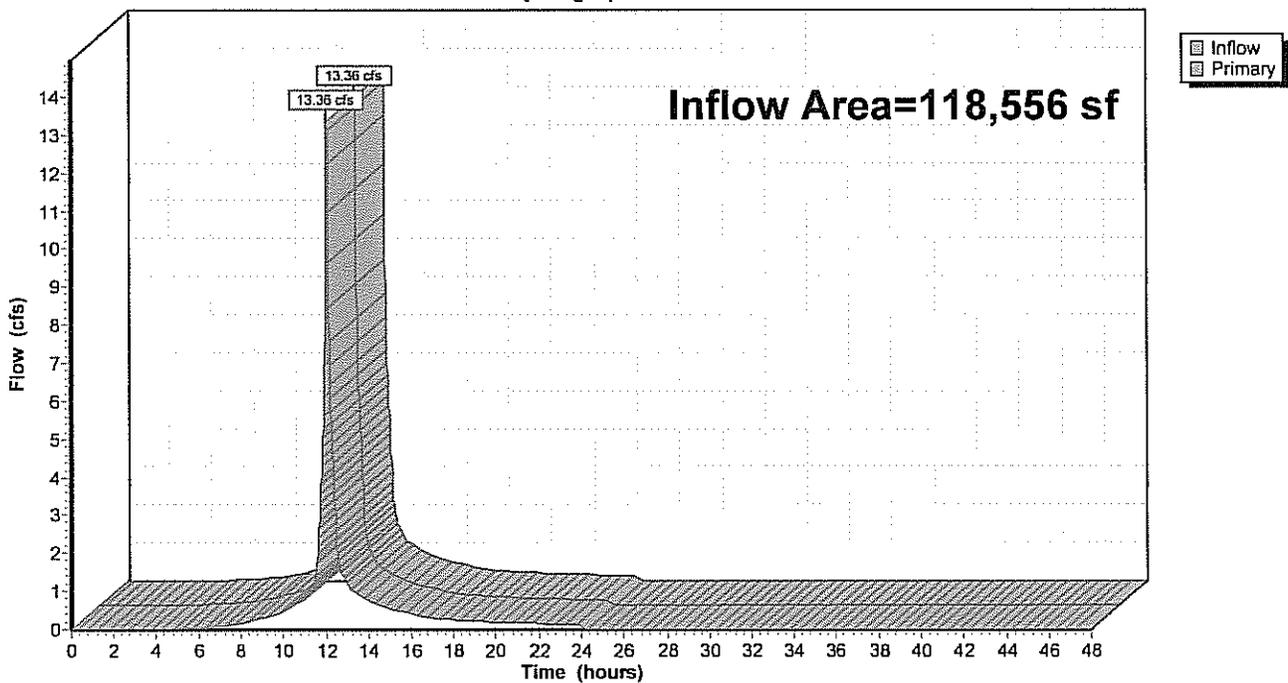
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,556 sf, 67.97% Impervious, Inflow Depth = 4.35" for 25 YR event
Inflow = 13.36 cfs @ 12.09 hrs, Volume= 42,964 cf
Primary = 13.36 cfs @ 12.09 hrs, Volume= 42,964 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-5: WET-3

Hydrograph



1998-PRE-WS-REV 1

Type III 24-hr 100 YR Rainfall=7.00"

Prepared by Field Engineering Co. Inc.

Printed 6/6/2014

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Time span=0.00-48.00 hrs, dt=0.02 hrs, 2401 points
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment PRE-A: Pre Development	Runoff Area=34,534 sf 91.04% Impervious Runoff Depth=6.52" Tc=6.0 min CN=96 Runoff=5.39 cfs 18,774 cf
Subcatchment PRE-B: Pre Development	Runoff Area=68,997 sf 17.39% Impervious Runoff Depth=4.37" Tc=6.0 min CN=77 Runoff=8.07 cfs 25,102 cf
Subcatchment PRE-C: Pre Development	Runoff Area=187,507 sf 61.29% Impervious Runoff Depth=5.71" Tc=6.0 min CN=89 Runoff=27.33 cfs 89,192 cf
Subcatchment PRE-D: Pre Development	Runoff Area=73,690 sf 38.79% Impervious Runoff Depth=5.03" Tc=10.0 min CN=83 Runoff=8.55 cfs 30,875 cf
Subcatchment PRE-E: Pre Development	Runoff Area=118,556 sf 67.97% Impervious Runoff Depth=5.71" Tc=6.0 min CN=89 Runoff=17.28 cfs 56,394 cf
Pond AP-1: WET-8	Inflow=5.39 cfs 18,774 cf Primary=5.39 cfs 18,774 cf
Pond AP-2: WET-1	Inflow=8.07 cfs 25,102 cf Primary=8.07 cfs 25,102 cf
Pond AP-3: OFFSITE (18" CMP DRAIN)	Inflow=27.33 cfs 89,192 cf Primary=27.33 cfs 89,192 cf
Pond AP-4: WET-2	Inflow=8.55 cfs 30,875 cf Primary=8.55 cfs 30,875 cf
Pond AP-5: WET-3	Inflow=17.28 cfs 56,394 cf Primary=17.28 cfs 56,394 cf

Total Runoff Area = 483,284 sf Runoff Volume = 220,337 cf Average Runoff Depth = 5.47"
44.64% Pervious = 215,744 sf 55.36% Impervious = 267,540 sf

Summary for Subcatchment PRE-A: Pre Development Area A

Runoff = 5.39 cfs @ 12.08 hrs, Volume= 18,774 cf, Depth= 6.52"

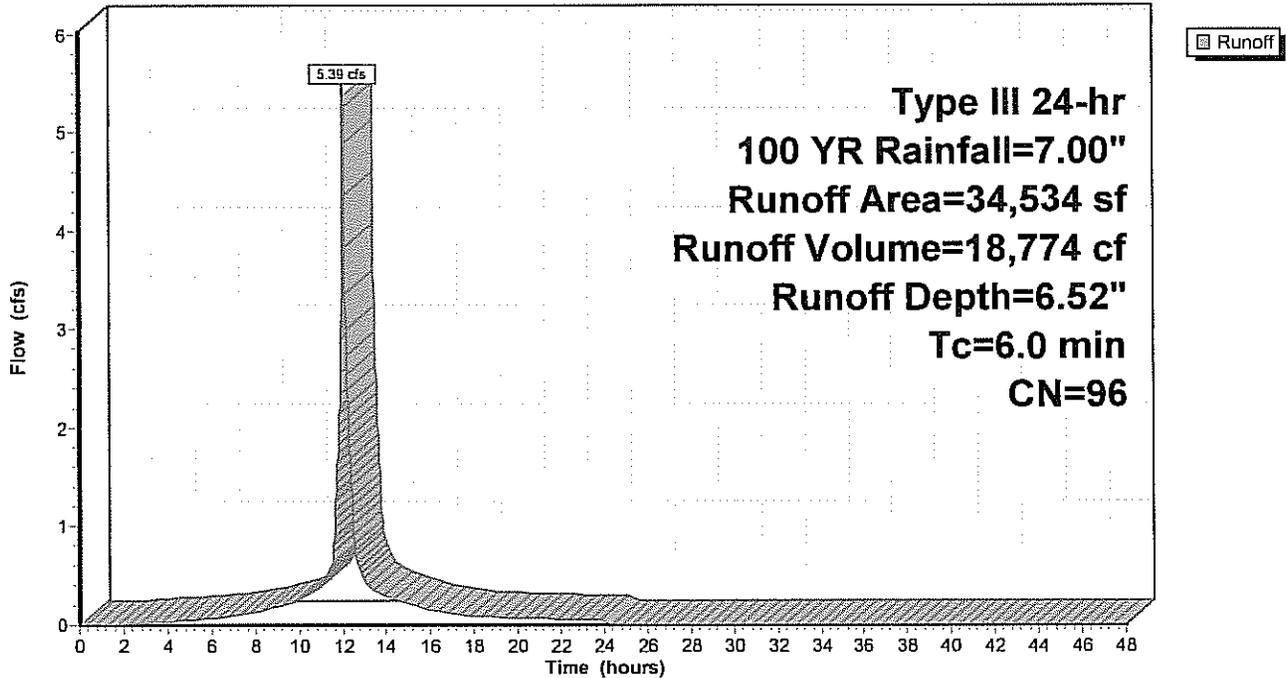
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
31,441	98	Paved parking, HSG C
3,093	74	>75% Grass cover, Good, HSG C
34,534	96	Weighted Average
3,093		8.96% Pervious Area
31,441		91.04% Impervious Area

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

Subcatchment PRE-A: Pre Development Area A

Hydrograph



Summary for Subcatchment PRE-B: Pre Development Area B

Runoff = 8.07 cfs @ 12.09 hrs, Volume= 25,102 cf, Depth= 4.37"

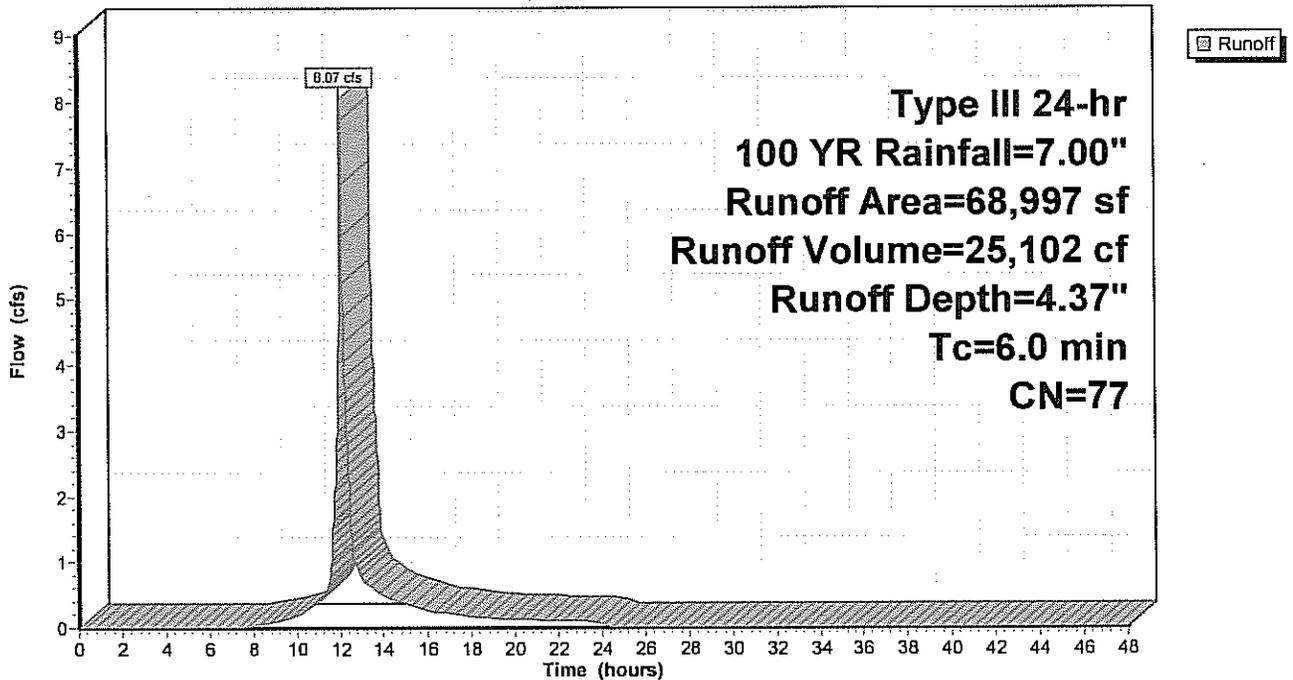
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
11,997	98	Paved parking, HSG C
28,874	74	>75% Grass cover, Good, HSG C
28,126	70	Woods, Good, HSG C
68,997	77	Weighted Average
57,000		82.61% Pervious Area
11,997		17.39% Impervious Area

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

Subcatchment PRE-B: Pre Development Area B

Hydrograph



Summary for Subcatchment PRE-C: Pre Development Area C

Runoff = 27.33 cfs @ 12.08 hrs, Volume= 89,192 cf, Depth= 5.71"

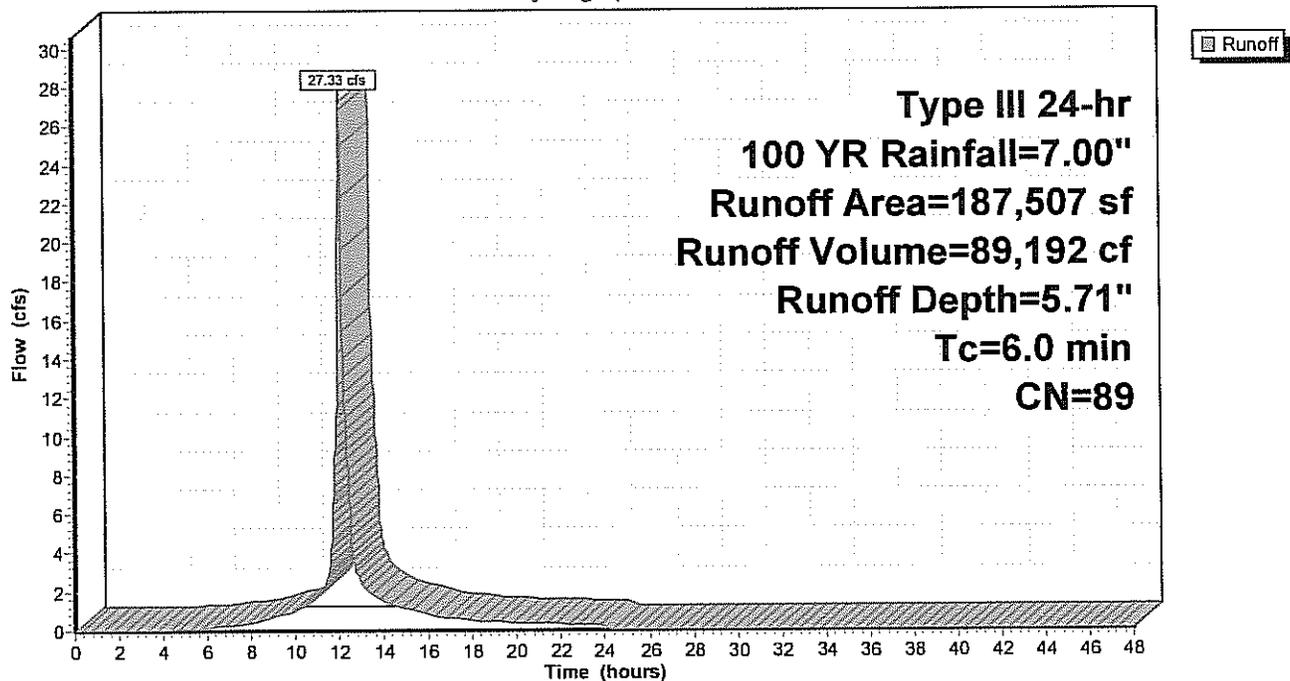
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
37,512	98	Paved parking, HSG C
77,417	98	Roofs, HSG C
68,595	74	>75% Grass cover, Good, HSG C
3,983	70	Woods, Good, HSG C
187,507	89	Weighted Average
72,578		38.71% Pervious Area
114,929		61.29% Impervious Area

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

Subcatchment PRE-C: Pre Development Area C

Hydrograph



Summary for Subcatchment PRE-D: Pre Development Area D

Runoff = 8.55 cfs @ 12.14 hrs, Volume= 30,875 cf, Depth= 5.03"

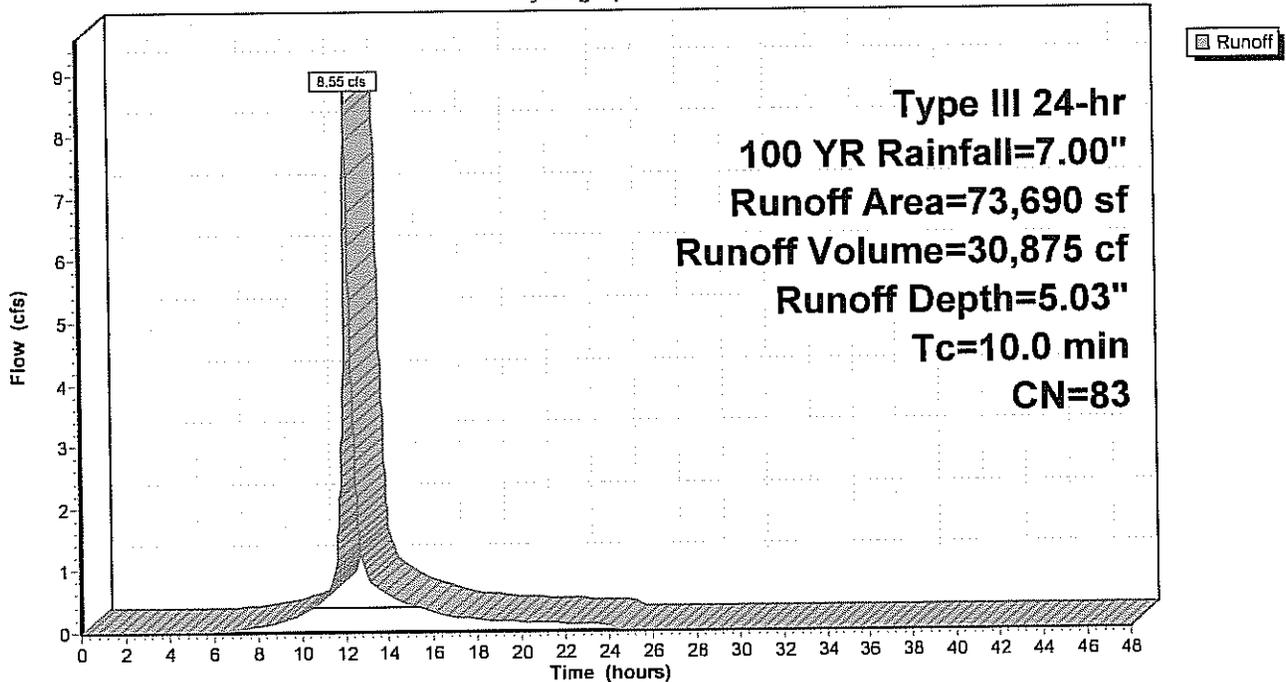
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
13,635	98	Paved parking, HSG C
45,105	74	>75% Grass cover, Good, HSG C
14,950	98	Roofs, HSG C
73,690	83	Weighted Average
45,105		61.21% Pervious Area
28,585		38.79% Impervious Area

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

Subcatchment PRE-D: Pre Development Area D

Hydrograph



Summary for Subcatchment PRE-E: Pre Development Area E

Runoff = 17.28 cfs @ 12.08 hrs, Volume= 56,394 cf, Depth= 5.71"

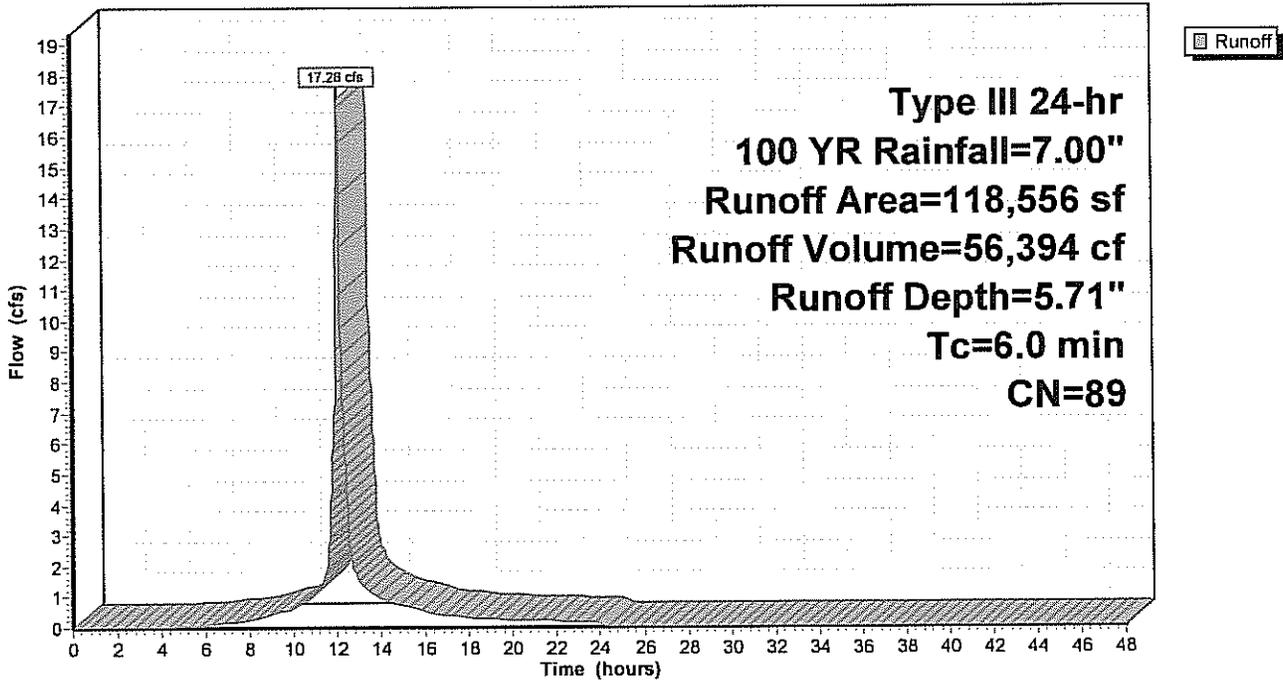
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
80,588	98	Paved parking, HSG C
32,968	70	Woods, Good, HSG C
5,000	74	>75% Grass cover, Good, HSG C
118,556	89	Weighted Average
37,968		32.03% Pervious Area
80,588		67.97% Impervious Area

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

Subcatchment PRE-E: Pre Development Area E

Hydrograph



Summary for Pond AP-1: WET-8

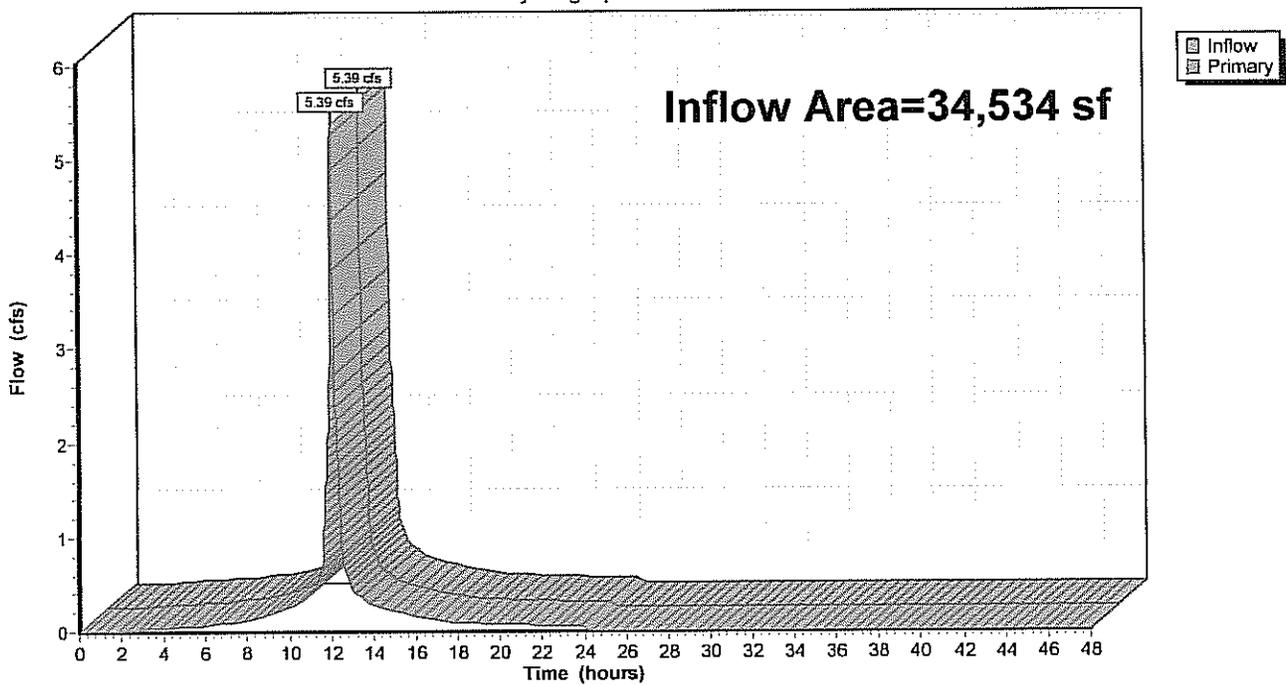
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 34,534 sf, 91.04% Impervious, Inflow Depth = 6.52" for 100 YR event
Inflow = 5.39 cfs @ 12.08 hrs, Volume= 18,774 cf
Primary = 5.39 cfs @ 12.08 hrs, Volume= 18,774 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-1: WET-8

Hydrograph



Summary for Pond AP-2: WET-1

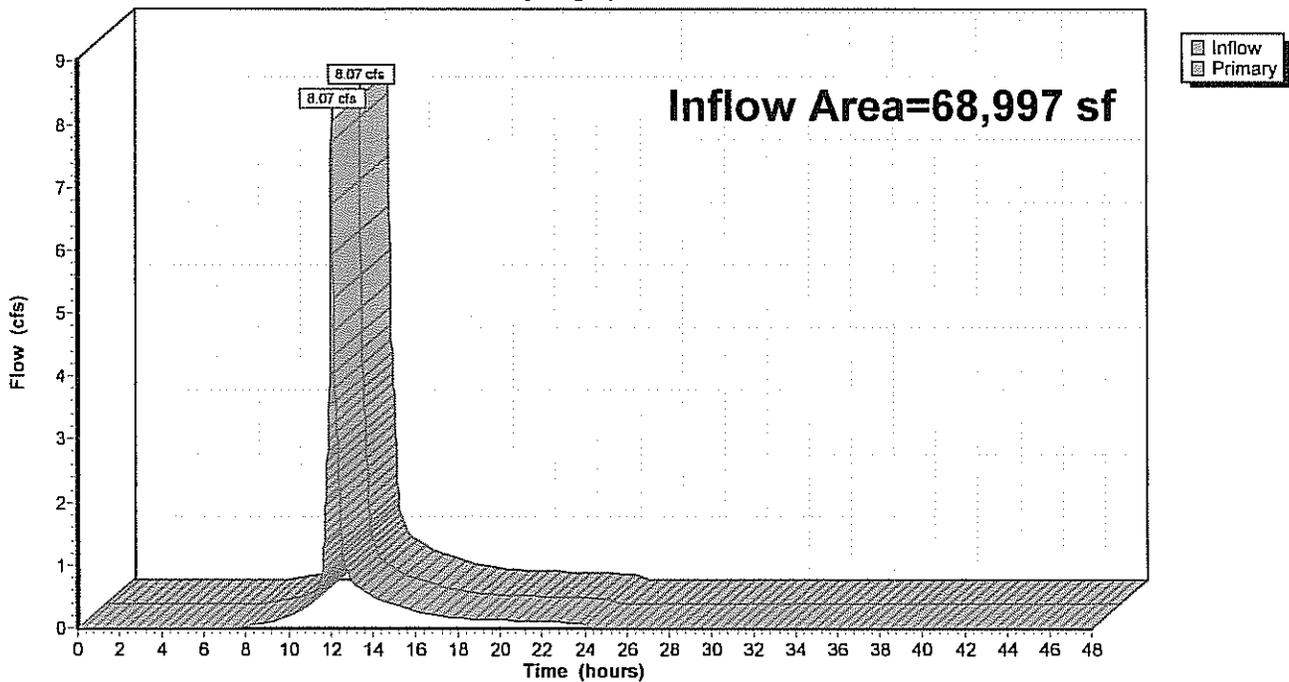
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 68,997 sf, 17.39% Impervious, Inflow Depth = 4.37" for 100 YR event
Inflow = 8.07 cfs @ 12.09 hrs, Volume= 25,102 cf
Primary = 8.07 cfs @ 12.09 hrs, Volume= 25,102 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-2: WET-1

Hydrograph



Summary for Pond AP-3: OFFSITE (18" CMP DRAIN)

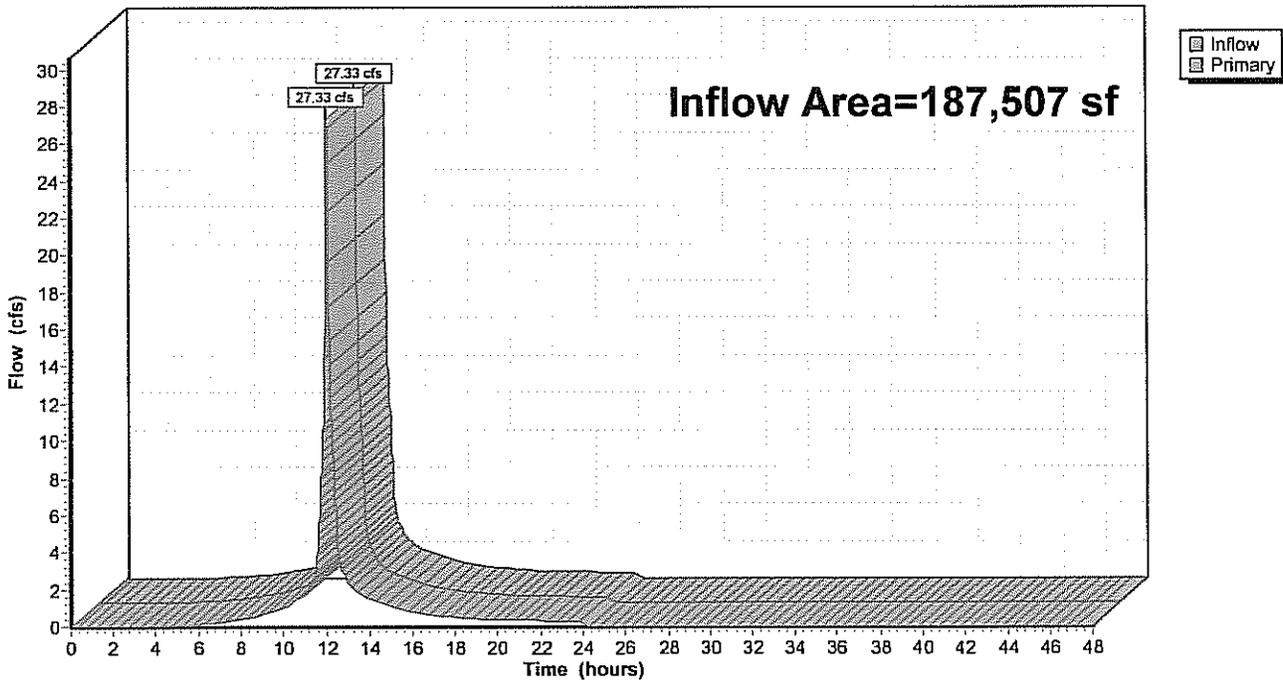
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 187,507 sf, 61.29% Impervious, Inflow Depth = 5.71" for 100 YR event
Inflow = 27.33 cfs @ 12.08 hrs, Volume= 89,192 cf
Primary = 27.33 cfs @ 12.08 hrs, Volume= 89,192 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-3: OFFSITE (18" CMP DRAIN)

Hydrograph



Summary for Pond AP-4: WET-2

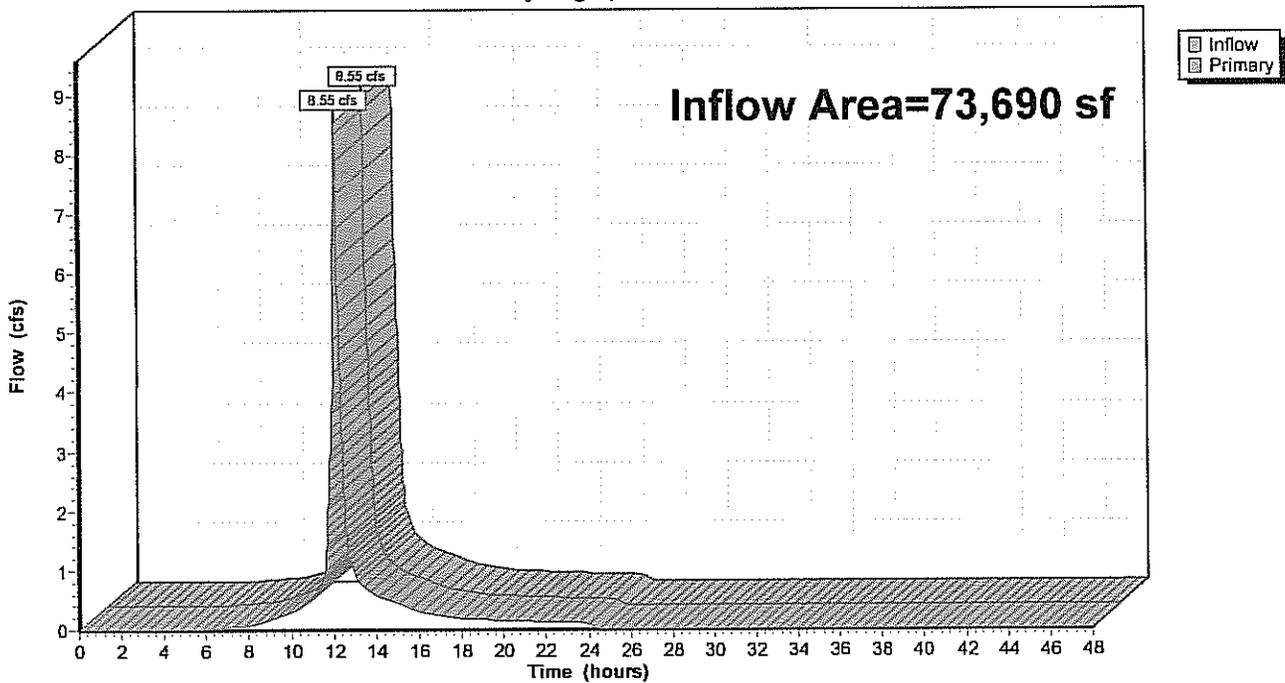
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 73,690 sf, 38.79% Impervious, Inflow Depth = 5.03" for 100 YR event
Inflow = 8.55 cfs @ 12.14 hrs, Volume= 30,875 cf
Primary = 8.55 cfs @ 12.14 hrs, Volume= 30,875 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

Pond AP-4: WET-2

Hydrograph



Summary for Pond AP-5: WET-3

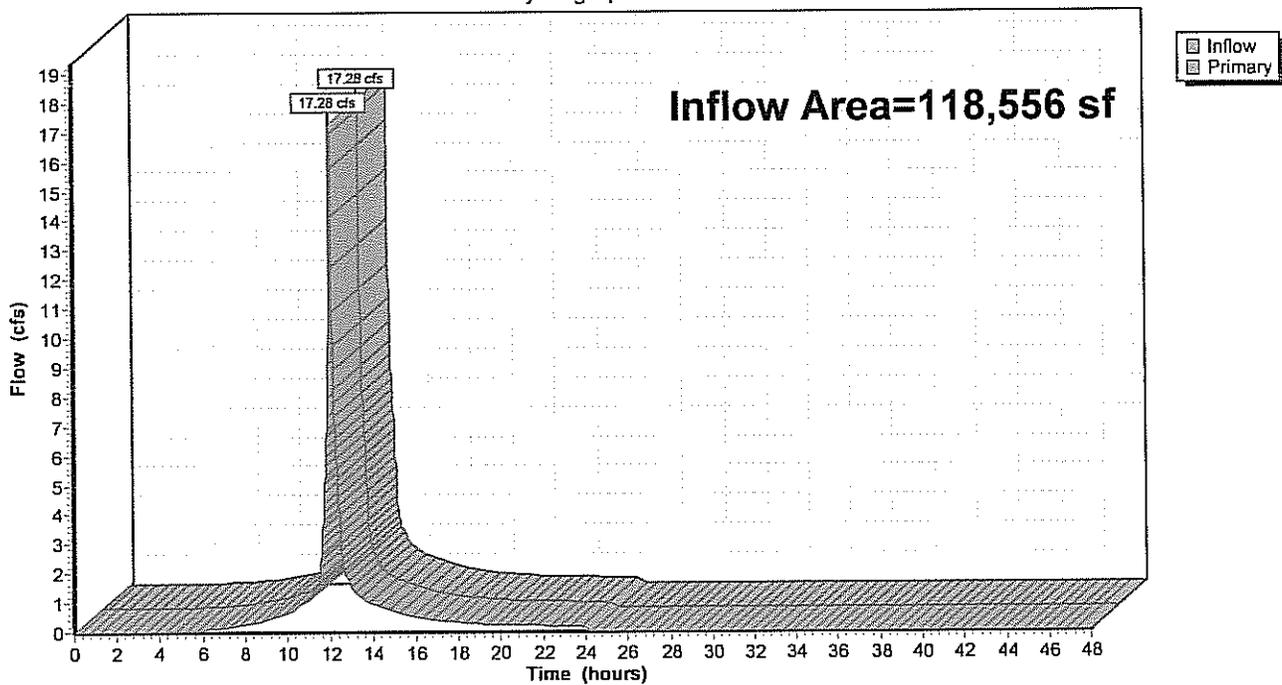
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,556 sf, 67.97% Impervious, Inflow Depth = 5.71" for 100 YR event
Inflow = 17.28 cfs @ 12.08 hrs, Volume= 56,394 cf
Primary = 17.28 cfs @ 12.08 hrs, Volume= 56,394 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.02 hrs

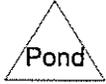
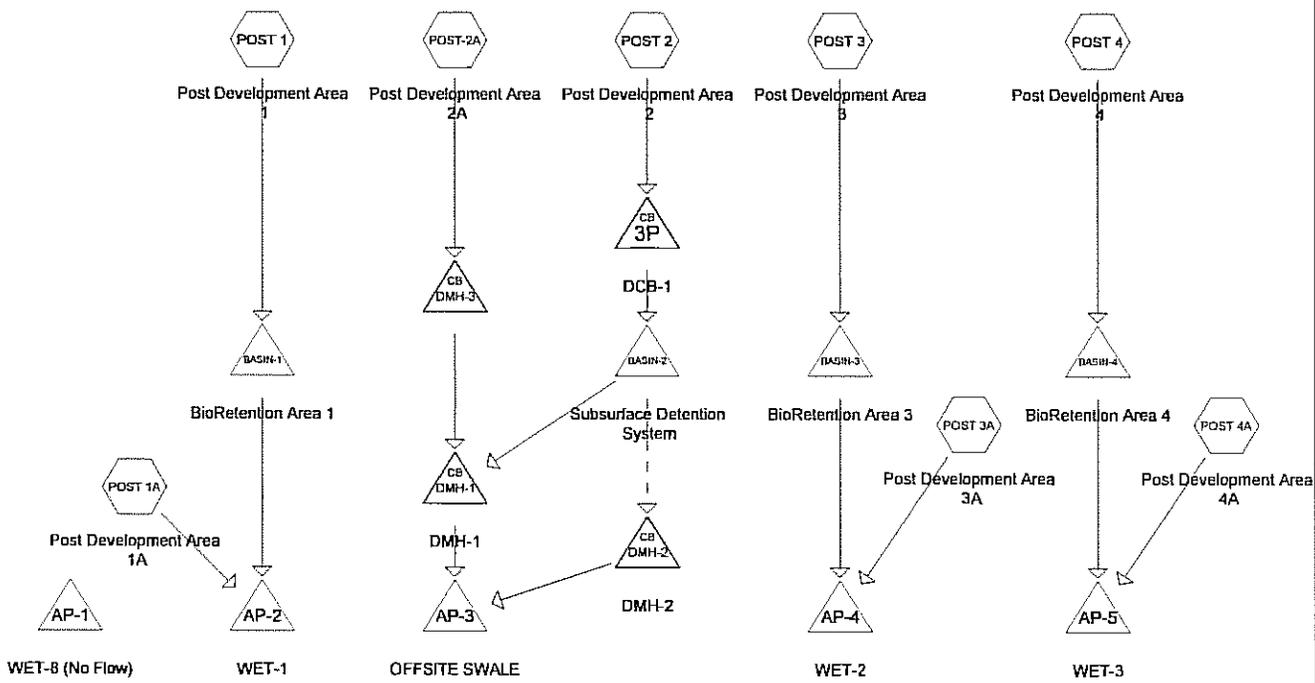
Pond AP-5: WET-3

Hydrograph



Section 3

Updated Post Development Hydrologic Analysis



Routing Diagram for 1998-POST-WS-REV 3
 Prepared by Field Engineering Co. Inc., Printed 6/9/2014
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1998-POST-WS-REV 3

Prepared by Field Engineering Co. Inc.

Printed 6/9/2014

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Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
56,806	74	>75% Grass cover, Good, HSG C (POST 1, POST 2, POST 3, POST 4)
3,773	89	Gravel roads, HSG C (POST 1A, POST 2)
51,749	96	Gravel surface, HSG C (POST 1)
146,863	98	Paved parking, HSG C (POST 1, POST 2, POST 3, POST 3A, POST 4, POST 4A)
115,778	98	Roofs, HSG C (POST 3A, POST-2A)
108,315	70	Woods, Good, HSG C (POST 1A, POST 3A, POST 4A)
483,284	89	TOTAL AREA

1998-POST-WS-REV 3

Type III 24-hr 2 YR Rainfall=3.50"

Prepared by Field Engineering Co. Inc.

Printed 6/9/2014

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 4
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment POST 1: Post Development Runoff Area=83,587 sf 4.22% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=89 Runoff=5.25 cfs 16,419 cf

Subcatchment POST 1A: Post Development Runoff Area=46,305 sf 0.00% Impervious Runoff Depth=1.01"
Tc=6.0 min CN=70 Runoff=1.16 cfs 3,890 cf

Subcatchment POST 2: Post Development Runoff Area=56,802 sf 85.28% Impervious Runoff Depth=2.94"
Tc=6.0 min CN=95 Runoff=4.22 cfs 13,912 cf

Subcatchment POST 3: Post Development Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=2.36"
Tc=6.0 min CN=89 Runoff=1.87 cfs 5,841 cf

Subcatchment POST 3A: Post Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=1.64"
Tc=6.0 min CN=80 Runoff=2.08 cfs 6,474 cf

Subcatchment POST 4: Post Development Runoff Area=83,887 sf 85.69% Impervious Runoff Depth=2.94"
Tc=6.0 min CN=95 Runoff=6.24 cfs 20,546 cf

Subcatchment POST 4A: Post Development Runoff Area=34,665 sf 7.35% Impervious Runoff Depth=1.12"
Tc=6.0 min CN=72 Runoff=0.99 cfs 3,238 cf

Subcatchment POST-2A: Post Runoff Area=100,828 sf 100.00% Impervious Runoff Depth=3.27"
Tc=6.0 min CN=98 Runoff=7.88 cfs 27,446 cf

Pond 3P: DCB-1 Peak Elev=76.89' Inflow=4.22 cfs 13,912 cf
12.0" Round Culvert x 2.00 n=0.013 L=6.0' S=0.0133 '/' Outflow=4.22 cfs 13,912 cf

Pond AP-1: WET-8 (No Flow) Primary=0.00 cfs 0 cf

Pond AP-2: WET-1 Inflow=1.39 cfs 19,818 cf
Primary=1.39 cfs 19,818 cf

Pond AP-3: OFFSITE SWALE Inflow=9.70 cfs 40,250 cf
Primary=9.70 cfs 40,250 cf

Pond AP-4: WET-2 Inflow=2.30 cfs 12,262 cf
Primary=2.30 cfs 12,262 cf

Pond AP-5: WET-3 Inflow=6.34 cfs 21,116 cf
Primary=6.34 cfs 21,116 cf

Pond BASIN-1: BioRetention Area 1 Peak Elev=78.44' Storage=9,509 cf Inflow=5.25 cfs 16,419 cf
Outflow=0.33 cfs 15,928 cf

Pond BASIN-2: Subsurface Detention Peak Elev=76.63' Storage=4,200 cf Inflow=4.22 cfs 13,912 cf
Primary=1.44 cfs 7,541 cf Secondary=1.50 cfs 5,263 cf Outflow=2.93 cfs 12,804 cf

Pond BASIN-3: BioRetention Area 3 Peak Elev=76.65' Storage=2,640 cf Inflow=1.87 cfs 5,841 cf
Outflow=0.29 cfs 5,788 cf

Pond BASIN-4: BioRetention Area 4 Peak Elev=78.11' Storage=4,303 cf Inflow=6.24 cfs 20,546 cf
Outflow=5.41 cfs 17,878 cf

Pond DMH-1: DMH-1 Peak Elev=76.43' Inflow=8.50 cfs 34,987 cf
24.0" Round Culvert x 2.00 n=0.010 L=50.0' S=0.0044 '/ Outflow=8.50 cfs 34,987 cf

Pond DMH-2: DMH-2 Peak Elev=76.45' Inflow=1.50 cfs 5,263 cf
18.0" Round Culvert n=0.011 L=50.0' S=0.0074 '/ Outflow=1.50 cfs 5,263 cf

Pond DMH-3: Peak Elev=77.57' Inflow=7.88 cfs 27,446 cf
24.0" Round Culvert n=0.013 L=171.0' S=0.0040 '/ Outflow=7.88 cfs 27,446 cf

Total Runoff Area = 483,284 sf Runoff Volume = 97,766 cf Average Runoff Depth = 2.43"
45.65% Pervious = 220,643 sf 54.35% Impervious = 262,641 sf

Summary for Subcatchment POST 1: Post Development Area 1

Runoff = 5.25 cfs @ 12.09 hrs, Volume= 16,419 cf, Depth= 2.36"

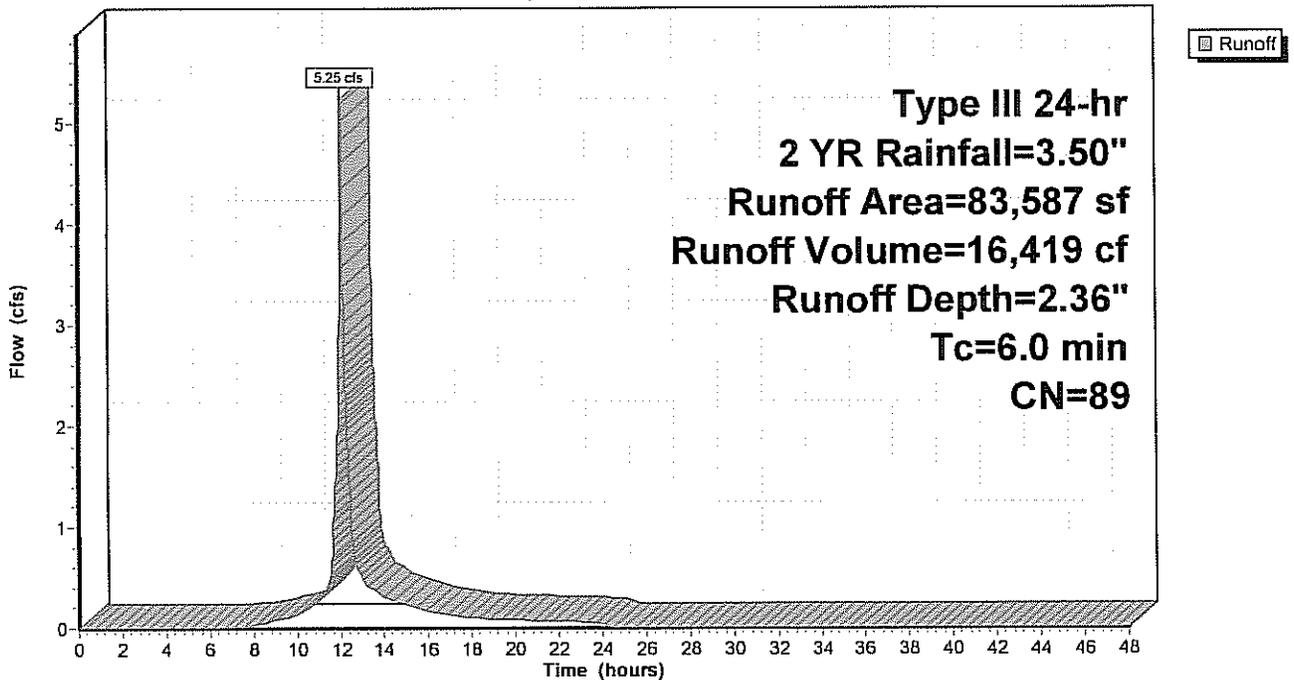
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
51,749	96	Gravel surface, HSG C
3,528	98	Paved parking, HSG C
28,310	74	>75% Grass cover, Good, HSG C
83,587	89	Weighted Average
80,059		95.78% Pervious Area
3,528		4.22% Impervious Area

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

Subcatchment POST 1: Post Development Area 1

Hydrograph



Summary for Subcatchment POST 1A: Post Development Area 1A

Runoff = 1.16 cfs @ 12.10 hrs, Volume= 3,890 cf, Depth= 1.01"

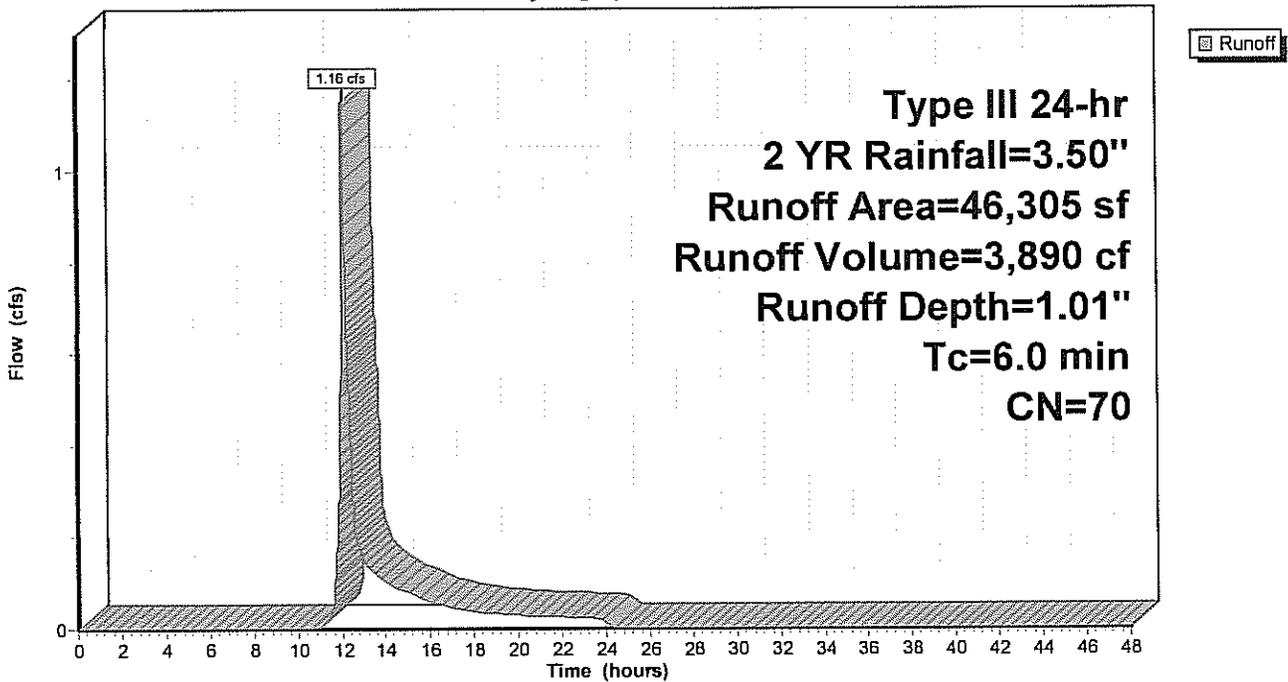
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
942	89	Gravel roads, HSG C
45,363	70	Woods, Good, HSG C
46,305	70	Weighted Average
46,305		100.00% Pervious Area

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

Subcatchment POST 1A: Post Development Area 1A

Hydrograph



Summary for Subcatchment POST 2: Post Development Area 2

Runoff = 4.22 cfs @ 12.08 hrs, Volume= 13,912 cf, Depth= 2.94"

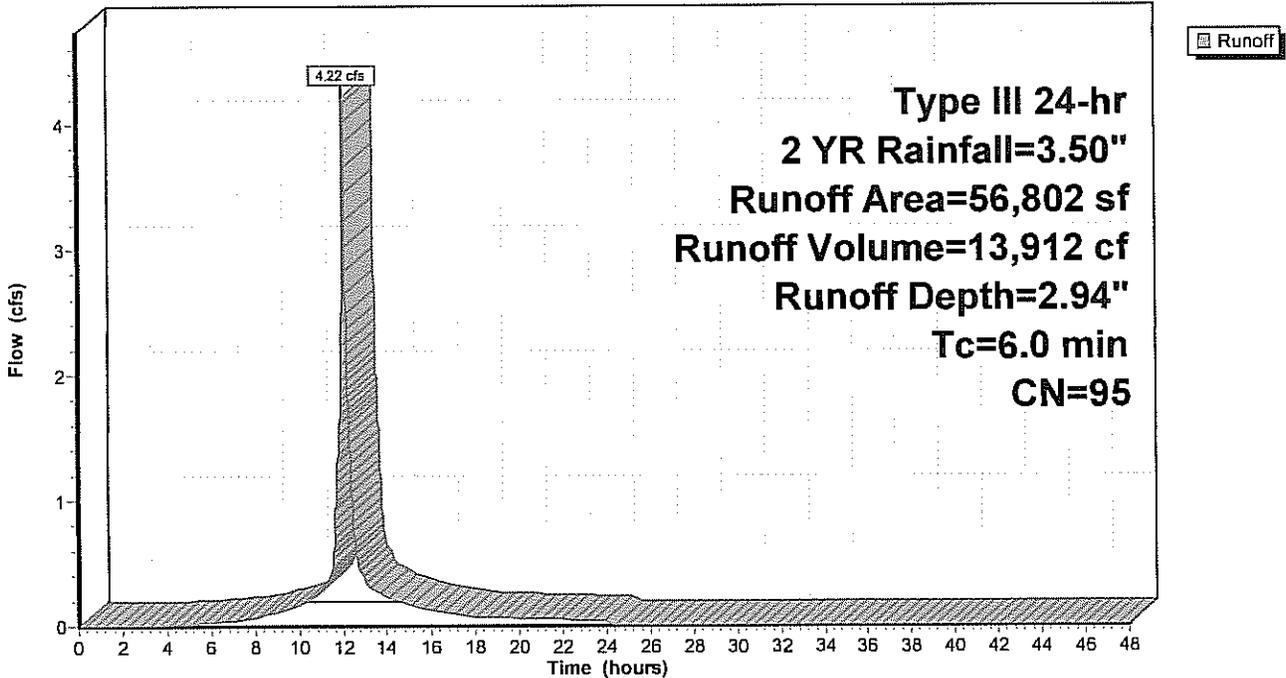
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
48,439	98	Paved parking, HSG C
2,831	89	Gravel roads, HSG C
5,532	74	>75% Grass cover, Good, HSG C
56,802	95	Weighted Average
8,363		14.72% Pervious Area
48,439		85.28% Impervious Area

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

Subcatchment POST 2: Post Development Area 2

Hydrograph



Summary for Subcatchment POST 3: Post Development Area 3

Runoff = 1.87 cfs @ 12.09 hrs, Volume= 5,841 cf, Depth= 2.36"

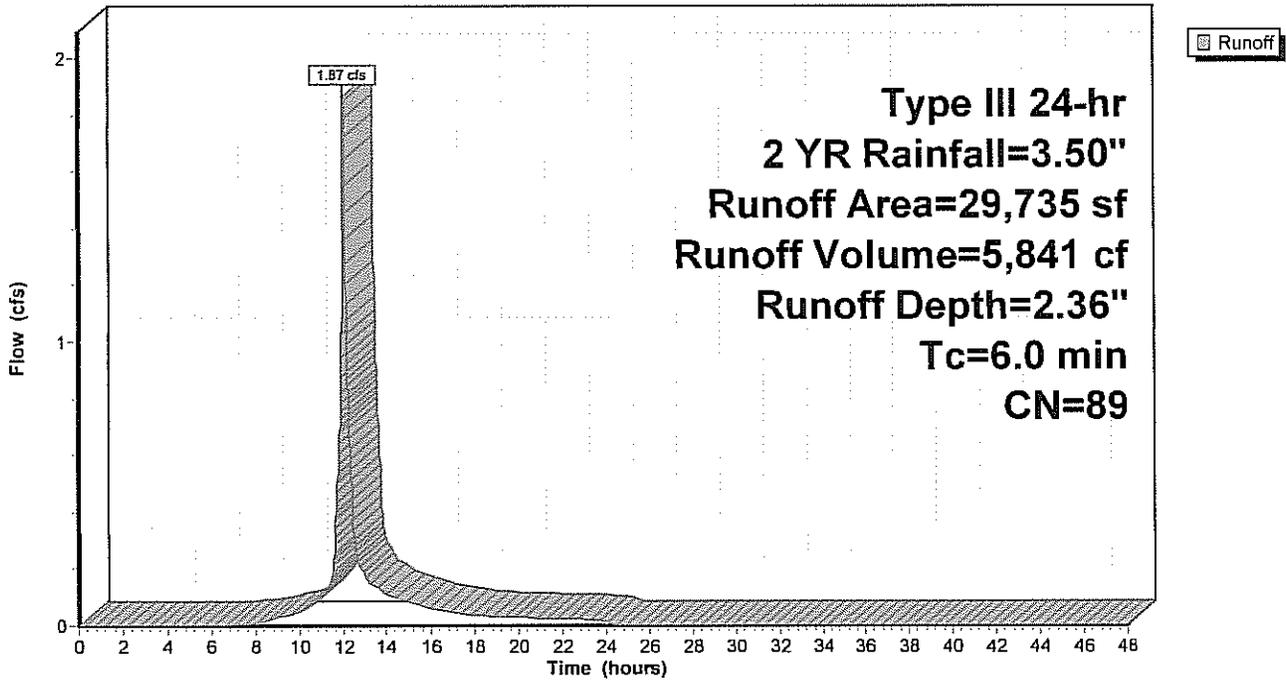
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
18,773	98	Paved parking, HSG C
10,962	74	>75% Grass cover, Good, HSG C
29,735	89	Weighted Average
10,962		36.87% Pervious Area
18,773		63.13% Impervious Area

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

Subcatchment POST 3: Post Development Area 3

Hydrograph



Summary for Subcatchment POST 3A: Post Development Area 3A

Runoff = 2.08 cfs @ 12.09 hrs, Volume= 6,474 cf, Depth= 1.64"

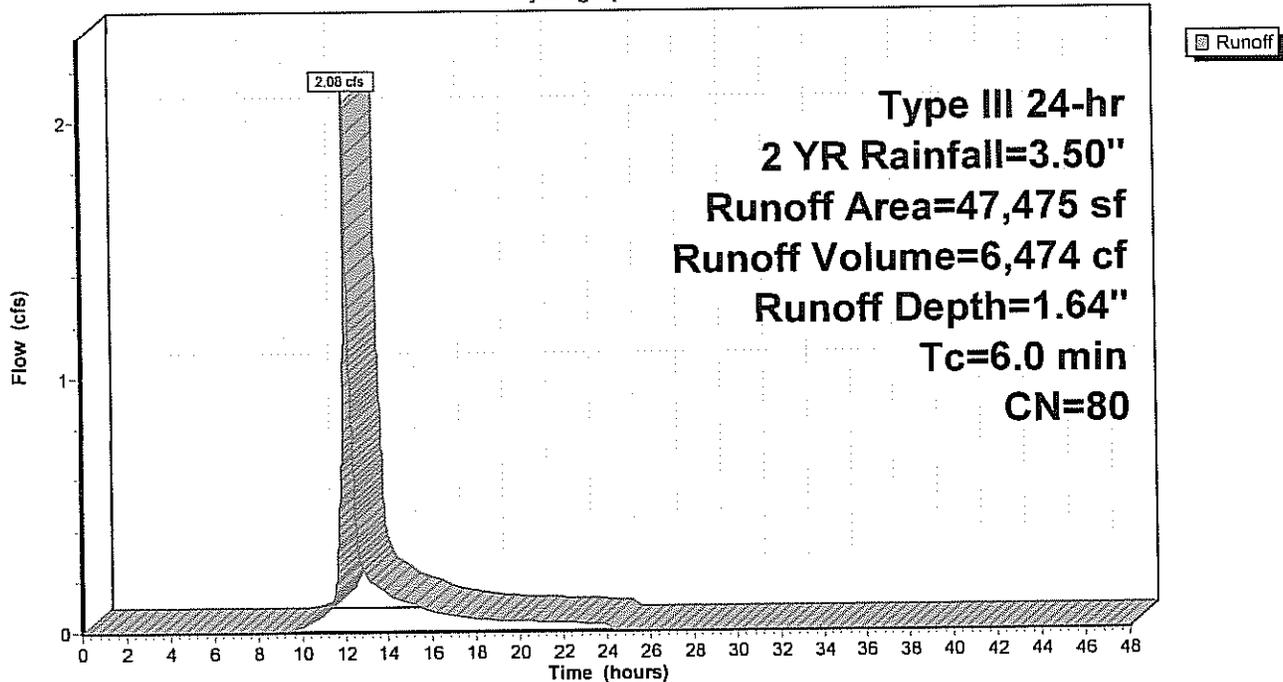
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
14,950	98	Roofs, HSG C
1,689	98	Paved parking, HSG C
30,836	70	Woods, Good, HSG C
47,475	80	Weighted Average
30,836		64.95% Pervious Area
16,639		35.05% Impervious Area

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

Subcatchment POST 3A: Post Development Area 3A

Hydrograph



Summary for Subcatchment POST 4: Post Development Area 4

Runoff = 6.24 cfs @ 12.08 hrs, Volume= 20,546 cf, Depth= 2.94"

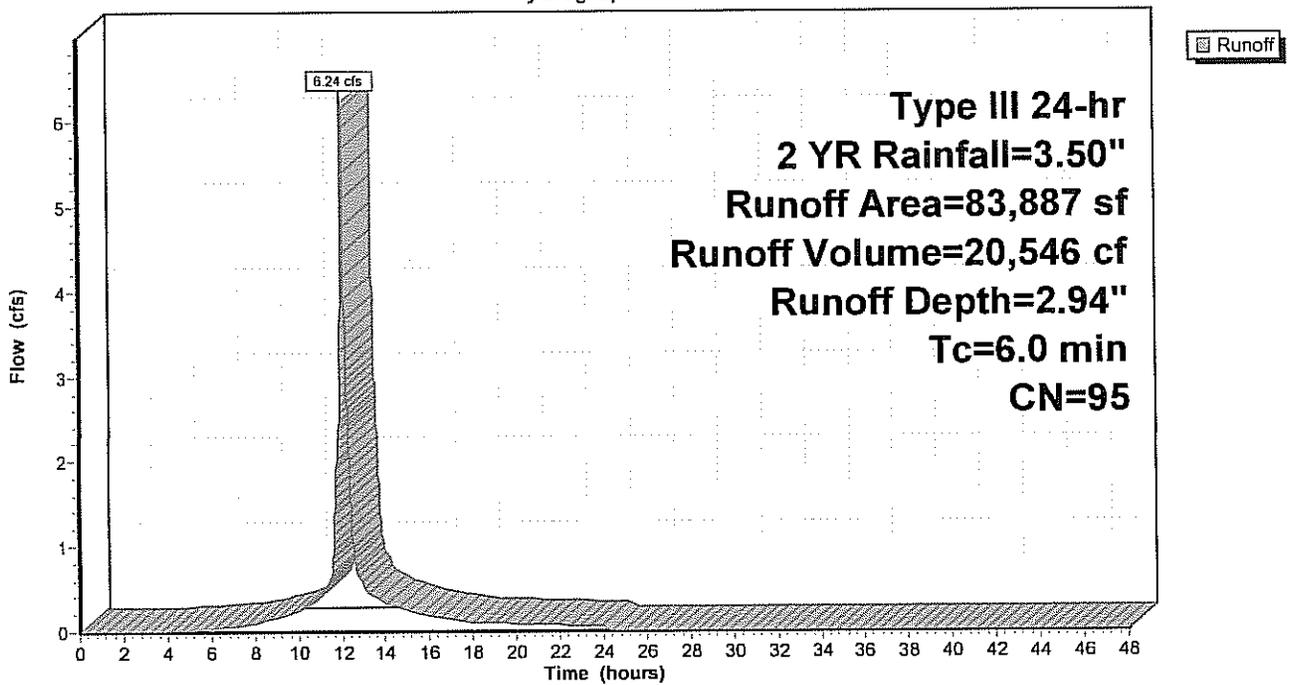
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
71,885	98	Paved parking, HSG C
12,002	74	>75% Grass cover, Good, HSG C
83,887	95	Weighted Average
12,002		14.31% Pervious Area
71,885		85.69% Impervious Area

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

Subcatchment POST 4: Post Development Area 4

Hydrograph



Summary for Subcatchment POST 4A: Post Development Area 4A

Runoff = 0.99 cfs @ 12.10 hrs, Volume= 3,238 cf, Depth= 1.12"

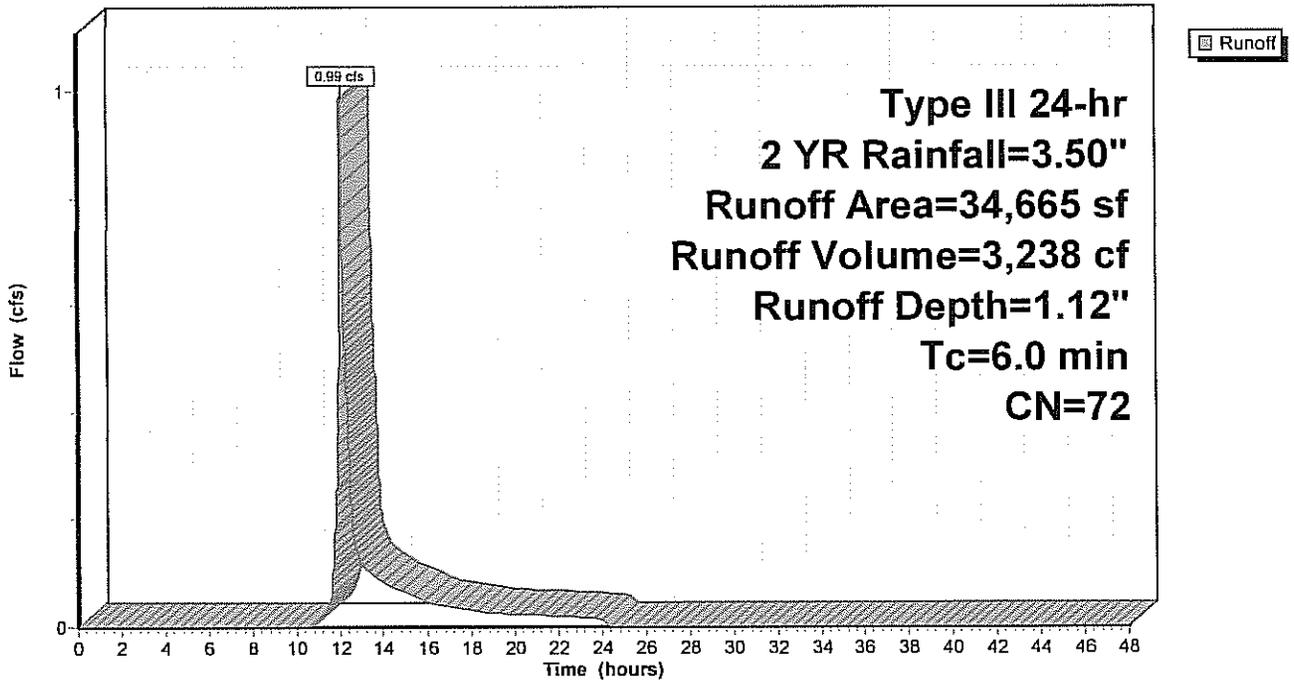
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
32,116	70	Woods, Good, HSG C
2,549	98	Paved parking, HSG C
34,665	72	Weighted Average
32,116		92.65% Pervious Area
2,549		7.35% Impervious Area

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

Subcatchment POST 4A: Post Development Area 4A

Hydrograph



Summary for Subcatchment POST-2A: Post Development Area 2A

Runoff = 7.88 cfs @ 12.08 hrs, Volume= 27,446 cf, Depth= 3.27"

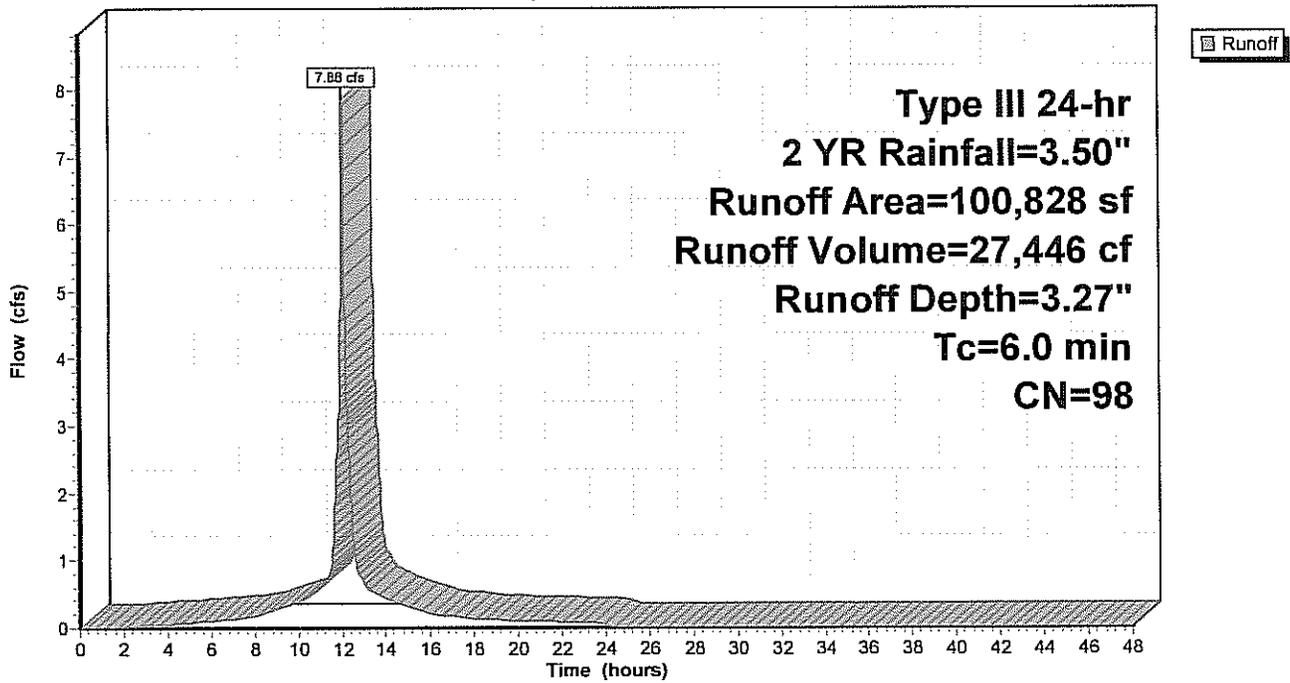
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
100,828	98	Roofs, HSG C
100,828		100.00% Impervious Area

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

Subcatchment POST-2A: Post Development Area 2A

Hydrograph



Summary for Pond 3P: DCB-1

Inflow Area = 56,802 sf, 85.28% Impervious, Inflow Depth = 2.94" for 2 YR event
 Inflow = 4.22 cfs @ 12.08 hrs, Volume= 13,912 cf
 Outflow = 4.22 cfs @ 12.08 hrs, Volume= 13,912 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.22 cfs @ 12.08 hrs, Volume= 13,912 cf

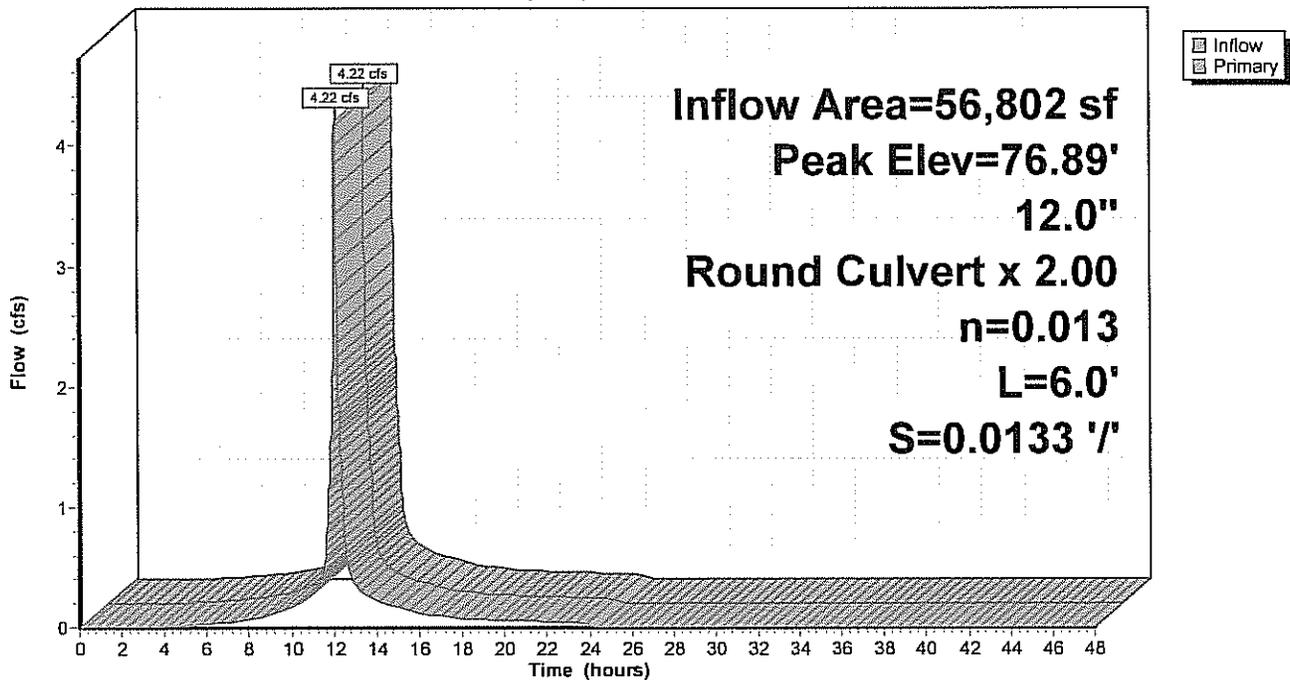
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.89' @ 12.08 hrs
 Flood Elev= 78.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	12.0" Round Culvert X 2.00 L= 6.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 76.00' / 75.92' S= 0.0133 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=4.22 cfs @ 12.08 hrs HW=76.89' TW=76.52' (Dynamic Tailwater)
 ←1=Culvert (Barrel Controls 4.22 cfs @ 3.79 fps)

Pond 3P: DCB-1

Hydrograph

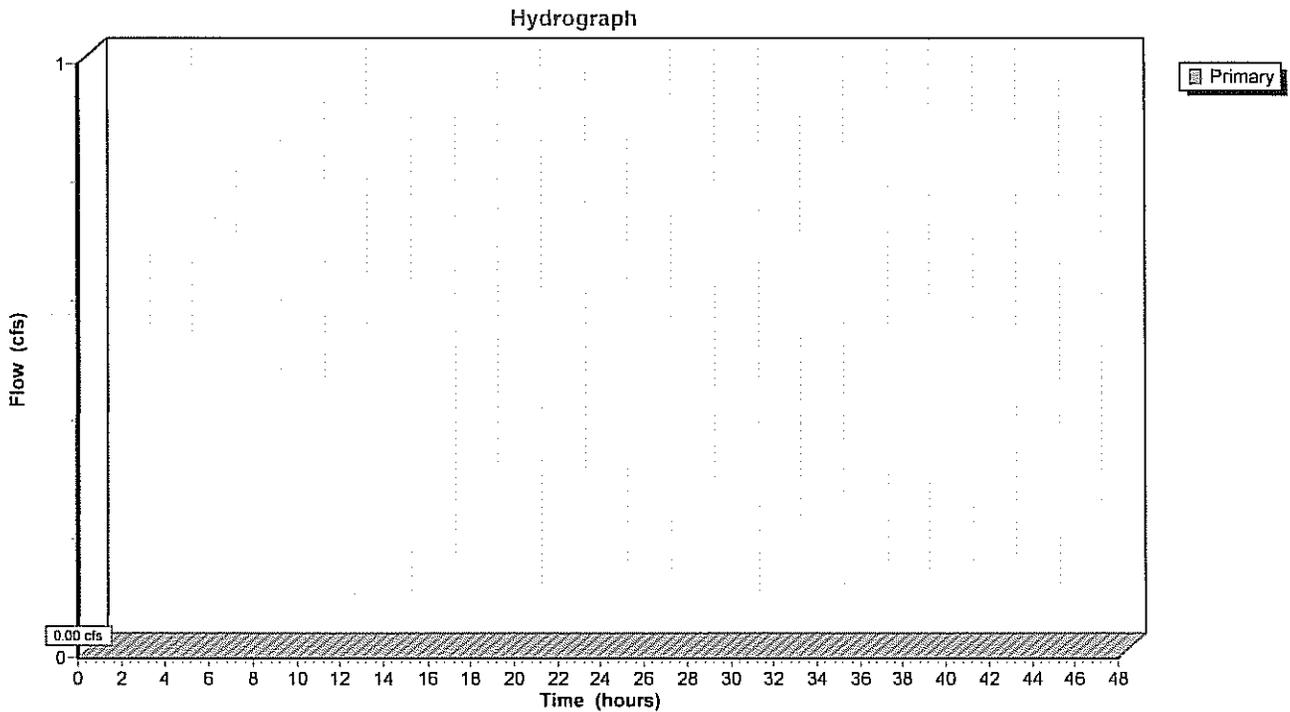


Summary for Pond AP-1: WET-8 (No Flow)

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

Pond AP-1: WET-8 (No Flow)



Summary for Pond AP-2: WET-1

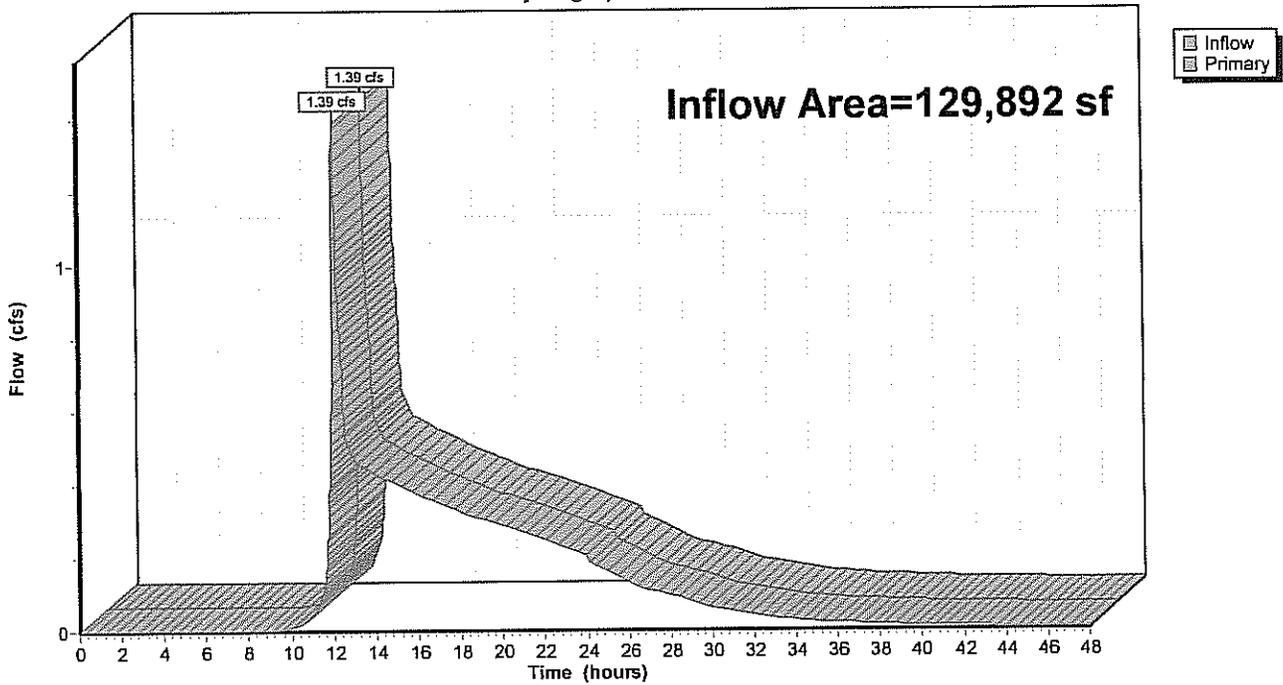
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 129,892 sf, 2.72% Impervious, Inflow Depth > 1.83" for 2 YR event
Inflow = 1.39 cfs @ 12.10 hrs, Volume= 19,818 cf
Primary = 1.39 cfs @ 12.10 hrs, Volume= 19,818 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-2: WET-1

Hydrograph



Summary for Pond AP-3: OFFSITE SWALE

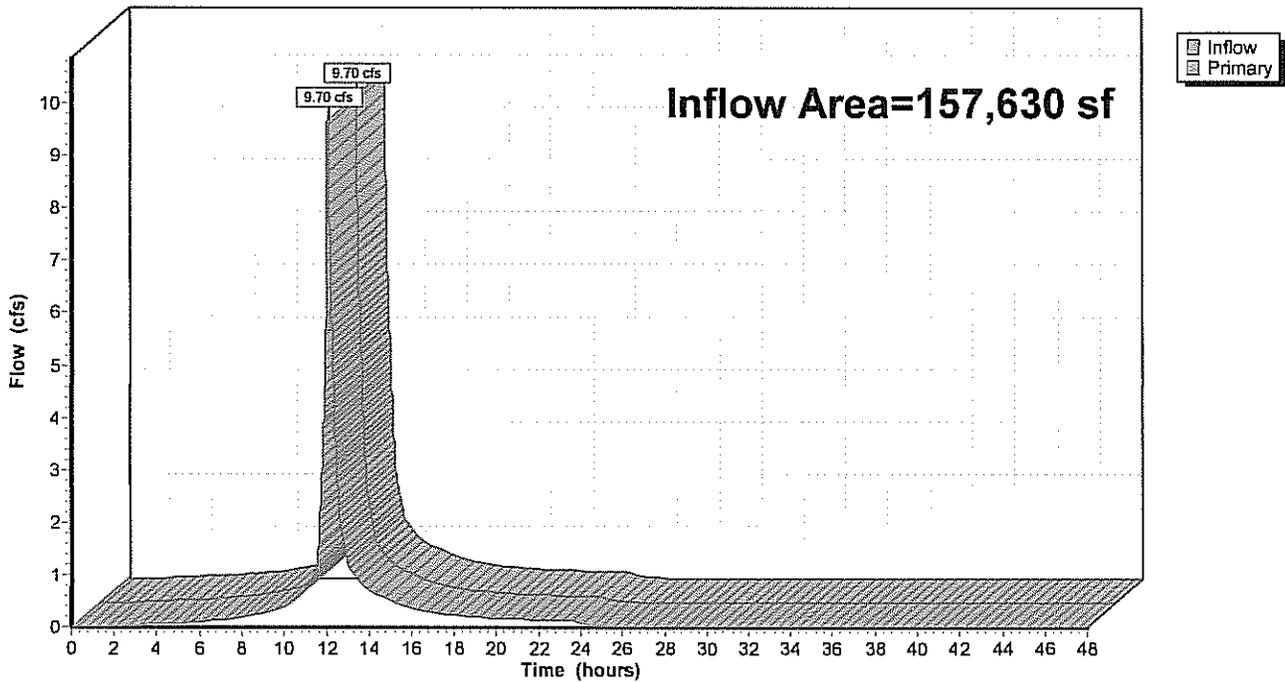
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 157,630 sf, 94.69% Impervious, Inflow Depth = 3.06" for 2 YR event
Inflow = 9.70 cfs @ 12.10 hrs, Volume= 40,250 cf
Primary = 9.70 cfs @ 12.10 hrs, Volume= 40,250 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-3: OFFSITE SWALE

Hydrograph



Summary for Pond AP-4: WET-2

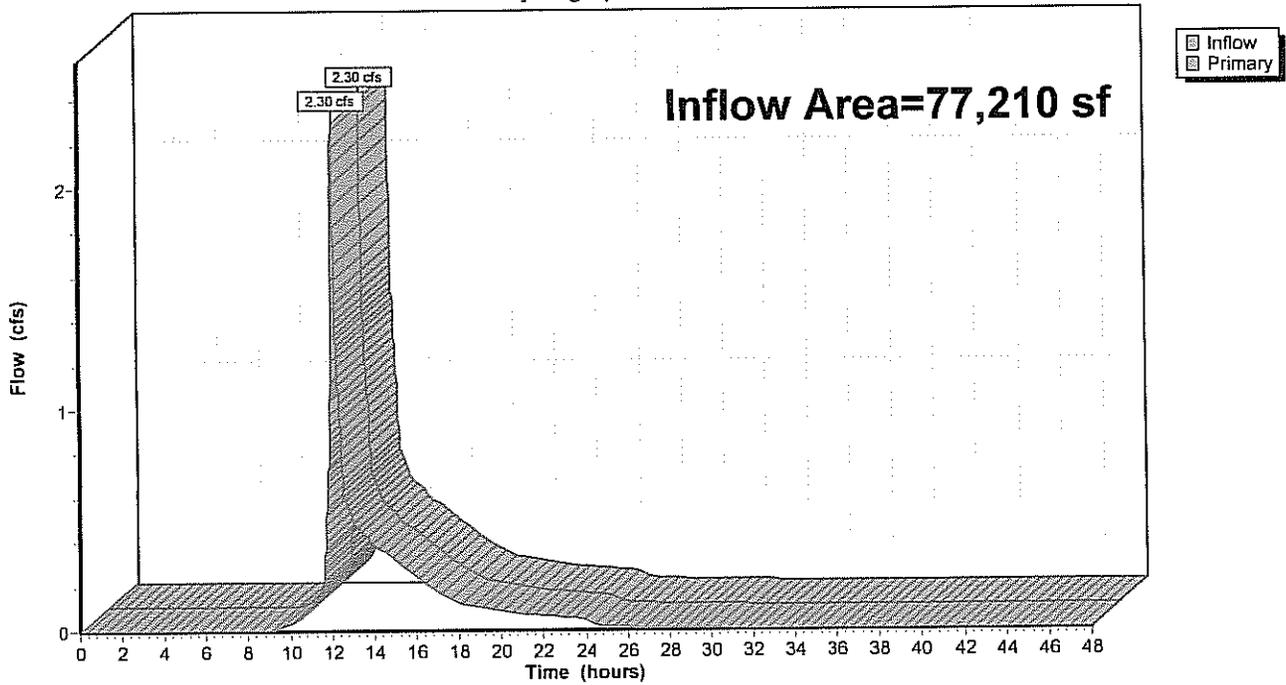
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 77,210 sf, 45.86% Impervious, Inflow Depth > 1.91" for 2 YR event
Inflow = 2.30 cfs @ 12.09 hrs, Volume= 12,262 cf
Primary = 2.30 cfs @ 12.09 hrs, Volume= 12,262 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-4: WET-2

Hydrograph

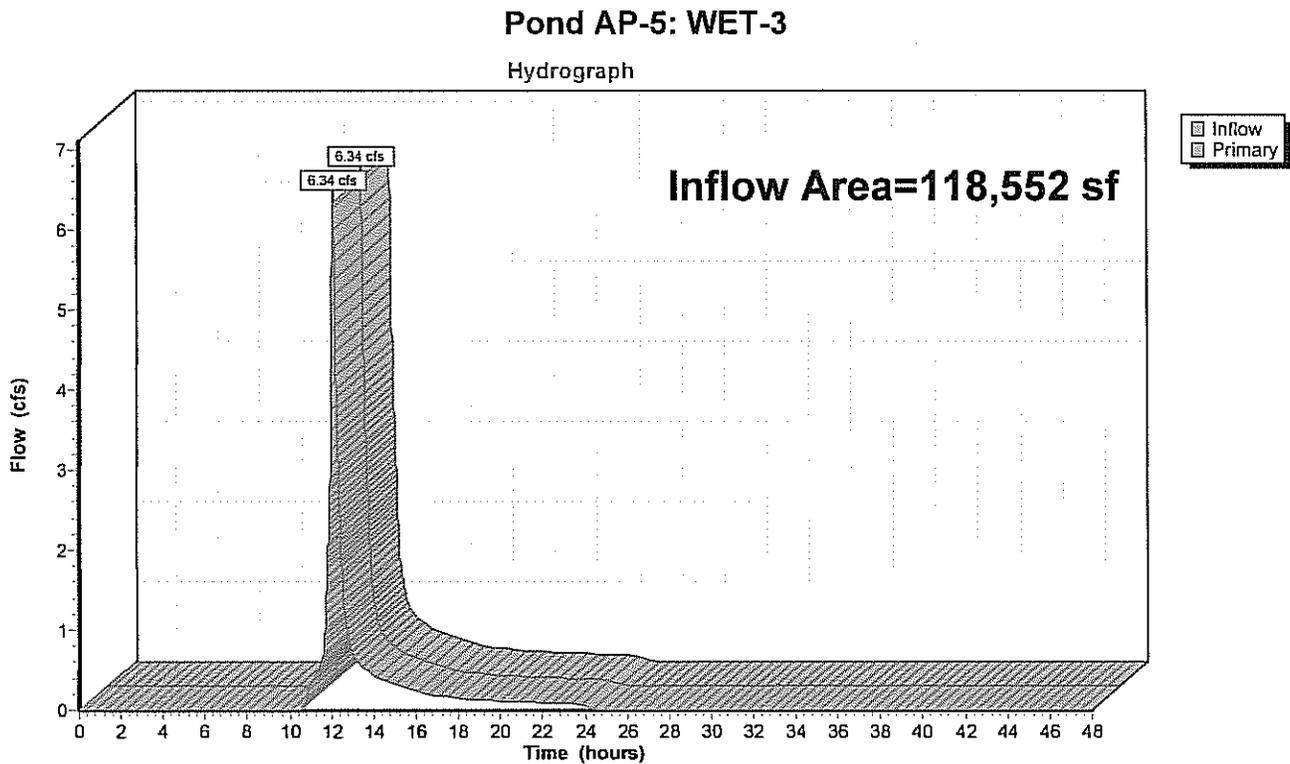


Summary for Pond AP-5: WET-3

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,552 sf, 62.79% Impervious, Inflow Depth = 2.14" for 2 YR event
Inflow = 6.34 cfs @ 12.12 hrs, Volume= 21,116 cf
Primary = 6.34 cfs @ 12.12 hrs, Volume= 21,116 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4



Summary for Pond BASIN-1: BioRetention Area 1

Inflow Area = 83,587 sf, 4.22% Impervious, Inflow Depth = 2.36" for 2 YR event
 Inflow = 5.25 cfs @ 12.09 hrs, Volume= 16,419 cf
 Outflow = 0.33 cfs @ 13.89 hrs, Volume= 15,928 cf, Atten= 94%, Lag= 108.2 min
 Primary = 0.33 cfs @ 13.89 hrs, Volume= 15,928 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 78.44' @ 13.89 hrs Surf.Area= 7,824 sf Storage= 9,509 cf
 Flood Elev= 80.00' Surf.Area= 10,755 sf Storage= 23,928 cf

Plug-Flow detention time= 413.5 min calculated for 15,925 cf (97% of inflow)
 Center-of-Mass det. time= 396.3 min (1,203.8 - 807.6)

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	23,928 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	5,397	0	0
78.00	7,048	6,223	6,223
79.00	8,804	7,926	14,149
80.00	10,755	9,780	23,928

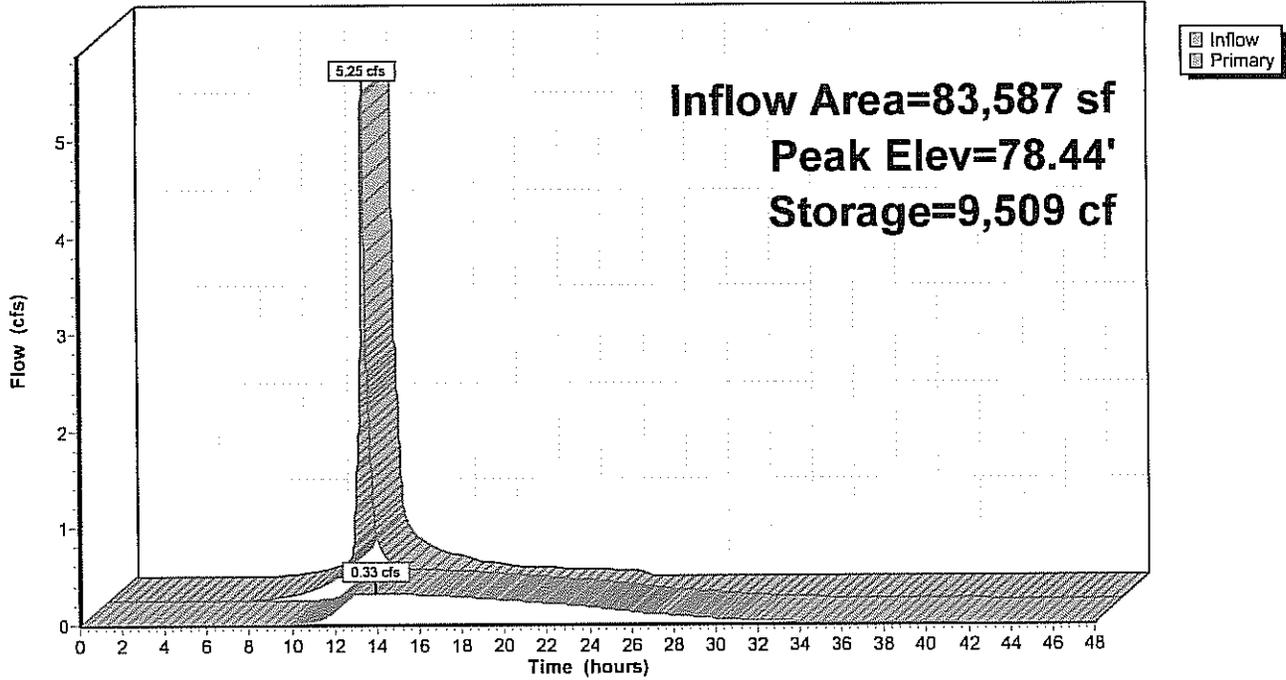
Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	4.0" Round Culvert L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 77.00' / 77.00' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Primary	78.75'	5.0' long x 25.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=0.33 cfs @ 13.89 hrs HW=78.44' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Barrel Controls 0.33 cfs @ 3.74 fps)
- 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond BASIN-1: BioRetention Area 1

Hydrograph



Summary for Pond BASIN-2: Subsurface Detention System

Inflow Area = 56,802 sf, 85.28% Impervious, Inflow Depth = 2.94" for 2 YR event
 Inflow = 4.22 cfs @ 12.08 hrs, Volume= 13,912 cf
 Outflow = 2.93 cfs @ 12.20 hrs, Volume= 12,804 cf, Atten= 31%, Lag= 6.7 min
 Primary = 1.44 cfs @ 12.21 hrs, Volume= 7,541 cf
 Secondary = 1.50 cfs @ 12.18 hrs, Volume= 5,263 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.63' @ 12.17 hrs Surf.Area= 5,296 sf Storage= 4,200 cf
 Flood Elev= 78.10' Surf.Area= 5,296 sf Storage= 6,011 cf

Plug-Flow detention time= 120.5 min calculated for 12,804 cf (92% of inflow)
 Center-of-Mass det. time= 79.2 min (857.4 - 778.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	75.37'	3,201 cf	68.33'W x 77.50'L x 2.04'H Field A 10,812 cf Overall - 2,811 cf Embedded = 8,001 cf x 40.0% Voids
#2A	75.87'	2,811 cf	Cultec C-100HD x 200 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 20 rows
		6,011 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	75.87'	12.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.42' S= 0.0090 ' S= 0.0090 ' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	75.87'	18.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.87' S= 0.0000 ' S= 0.0000 ' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.44 cfs @ 12.21 hrs HW=76.62' TW=76.22' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 1.44 cfs @ 3.18 fps)

Secondary OutFlow Max=1.52 cfs @ 12.18 hrs HW=76.63' TW=76.45' (Dynamic Tailwater)

↑2=Culvert (Outlet Controls 1.52 cfs @ 2.47 fps)

Pond BASIN-2: Subsurface Detention System - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)

Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf

Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap

Row Length Adjustment= +0.50' x 1.86 sf x 20 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

10 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 75.50' Row Length +12.0" End Stone x 2 = 77.50' Base Length

20 Rows x 36.0" Wide + 4.0" Spacing x 19 + 12.0" Side Stone x 2 = 68.33' Base Width

6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

200 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 20 Rows = 2,810.9 cf Chamber Storage

10,812.3 cf Field - 2,810.9 cf Chambers = 8,001.5 cf Stone x 40.0% Voids = 3,200.6 cf Stone Storage

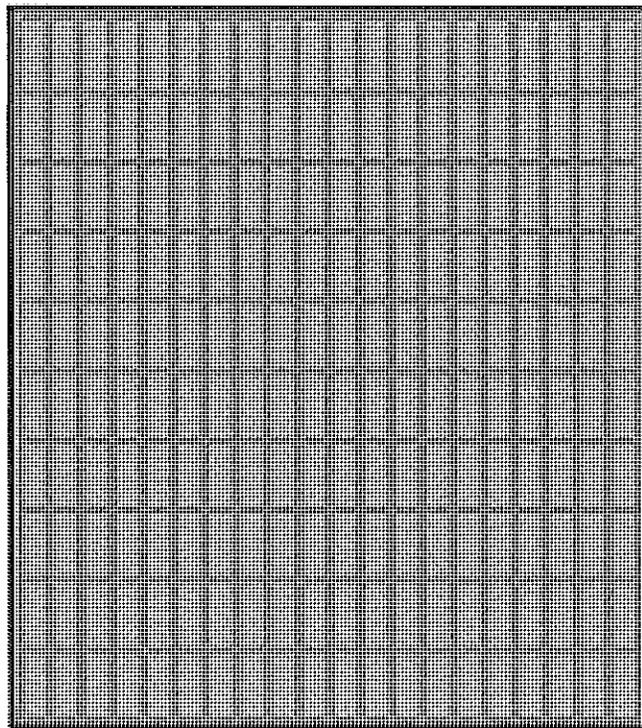
Chamber Storage + Stone Storage = 6,011.4 cf = 0.138 af

Overall Storage Efficiency = 55.6%

200 Chambers

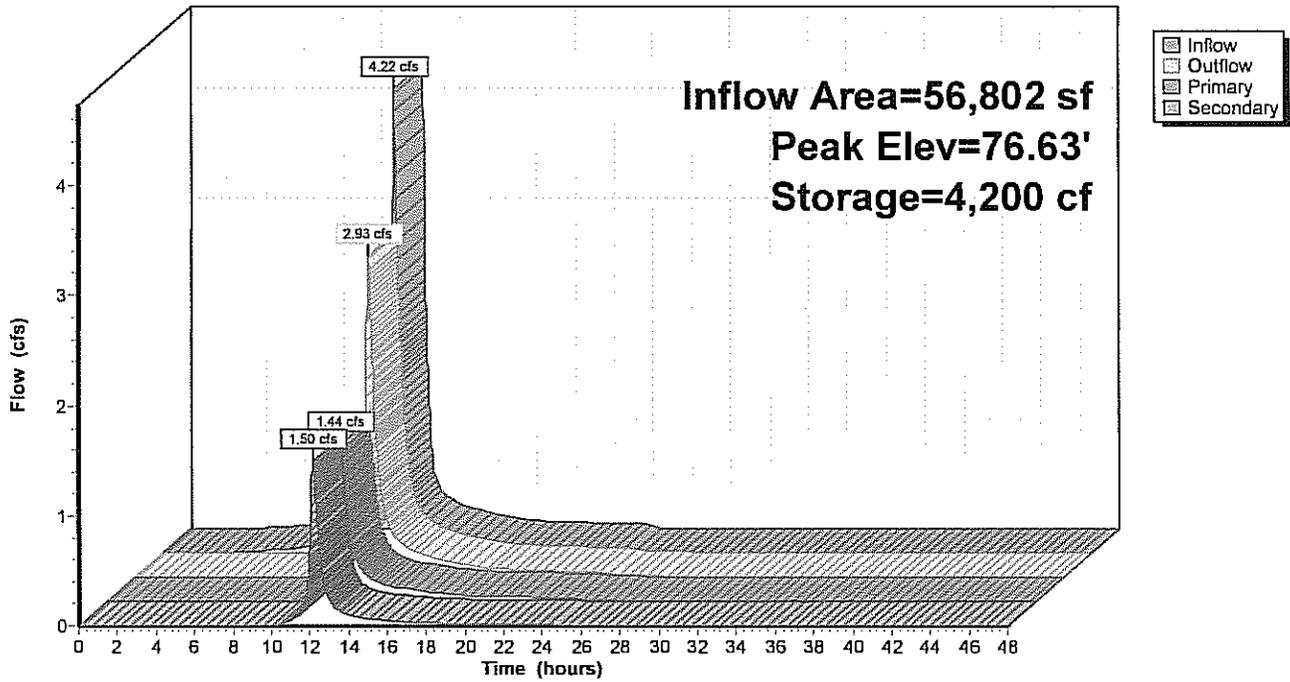
400.5 cy Field

296.4 cy Stone



Pond BASIN-2: Subsurface Detention System

Hydrograph



Summary for Pond BASIN-3: BioRetention Area 3

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 2.36" for 2 YR event
 Inflow = 1.87 cfs @ 12.09 hrs, Volume= 5,841 cf
 Outflow = 0.29 cfs @ 12.58 hrs, Volume= 5,788 cf, Atten= 84%, Lag= 29.5 min
 Primary = 0.29 cfs @ 12.58 hrs, Volume= 5,788 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.65' @ 12.58 hrs Surf.Area= 4,520 sf Storage= 2,640 cf
 Flood Elev= 78.00' Surf.Area= 6,149 sf Storage= 9,892 cf

Plug-Flow detention time= 161.7 min calculated for 5,788 cf (99% of inflow)
 Center-of-Mass det. time= 156.1 min (963.7 - 807.6)

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	9,892 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	3,624	0	0
77.00	5,005	4,315	4,315
78.00	6,149	5,577	9,892

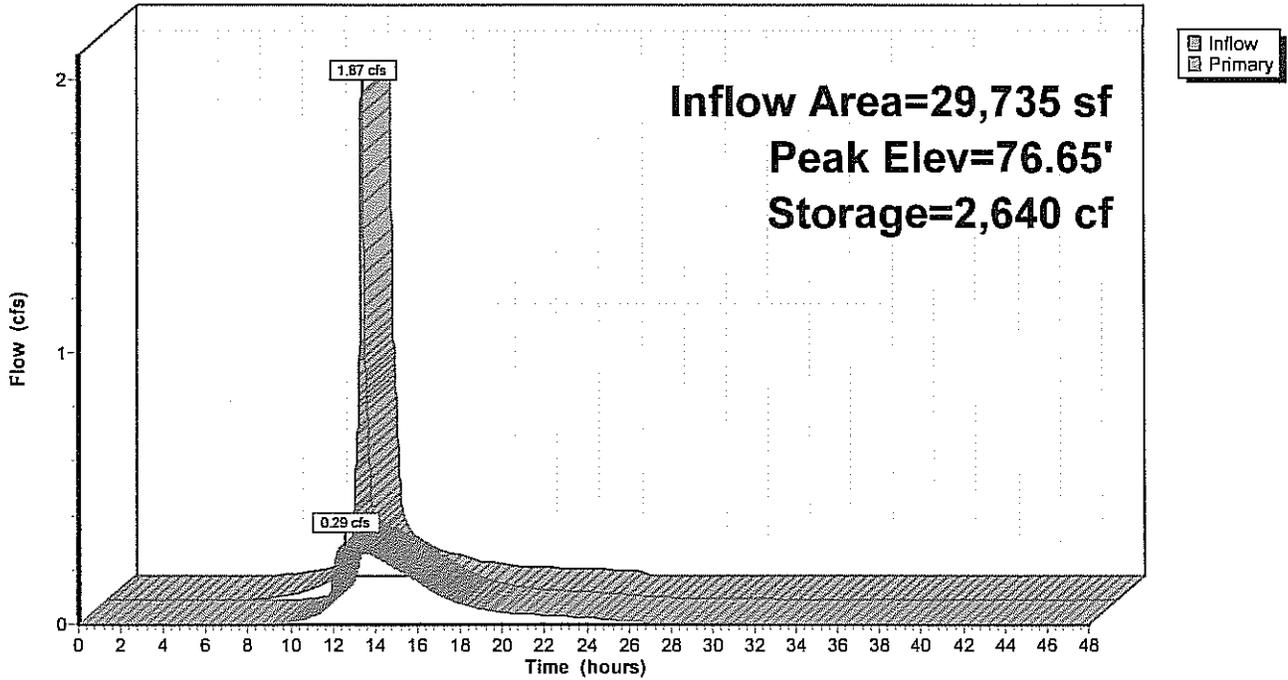
Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	12.0" Round 12" HDPE L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.00' / 74.80' S= 0.0067 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	76.00'	4.0" Vert. 4" Orifice C= 0.600
#3	Device 1	76.70'	4.0' long x 1.50' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.5' Crest Height

Primary OutFlow Max=0.29 cfs @ 12.58 hrs HW=76.65' TW=0.00' (Dynamic Tailwater)

- ↑ 1=12" HDPE (Passes 0.29 cfs of 3.94 cfs potential flow)
- ↑ 2=4" Orifice (Orifice Controls 0.29 cfs @ 3.34 fps)
- ↑ 3=Sharp-Crested Rectangular Weir (Controls 0.00 cfs)

Pond BASIN-3: BioRetention Area 3

Hydrograph



Summary for Pond BASIN-4: BioRetention Area 4

Inflow Area = 83,887 sf, 85.69% Impervious, Inflow Depth = 2.94" for 2 YR event
 Inflow = 6.24 cfs @ 12.08 hrs, Volume= 20,546 cf
 Outflow = 5.41 cfs @ 12.13 hrs, Volume= 17,878 cf, Atten= 13%, Lag= 2.8 min
 Primary = 5.41 cfs @ 12.13 hrs, Volume= 17,878 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 78.11' @ 12.13 hrs Surf.Area= 4,820 sf Storage= 4,303 cf
 Flood Elev= 79.00' Surf.Area= 5,813 sf Storage= 9,041 cf

Plug-Flow detention time= 105.7 min calculated for 17,878 cf (87% of inflow)
 Center-of-Mass det. time= 47.4 min (825.6 - 778.3)

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	9,041 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

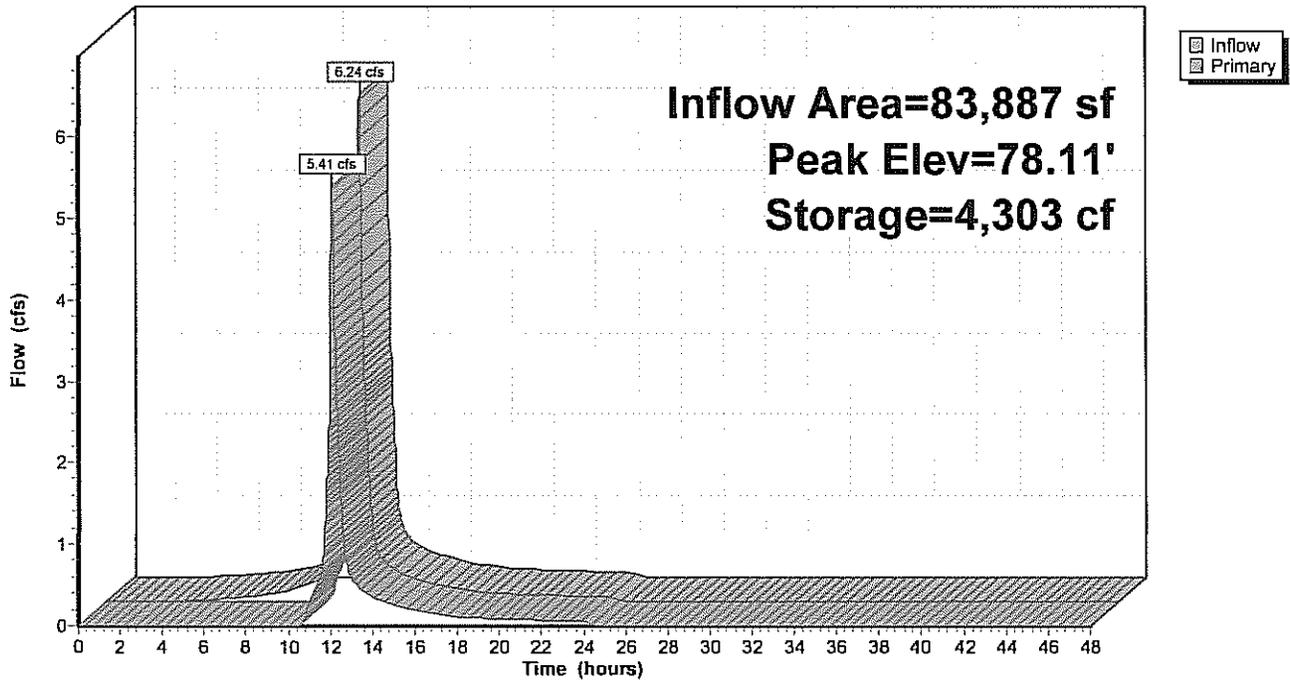
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	2,871	0	0
78.00	4,699	3,785	3,785
79.00	5,813	5,256	9,041

Device	Routing	Invert	Outlet Devices
#1	Primary	77.75'	10.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=5.41 cfs @ 12.13 hrs HW=78.11' TW=0.00' (Dynamic Tailwater)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 5.41 cfs @ 1.51 fps)

Pond BASIN-4: BioRetention Area 4

Hydrograph



Summary for Pond DMH-1: DMH-1

Inflow Area = 157,630 sf, 94.69% Impervious, Inflow Depth = 2.66" for 2 YR event
 Inflow = 8.50 cfs @ 12.09 hrs, Volume= 34,987 cf
 Outflow = 8.50 cfs @ 12.09 hrs, Volume= 34,987 cf, Atten= 0%, Lag= 0.0 min
 Primary = 8.50 cfs @ 12.09 hrs, Volume= 34,987 cf

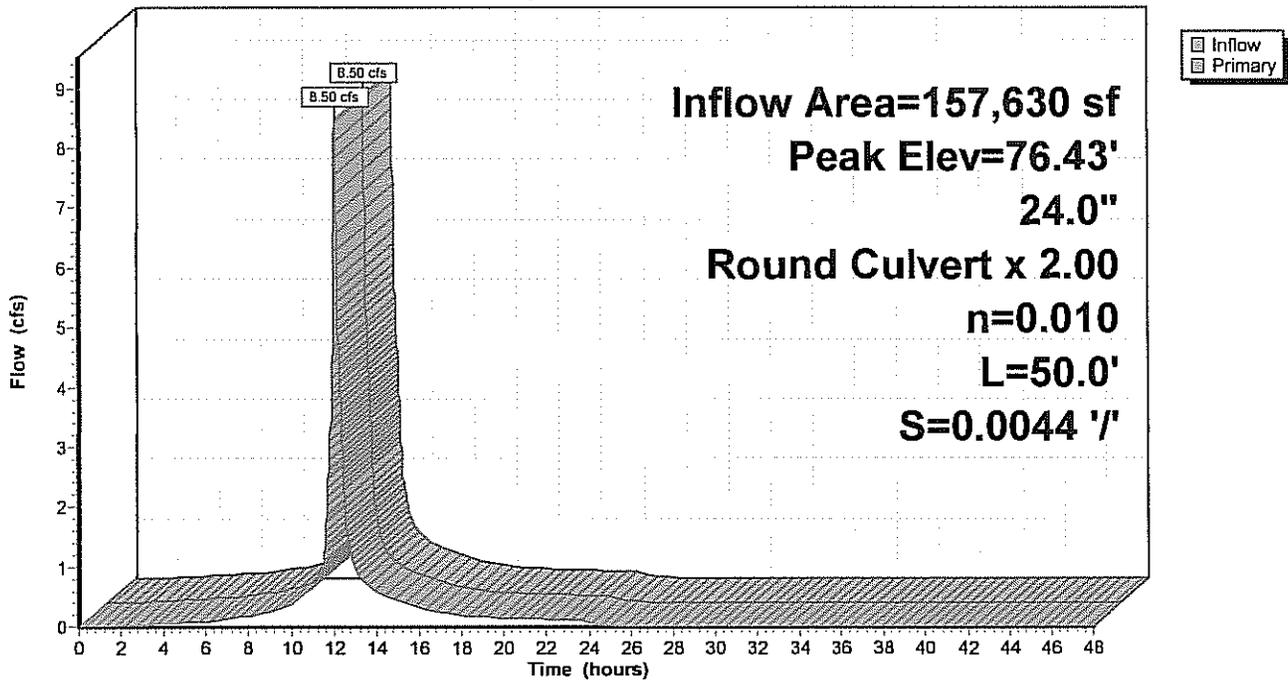
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.43' @ 12.09 hrs
 Flood Elev= 79.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	75.42'	24.0" Round Culvert X 2.00 L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.42' / 75.20' S= 0.0044 '/' Cc= 0.900 n= 0.010 Cast iron, coated, Flow Area= 3.14 sf

Primary OutFlow Max=8.49 cfs @ 12.09 hrs HW=76.43' TW=0.00' (Dynamic Tailwater)
 ↑-1=Culvert (Barrel Controls 8.49 cfs @ 3.92 fps)

Pond DMH-1: DMH-1

Hydrograph



Summary for Pond DMH-2: DMH-2

Inflow = 1.50 cfs @ 12.18 hrs, Volume= 5,263 cf
 Outflow = 1.50 cfs @ 12.18 hrs, Volume= 5,263 cf, Atten= 0%, Lag= 0.0 min
 Primary = 1.50 cfs @ 12.18 hrs, Volume= 5,263 cf

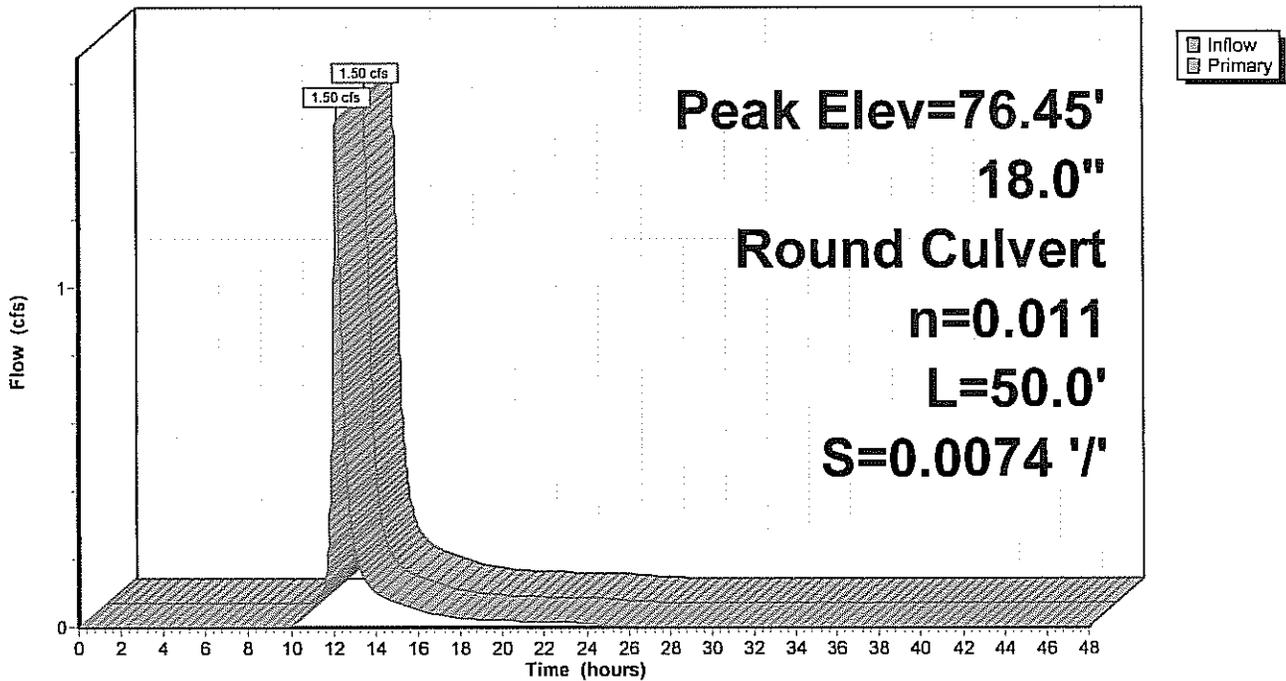
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.45' @ 12.18 hrs
 Flood Elev= 79.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	75.87'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.50' S= 0.0074 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=1.50 cfs @ 12.18 hrs HW=76.45' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 1.50 cfs @ 3.55 fps)

Pond DMH-2: DMH-2

Hydrograph



Summary for Pond DMH-3:

Inflow Area = 100,828 sf, 100.00% Impervious, Inflow Depth = 3.27" for 2 YR event
 Inflow = 7.88 cfs @ 12.08 hrs, Volume= 27,446 cf
 Outflow = 7.88 cfs @ 12.08 hrs, Volume= 27,446 cf, Atten= 0%, Lag= 0.0 min
 Primary = 7.88 cfs @ 12.08 hrs, Volume= 27,446 cf

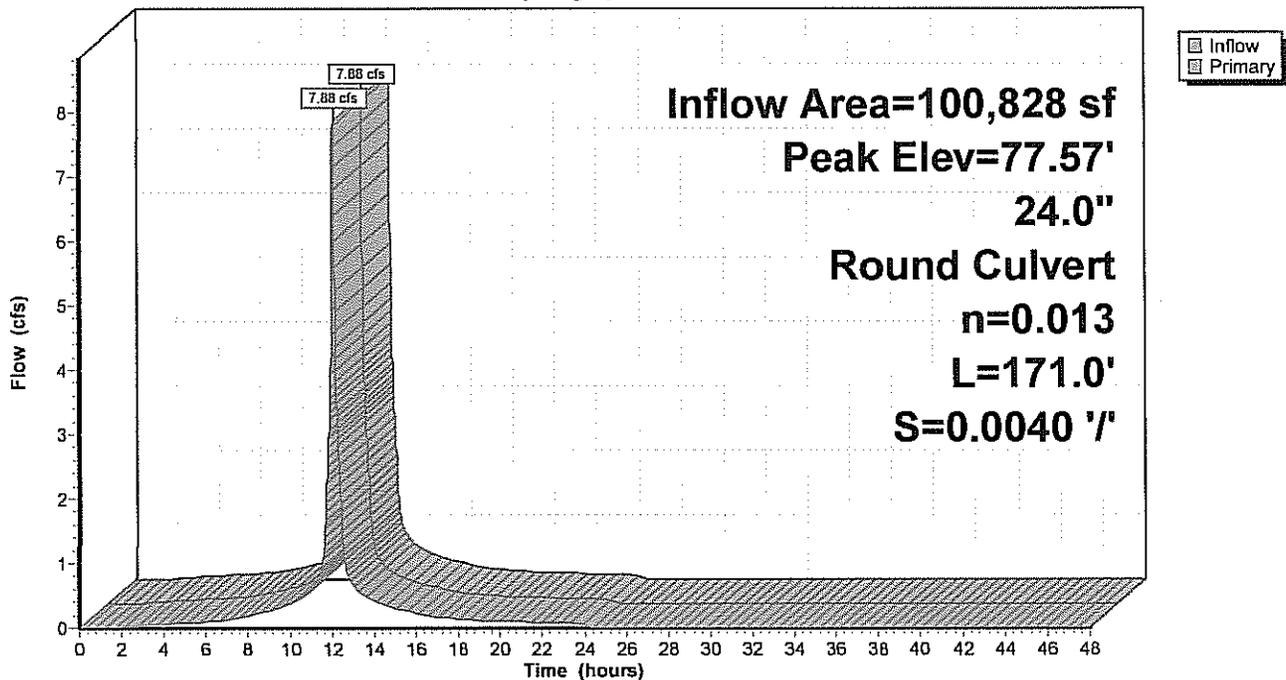
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 77.57' @ 12.08 hrs
 Flood Elev= 79.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.14'	24.0" Round Culvert L= 171.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 76.14' / 75.45' S= 0.0040 '/' Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=7.87 cfs @ 12.08 hrs HW=77.57' TW=76.42' (Dynamic Tailwater)
 ↳1=Culvert (Barrel Controls 7.87 cfs @ 4.58 fps)

Pond DMH-3:

Hydrograph



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 4
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment POST 1: Post Development Runoff Area=83,587 sf 4.22% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=89 Runoff=7.84 cfs 24,942 cf

Subcatchment POST 1A: Post Development Runoff Area=46,305 sf 0.00% Impervious Runoff Depth=1.89"
Tc=6.0 min CN=70 Runoff=2.30 cfs 7,290 cf

Subcatchment POST 2: Post Development Runoff Area=56,802 sf 85.28% Impervious Runoff Depth=4.22"
Tc=6.0 min CN=95 Runoff=5.94 cfs 19,982 cf

Subcatchment POST 3: Post Development Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=3.58"
Tc=6.0 min CN=89 Runoff=2.79 cfs 8,873 cf

Subcatchment POST 3A: Post Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=2.72"
Tc=6.0 min CN=80 Runoff=3.48 cfs 10,758 cf

Subcatchment POST 4: Post Development Runoff Area=83,887 sf 85.69% Impervious Runoff Depth=4.22"
Tc=6.0 min CN=95 Runoff=8.77 cfs 29,511 cf

Subcatchment POST 4A: Post Development Runoff Area=34,665 sf 7.35% Impervious Runoff Depth=2.05"
Tc=6.0 min CN=72 Runoff=1.88 cfs 5,908 cf

Subcatchment POST-2A: Post Runoff Area=100,828 sf 100.00% Impervious Runoff Depth=4.56"
Tc=6.0 min CN=98 Runoff=10.86 cfs 38,344 cf

Pond 3P: DCB-1 Peak Elev=77.20' Inflow=5.94 cfs 19,982 cf
12.0" Round Culvert x 2.00 n=0.013 L=6.0' S=0.0133 '/' Outflow=5.94 cfs 19,982 cf

Pond AP-1: WET-8 (No Flow) Primary=0.00 cfs 0 cf

Pond AP-2: WET-1 Inflow=2.61 cfs 31,687 cf
Primary=2.61 cfs 31,687 cf

Pond AP-3: OFFSITE SWALE Inflow=14.10 cfs 57,218 cf
Primary=14.10 cfs 57,218 cf

Pond AP-4: WET-2 Inflow=3.76 cfs 19,576 cf
Primary=3.76 cfs 19,576 cf

Pond AP-5: WET-3 Inflow=9.57 cfs 32,751 cf
Primary=9.57 cfs 32,751 cf

Pond BASIN-1: BioRetention Area 1 Peak Elev=78.90' Storage=13,314 cf Inflow=7.84 cfs 24,942 cf
Outflow=1.20 cfs 24,397 cf

Pond BASIN-2: Subsurface Detention Peak Elev=76.91' Storage=4,942 cf Inflow=5.94 cfs 19,982 cf
Primary=2.16 cfs 10,705 cf Secondary=2.54 cfs 8,169 cf Outflow=4.70 cfs 18,874 cf

Pond BASIN-3: BioRetention Area 3 Peak Elev=76.83' Storage=3,488 cf Inflow=2.79 cfs 8,873 cf
Outflow=0.96 cfs 8,819 cf

Pond BASIN-4: BioRetention Area 4 Peak Elev=78.20' Storage=4,749 cf Inflow=8.77 cfs 29,511 cf
Outflow=7.80 cfs 26,843 cf

Pond DMH-1: DMH-1 Peak Elev=76.65' Inflow=11.92 cfs 49,049 cf
24.0" Round Culvert x 2.00 n=0.010 L=50.0' S=0.0044 '/' Outflow=11.92 cfs 49,049 cf

Pond DMH-2: DMH-2 Peak Elev=76.65' Inflow=2.54 cfs 8,169 cf
18.0" Round Culvert n=0.011 L=50.0' S=0.0074 '/' Outflow=2.54 cfs 8,169 cf

Pond DMH-3: Peak Elev=77.89' Inflow=10.86 cfs 38,344 cf
24.0" Round Culvert n=0.013 L=171.0' S=0.0040 '/' Outflow=10.86 cfs 38,344 cf

Total Runoff Area = 483,284 sf Runoff Volume = 145,607 cf Average Runoff Depth = 3.62"
45.65% Pervious = 220,643 sf 54.35% Impervious = 262,641 sf

Summary for Subcatchment POST 1: Post Development Area 1

Runoff = 7.84 cfs @ 12.09 hrs, Volume= 24,942 cf, Depth= 3.58"

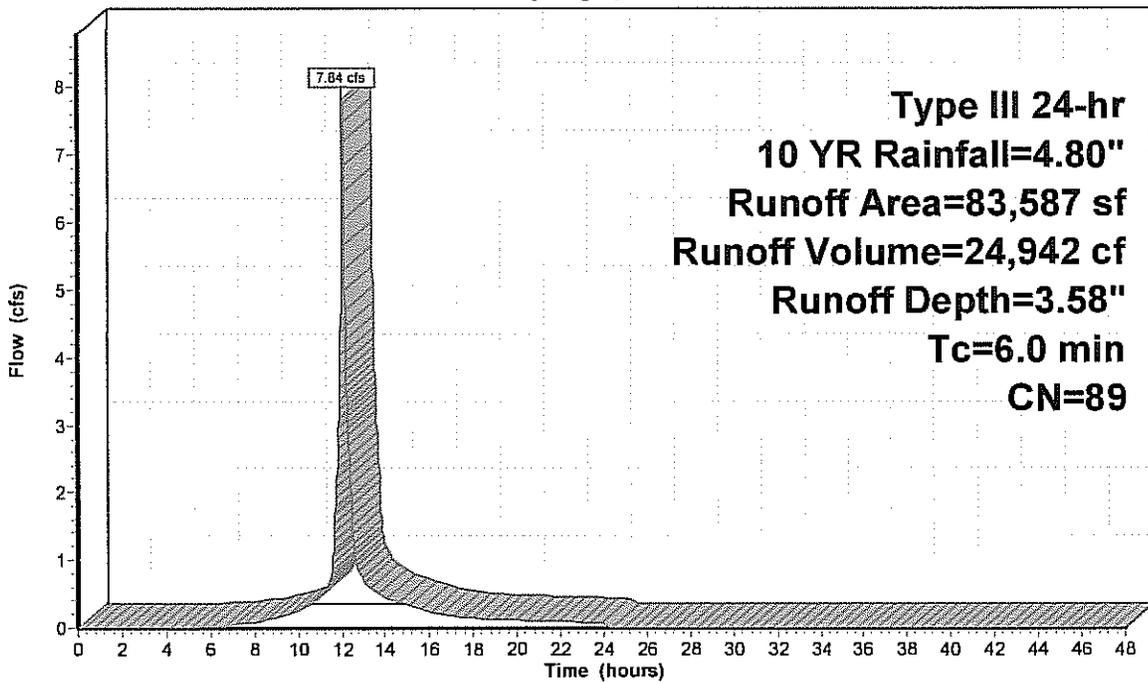
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
51,749	96	Gravel surface, HSG C
3,528	98	Paved parking, HSG C
28,310	74	>75% Grass cover, Good, HSG C
83,587	89	Weighted Average
80,059		95.78% Pervious Area
3,528		4.22% Impervious Area

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

Subcatchment POST 1: Post Development Area 1

Hydrograph



Summary for Subcatchment POST 1A: Post Development Area 1A

Runoff = 2.30 cfs @ 12.09 hrs, Volume= 7,290 cf, Depth= 1.89"

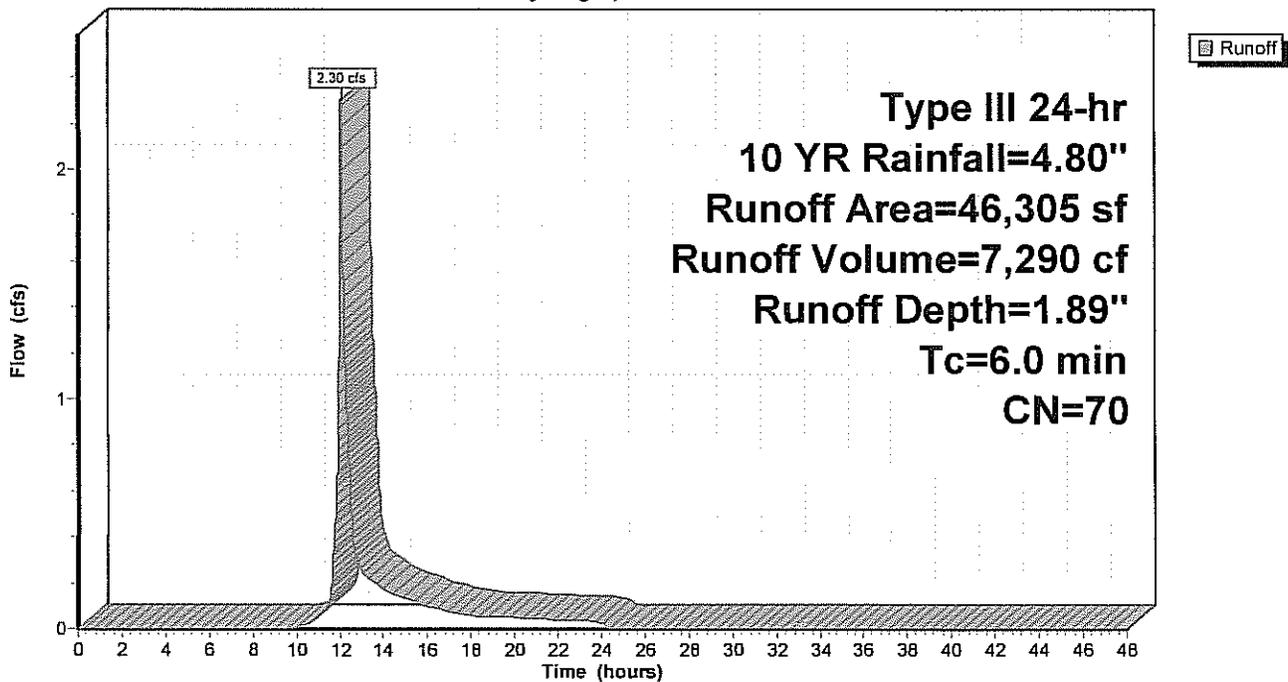
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
942	89	Gravel roads, HSG C
45,363	70	Woods, Good, HSG C
46,305	70	Weighted Average
46,305		100.00% Pervious Area

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

Subcatchment POST 1A: Post Development Area 1A

Hydrograph



Summary for Subcatchment POST 2: Post Development Area 2

Runoff = 5.94 cfs @ 12.08 hrs, Volume= 19,982 cf, Depth= 4.22"

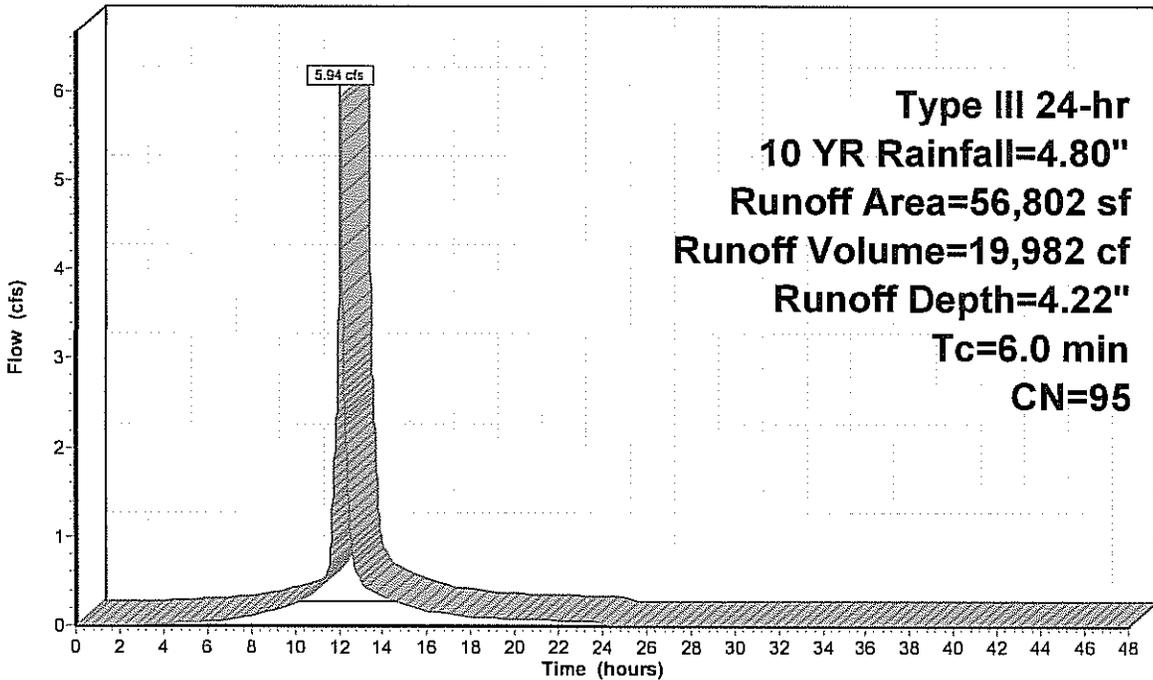
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
48,439	98	Paved parking, HSG C
2,831	89	Gravel roads, HSG C
5,532	74	>75% Grass cover, Good, HSG C
56,802	95	Weighted Average
8,363		14.72% Pervious Area
48,439		85.28% Impervious Area

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

Subcatchment POST 2: Post Development Area 2

Hydrograph



Runoff

**Type III 24-hr
 10 YR Rainfall=4.80"
 Runoff Area=56,802 sf
 Runoff Volume=19,982 cf
 Runoff Depth=4.22"
 Tc=6.0 min
 CN=95**

Summary for Subcatchment POST 3: Post Development Area 3

Runoff = 2.79 cfs @ 12.09 hrs, Volume= 8,873 cf, Depth= 3.58"

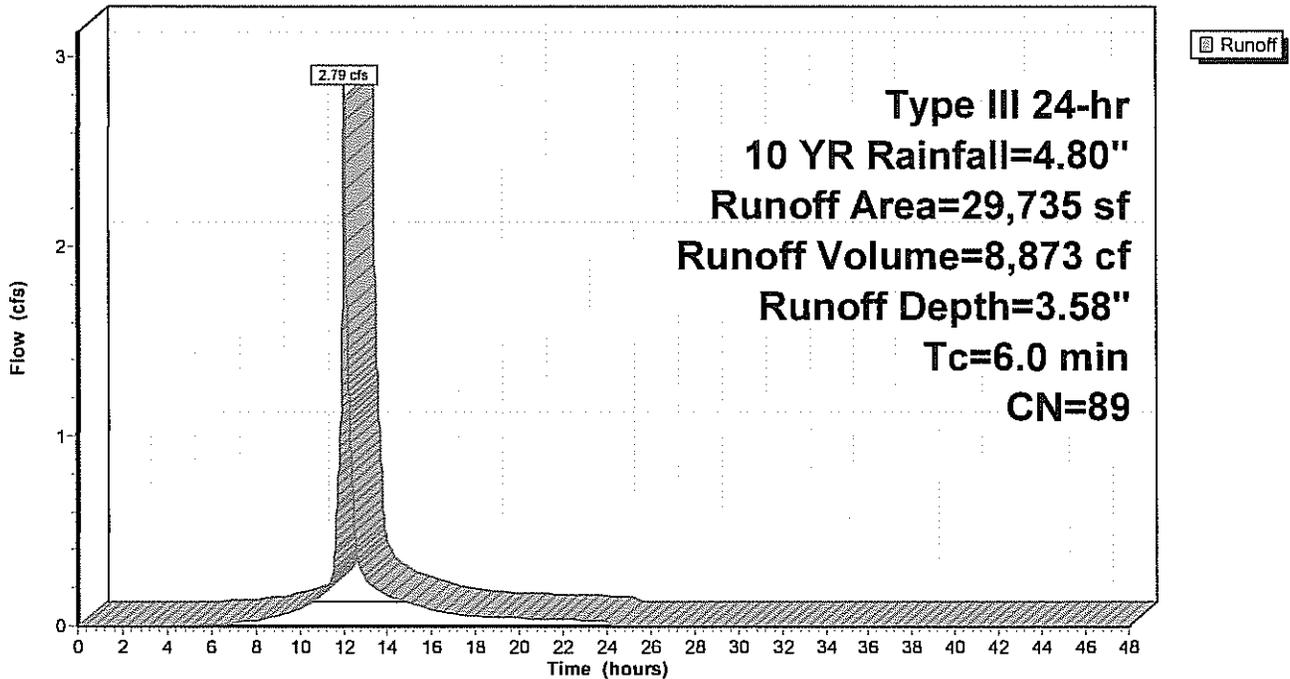
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
18,773	98	Paved parking, HSG C
10,962	74	>75% Grass cover, Good, HSG C
29,735	89	Weighted Average
10,962		36.87% Pervious Area
18,773		63.13% Impervious Area

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

Subcatchment POST 3: Post Development Area 3

Hydrograph



Summary for Subcatchment POST 3A: Post Development Area 3A

Runoff = 3.48 cfs @ 12.09 hrs, Volume= 10,758 cf, Depth= 2.72"

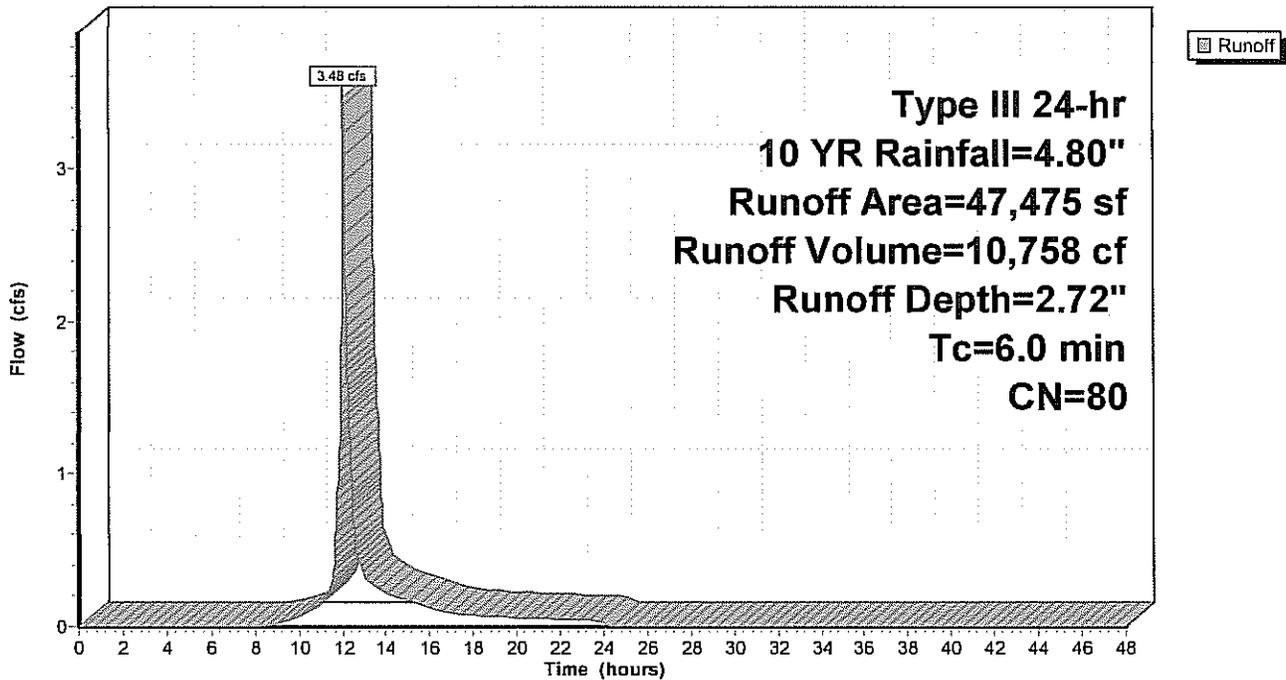
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
14,950	98	Roofs, HSG C
1,689	98	Paved parking, HSG C
30,836	70	Woods, Good, HSG C
47,475	80	Weighted Average
30,836		64.95% Pervious Area
16,639		35.05% Impervious Area

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

Subcatchment POST 3A: Post Development Area 3A

Hydrograph



Summary for Subcatchment POST 4: Post Development Area 4

Runoff = 8.77 cfs @ 12.08 hrs, Volume= 29,511 cf, Depth= 4.22"

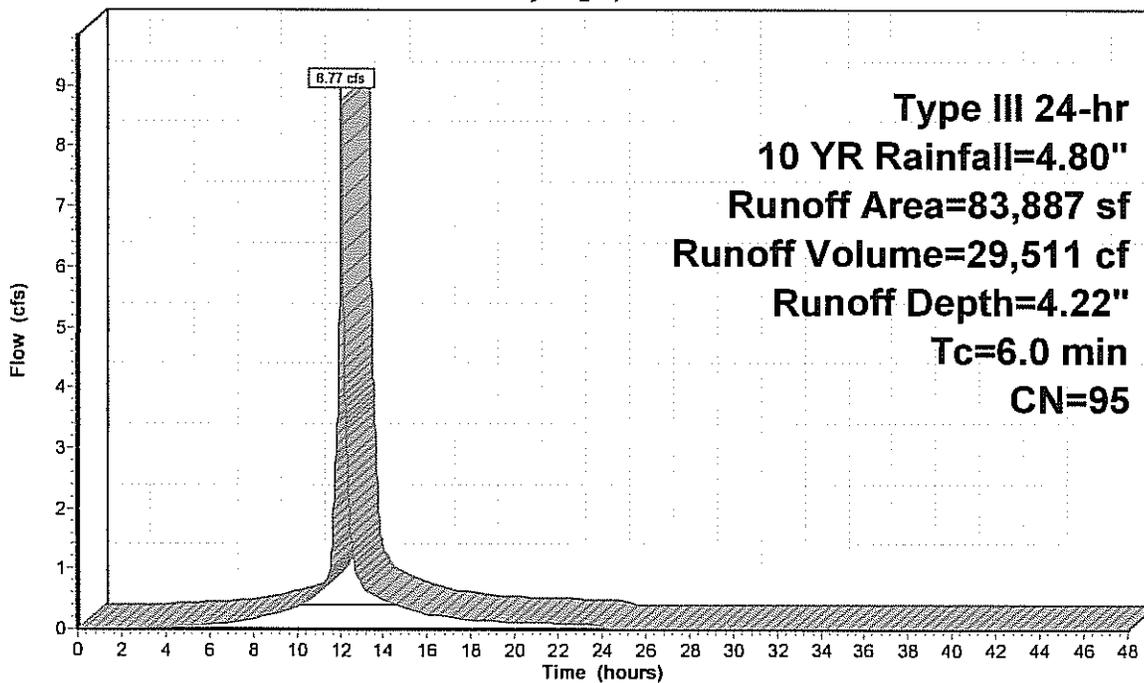
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
71,885	98	Paved parking, HSG C
12,002	74	>75% Grass cover, Good, HSG C
83,887	95	Weighted Average
12,002		14.31% Pervious Area
71,885		85.69% Impervious Area

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

Subcatchment POST 4: Post Development Area 4

Hydrograph



Summary for Subcatchment POST 4A: Post Development Area 4A

Runoff = 1.88 cfs @ 12.09 hrs, Volume= 5,908 cf, Depth= 2.05"

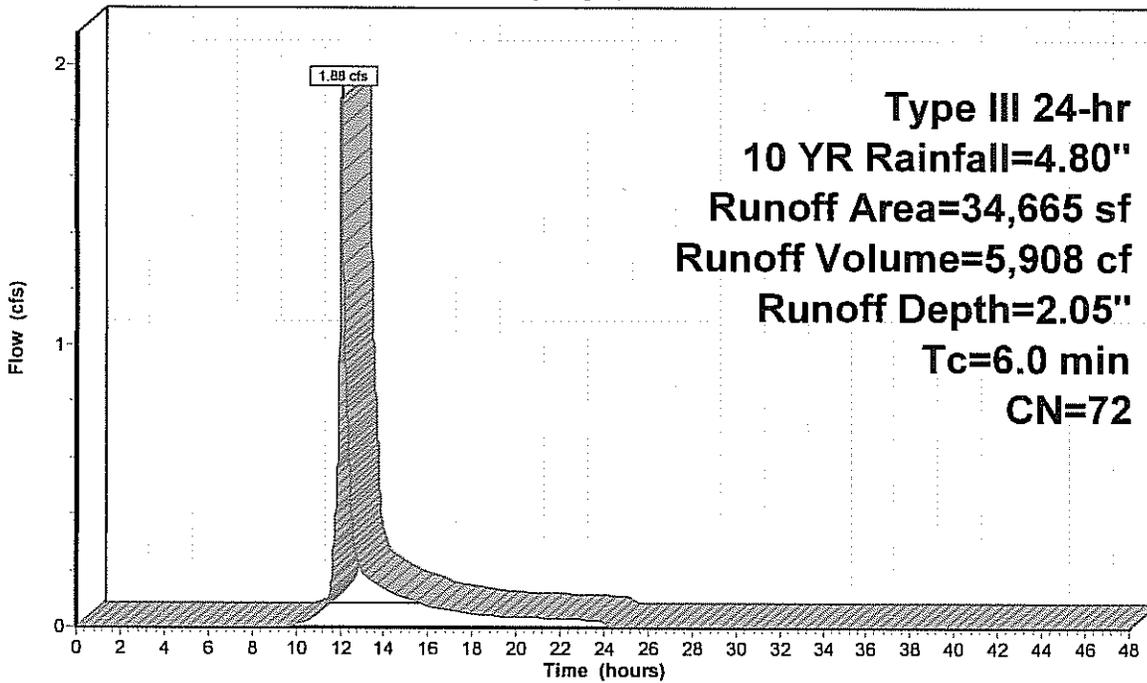
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
32,116	70	Woods, Good, HSG C
2,549	98	Paved parking, HSG C
34,665	72	Weighted Average
32,116		92.65% Pervious Area
2,549		7.35% Impervious Area

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

Subcatchment POST 4A: Post Development Area 4A

Hydrograph



Runoff

**Type III 24-hr
 10 YR Rainfall=4.80"
 Runoff Area=34,665 sf
 Runoff Volume=5,908 cf
 Runoff Depth=2.05"
 Tc=6.0 min
 CN=72**

Summary for Subcatchment POST-2A: Post Development Area 2A

Runoff = 10.86 cfs @ 12.08 hrs, Volume= 38,344 cf, Depth= 4.56"

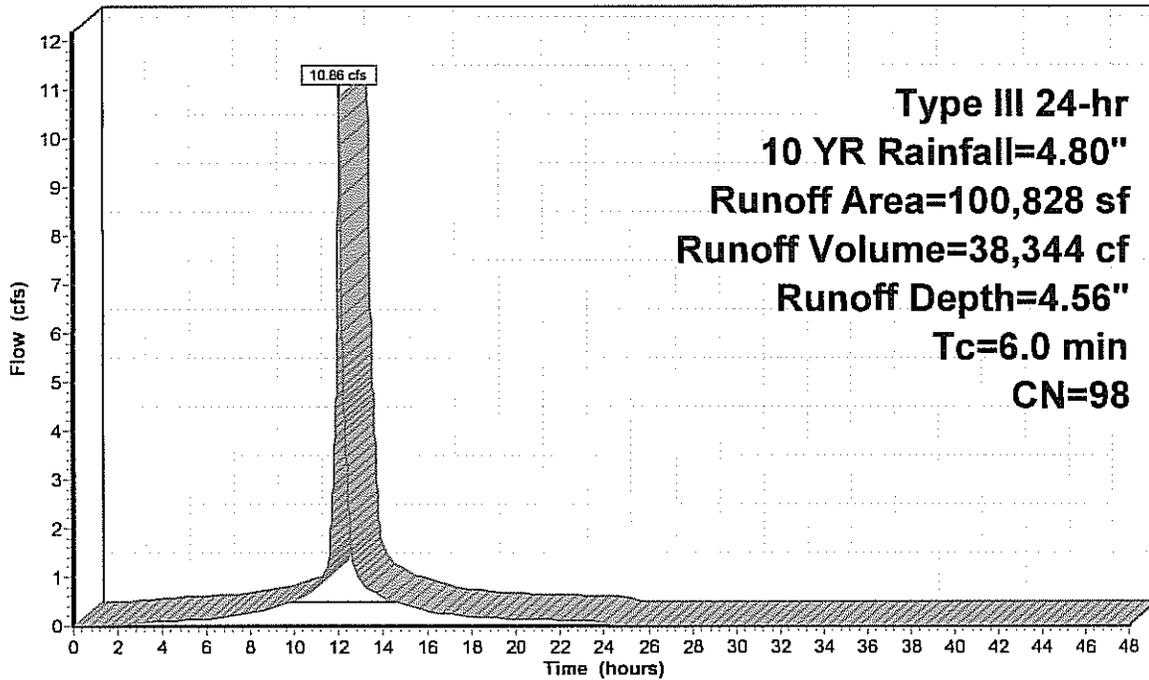
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 10 YR Rainfall=4.80"

Area (sf)	CN	Description
100,828	98	Roofs, HSG C
100,828		100.00% Impervious Area

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

Subcatchment POST-2A: Post Development Area 2A

Hydrograph



Summary for Pond 3P: DCB-1

Inflow Area = 56,802 sf, 85.28% Impervious, Inflow Depth = 4.22" for 10 YR event
 Inflow = 5.94 cfs @ 12.08 hrs, Volume= 19,982 cf
 Outflow = 5.94 cfs @ 12.08 hrs, Volume= 19,982 cf, Atten= 0%, Lag= 0.0 min
 Primary = 5.94 cfs @ 12.08 hrs, Volume= 19,982 cf

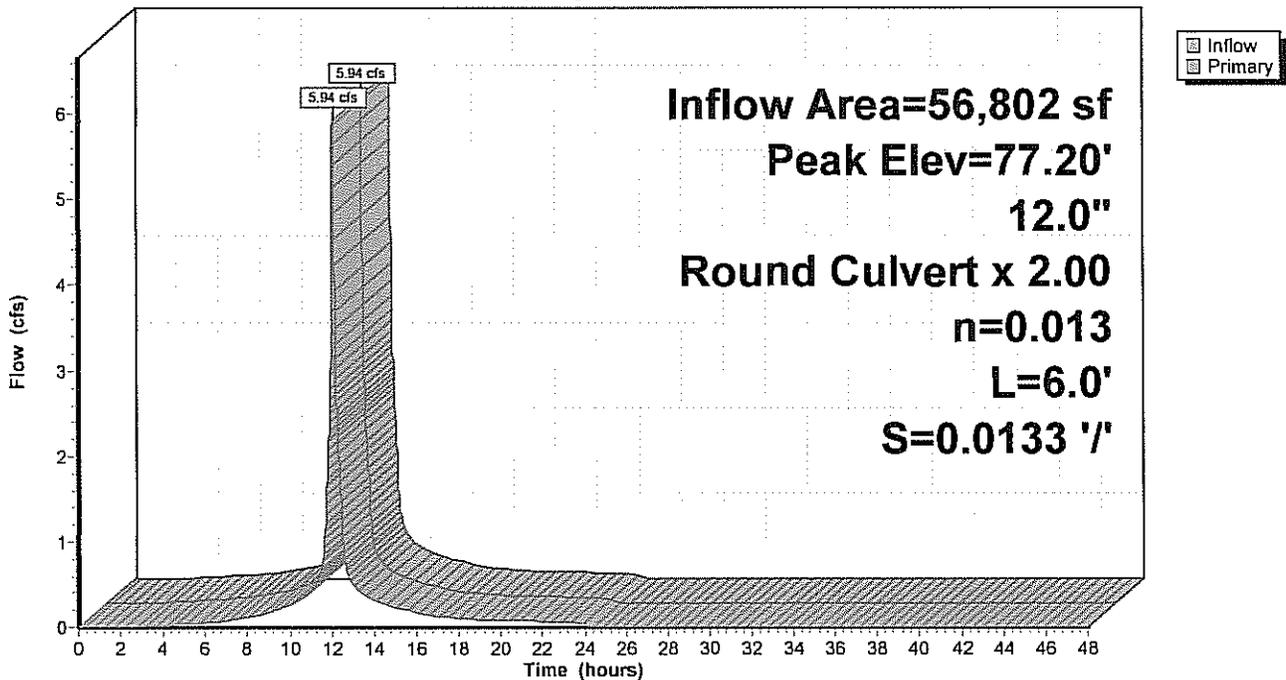
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 77.20' @ 12.11 hrs
 Flood Elev= 78.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	12.0" Round Culvert X 2.00 L= 6.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 76.00' / 75.92' S= 0.0133 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=5.94 cfs @ 12.08 hrs HW=77.15' TW=76.75' (Dynamic Tailwater)
 ↑1=Culvert (Inlet Controls 5.94 cfs @ 3.78 fps)

Pond 3P: DCB-1

Hydrograph

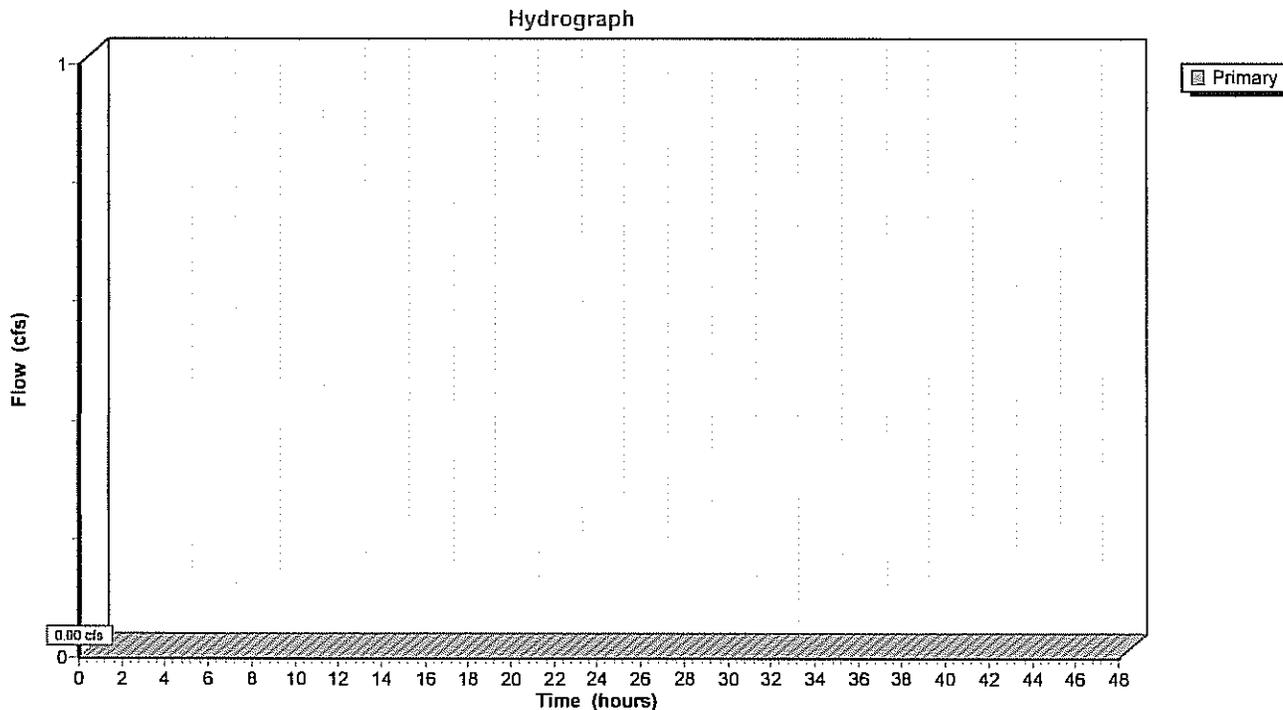


Summary for Pond AP-1: WET-8 (No Flow)

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

Pond AP-1: WET-8 (No Flow)



Summary for Pond AP-2: WET-1

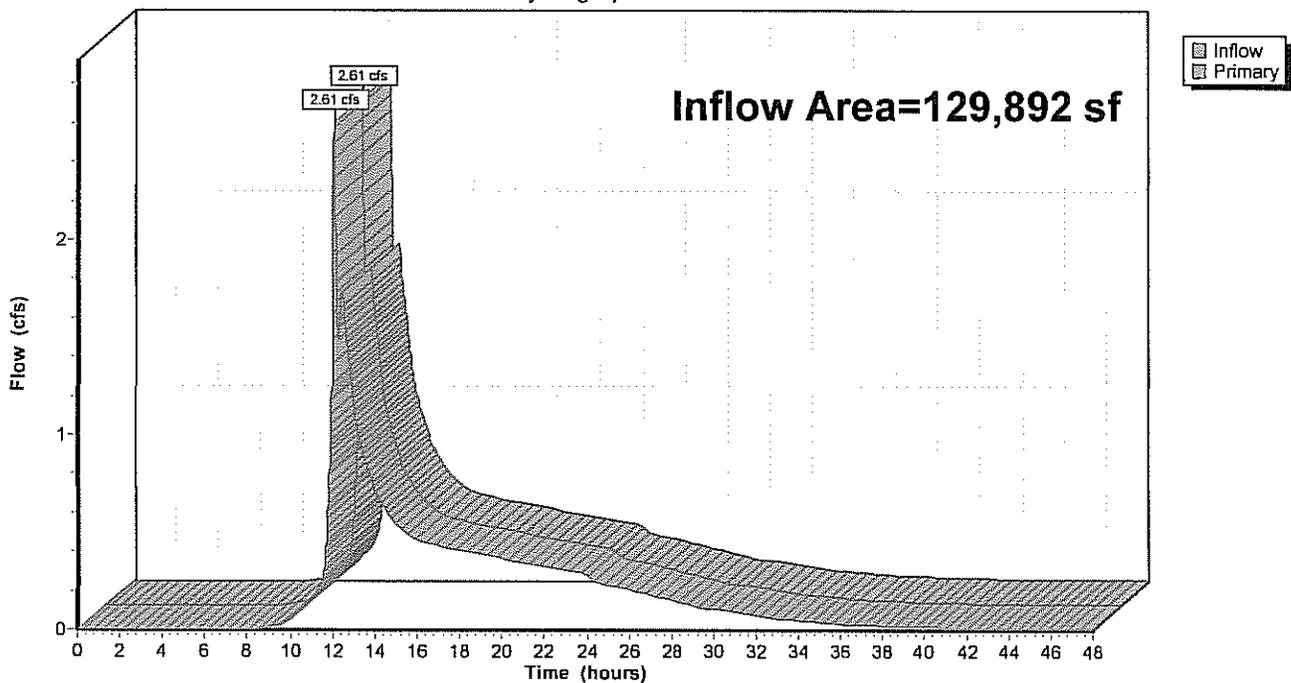
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 129,892 sf, 2.72% Impervious, Inflow Depth > 2.93" for 10 YR event
Inflow = 2.61 cfs @ 12.09 hrs, Volume= 31,687 cf
Primary = 2.61 cfs @ 12.09 hrs, Volume= 31,687 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-2: WET-1

Hydrograph



Summary for Pond AP-3: OFFSITE SWALE

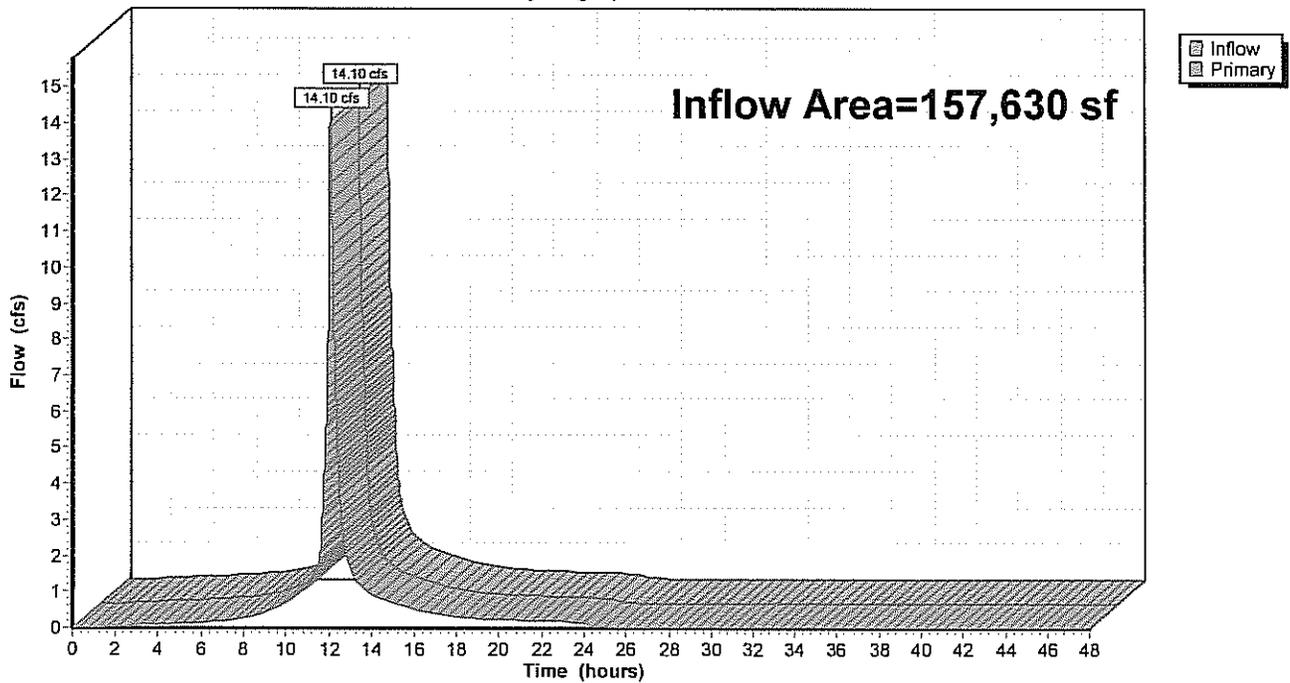
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 157,630 sf, 94.69% Impervious, Inflow Depth = 4.36" for 10 YR event
Inflow = 14.10 cfs @ 12.11 hrs, Volume= 57,218 cf
Primary = 14.10 cfs @ 12.11 hrs, Volume= 57,218 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-3: OFFSITE SWALE

Hydrograph



Summary for Pond AP-4: WET-2

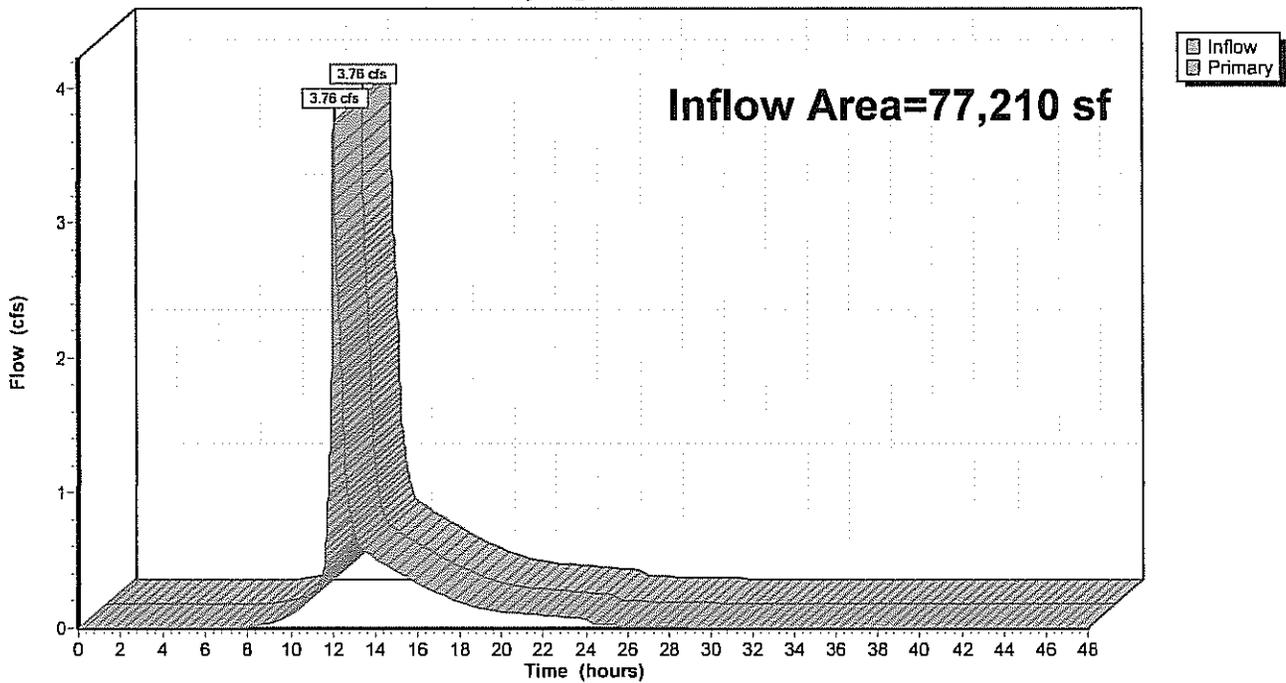
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 77,210 sf, 45.86% Impervious, Inflow Depth > 3.04" for 10 YR event
Inflow = 3.76 cfs @ 12.09 hrs, Volume= 19,576 cf
Primary = 3.76 cfs @ 12.09 hrs, Volume= 19,576 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-4: WET-2

Hydrograph



Summary for Pond AP-5: WET-3

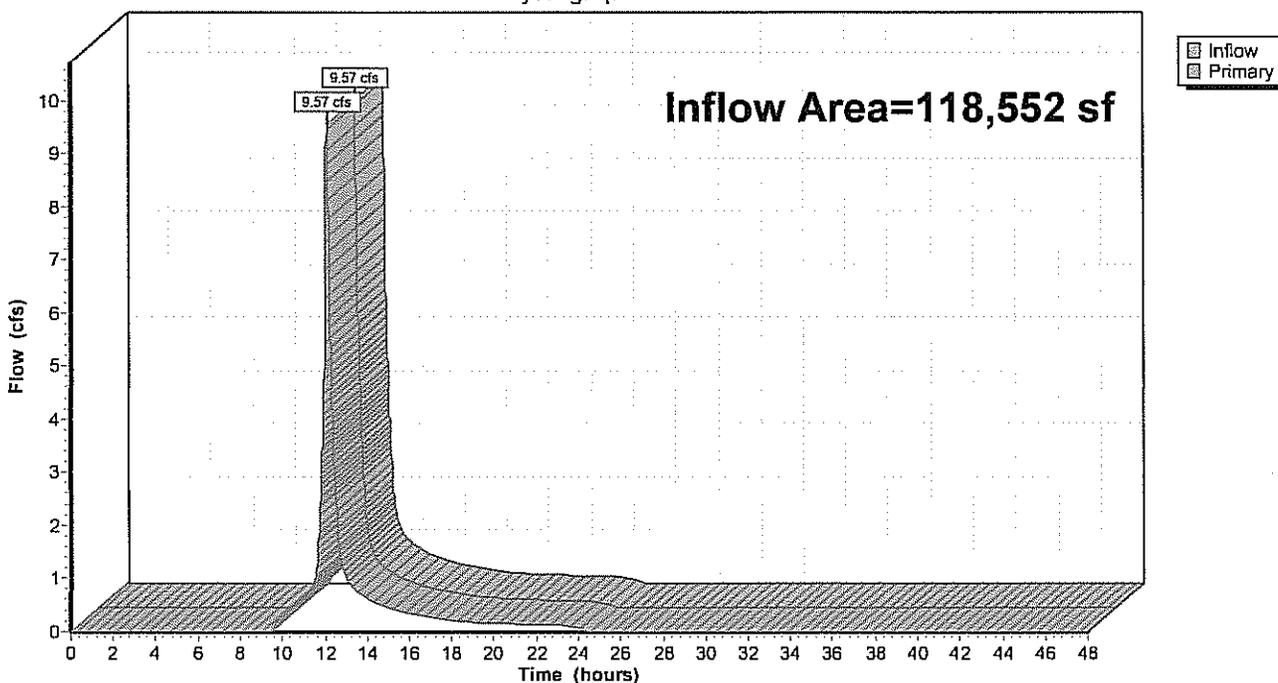
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,552 sf, 62.79% Impervious, Inflow Depth = 3.32" for 10 YR event
Inflow = 9.57 cfs @ 12.12 hrs, Volume= 32,751 cf
Primary = 9.57 cfs @ 12.12 hrs, Volume= 32,751 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-5: WET-3

Hydrograph



Summary for Pond BASIN-1: BioRetention Area 1

Inflow Area = 83,587 sf, 4.22% Impervious, Inflow Depth = 3.58" for 10 YR event
 Inflow = 7.84 cfs @ 12.09 hrs, Volume= 24,942 cf
 Outflow = 1.20 cfs @ 12.58 hrs, Volume= 24,397 cf, Atten= 85%, Lag= 29.4 min
 Primary = 1.20 cfs @ 12.58 hrs, Volume= 24,397 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 78.90' @ 12.58 hrs Surf.Area= 8,636 sf Storage= 13,314 cf
 Flood Elev= 80.00' Surf.Area= 10,755 sf Storage= 23,928 cf

Plug-Flow detention time= 394.3 min calculated for 24,392 cf (98% of inflow)
 Center-of-Mass det. time= 381.3 min (1,177.2 - 795.8)

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	23,928 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	5,397	0	0
78.00	7,048	6,223	6,223
79.00	8,804	7,926	14,149
80.00	10,755	9,780	23,928

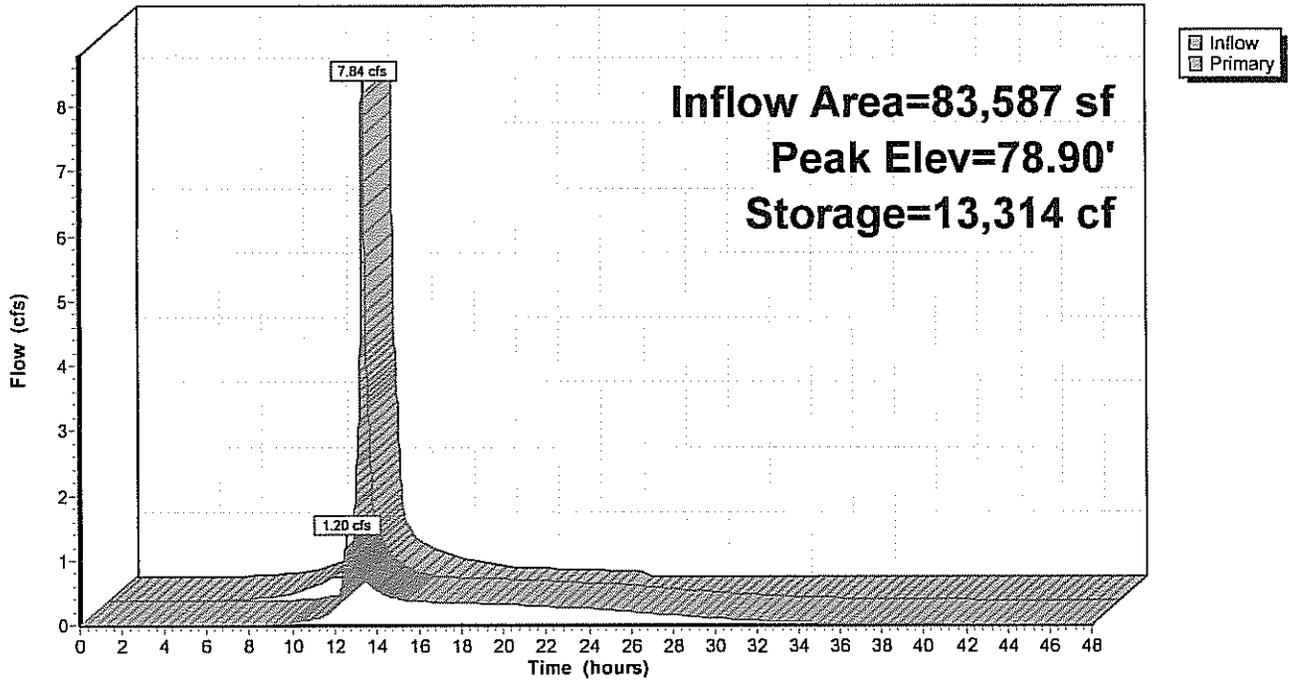
Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	4.0" Round Culvert L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 77.00' / 77.00' S= 0.0000 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Primary	78.75'	5.0' long x 25.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.20 cfs @ 12.58 hrs HW=78.90' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Barrel Controls 0.39 cfs @ 4.45 fps)
- 2=Broad-Crested Rectangular Weir (Weir Controls 0.81 cfs @ 1.05 fps)

Pond BASIN-1: BioRetention Area 1

Hydrograph



Summary for Pond BASIN-2: Subsurface Detention System

Inflow Area = 56,802 sf, 85.28% Impervious, Inflow Depth = 4.22" for 10 YR event
 Inflow = 5.94 cfs @ 12.08 hrs, Volume= 19,982 cf
 Outflow = 4.70 cfs @ 12.17 hrs, Volume= 18,874 cf, Atten= 21%, Lag= 5.4 min
 Primary = 2.16 cfs @ 12.18 hrs, Volume= 10,705 cf
 Secondary = 2.54 cfs @ 12.17 hrs, Volume= 8,169 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.91' @ 12.15 hrs Surf.Area= 5,296 sf Storage= 4,942 cf
 Flood Elev= 78.10' Surf.Area= 5,296 sf Storage= 6,011 cf

Plug-Flow detention time= 97.6 min calculated for 18,870 cf (94% of inflow)
 Center-of-Mass det. time= 66.7 min (836.0 - 769.3)

Volume	Invert	Avail.Storage	Storage Description
#1A	75.37'	3,201 cf	68.33'W x 77.50'L x 2.04'H Field A 10,812 cf Overall - 2,811 cf Embedded = 8,001 cf x 40.0% Voids
#2A	75.87'	2,811 cf	Cultec C-100HD x 200 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 20 rows
		6,011 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	75.87'	12.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.42' S= 0.0090 '/ Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	75.87'	18.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.87' S= 0.0000 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.16 cfs @ 12.18 hrs HW=76.88' TW=76.46' (Dynamic Tailwater)

↑**1=Culvert** (Outlet Controls 2.16 cfs @ 3.37 fps)

Secondary OutFlow Max=2.67 cfs @ 12.17 hrs HW=76.89' TW=76.65' (Dynamic Tailwater)

↑**2=Culvert** (Outlet Controls 2.67 cfs @ 2.93 fps)

Pond BASIN-2: Subsurface Detention System - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)

Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf

Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap

Row Length Adjustment= +0.50' x 1.86 sf x 20 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

10 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 75.50' Row Length +12.0" End Stone x 2 = 77.50' Base Length

20 Rows x 36.0" Wide + 4.0" Spacing x 19 + 12.0" Side Stone x 2 = 68.33' Base Width

6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

200 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 20 Rows = 2,810.9 cf Chamber Storage

10,812.3 cf Field - 2,810.9 cf Chambers = 8,001.5 cf Stone x 40.0% Voids = 3,200.6 cf Stone Storage

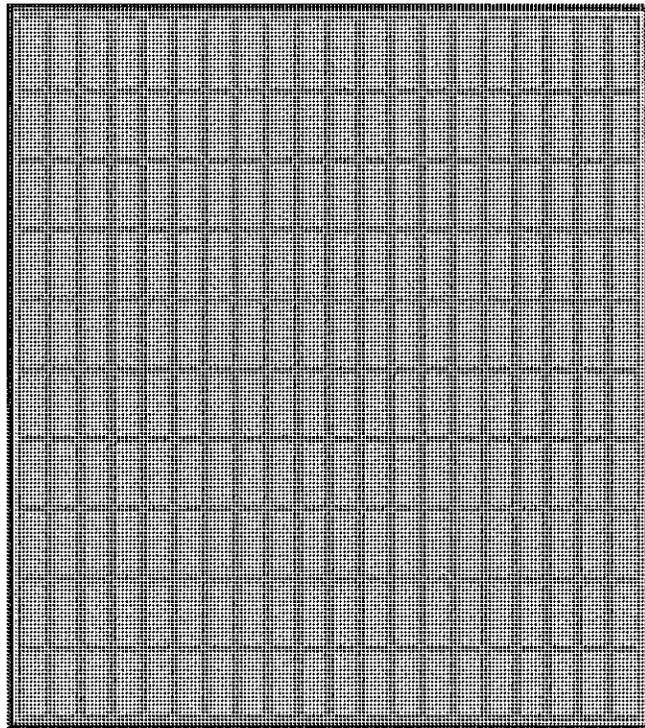
Chamber Storage + Stone Storage = 6,011.4 cf = 0.138 af

Overall Storage Efficiency = 55.6%

200 Chambers

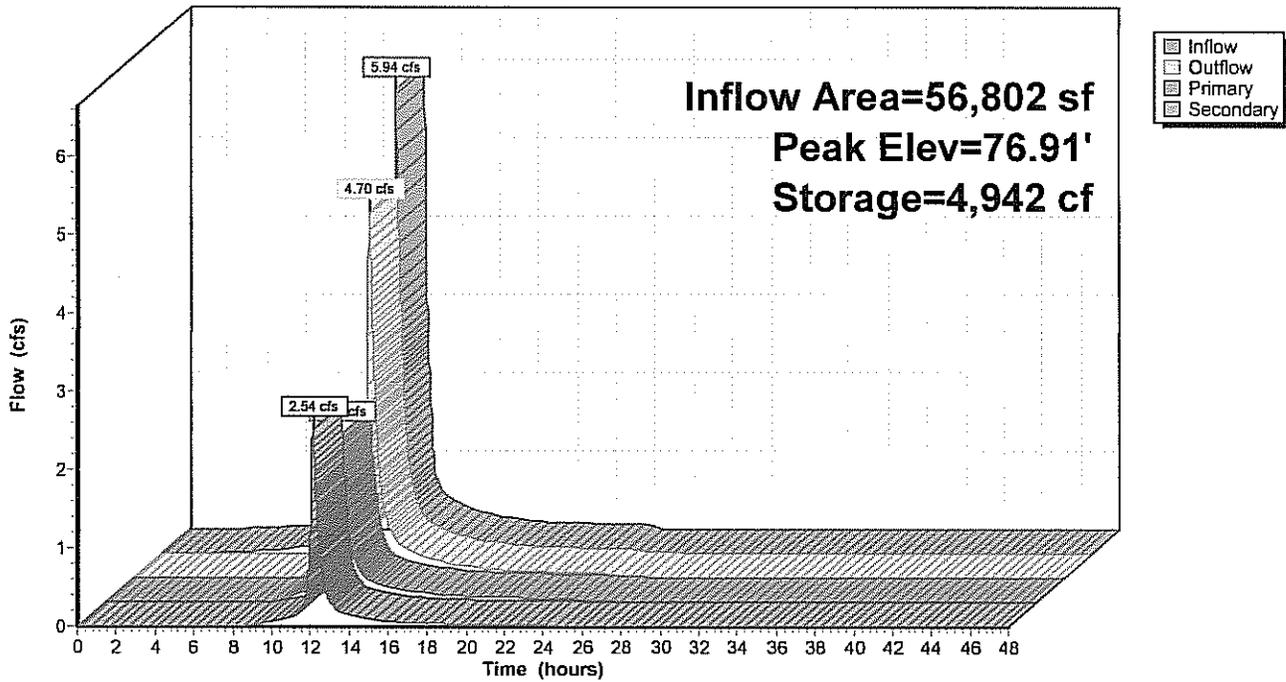
400.5 cy Field

296.4 cy Stone



Pond BASIN-2: Subsurface Detention System

Hydrograph



Summary for Pond BASIN-3: BioRetention Area 3

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 3.58" for 10 YR event
 Inflow = 2.79 cfs @ 12.09 hrs, Volume= 8,873 cf
 Outflow = 0.96 cfs @ 12.36 hrs, Volume= 8,819 cf, Atten= 65%, Lag= 16.7 min
 Primary = 0.96 cfs @ 12.36 hrs, Volume= 8,819 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.83' @ 12.36 hrs Surf.Area= 4,771 sf Storage= 3,488 cf
 Flood Elev= 78.00' Surf.Area= 6,149 sf Storage= 9,892 cf

Plug-Flow detention time= 139.8 min calculated for 8,819 cf (99% of inflow)
 Center-of-Mass det. time= 135.9 min (931.8 - 795.8)

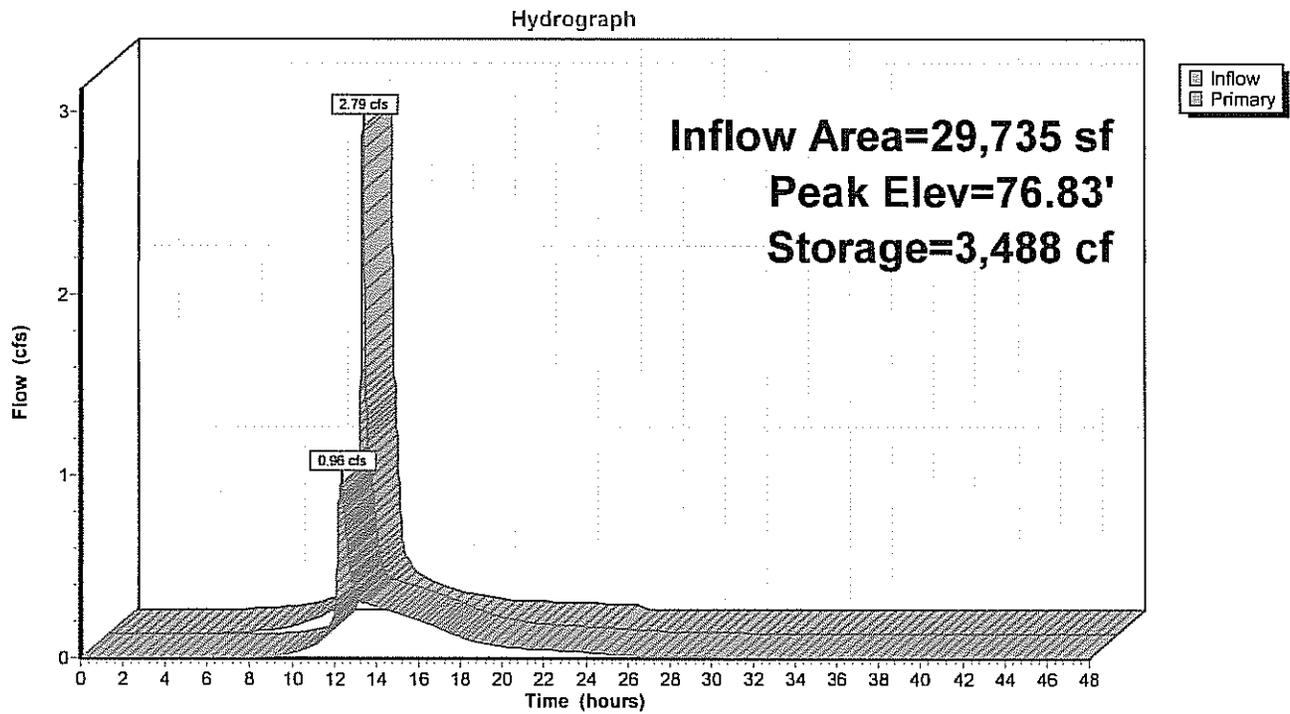
Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	9,892 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	3,624	0	0
77.00	5,005	4,315	4,315
78.00	6,149	5,577	9,892

Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	12.0" Round 12" HDPE L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.00' / 74.80' S= 0.0067 ' / Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	76.00'	4.0" Vert. 4" Orifice C= 0.600
#3	Device 1	76.70'	4.0' long x 1.50' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.5' Crest Height

Primary OutFlow Max=0.96 cfs @ 12.36 hrs HW=76.83' TW=0.00' (Dynamic Tailwater)

- ↑ 1=12" HDPE (Passes 0.96 cfs of 4.34 cfs potential flow)
- ↑ 2=4" Orifice (Orifice Controls 0.34 cfs @ 3.92 fps)
- ↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 0.62 cfs @ 1.20 fps)

Pond BASIN-3: BioRetention Area 3



Summary for Pond BASIN-4: BioRetention Area 4

Inflow Area = 83,887 sf, 85.69% Impervious, Inflow Depth = 4.22" for 10 YR event
 Inflow = 8.77 cfs @ 12.08 hrs, Volume= 29,511 cf
 Outflow = 7.80 cfs @ 12.13 hrs, Volume= 26,843 cf, Atten= 11%, Lag= 2.5 min
 Primary = 7.80 cfs @ 12.13 hrs, Volume= 26,843 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 78.20' @ 12.13 hrs Surf.Area= 4,922 sf Storage= 4,749 cf
 Flood Elev= 79.00' Surf.Area= 5,813 sf Storage= 9,041 cf

Plug-Flow detention time= 86.4 min calculated for 26,843 cf (91% of inflow)
 Center-of-Mass det. time= 40.6 min (809.9 - 769.3)

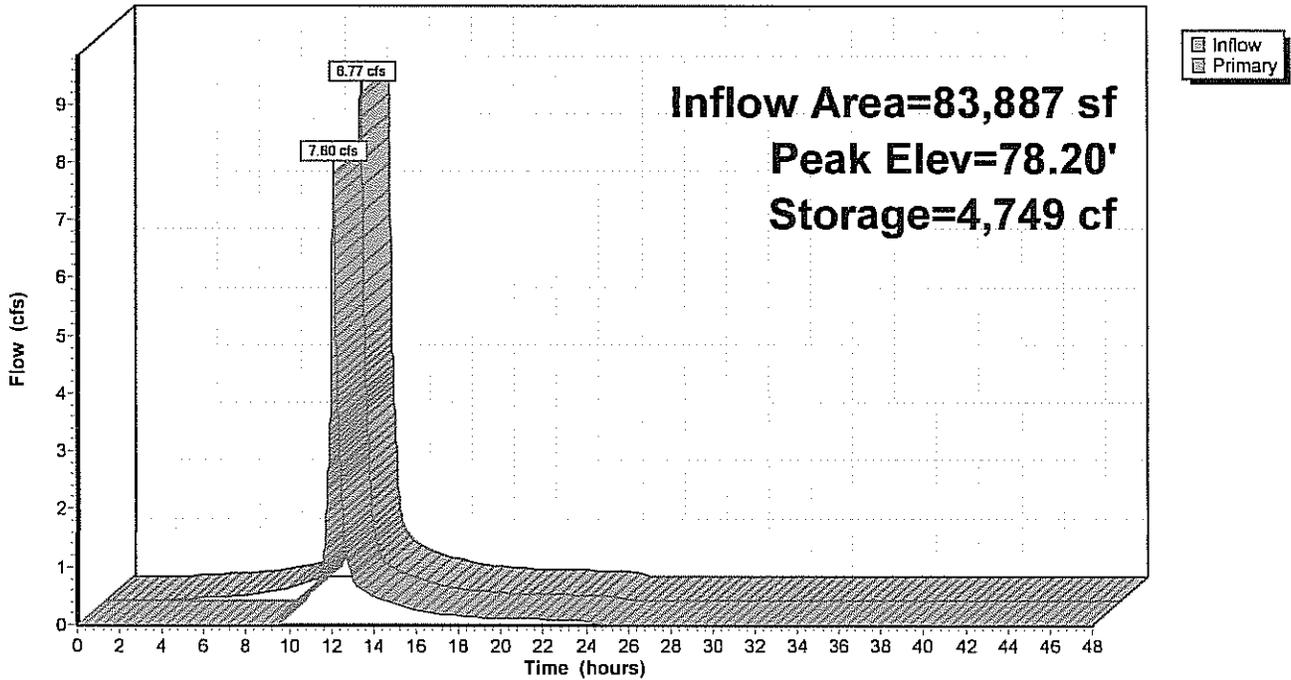
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	9,041 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	2,871	0	0
78.00	4,699	3,785	3,785
79.00	5,813	5,256	9,041

Device	Routing	Invert	Outlet Devices
#1	Primary	77.75'	10.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=7.79 cfs @ 12.13 hrs HW=78.20' TW=0.00' (Dynamic Tailwater)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 7.79 cfs @ 1.73 fps)

Pond BASIN-4: BioRetention Area 4

Hydrograph



Summary for Pond DMH-1: DMH-1

Inflow Area = 157,630 sf, 94.69% Impervious, Inflow Depth = 3.73" for 10 YR event
 Inflow = 11.92 cfs @ 12.10 hrs, Volume= 49,049 cf
 Outflow = 11.92 cfs @ 12.10 hrs, Volume= 49,049 cf, Atten= 0%, Lag= 0.0 min
 Primary = 11.92 cfs @ 12.10 hrs, Volume= 49,049 cf

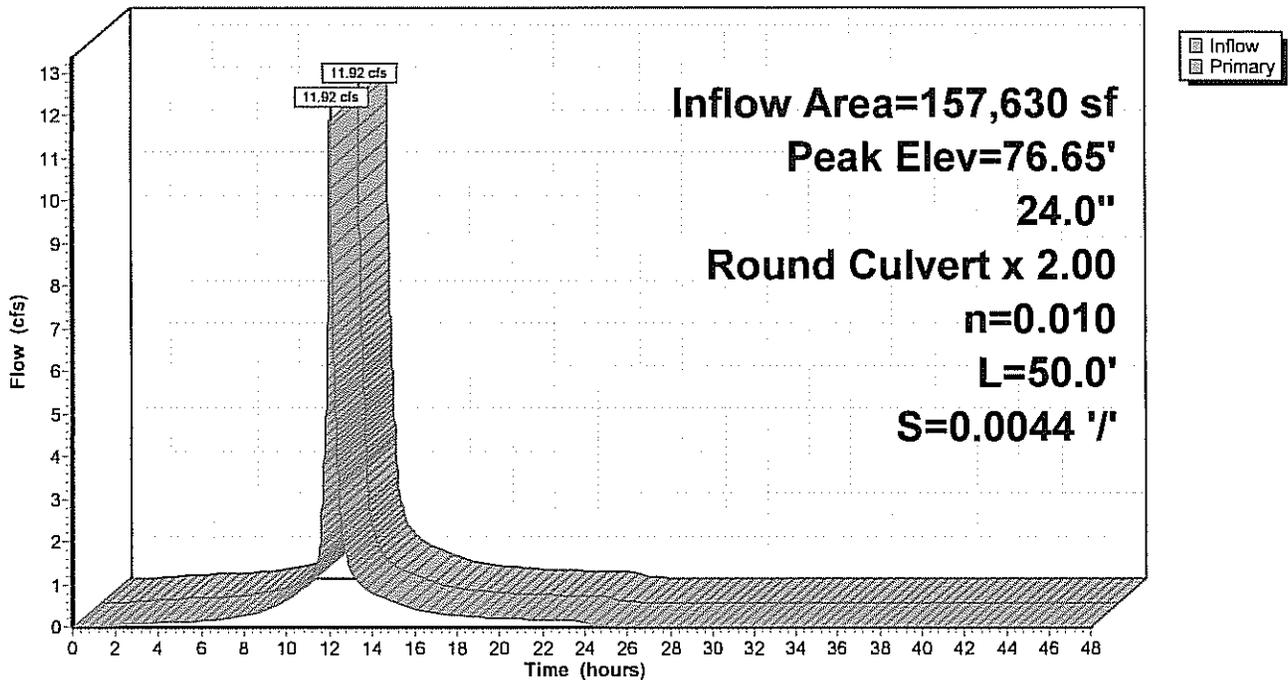
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.65' @ 12.10 hrs
 Flood Elev= 79.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	75.42'	24.0" Round Culvert X 2.00 L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.42' / 75.20' S= 0.0044 '/ Cc= 0.900 n= 0.010 Cast iron, coated, Flow Area= 3.14 sf

Primary OutFlow Max=11.91 cfs @ 12.10 hrs HW=76.65' TW=0.00' (Dynamic Tailwater)
 ←1=Culvert (Barrel Controls 11.91 cfs @ 4.23 fps)

Pond DMH-1: DMH-1

Hydrograph



Summary for Pond DMH-2: DMH-2

Inflow = 2.54 cfs @ 12.17 hrs, Volume= 8,169 cf
 Outflow = 2.54 cfs @ 12.17 hrs, Volume= 8,169 cf, Atten= 0%, Lag= 0.0 min
 Primary = 2.54 cfs @ 12.17 hrs, Volume= 8,169 cf

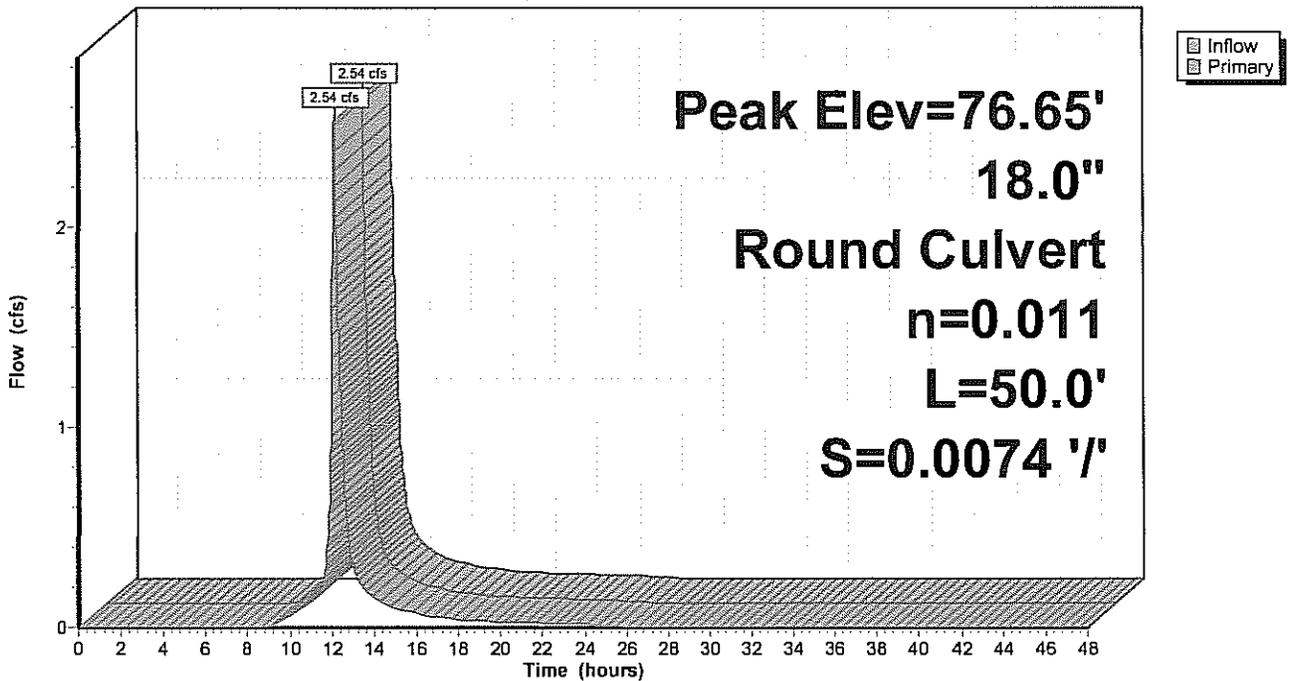
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.65' @ 12.17 hrs
 Flood Elev= 79.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	75.87'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.50' S= 0.0074 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.54 cfs @ 12.17 hrs HW=76.65' TW=0.00' (Dynamic Tailwater)
 1=Culvert (Barrel Controls 2.54 cfs @ 3.96 fps)

Pond DMH-2: DMH-2

Hydrograph



Summary for Pond DMH-3:

Inflow Area = 100,828 sf, 100.00% Impervious, Inflow Depth = 4.56" for 10 YR event
 Inflow = 10.86 cfs @ 12.08 hrs, Volume= 38,344 cf
 Outflow = 10.86 cfs @ 12.08 hrs, Volume= 38,344 cf, Atten= 0%, Lag= 0.0 min
 Primary = 10.86 cfs @ 12.08 hrs, Volume= 38,344 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Peak Elev= 77.89' @ 12.08 hrs

Flood Elev= 79.80'

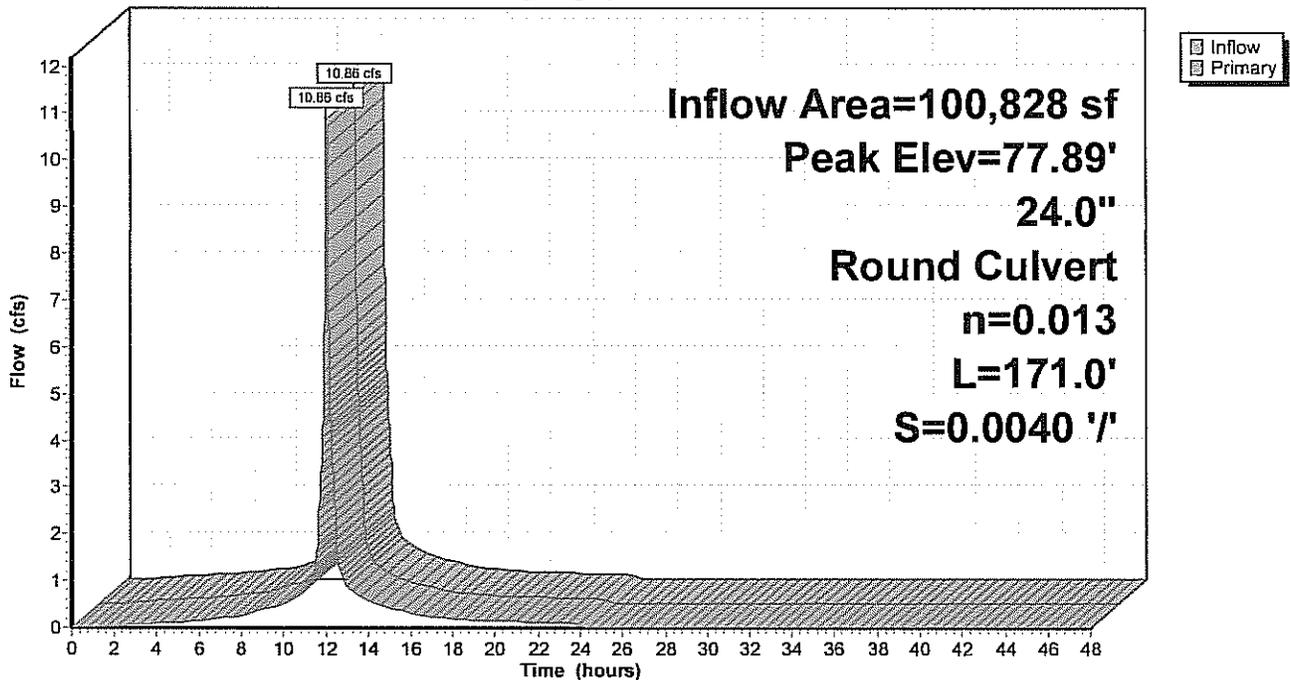
Device	Routing	Invert	Outlet Devices
#1	Primary	76.14'	24.0" Round Culvert L= 171.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 76.14' / 75.45' S= 0.0040 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=10.85 cfs @ 12.08 hrs HW=77.89' TW=76.64' (Dynamic Tailwater)

↑1=Culvert (Barrel Controls 10.85 cfs @ 4.96 fps)

Pond DMH-3:

Hydrograph



1998-POST-WS-REV 3

Type III 24-hr 25 YR Rainfall=5.50"

Prepared by Field Engineering Co. Inc.

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Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 4
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment POST 1: Post Development Runoff Area=83,587 sf 4.22% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=89 Runoff=9.24 cfs 29,620 cf

Subcatchment POST 1A: Post Development Runoff Area=46,305 sf 0.00% Impervious Runoff Depth=2.41"
Tc=6.0 min CN=70 Runoff=2.98 cfs 9,316 cf

Subcatchment POST 2: Post Development Runoff Area=56,802 sf 85.28% Impervious Runoff Depth=4.92"
Tc=6.0 min CN=95 Runoff=6.86 cfs 23,266 cf

Subcatchment POST 3: Post Development Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=4.25"
Tc=6.0 min CN=89 Runoff=3.29 cfs 10,537 cf

Subcatchment POST 3A: Post Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=3.33"
Tc=6.0 min CN=80 Runoff=4.25 cfs 13,188 cf

Subcatchment POST 4: Post Development Runoff Area=83,887 sf 85.69% Impervious Runoff Depth=4.92"
Tc=6.0 min CN=95 Runoff=10.13 cfs 34,360 cf

Subcatchment POST 4A: Post Development Runoff Area=34,665 sf 7.35% Impervious Runoff Depth=2.59"
Tc=6.0 min CN=72 Runoff=2.41 cfs 7,481 cf

Subcatchment POST-2A: Post Runoff Area=100,828 sf 100.00% Impervious Runoff Depth=5.26"
Tc=6.0 min CN=98 Runoff=12.47 cfs 44,217 cf

Pond 3P: DCB-1 Peak Elev=77.48' Inflow=6.86 cfs 23,266 cf
12.0" Round Culvert x 2.00 n=0.013 L=6.0' S=0.0133 '/' Outflow=6.86 cfs 23,266 cf

Pond AP-1: WET-8 (No Flow) Primary=0.00 cfs 0 cf

Pond AP-2: WET-1 Inflow=3.50 cfs 38,378 cf
Primary=3.50 cfs 38,378 cf

Pond AP-3: OFFSITE SWALE Inflow=16.70 cfs 66,375 cf
Primary=16.70 cfs 66,375 cf

Pond AP-4: WET-2 Inflow=4.74 cfs 23,670 cf
Primary=4.74 cfs 23,670 cf

Pond AP-5: WET-3 Inflow=11.36 cfs 39,173 cf
Primary=11.36 cfs 39,173 cf

Pond BASIN-1: BioRetention Area 1 Peak Elev=79.04' Storage=14,461 cf Inflow=9.24 cfs 29,620 cf
Outflow=2.45 cfs 29,062 cf

Pond BASIN-2: Subsurface Detention Peak Elev=77.06' Storage=5,257 cf Inflow=6.86 cfs 23,266 cf
Primary=2.55 cfs 12,362 cf Secondary=3.12 cfs 9,796 cf Outflow=5.65 cfs 22,158 cf

Pond BASIN-3: BioRetention Area 3 Peak Elev=76.89' Storage=3,770 cf Inflow=3.29 cfs 10,537 cf
Outflow=1.44 cfs 10,482 cf

Pond BASIN-4: BioRetention Area 4 Peak Elev=78.24' Storage=4,967 cf Inflow=10.13 cfs 34,360 cf
Outflow=9.09 cfs 31,693 cf

Pond DMH-1: DMH-1 Peak Elev=76.76' Inflow=13.91 cfs 56,579 cf
24.0" Round Culvert x 2.00 n=0.010 L=50.0' S=0.0044 '/' Outflow=13.91 cfs 56,579 cf

Pond DMH-2: DMH-2 Peak Elev=76.76' Inflow=3.12 cfs 9,796 cf
18.0" Round Culvert n=0.011 L=50.0' S=0.0074 '/' Outflow=3.12 cfs 9,796 cf

Pond DMH-3: Peak Elev=78.07' Inflow=12.47 cfs 44,217 cf
24.0" Round Culvert n=0.013 L=171.0' S=0.0040 '/' Outflow=12.47 cfs 44,217 cf

Total Runoff Area = 483,284 sf Runoff Volume = 171,984 cf Average Runoff Depth = 4.27"
45.65% Pervious = 220,643 sf 54.35% Impervious = 262,641 sf

Summary for Subcatchment POST 1: Post Development Area 1

Runoff = 9.24 cfs @ 12.09 hrs, Volume= 29,620 cf, Depth= 4.25"

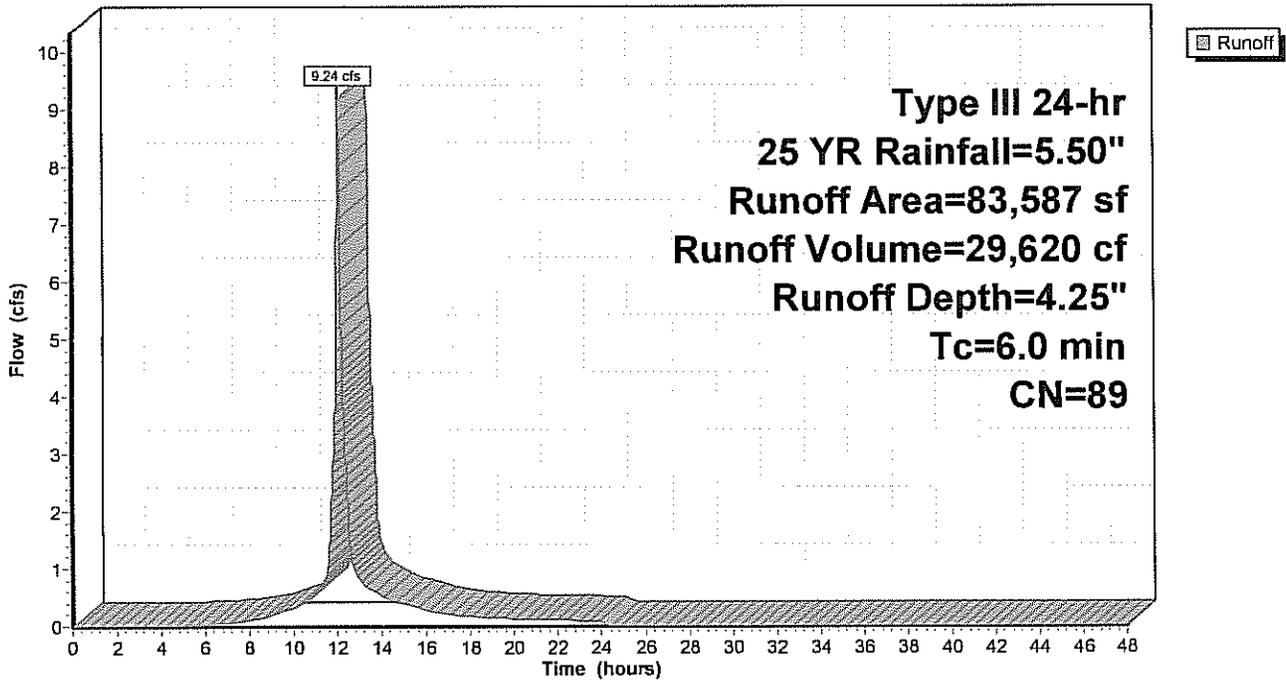
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
51,749	96	Gravel surface, HSG C
3,528	98	Paved parking, HSG C
28,310	74	>75% Grass cover, Good, HSG C
83,587	89	Weighted Average
80,059		95.78% Pervious Area
3,528		4.22% Impervious Area

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

Subcatchment POST 1: Post Development Area 1

Hydrograph



Summary for Subcatchment POST 1A: Post Development Area 1A

Runoff = 2.98 cfs @ 12.09 hrs, Volume= 9,316 cf, Depth= 2.41"

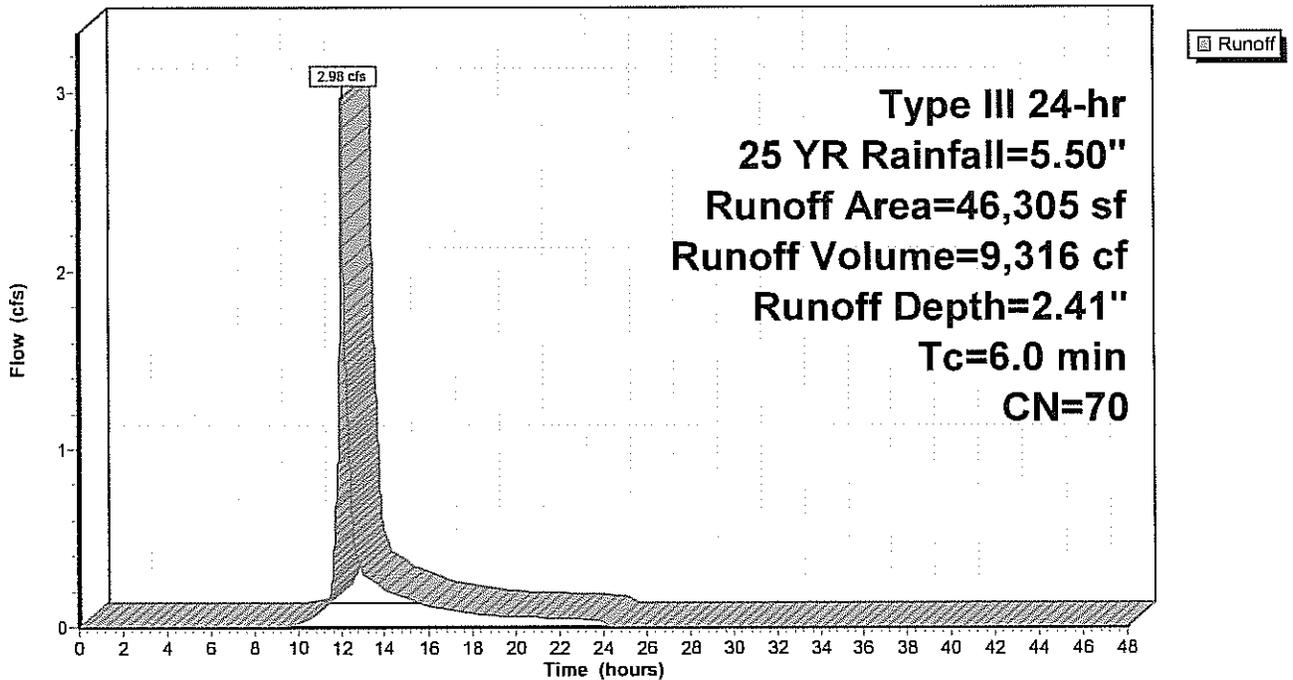
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
942	89	Gravel roads, HSG C
45,363	70	Woods, Good, HSG C
46,305	70	Weighted Average
46,305		100.00% Pervious Area

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

Subcatchment POST 1A: Post Development Area 1A

Hydrograph



Summary for Subcatchment POST 2: Post Development Area 2

Runoff = 6.86 cfs @ 12.08 hrs, Volume= 23,266 cf, Depth= 4.92"

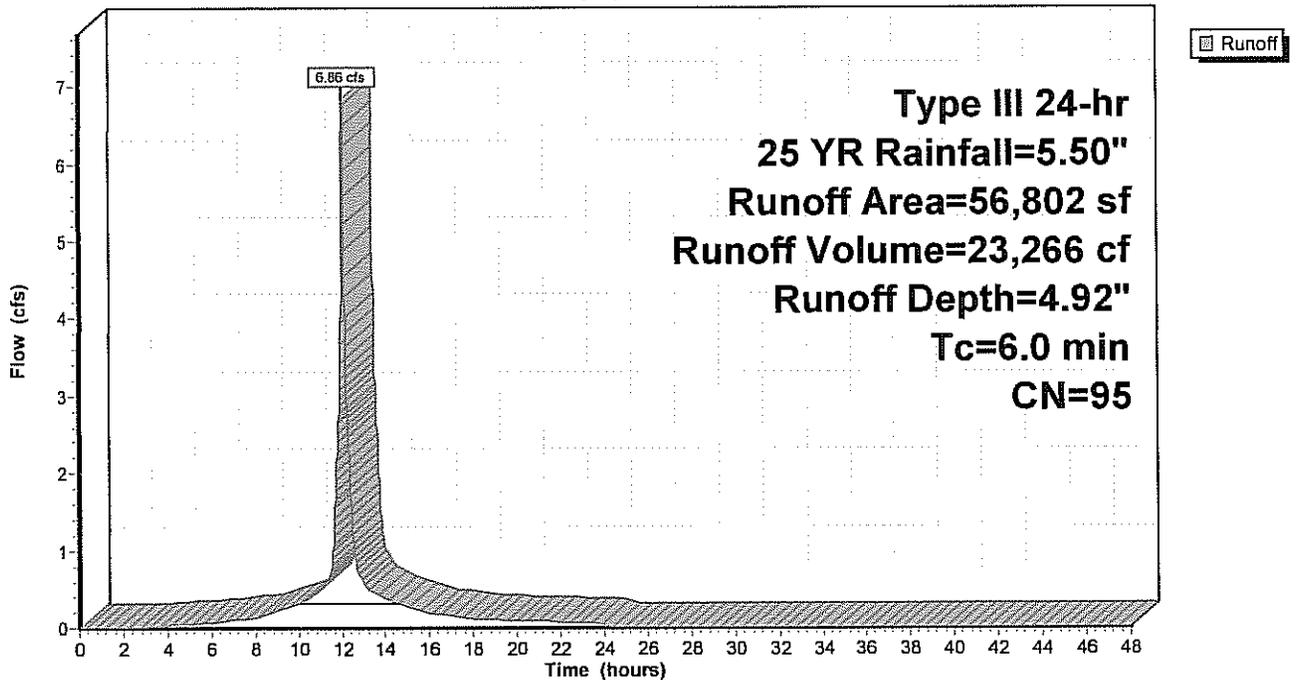
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
48,439	98	Paved parking, HSG C
2,831	89	Gravel roads, HSG C
5,532	74	>75% Grass cover, Good, HSG C
56,802	95	Weighted Average
8,363		14.72% Pervious Area
48,439		85.28% Impervious Area

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

Subcatchment POST 2: Post Development Area 2

Hydrograph



Summary for Subcatchment POST 3: Post Development Area 3

Runoff = 3.29 cfs @ 12.09 hrs, Volume= 10,537 cf, Depth= 4.25"

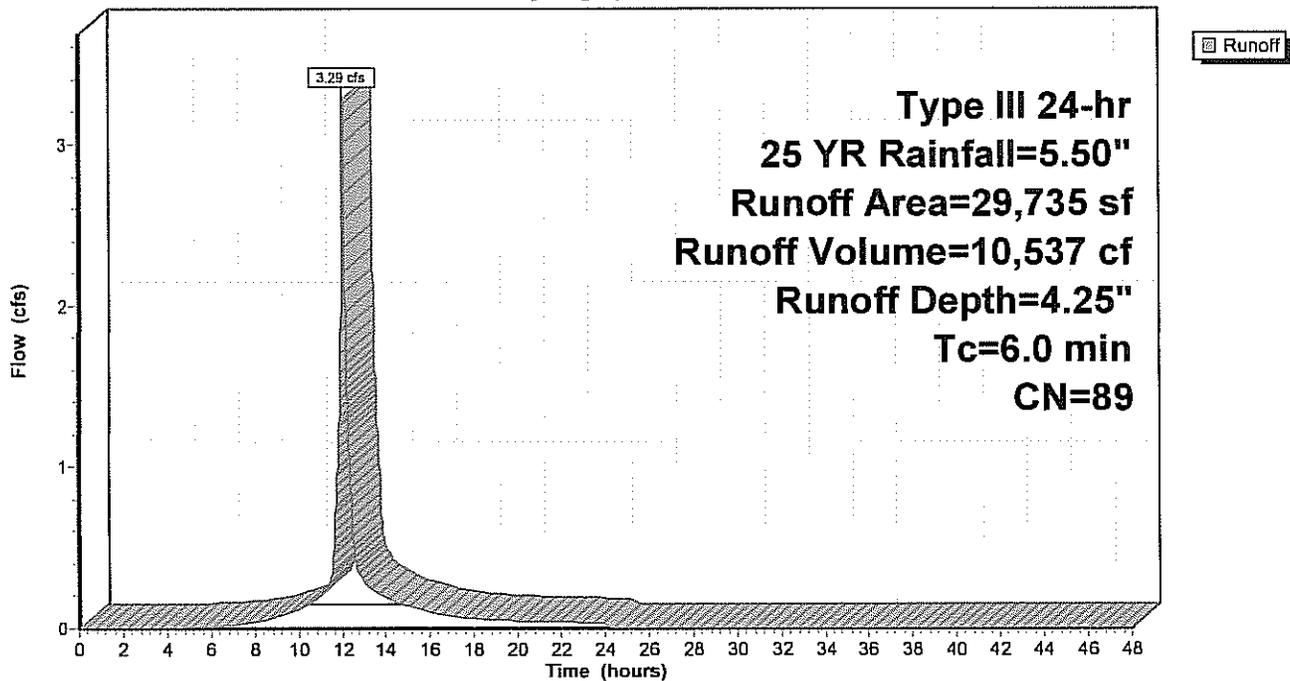
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
18,773	98	Paved parking, HSG C
10,962	74	>75% Grass cover, Good, HSG C
29,735	89	Weighted Average
10,962		36.87% Pervious Area
18,773		63.13% Impervious Area

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

Subcatchment POST 3: Post Development Area 3

Hydrograph



Summary for Subcatchment POST 3A: Post Development Area 3A

Runoff = 4.25 cfs @ 12.09 hrs, Volume= 13,188 cf, Depth= 3.33"

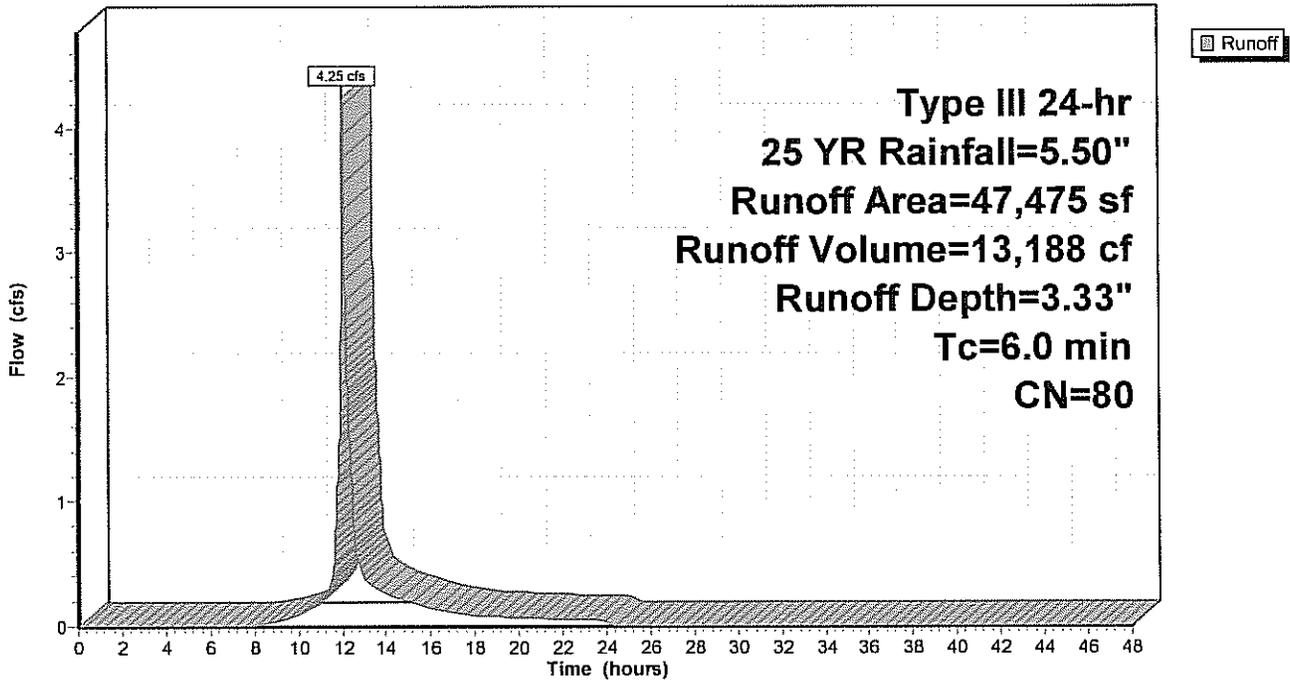
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
14,950	98	Roofs, HSG C
1,689	98	Paved parking, HSG C
30,836	70	Woods, Good, HSG C
47,475	80	Weighted Average
30,836		64.95% Pervious Area
16,639		35.05% Impervious Area

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

Subcatchment POST 3A: Post Development Area 3A

Hydrograph



Summary for Subcatchment POST 4: Post Development Area 4

Runoff = 10.13 cfs @ 12.08 hrs, Volume= 34,360 cf, Depth= 4.92"

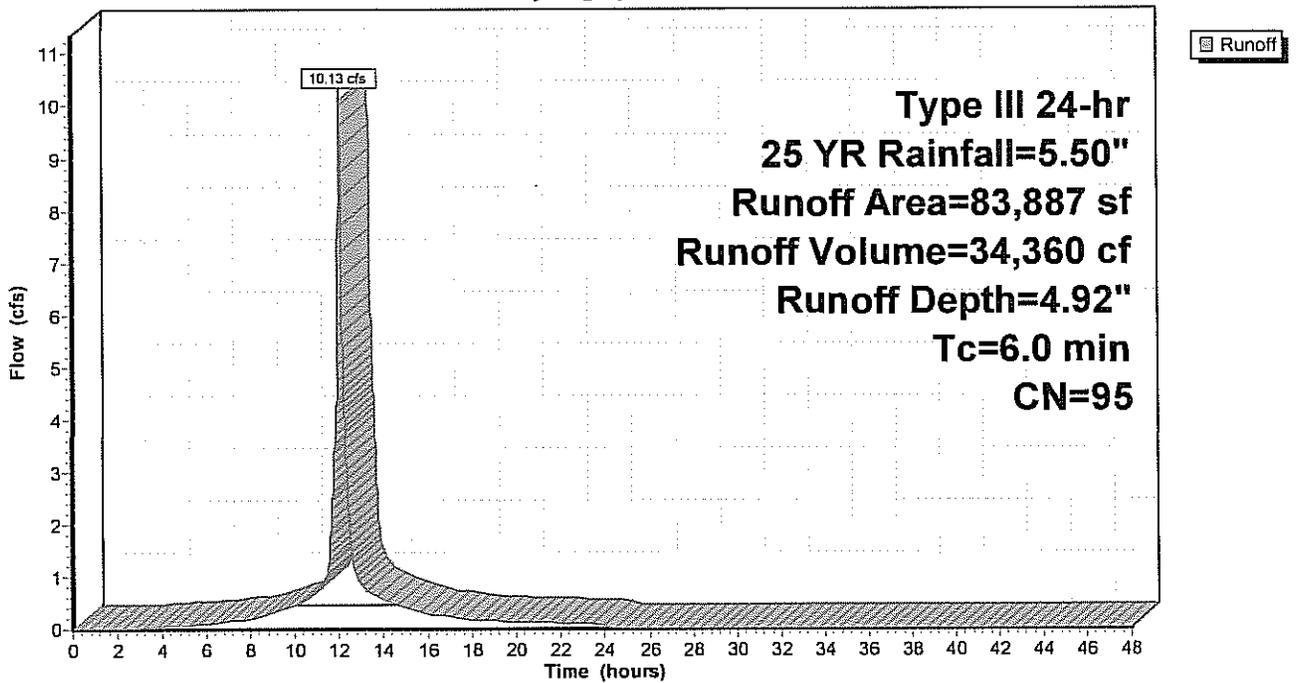
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
71,885	98	Paved parking, HSG C
12,002	74	>75% Grass cover, Good, HSG C
83,887	95	Weighted Average
12,002		14.31% Pervious Area
71,885		85.69% Impervious Area

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

Subcatchment POST 4: Post Development Area 4

Hydrograph



Summary for Subcatchment POST 4A: Post Development Area 4A

Runoff = 2.41 cfs @ 12.09 hrs, Volume= 7,481 cf, Depth= 2.59"

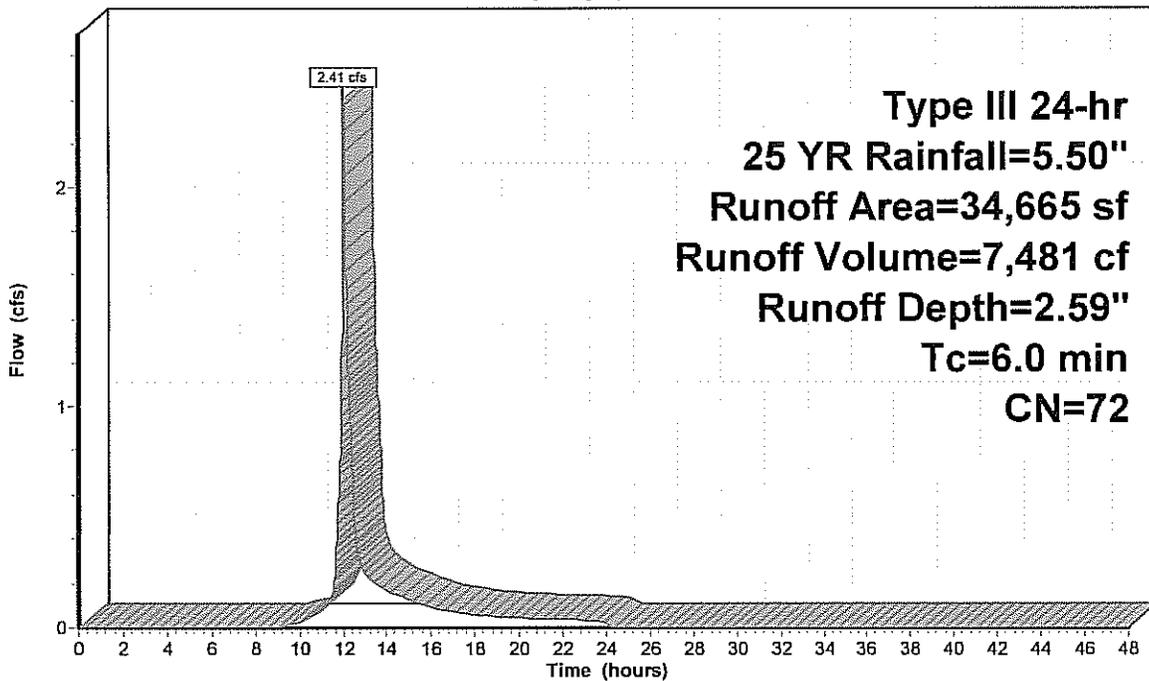
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
32,116	70	Woods, Good, HSG C
2,549	98	Paved parking, HSG C
34,665	72	Weighted Average
32,116		92.65% Pervious Area
2,549		7.35% Impervious Area

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

Subcatchment POST 4A: Post Development Area 4A

Hydrograph



Summary for Subcatchment POST-2A: Post Development Area 2A

Runoff = 12.47 cfs @ 12.08 hrs, Volume= 44,217 cf, Depth= 5.26"

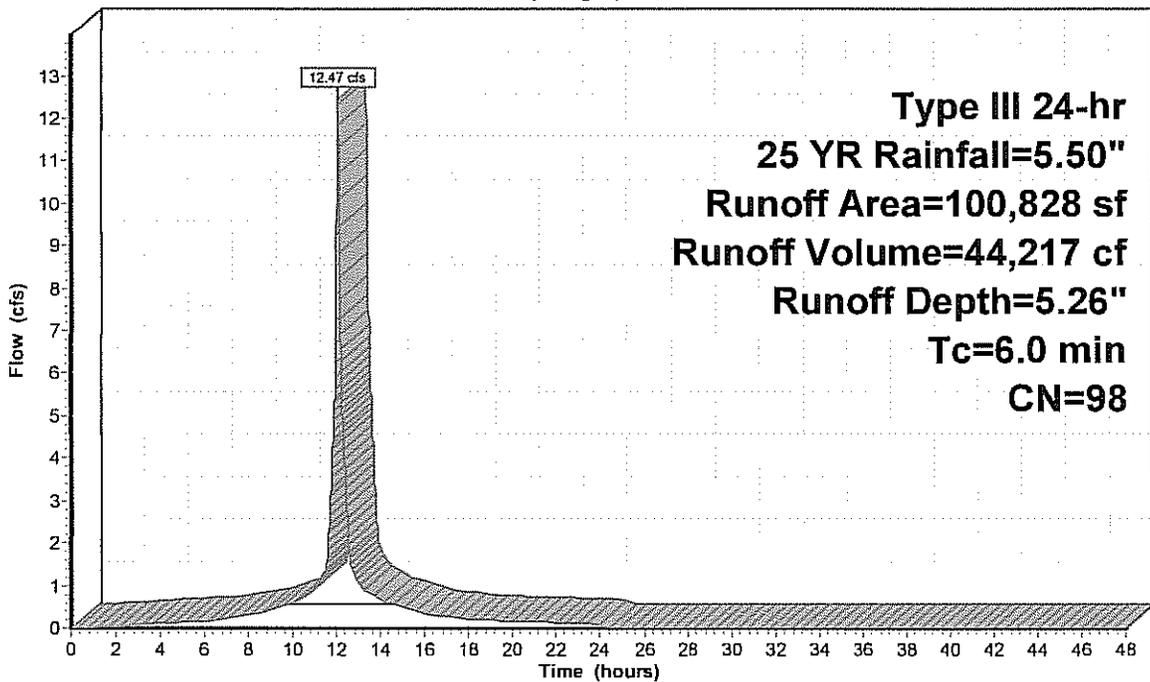
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 25 YR Rainfall=5.50"

Area (sf)	CN	Description
100,828	98	Roofs, HSG C
100,828		100.00% Impervious Area

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

Subcatchment POST-2A: Post Development Area 2A

Hydrograph



Runoff

Summary for Pond 3P: DCB-1

Inflow Area = 56,802 sf, 85.28% Impervious, Inflow Depth = 4.92" for 25 YR event
 Inflow = 6.86 cfs @ 12.08 hrs, Volume= 23,266 cf
 Outflow = 6.86 cfs @ 12.08 hrs, Volume= 23,266 cf, Atten= 0%, Lag= 0.0 min
 Primary = 6.86 cfs @ 12.08 hrs, Volume= 23,266 cf

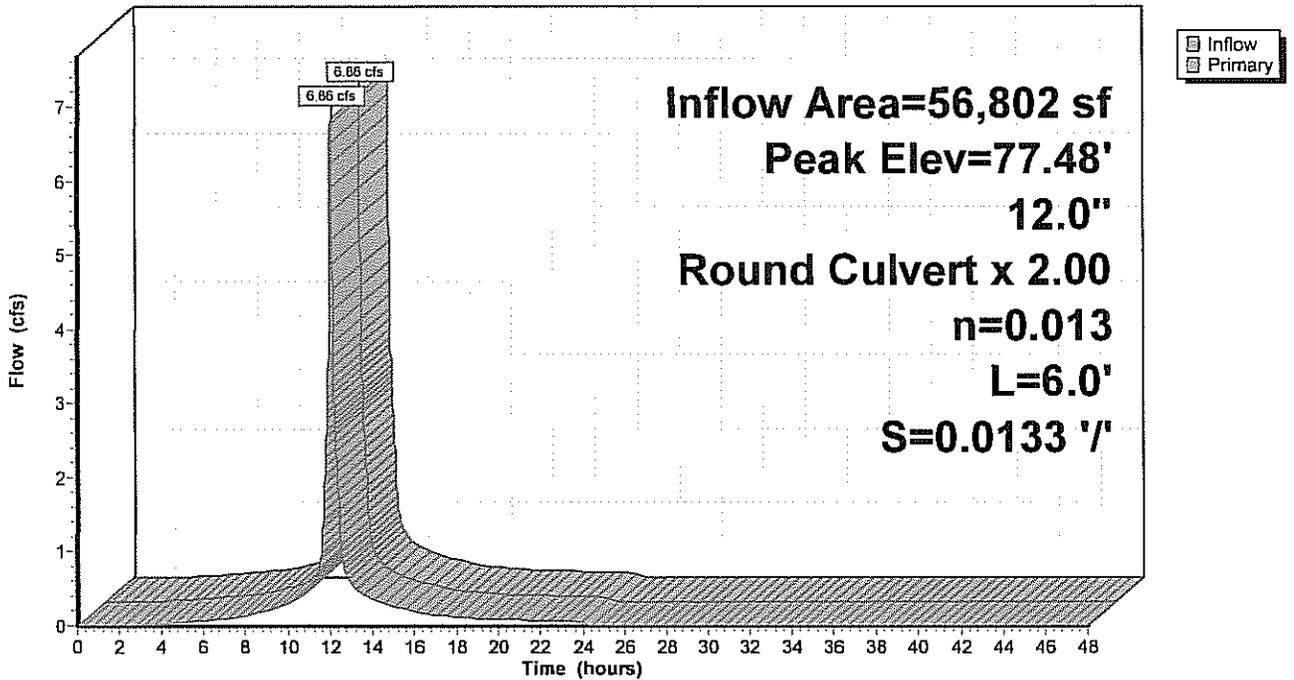
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 77.48' @ 12.11 hrs
 Flood Elev= 78.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	12.0" Round Culvert X 2.00 L= 6.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 76.00' / 75.92' S= 0.0133 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=6.83 cfs @ 12.08 hrs HW=77.42' TW=76.90' (Dynamic Tailwater)
 ↑-1=Culvert (Inlet Controls 6.83 cfs @ 4.35 fps)

Pond 3P: DCB-1

Hydrograph

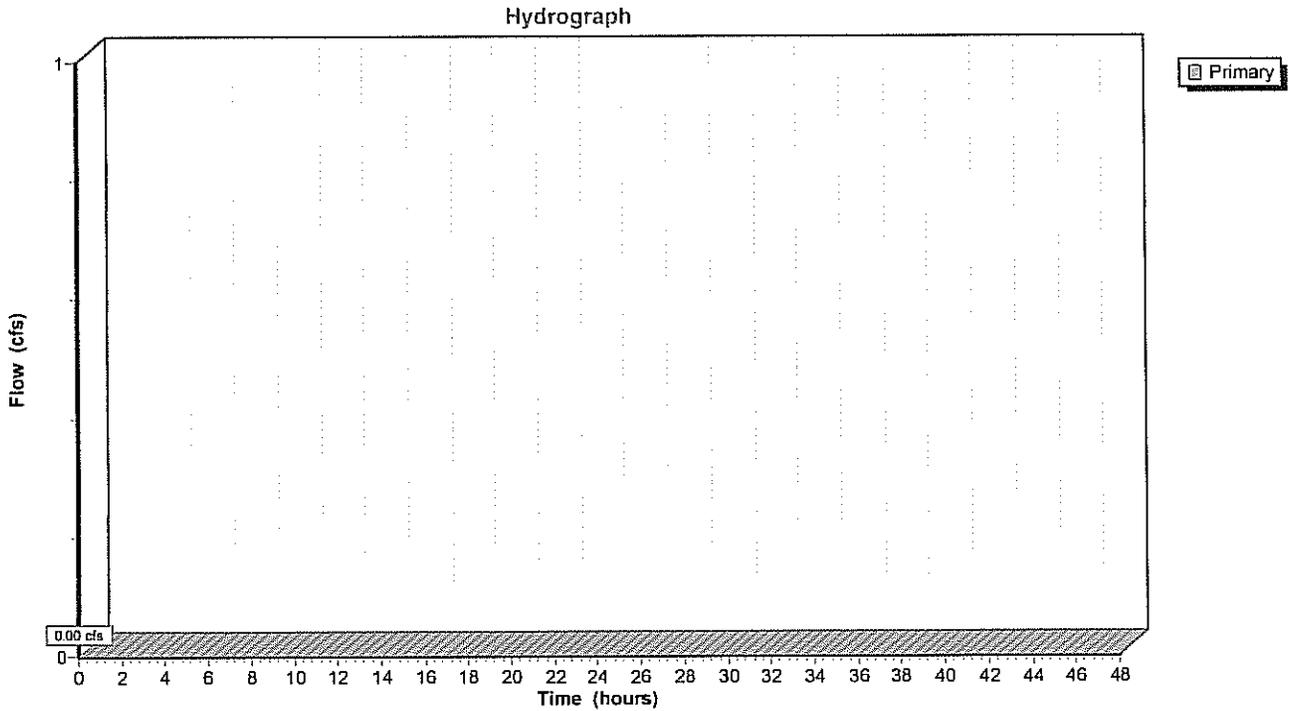


Summary for Pond AP-1: WET-8 (No Flow)

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

Pond AP-1: WET-8 (No Flow)



Summary for Pond AP-2: WET-1

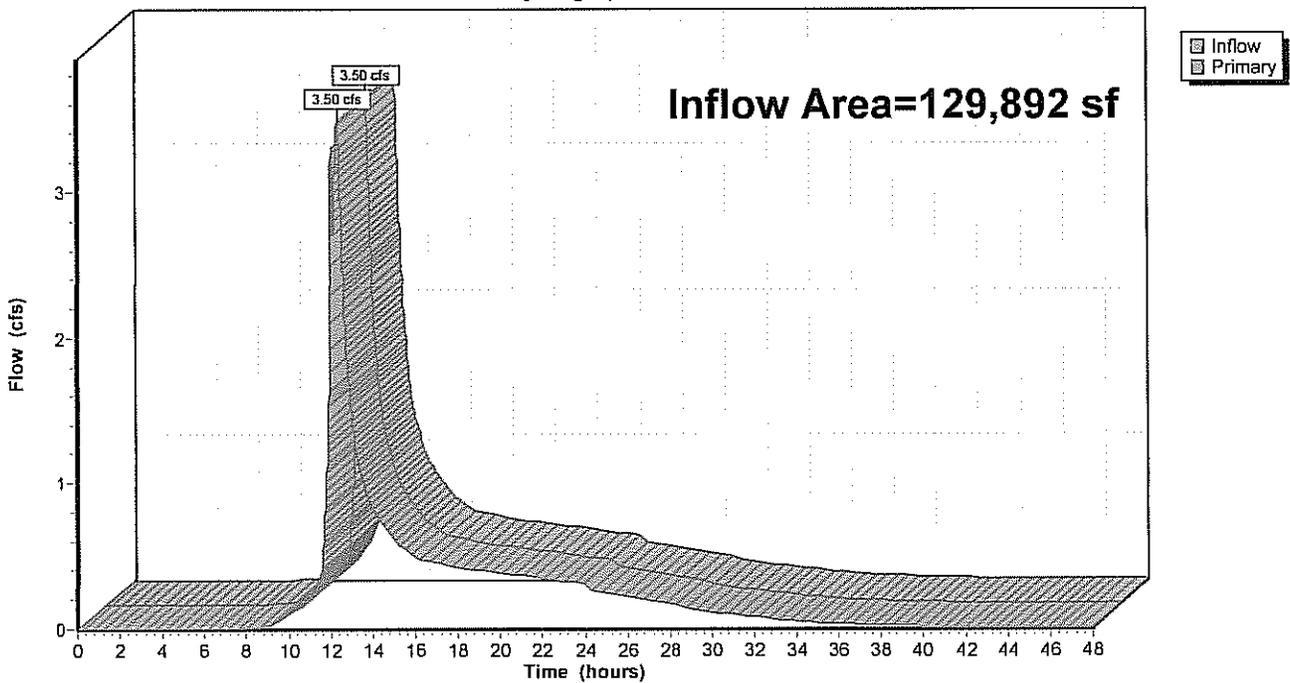
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 129,892 sf, 2.72% Impervious, Inflow Depth > 3.55" for 25 YR event
Inflow = 3.50 cfs @ 12.38 hrs, Volume= 38,378 cf
Primary = 3.50 cfs @ 12.38 hrs, Volume= 38,378 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-2: WET-1

Hydrograph



Summary for Pond AP-3: OFFSITE SWALE

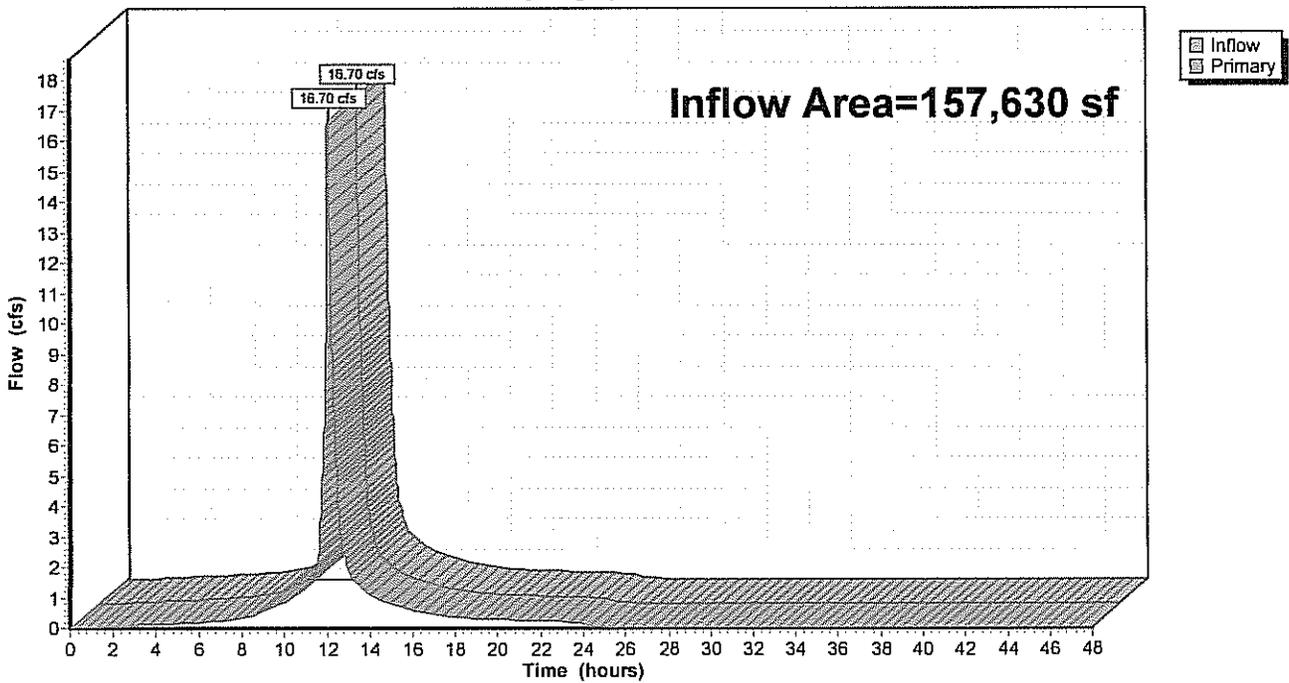
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 157,630 sf, 94.69% Impervious, Inflow Depth = 5.05" for 25 YR event
Inflow = 16.70 cfs @ 12.10 hrs, Volume= 66,375 cf
Primary = 16.70 cfs @ 12.10 hrs, Volume= 66,375 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-3: OFFSITE SWALE

Hydrograph



Summary for Pond AP-4: WET-2

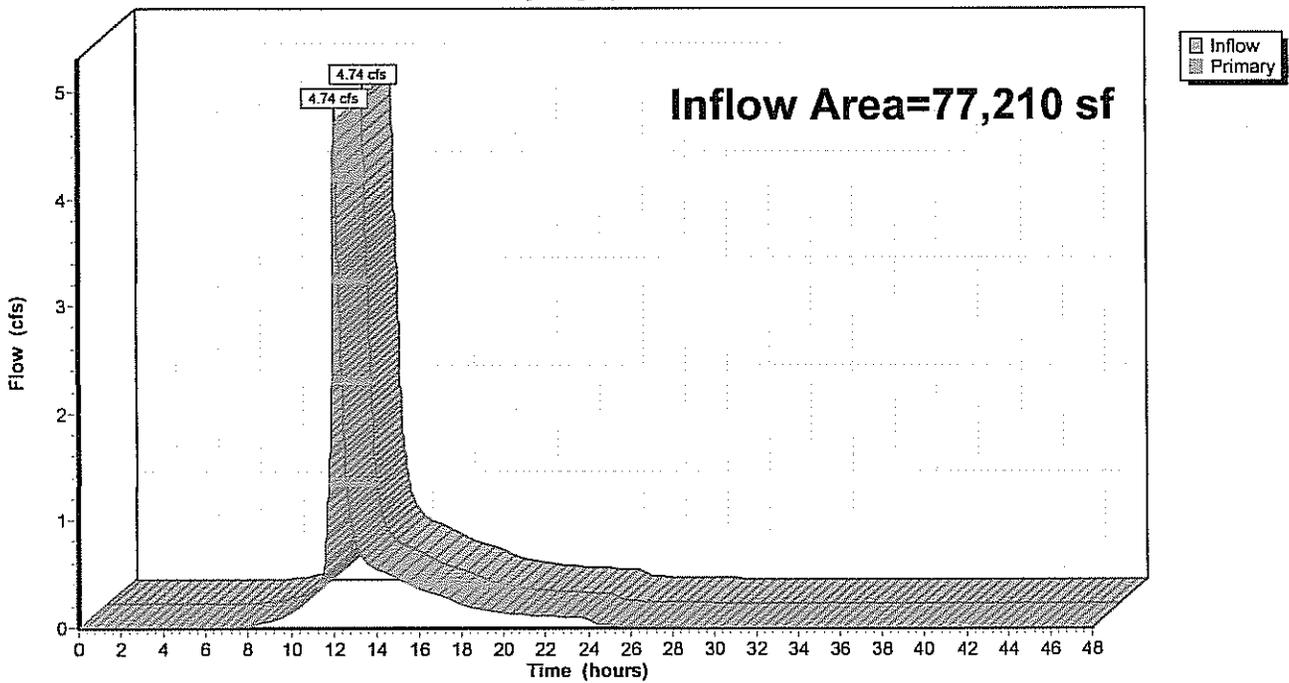
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 77,210 sf, 45.86% Impervious, Inflow Depth > 3.68" for 25 YR event
Inflow = 4.74 cfs @ 12.11 hrs, Volume= 23,670 cf
Primary = 4.74 cfs @ 12.11 hrs, Volume= 23,670 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-4: WET-2

Hydrograph



Summary for Pond AP-5: WET-3

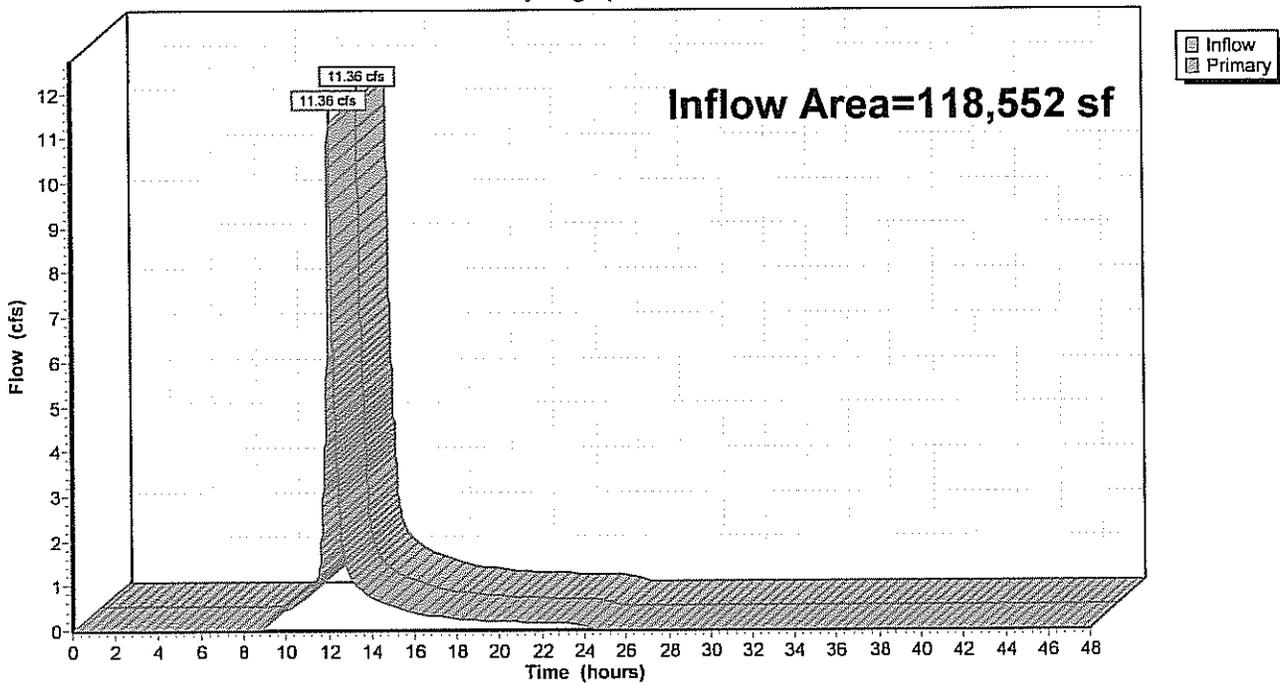
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,552 sf, 62.79% Impervious, Inflow Depth = 3.97" for 25 YR event
Inflow = 11.36 cfs @ 12.12 hrs, Volume= 39,173 cf
Primary = 11.36 cfs @ 12.12 hrs, Volume= 39,173 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-5: WET-3

Hydrograph



Summary for Pond BASIN-1: BioRetention Area 1

Inflow Area = 83,587 sf, 4.22% Impervious, Inflow Depth = 4.25" for 25 YR event
 Inflow = 9.24 cfs @ 12.09 hrs, Volume= 29,620 cf
 Outflow = 2.45 cfs @ 12.45 hrs, Volume= 29,062 cf, Atten= 73%, Lag= 21.7 min
 Primary = 2.45 cfs @ 12.45 hrs, Volume= 29,062 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 79.04' @ 12.45 hrs Surf.Area= 8,873 sf Storage= 14,461 cf
 Flood Elev= 80.00' Surf.Area= 10,755 sf Storage= 23,928 cf

Plug-Flow detention time= 352.6 min calculated for 29,062 cf (98% of inflow)
 Center-of-Mass det. time= 341.0 min (1,132.1 - 791.1)

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	23,928 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	5,397	0	0
78.00	7,048	6,223	6,223
79.00	8,804	7,926	14,149
80.00	10,755	9,780	23,928

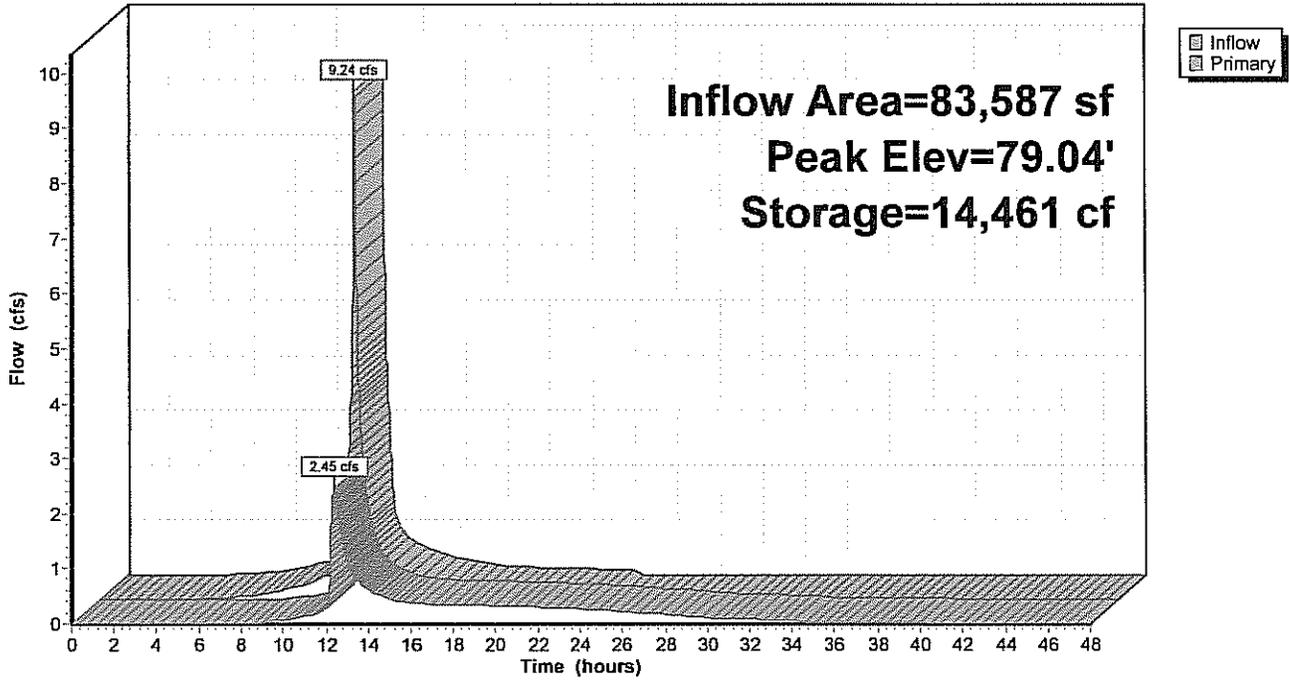
Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	4.0" Round Culvert L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 77.00' / 77.00' S= 0.0000 ' / S= 0.0000 ' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Primary	78.75'	5.0' long x 25.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=2.45 cfs @ 12.45 hrs HW=79.04' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Barrel Controls 0.40 cfs @ 4.63 fps)
- 2=Broad-Crested Rectangular Weir (Weir Controls 2.05 cfs @ 1.44 fps)

Pond BASIN-1: BioRetention Area 1

Hydrograph



Summary for Pond BASIN-2: Subsurface Detention System

Inflow Area = 56,802 sf, 85.28% Impervious, Inflow Depth = 4.92" for 25 YR event
 Inflow = 6.86 cfs @ 12.08 hrs, Volume= 23,266 cf
 Outflow = 5.65 cfs @ 12.17 hrs, Volume= 22,158 cf, Atten= 18%, Lag= 5.4 min
 Primary = 2.55 cfs @ 12.17 hrs, Volume= 12,362 cf
 Secondary = 3.12 cfs @ 12.14 hrs, Volume= 9,796 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 77.06' @ 12.14 hrs Surf.Area= 5,296 sf Storage= 5,257 cf
 Flood Elev= 78.10' Surf.Area= 5,296 sf Storage= 6,011 cf

Plug-Flow detention time= 89.6 min calculated for 22,158 cf (95% of inflow)
 Center-of-Mass det. time= 62.0 min (827.8 - 765.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	75.37'	3,201 cf	68.33'W x 77.50'L x 2.04'H Field A 10,812 cf Overall - 2,811 cf Embedded = 8,001 cf x 40.0% Voids
#2A	75.87'	2,811 cf	Cultec C-100HD x 200 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 20 rows
		6,011 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	75.87'	12.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.42' S= 0.0090 ' / Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	75.87'	18.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.87' S= 0.0000 ' / Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.54 cfs @ 12.17 hrs HW=77.02' TW=76.56' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 2.54 cfs @ 3.53 fps)

Secondary OutFlow Max=3.57 cfs @ 12.14 hrs HW=77.05' TW=76.76' (Dynamic Tailwater)

↑2=Culvert (Barrel Controls 3.57 cfs @ 3.28 fps)

Pond BASIN-2: Subsurface Detention System - Chamber Wizard Field A

Chamber Model = Cultec C-100HD (Cultec Contactor® 100HD)

Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf

Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap

Row Length Adjustment= +0.50' x 1.86 sf x 20 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

10 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 75.50' Row Length +12.0" End Stone x 2 = 77.50' Base Length

20 Rows x 36.0" Wide + 4.0" Spacing x 19 + 12.0" Side Stone x 2 = 68.33' Base Width

6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

200 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 20 Rows = 2,810.9 cf Chamber Storage

10,812.3 cf Field - 2,810.9 cf Chambers = 8,001.5 cf Stone x 40.0% Voids = 3,200.6 cf Stone Storage

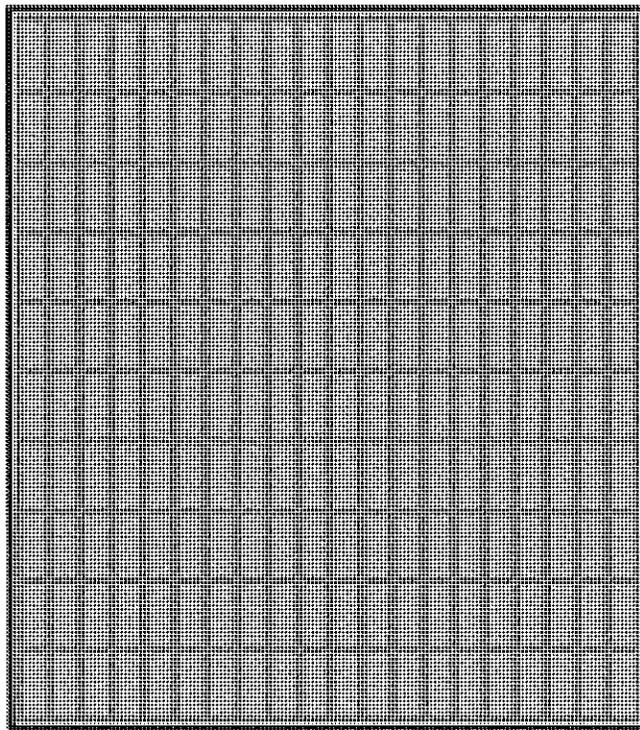
Chamber Storage + Stone Storage = 6,011.4 cf = 0.138 af

Overall Storage Efficiency = 55.6%

200 Chambers

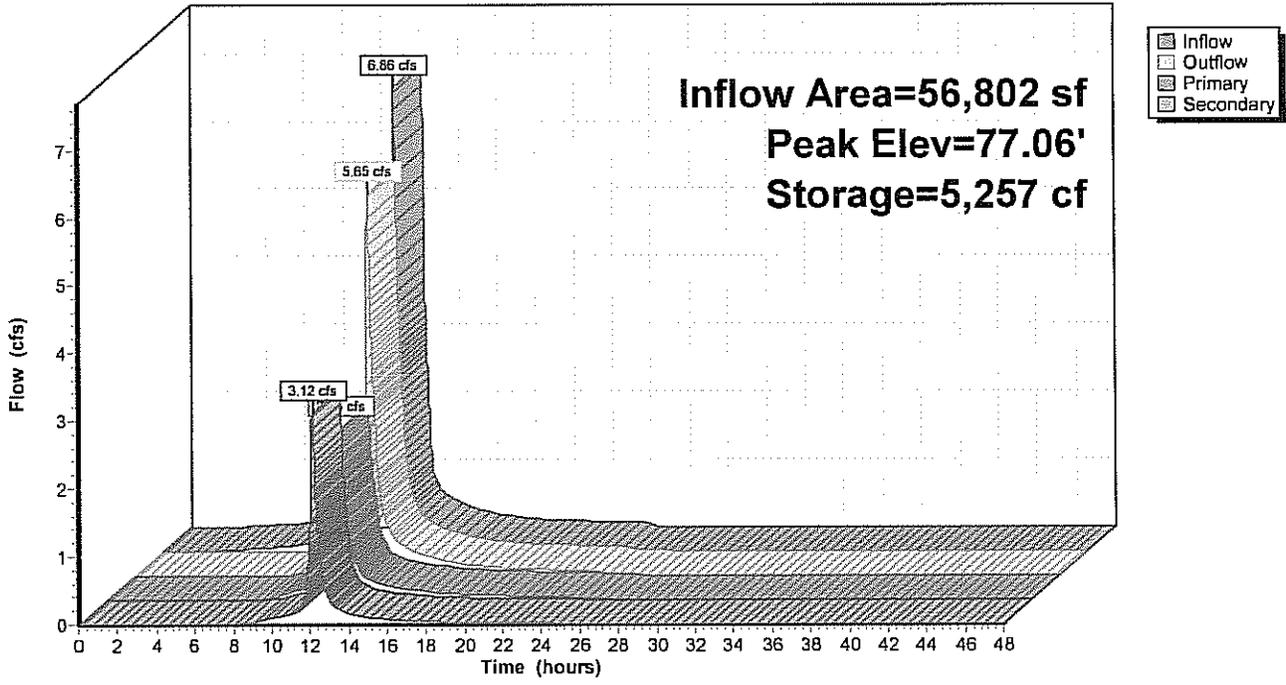
400.5 cy Field

296.4 cy Stone



Pond BASIN-2: Subsurface Detention System

Hydrograph



Summary for Pond BASIN-3: BioRetention Area 3

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 4.25" for 25 YR event
 Inflow = 3.29 cfs @ 12.09 hrs, Volume= 10,537 cf
 Outflow = 1.44 cfs @ 12.27 hrs, Volume= 10,482 cf, Atten= 56%, Lag= 11.2 min
 Primary = 1.44 cfs @ 12.27 hrs, Volume= 10,482 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.89' @ 12.27 hrs Surf.Area= 4,852 sf Storage= 3,770 cf
 Flood Elev= 78.00' Surf.Area= 6,149 sf Storage= 9,892 cf

Plug-Flow detention time= 128.2 min calculated for 10,480 cf (99% of inflow)
 Center-of-Mass det. time= 125.1 min (916.2 - 791.1)

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	9,892 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	3,624	0	0
77.00	5,005	4,315	4,315
78.00	6,149	5,577	9,892

Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	12.0" Round 12" HDPE L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.00' / 74.80' S= 0.0067 ' / Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	76.00'	4.0" Vert. 4" Orifice C= 0.600
#3	Device 1	76.70'	4.0' long x 1.50' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.5' Crest Height

Primary OutFlow Max=1.44 cfs @ 12.27 hrs HW=76.89' TW=0.00' (Dynamic Tailwater)

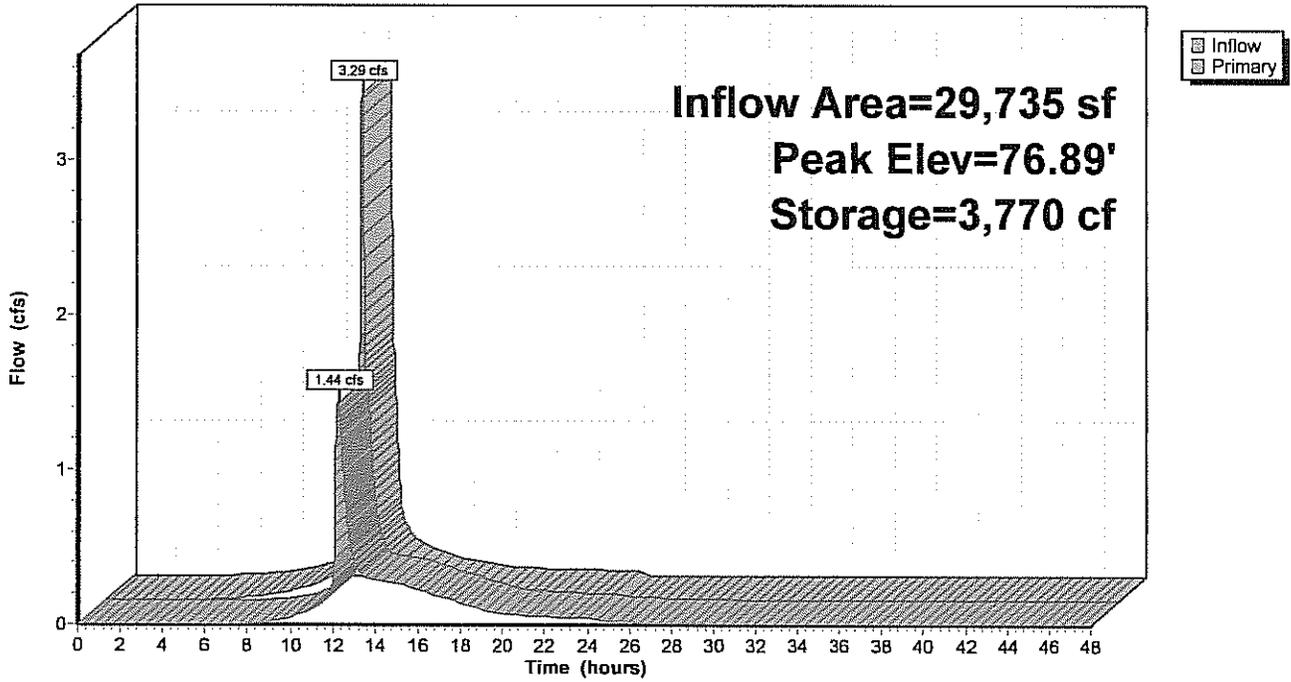
↑ 1=12" HDPE (Passes 1.44 cfs of 4.46 cfs potential flow)

↑ 2=4" Orifice (Orifice Controls 0.36 cfs @ 4.09 fps)

↑ 3=Sharp-Crested Rectangular Weir (Weir Controls 1.09 cfs @ 1.45 fps)

Pond BASIN-3: BioRetention Area 3

Hydrograph



Summary for Pond BASIN-4: BioRetention Area 4

Inflow Area = 83,887 sf, 85.69% Impervious, Inflow Depth = 4.92" for 25 YR event
 Inflow = 10.13 cfs @ 12.08 hrs, Volume= 34,360 cf
 Outflow = 9.09 cfs @ 12.12 hrs, Volume= 31,693 cf, Atten= 10%, Lag= 2.4 min
 Primary = 9.09 cfs @ 12.12 hrs, Volume= 31,693 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 78.24' @ 12.12 hrs Surf.Area= 4,971 sf Storage= 4,967 cf
 Flood Elev= 79.00' Surf.Area= 5,813 sf Storage= 9,041 cf

Plug-Flow detention time= 78.7 min calculated for 31,686 cf (92% of inflow)
 Center-of-Mass det. time= 38.0 min (803.7 - 765.8)

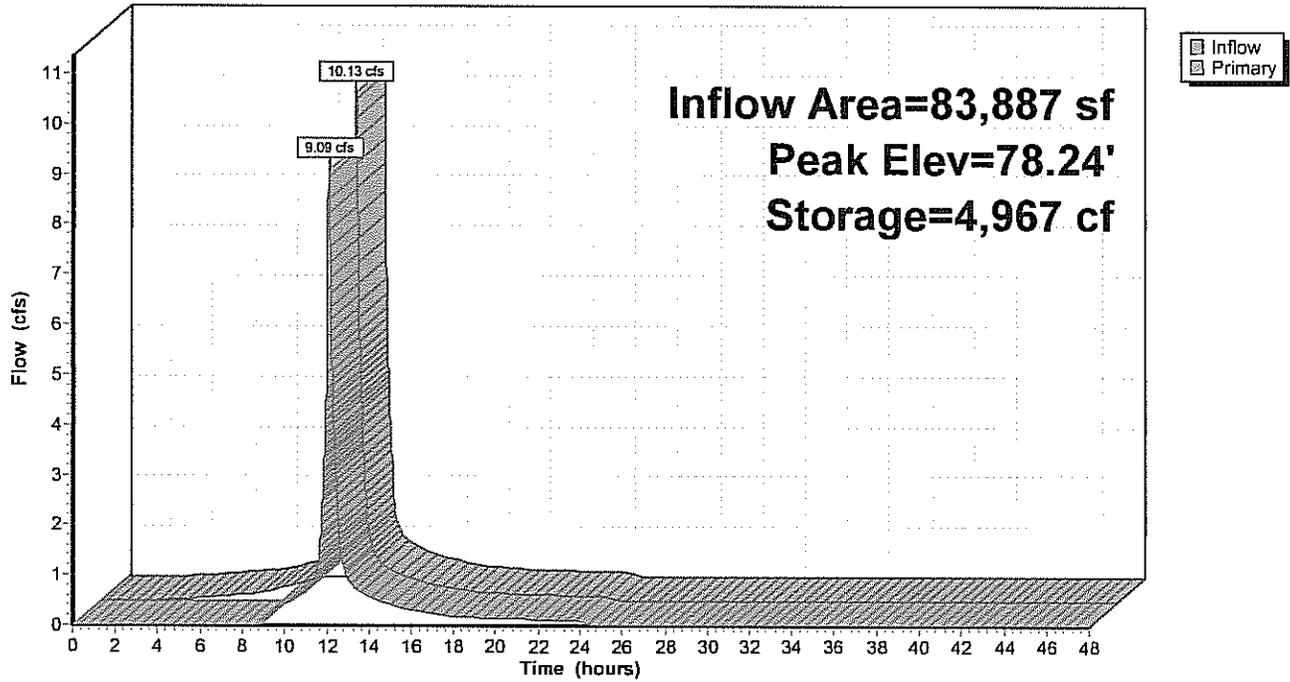
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	9,041 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	2,871	0	0
78.00	4,699	3,785	3,785
79.00	5,813	5,256	9,041

Device	Routing	Invert	Outlet Devices
#1	Primary	77.75'	10.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=9.08 cfs @ 12.12 hrs HW=78.24' TW=0.00' (Dynamic Tailwater)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 9.08 cfs @ 1.84 fps)

Pond BASIN-4: BioRetention Area 4

Hydrograph



Summary for Pond DMH-1: DMH-1

Inflow Area = 157,630 sf, 94.69% Impervious, Inflow Depth = 4.31" for 25 YR event
 Inflow = 13.91 cfs @ 12.10 hrs, Volume= 56,579 cf
 Outflow = 13.91 cfs @ 12.10 hrs, Volume= 56,579 cf, Atten= 0%, Lag= 0.0 min
 Primary = 13.91 cfs @ 12.10 hrs, Volume= 56,579 cf

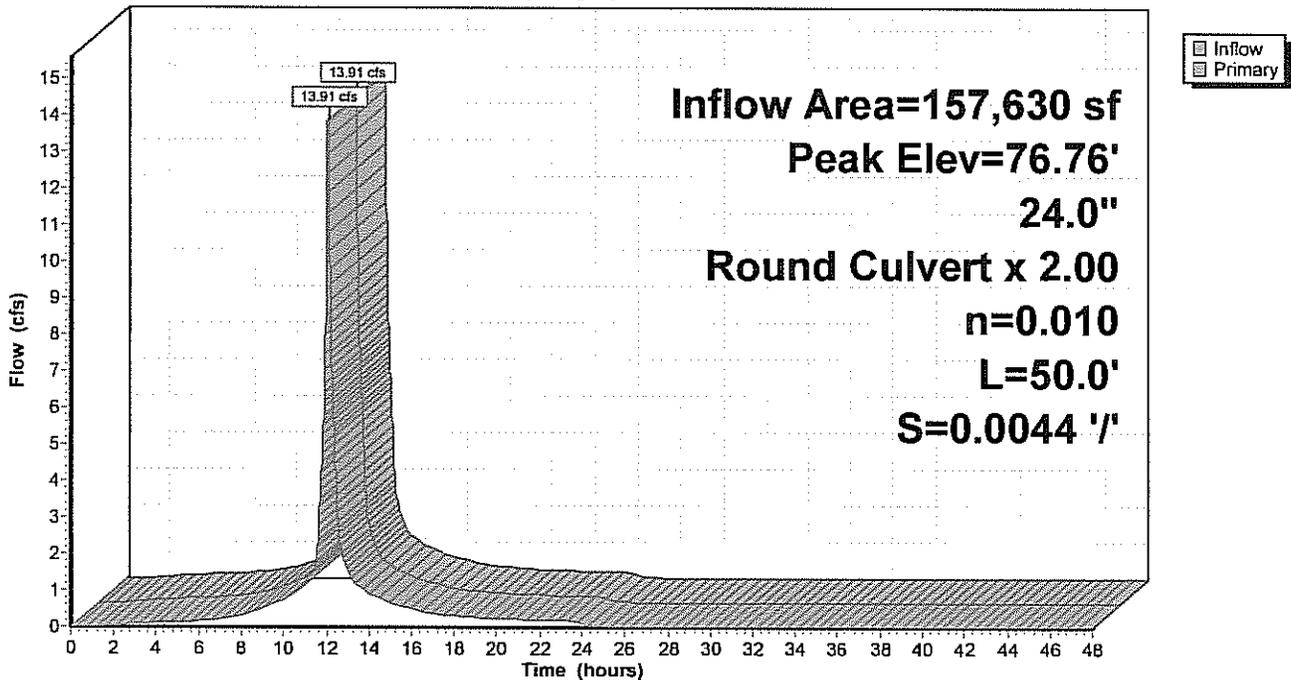
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.76' @ 12.10 hrs
 Flood Elev= 79.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	75.42'	24.0" Round Culvert X 2.00 L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.42' / 75.20' S= 0.0044 '/ Cc= 0.900 n= 0.010 Cast iron, coated, Flow Area= 3.14 sf

Primary OutFlow Max=13.89 cfs @ 12.10 hrs HW=76.76' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 13.89 cfs @ 4.38 fps)

Pond DMH-1: DMH-1

Hydrograph



Summary for Pond DMH-2: DMH-2

Inflow = 3.12 cfs @ 12.14 hrs, Volume= 9,796 cf
 Outflow = 3.12 cfs @ 12.14 hrs, Volume= 9,796 cf, Atten= 0%, Lag= 0.0 min
 Primary = 3.12 cfs @ 12.14 hrs, Volume= 9,796 cf

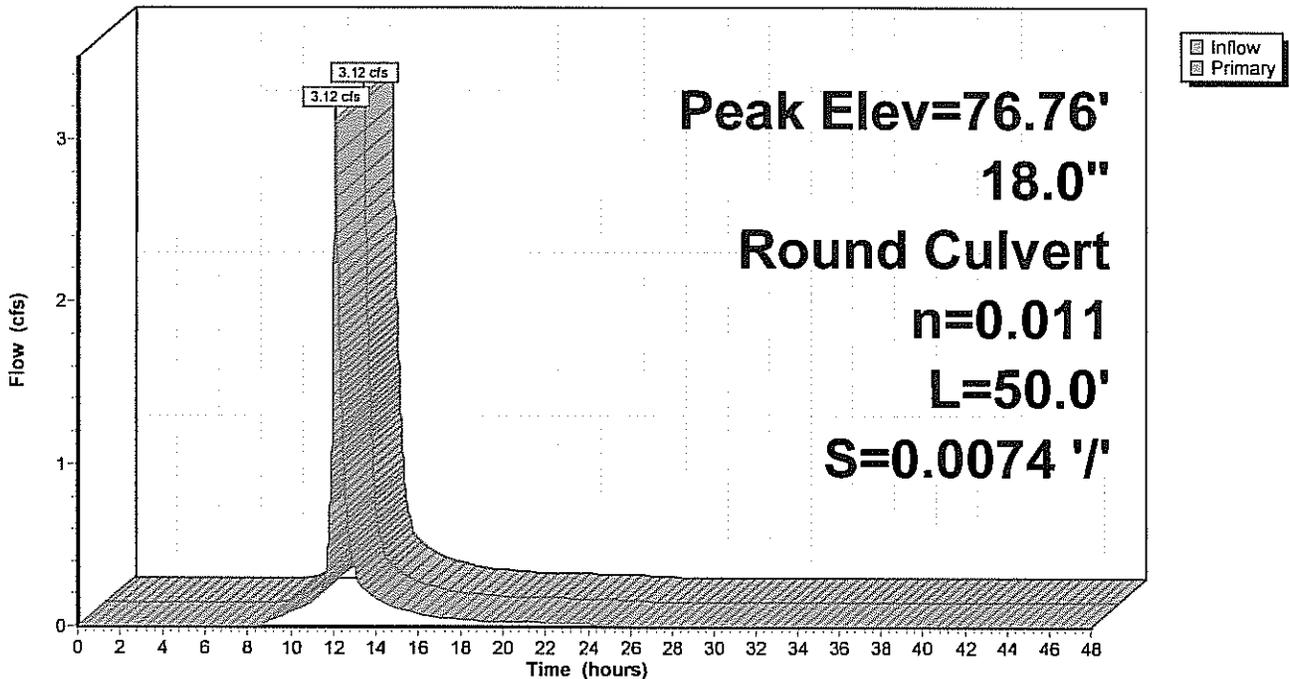
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.76' @ 12.14 hrs
 Flood Elev= 79.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	75.87'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.50' S= 0.0074 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=3.12 cfs @ 12.14 hrs HW=76.76' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 3.12 cfs @ 4.13 fps)

Pond DMH-2: DMH-2

Hydrograph



Summary for Pond DMH-3:

Inflow Area = 100,828 sf, 100.00% Impervious, Inflow Depth = 5.26" for 25 YR event
 Inflow = 12.47 cfs @ 12.08 hrs, Volume= 44,217 cf
 Outflow = 12.47 cfs @ 12.08 hrs, Volume= 44,217 cf, Atten= 0%, Lag= 0.0 min
 Primary = 12.47 cfs @ 12.08 hrs, Volume= 44,217 cf

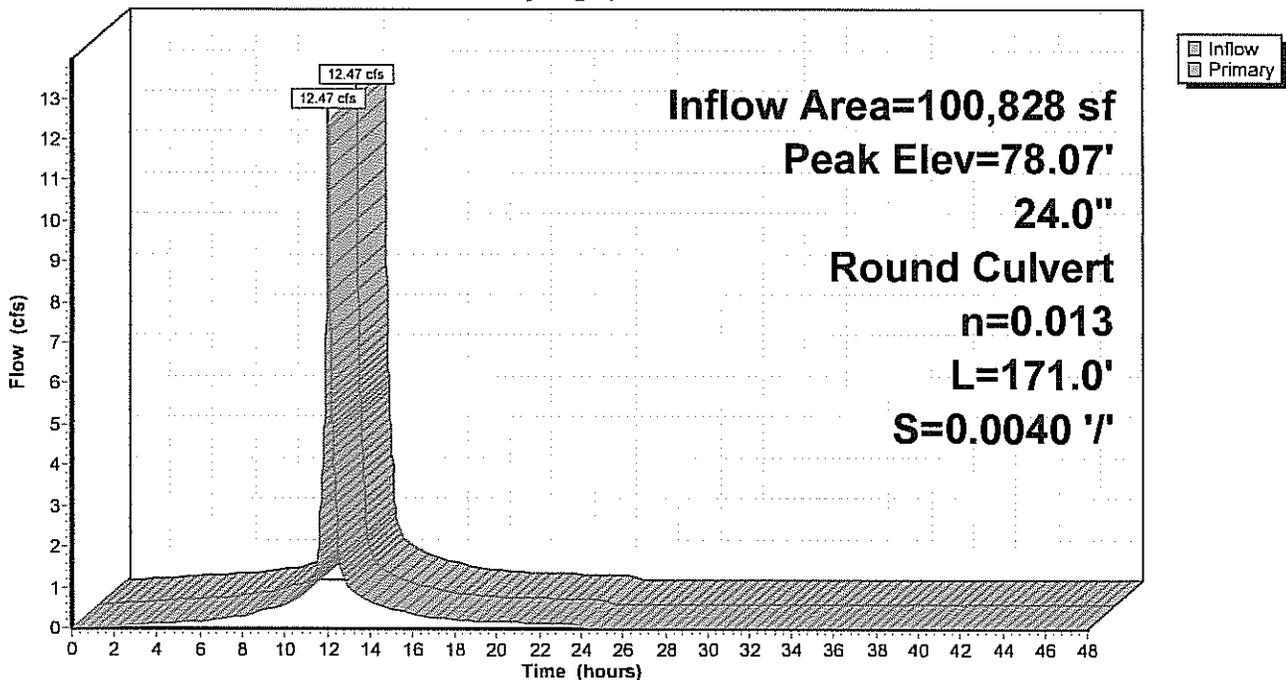
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 78.07' @ 12.08 hrs
 Flood Elev= 79.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.14'	24.0" Round Culvert L= 171.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 76.14' / 75.45' S= 0.0040 ' / Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=12.45 cfs @ 12.08 hrs HW=78.07' TW=76.75' (Dynamic Tailwater)
 ↑ 1=Culvert (Barrel Controls 12.45 cfs @ 5.12 fps)

Pond DMH-3:

Hydrograph



Time span=0.00-48.00 hrs, dt=0.01 hrs, 4801 points x 4
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
 Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment POST 1: Post Development Runoff Area=83,587 sf 4.22% Impervious Runoff Depth=5.71"
 Tc=6.0 min CN=89 Runoff=12.20 cfs 39,760 cf

Subcatchment POST 1A: Post Development Runoff Area=46,305 sf 0.00% Impervious Runoff Depth=3.62"
 Tc=6.0 min CN=70 Runoff=4.51 cfs 13,962 cf

Subcatchment POST 2: Post Development Runoff Area=56,802 sf 85.28% Impervious Runoff Depth=6.41"
 Tc=6.0 min CN=95 Runoff=8.82 cfs 30,322 cf

Subcatchment POST 3: Post Development Runoff Area=29,735 sf 63.13% Impervious Runoff Depth=5.71"
 Tc=6.0 min CN=89 Runoff=4.34 cfs 14,144 cf

Subcatchment POST 3A: Post Runoff Area=47,475 sf 35.05% Impervious Runoff Depth=4.69"
 Tc=6.0 min CN=80 Runoff=5.94 cfs 18,572 cf

Subcatchment POST 4: Post Development Runoff Area=83,887 sf 85.69% Impervious Runoff Depth=6.41"
 Tc=6.0 min CN=95 Runoff=13.02 cfs 44,780 cf

Subcatchment POST 4A: Post Development Runoff Area=34,665 sf 7.35% Impervious Runoff Depth=3.83"
 Tc=6.0 min CN=72 Runoff=3.57 cfs 11,061 cf

Subcatchment POST-2A: Post Runoff Area=100,828 sf 100.00% Impervious Runoff Depth=6.76"
 Tc=6.0 min CN=98 Runoff=15.90 cfs 56,807 cf

Pond 3P: DCB-1 Peak Elev=78.11' Inflow=8.82 cfs 30,322 cf
 12.0" Round Culvert x 2.00 n=0.013 L=6.0' S=0.0133 '/' Outflow=8.82 cfs 30,322 cf

Pond AP-1: WET-8 (No Flow) Primary=0.00 cfs 0 cf

Pond AP-2: WET-1 Inflow=7.91 cfs 53,142 cf
 Primary=7.91 cfs 53,142 cf

Pond AP-3: OFFSITE SWALE Inflow=21.75 cfs 86,020 cf
 Primary=21.75 cfs 86,020 cf

Pond AP-4: WET-2 Inflow=7.82 cfs 32,661 cf
 Primary=7.82 cfs 32,661 cf

Pond AP-5: WET-3 Inflow=15.25 cfs 53,174 cf
 Primary=15.25 cfs 53,174 cf

Pond BASIN-1: BioRetention Area 1 Peak Elev=79.26' Storage=16,545 cf Inflow=12.20 cfs 39,760 cf
 Outflow=5.41 cfs 39,179 cf

Pond BASIN-2: Subsurface Detention Peak Elev=77.37' Storage=5,917 cf Inflow=8.82 cfs 30,322 cf
 Primary=2.95 cfs 15,734 cf Secondary=4.41 cfs 13,479 cf Outflow=7.25 cfs 29,213 cf

1998-POST-WS-REV 3

Type III 24-hr 100 YR Rainfall=7.00"

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Pond BASIN-3: BioRetention Area 3 Peak Elev=77.01' Storage=4,355 cf Inflow=4.34 cfs 14,144 cf
Outflow=2.64 cfs 14,089 cf

Pond BASIN-4: BioRetention Area 4 Peak Elev=78.33' Storage=5,397 cf Inflow=13.02 cfs 44,780 cf
Outflow=11.86 cfs 42,112 cf

Pond DMH-1: DMH-1 Peak Elev=76.98' Inflow=17.75 cfs 72,541 cf
24.0" Round Culvert x 2.00 n=0.010 L=50.0' S=0.0044 '/ Outflow=17.75 cfs 72,541 cf

Pond DMH-2: DMH-2 Peak Elev=76.97' Inflow=4.41 cfs 13,479 cf
18.0" Round Culvert n=0.011 L=50.0' S=0.0074 '/ Outflow=4.41 cfs 13,479 cf

Pond DMH-3: Peak Elev=78.52' Inflow=15.90 cfs 56,807 cf
24.0" Round Culvert n=0.013 L=171.0' S=0.0040 '/ Outflow=15.90 cfs 56,807 cf

Total Runoff Area = 483,284 sf Runoff Volume = 229,409 cf Average Runoff Depth = 5.70"
45.65% Pervious = 220,643 sf 54.35% Impervious = 262,641 sf

Summary for Subcatchment POST 1: Post Development Area 1

Runoff = 12.20 cfs @ 12.08 hrs, Volume= 39,760 cf, Depth= 5.71"

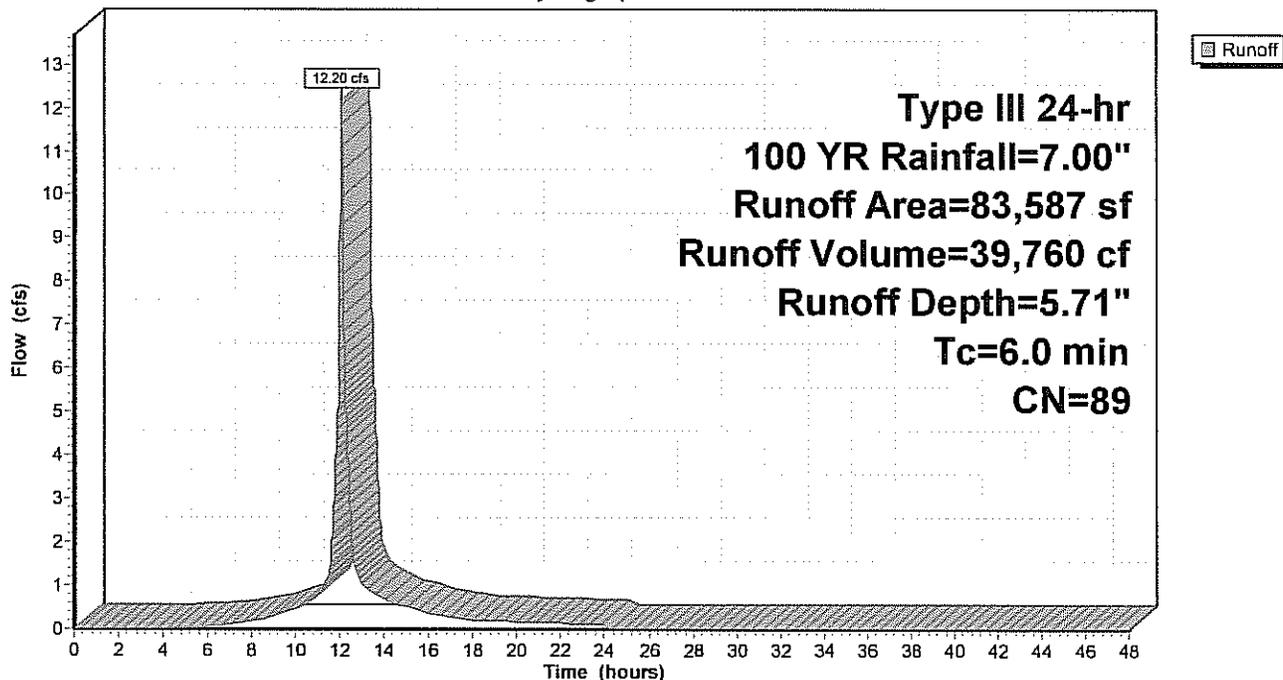
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
51,749	96	Gravel surface, HSG C
3,528	98	Paved parking, HSG C
28,310	74	>75% Grass cover, Good, HSG C
83,587	89	Weighted Average
80,059		95.78% Pervious Area
3,528		4.22% Impervious Area

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

Subcatchment POST 1: Post Development Area 1

Hydrograph



Summary for Subcatchment POST 1A: Post Development Area 1A

Runoff = 4.51 cfs @ 12.09 hrs, Volume= 13,962 cf, Depth= 3.62"

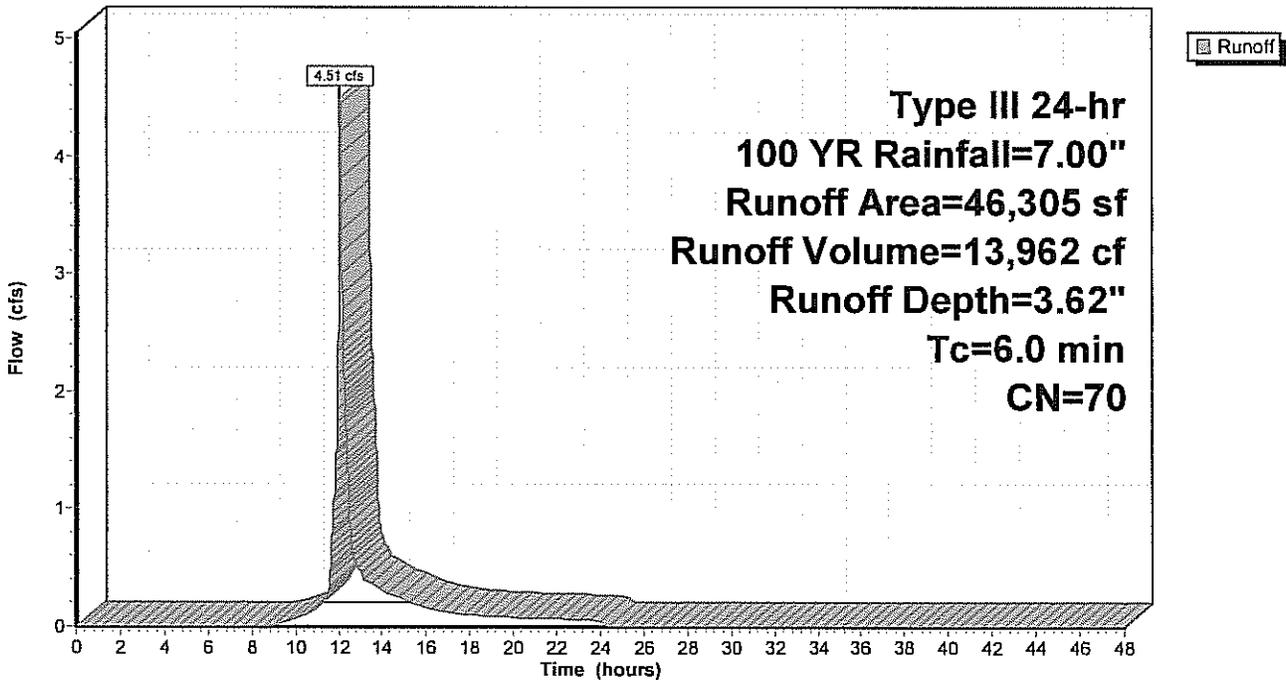
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
942	89	Gravel roads, HSG C
45,363	70	Woods, Good, HSG C
46,305	70	Weighted Average
46,305		100.00% Pervious Area

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

Subcatchment POST 1A: Post Development Area 1A

Hydrograph



Summary for Subcatchment POST 2: Post Development Area 2

Runoff = 8.82 cfs @ 12.08 hrs, Volume= 30,322 cf, Depth= 6.41"

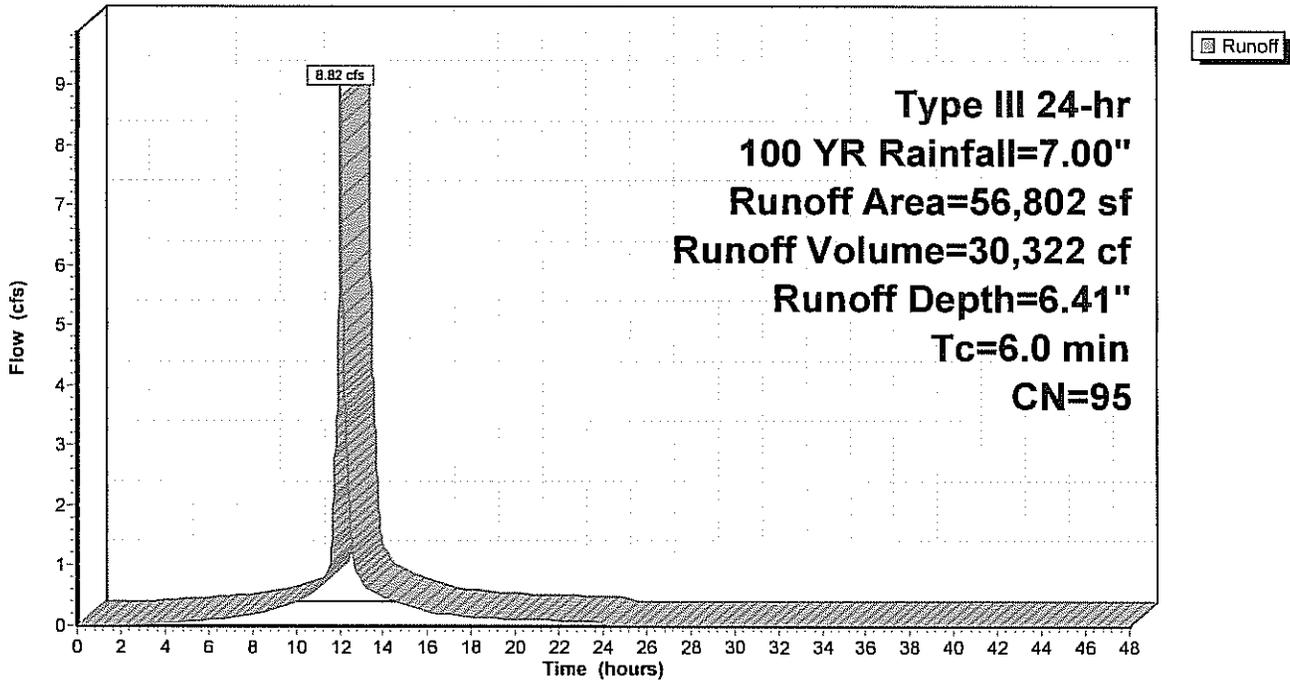
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
48,439	98	Paved parking, HSG C
2,831	89	Gravel roads, HSG C
5,532	74	>75% Grass cover, Good, HSG C
56,802	95	Weighted Average
8,363		14.72% Pervious Area
48,439		85.28% Impervious Area

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

Subcatchment POST 2: Post Development Area 2

Hydrograph



Summary for Subcatchment POST 3: Post Development Area 3

Runoff = 4.34 cfs @ 12.08 hrs, Volume= 14,144 cf, Depth= 5.71"

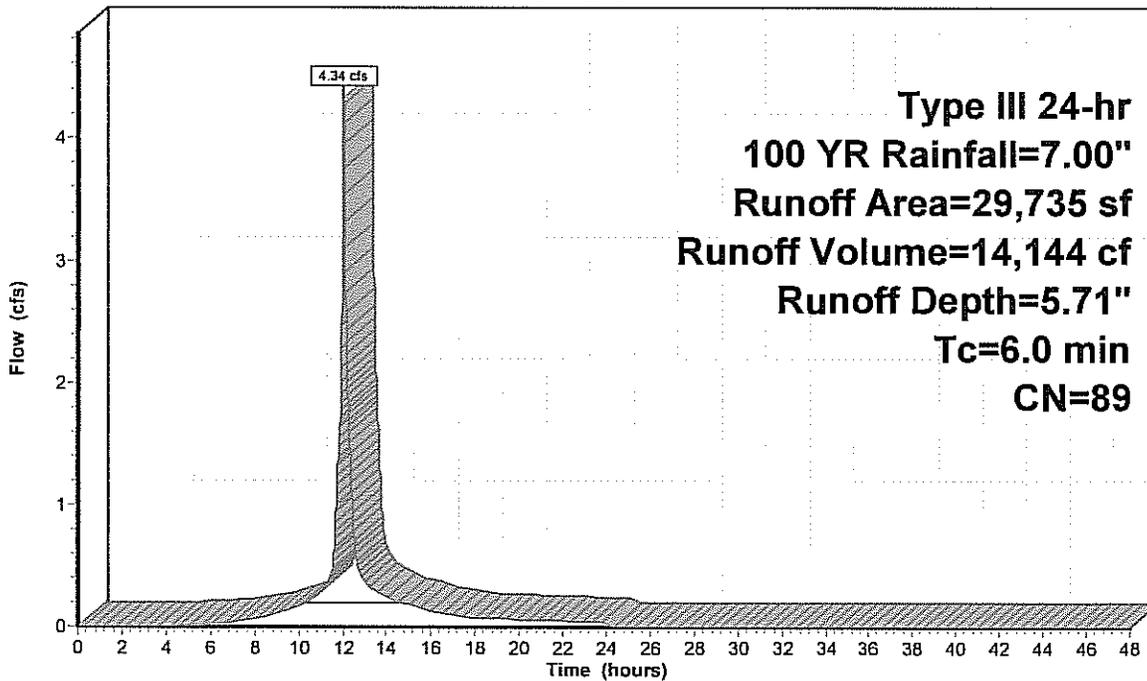
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
18,773	98	Paved parking, HSG C
10,962	74	>75% Grass cover, Good, HSG C
29,735	89	Weighted Average
10,962		36.87% Pervious Area
18,773		63.13% Impervious Area

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

Subcatchment POST 3: Post Development Area 3

Hydrograph



Runoff

**Type III 24-hr
 100 YR Rainfall=7.00"
 Runoff Area=29,735 sf
 Runoff Volume=14,144 cf
 Runoff Depth=5.71"
 Tc=6.0 min
 CN=89**

Summary for Subcatchment POST 3A: Post Development Area 3A

Runoff = 5.94 cfs @ 12.09 hrs, Volume= 18,572 cf, Depth= 4.69"

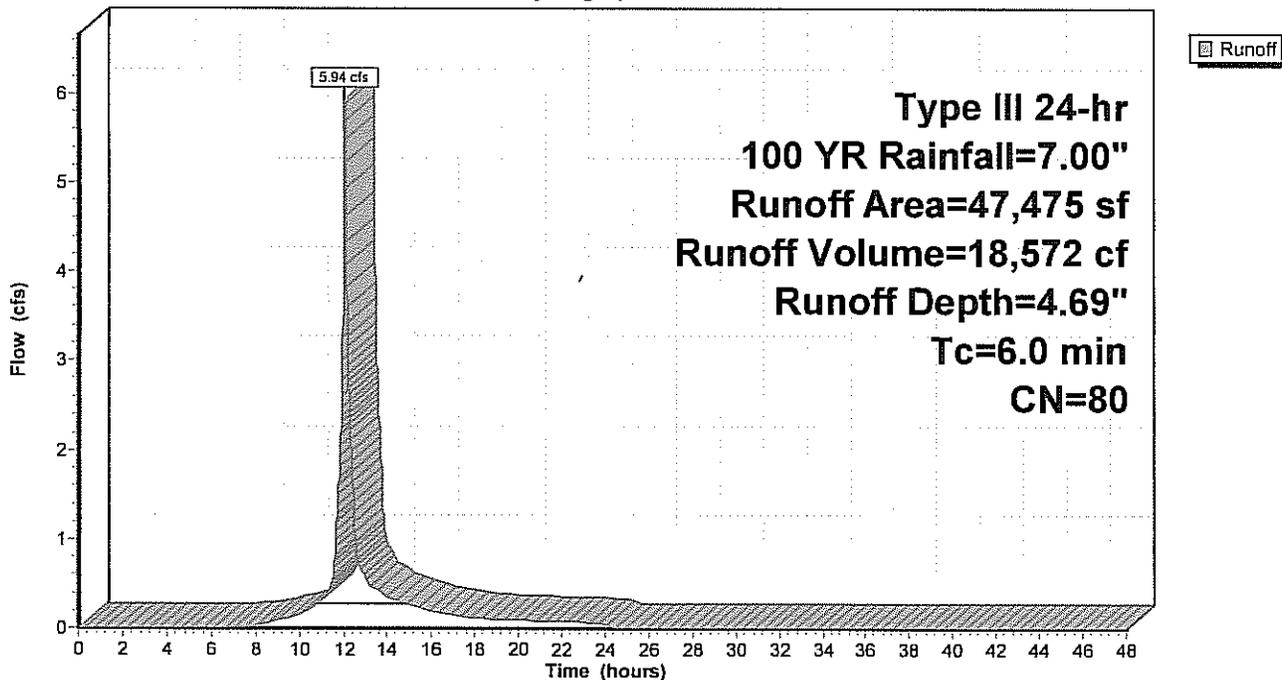
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
14,950	98	Roofs, HSG C
1,689	98	Paved parking, HSG C
30,836	70	Woods, Good, HSG C
47,475	80	Weighted Average
30,836		64.95% Pervious Area
16,639		35.05% Impervious Area

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

Subcatchment POST 3A: Post Development Area 3A

Hydrograph



Summary for Subcatchment POST 4: Post Development Area 4

Runoff = 13.02 cfs @ 12.08 hrs, Volume= 44,780 cf, Depth= 6.41"

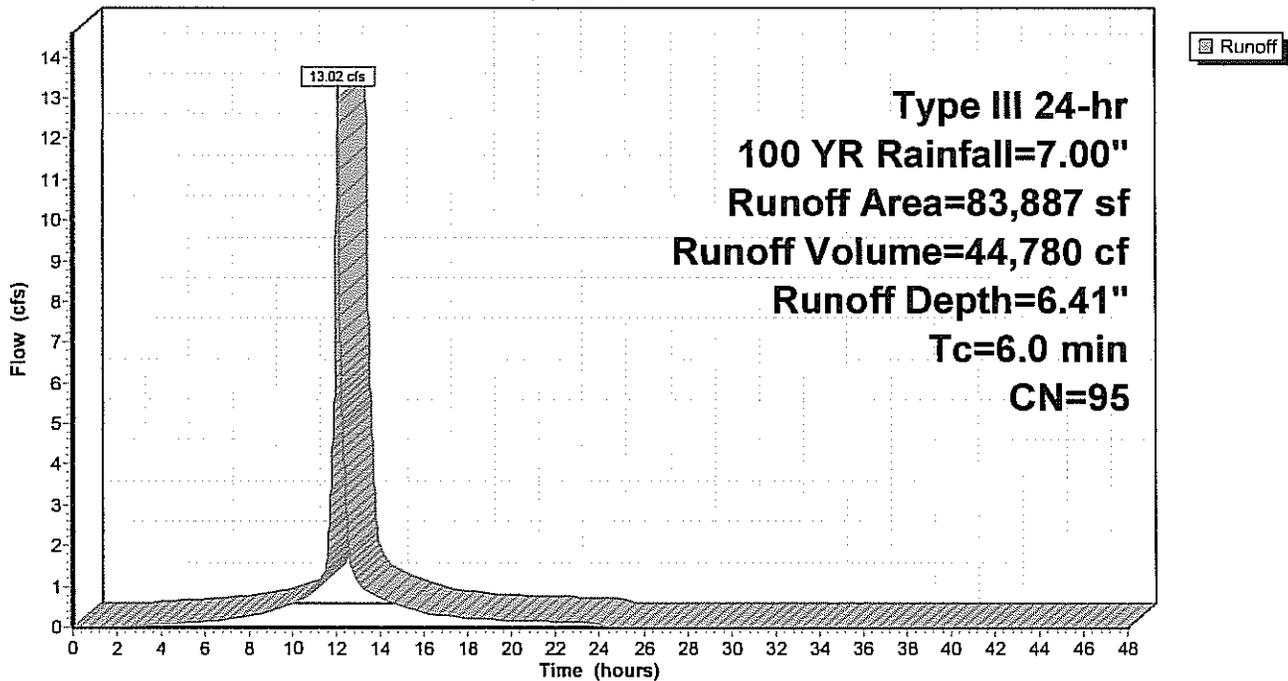
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
71,885	98	Paved parking, HSG C
12,002	74	>75% Grass cover, Good, HSG C
83,887	95	Weighted Average
12,002		14.31% Pervious Area
71,885		85.69% Impervious Area

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

Subcatchment POST 4: Post Development Area 4

Hydrograph



Summary for Subcatchment POST 4A: Post Development Area 4A

Runoff = 3.57 cfs @ 12.09 hrs, Volume= 11,061 cf, Depth= 3.83"

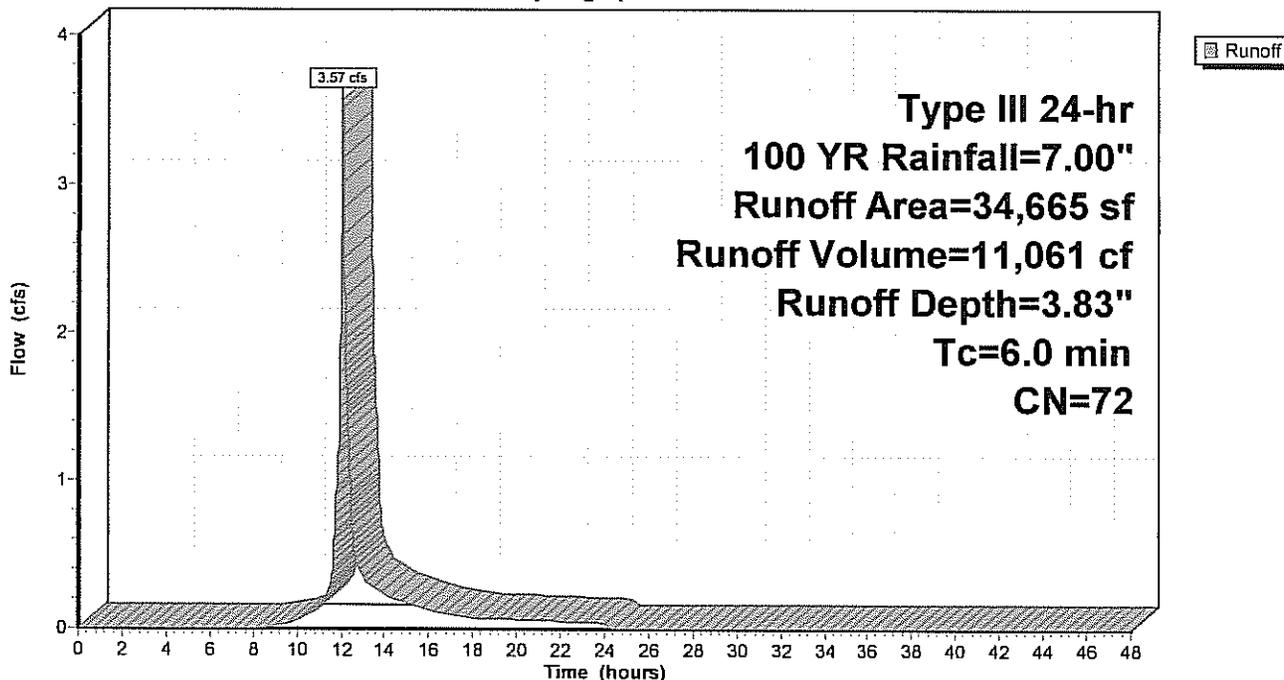
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
32,116	70	Woods, Good, HSG C
2,549	98	Paved parking, HSG C
34,665	72	Weighted Average
32,116		92.65% Pervious Area
2,549		7.35% Impervious Area

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

Subcatchment POST 4A: Post Development Area 4A

Hydrograph



Summary for Subcatchment POST-2A: Post Development Area 2A

Runoff = 15.90 cfs @ 12.08 hrs, Volume= 56,807 cf, Depth= 6.76"

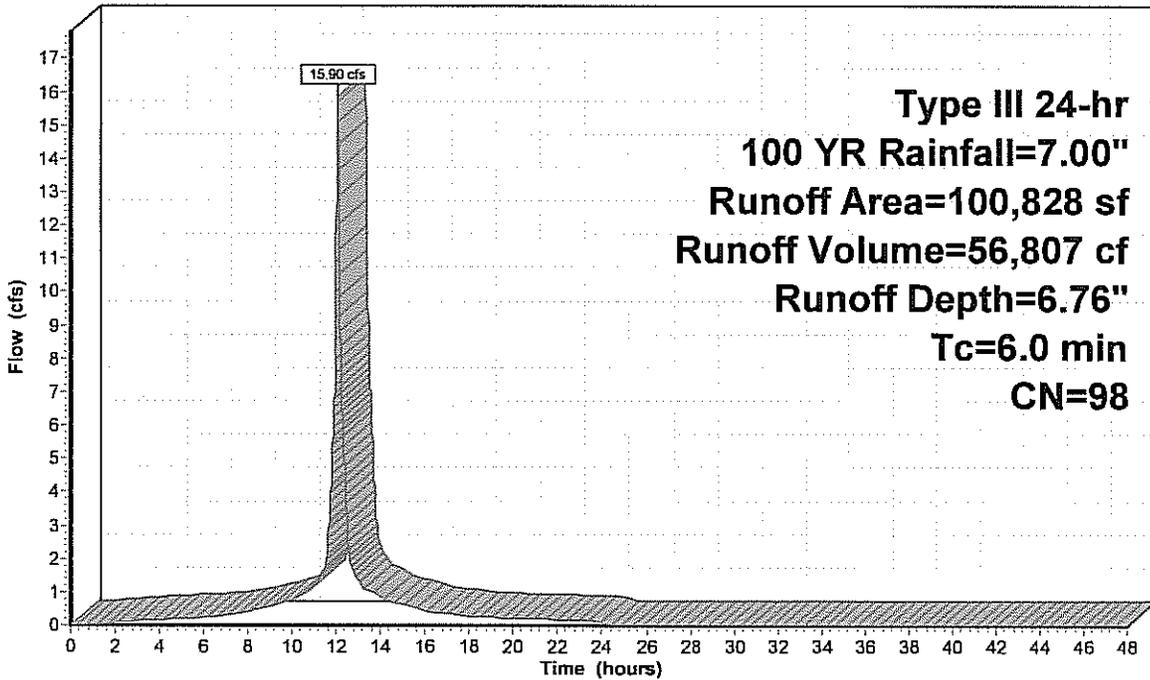
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs
 Type III 24-hr 100 YR Rainfall=7.00"

Area (sf)	CN	Description
100,828	98	Roofs, HSG C
100,828		100.00% Impervious Area

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

Subcatchment POST-2A: Post Development Area 2A

Hydrograph



Runoff

**Type III 24-hr
 100 YR Rainfall=7.00"
 Runoff Area=100,828 sf
 Runoff Volume=56,807 cf
 Runoff Depth=6.76"
 Tc=6.0 min
 CN=98**

Summary for Pond 3P: DCB-1

Inflow Area = 56,802 sf, 85.28% Impervious, Inflow Depth = 6.41" for 100 YR event
 Inflow = 8.82 cfs @ 12.08 hrs, Volume= 30,322 cf
 Outflow = 8.82 cfs @ 12.08 hrs, Volume= 30,322 cf, Atten= 0%, Lag= 0.0 min
 Primary = 8.82 cfs @ 12.08 hrs, Volume= 30,322 cf

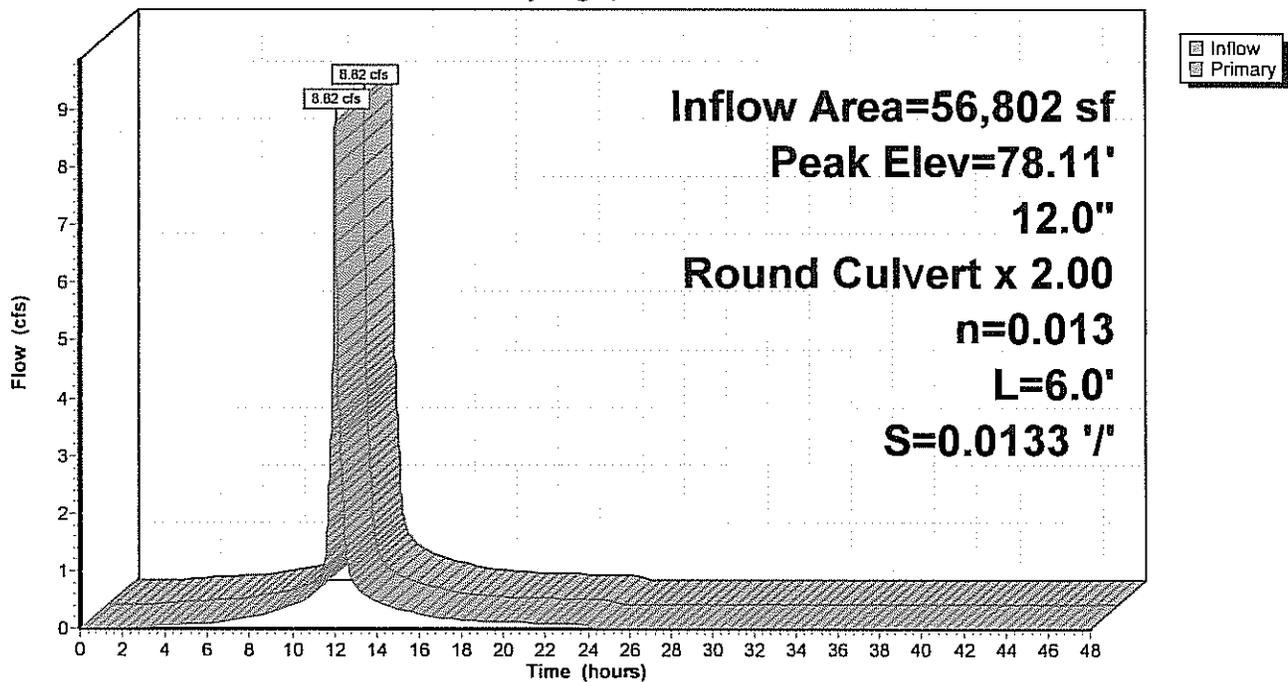
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 78.11' @ 12.10 hrs
 Flood Elev= 78.40'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.00'	12.0" Round Culvert X 2.00 L= 6.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 76.00' / 75.92' S= 0.0133 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 0.79 sf

Primary OutFlow Max=8.78 cfs @ 12.08 hrs HW=78.06' TW=77.20' (Dynamic Tailwater)
 ←1=Culvert (Inlet Controls 8.78 cfs @ 5.59 fps)

Pond 3P: DCB-1

Hydrograph

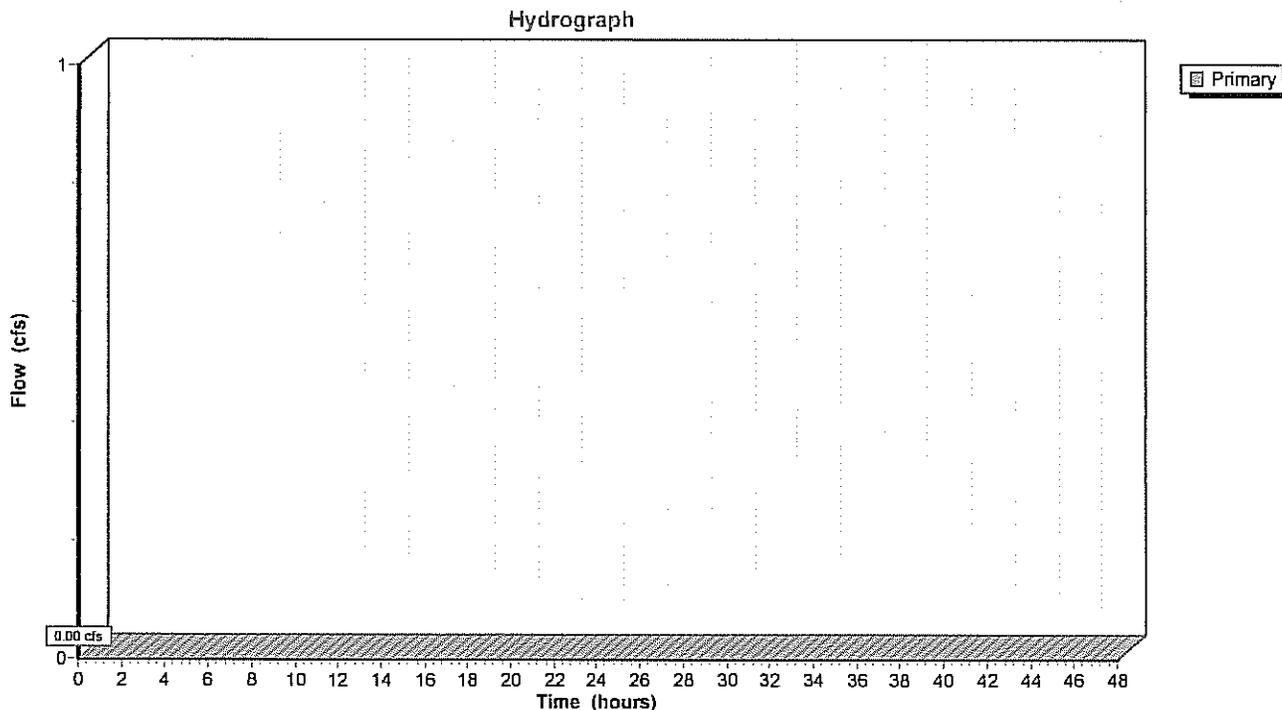


Summary for Pond AP-1: WET-8 (No Flow)

[40] Hint: Not Described (Outflow=Inflow)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=0.00' TW=0.00' (Dynamic Tailwater)

Pond AP-1: WET-8 (No Flow)



Summary for Pond AP-2: WET-1

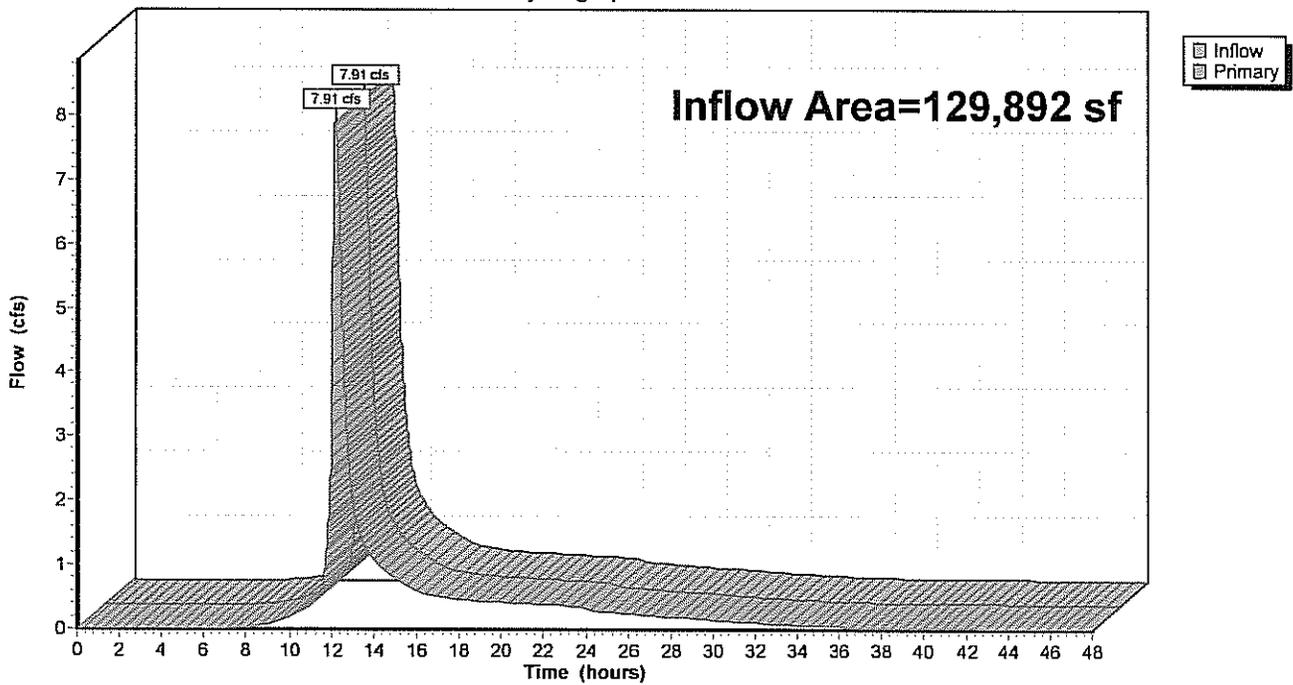
[40] Hint: Not Described (Outflow=inflow)

Inflow Area = 129,892 sf, 2.72% Impervious, Inflow Depth > 4.91" for 100 YR event
Inflow = 7.91 cfs @ 12.17 hrs, Volume= 53,142 cf
Primary = 7.91 cfs @ 12.17 hrs, Volume= 53,142 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-2: WET-1

Hydrograph



Summary for Pond AP-3: OFFSITE SWALE

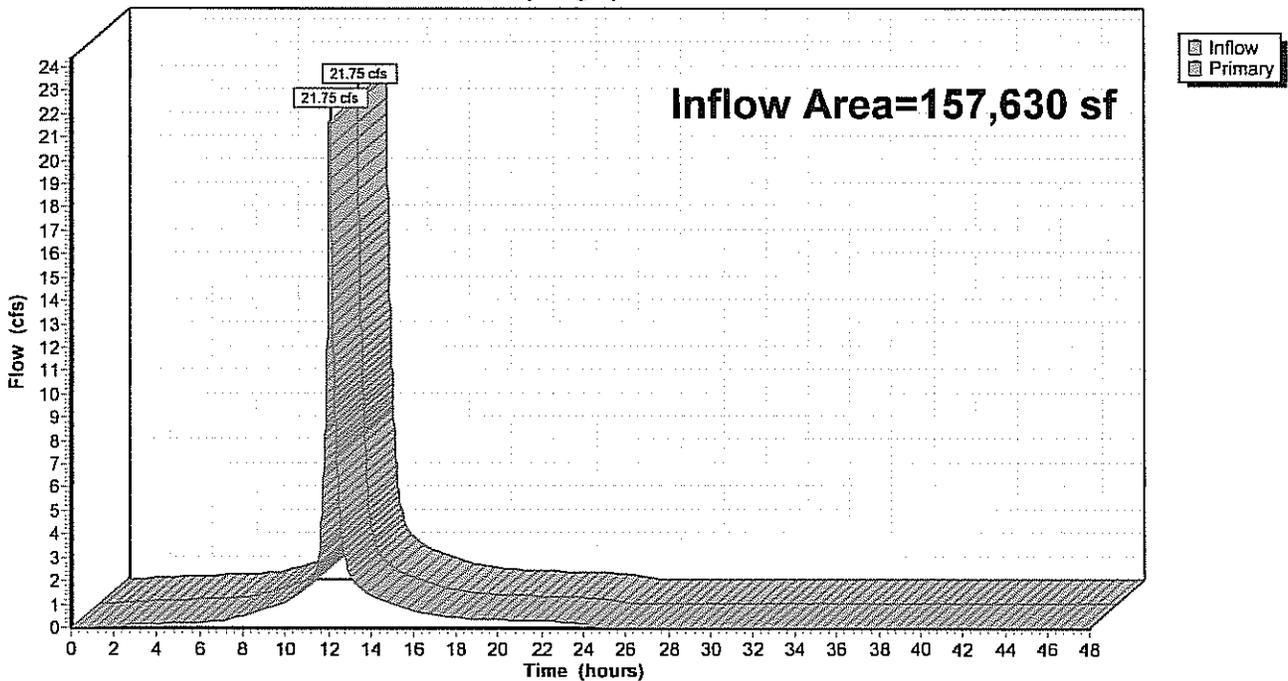
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 157,630 sf, 94.69% Impervious, Inflow Depth = 6.55" for 100 YR event
Inflow = 21.75 cfs @ 12.10 hrs, Volume= 86,020 cf
Primary = 21.75 cfs @ 12.10 hrs, Volume= 86,020 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-3: OFFSITE SWALE

Hydrograph



Summary for Pond AP-4: WET-2

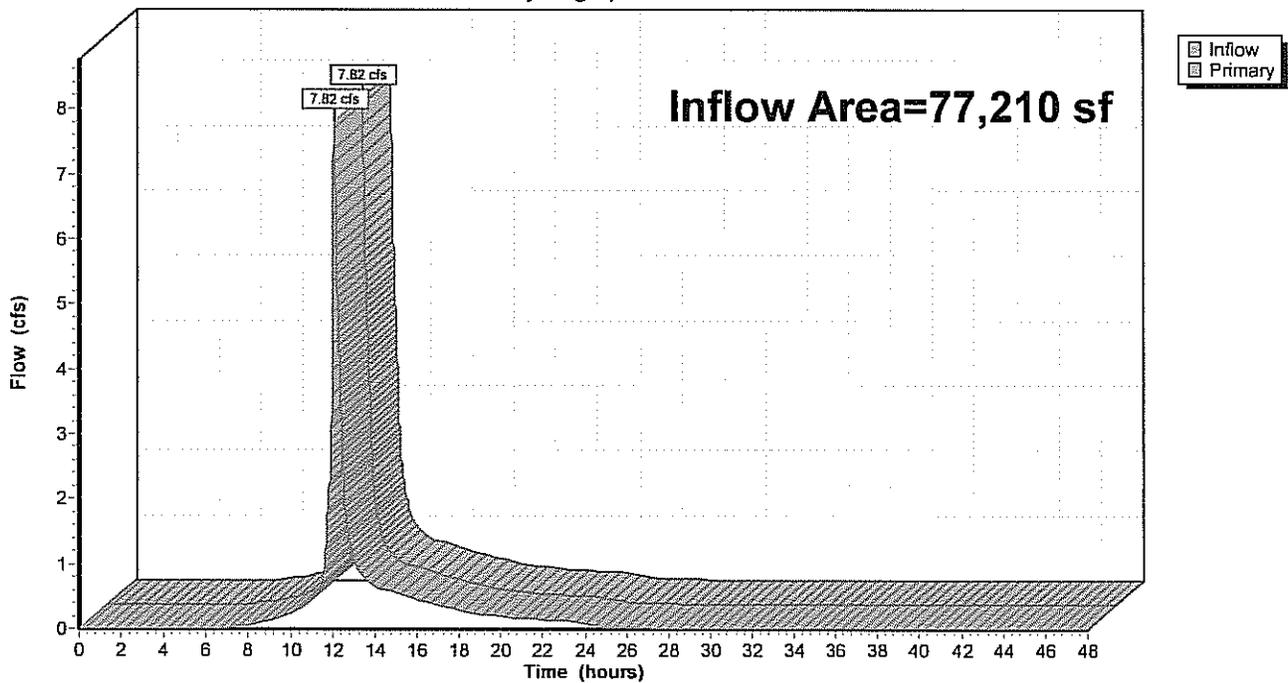
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 77,210 sf, 45.86% Impervious, Inflow Depth = 5.08" for 100 YR event
Inflow = 7.82 cfs @ 12.11 hrs, Volume= 32,661 cf
Primary = 7.82 cfs @ 12.11 hrs, Volume= 32,661 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-4: WET-2

Hydrograph



Summary for Pond AP-5: WET-3

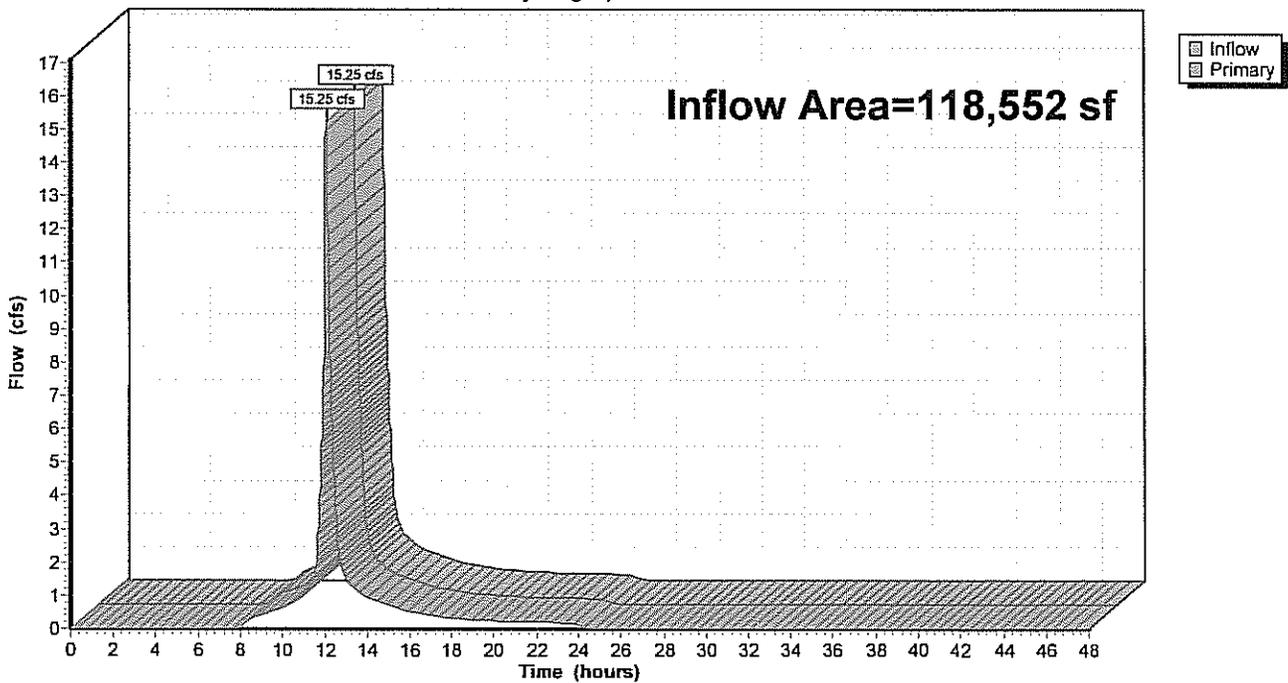
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 118,552 sf, 62.79% Impervious, Inflow Depth = 5.38" for 100 YR event
Inflow = 15.25 cfs @ 12.11 hrs, Volume= 53,174 cf
Primary = 15.25 cfs @ 12.11 hrs, Volume= 53,174 cf, Atten= 0%, Lag= 0.0 min

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4

Pond AP-5: WET-3

Hydrograph



Summary for Pond BASIN-1: BioRetention Area 1

Inflow Area = 83,587 sf, 4.22% Impervious, Inflow Depth = 5.71" for 100 YR event
 Inflow = 12.20 cfs @ 12.08 hrs, Volume= 39,760 cf
 Outflow = 5.41 cfs @ 12.27 hrs, Volume= 39,179 cf, Atten= 56%, Lag= 10.8 min
 Primary = 5.41 cfs @ 12.27 hrs, Volume= 39,179 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 79.26' @ 12.27 hrs Surf.Area= 9,320 sf Storage= 16,545 cf
 Flood Elev= 80.00' Surf.Area= 10,755 sf Storage= 23,928 cf

Plug-Flow detention time= 291.5 min calculated for 39,171 cf (99% of inflow)
 Center-of-Mass det. time= 282.5 min (1,065.7 - 783.2)

Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	23,928 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	5,397	0	0
78.00	7,048	6,223	6,223
79.00	8,804	7,926	14,149
80.00	10,755	9,780	23,928

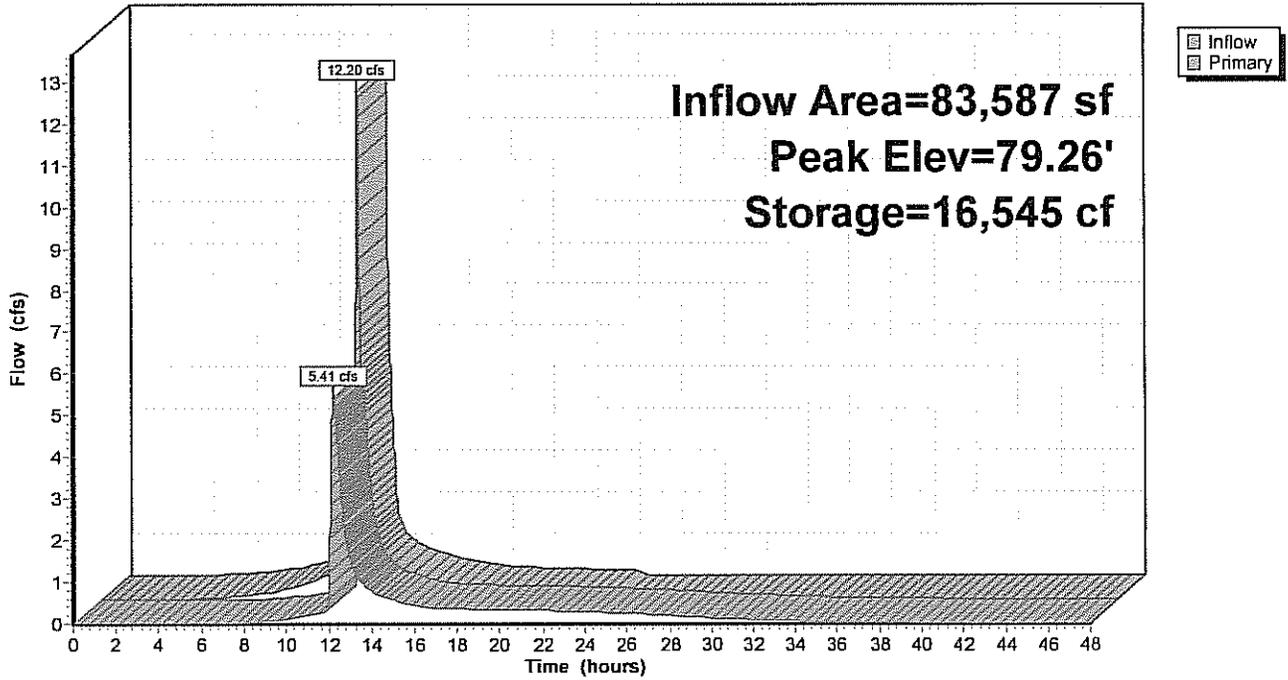
Device	Routing	Invert	Outlet Devices
#1	Primary	77.00'	4.0" Round Culvert L= 40.0' CPP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 77.00' / 77.00' S= 0.0000 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Primary	78.75'	5.0' long x 25.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.41 cfs @ 12.27 hrs HW=79.26' TW=0.00' (Dynamic Tailwater)

- 1=Culvert (Barrel Controls 0.43 cfs @ 4.93 fps)
- 2=Broad-Crested Rectangular Weir (Weir Controls 4.98 cfs @ 1.94 fps)

Pond BASIN-1: BioRetention Area 1

Hydrograph



Summary for Pond BASIN-2: Subsurface Detention System

Inflow Area = 56,802 sf, 85.28% Impervious, Inflow Depth = 6.41" for 100 YR event
 Inflow = 8.82 cfs @ 12.08 hrs, Volume= 30,322 cf
 Outflow = 7.25 cfs @ 12.16 hrs, Volume= 29,213 cf, Atten= 18%, Lag= 4.7 min
 Primary = 2.95 cfs @ 12.19 hrs, Volume= 15,734 cf
 Secondary = 4.41 cfs @ 12.14 hrs, Volume= 13,479 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 77.37' @ 12.14 hrs Surf.Area= 5,296 sf Storage= 5,917 cf
 Flood Elev= 78.10' Surf.Area= 5,296 sf Storage= 6,011 cf

Plug-Flow detention time= 76.3 min calculated for 29,207 cf (96% of inflow)
 Center-of-Mass det. time= 54.5 min (814.5 - 760.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	75.37'	3,201 cf	68.33'W x 77.50'L x 2.04'H Field A 10,812 cf Overall - 2,811 cf Embedded = 8,001 cf x 40.0% Voids
#2A	75.87'	2,811 cf	Cultec C-100HD x 200 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 20 rows
		6,011 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Primary	75.87'	12.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.42' S= 0.0090 '/' Cc= 0.900 n= 0.011, Flow Area= 0.79 sf
#2	Secondary	75.87'	18.0" Round Culvert L= 24.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.87' S= 0.0000 '/' Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=2.95 cfs @ 12.19 hrs HW=77.28' TW=76.67' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 2.95 cfs @ 3.76 fps)

Secondary OutFlow Max=5.27 cfs @ 12.14 hrs HW=77.37' TW=76.97' (Dynamic Tailwater)

↑2=Culvert (Barrel Controls 5.27 cfs @ 3.72 fps)

Pond BASIN-2: Subsurface Detention System - Chamber Wizard Field A

Chamber Model = Culitec C-100HD (Culitec Contactor® 100HD)

Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf

Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap

Row Length Adjustment= +0.50' x 1.86 sf x 20 rows

36.0" Wide + 4.0" Spacing = 40.0" C-C Row Spacing

10 Chambers/Row x 7.50' Long +0.50' Row Adjustment = 75.50' Row Length +12.0" End Stone x 2 = 77.50' Base Length

20 Rows x 36.0" Wide + 4.0" Spacing x 19 + 12.0" Side Stone x 2 = 68.33' Base Width

6.0" Base + 12.5" Chamber Height + 6.0" Cover = 2.04' Field Height

200 Chambers x 14.0 cf +0.50' Row Adjustment x 1.86 sf x 20 Rows = 2,810.9 cf Chamber Storage

10,812.3 cf Field - 2,810.9 cf Chambers = 8,001.5 cf Stone x 40.0% Voids = 3,200.6 cf Stone Storage

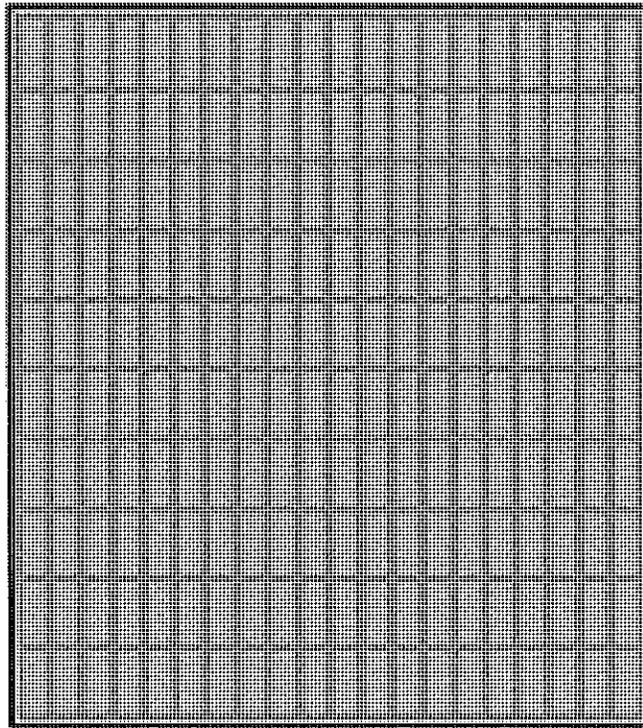
Chamber Storage + Stone Storage = 6,011.4 cf = 0.138 af

Overall Storage Efficiency = 55.6%

200 Chambers

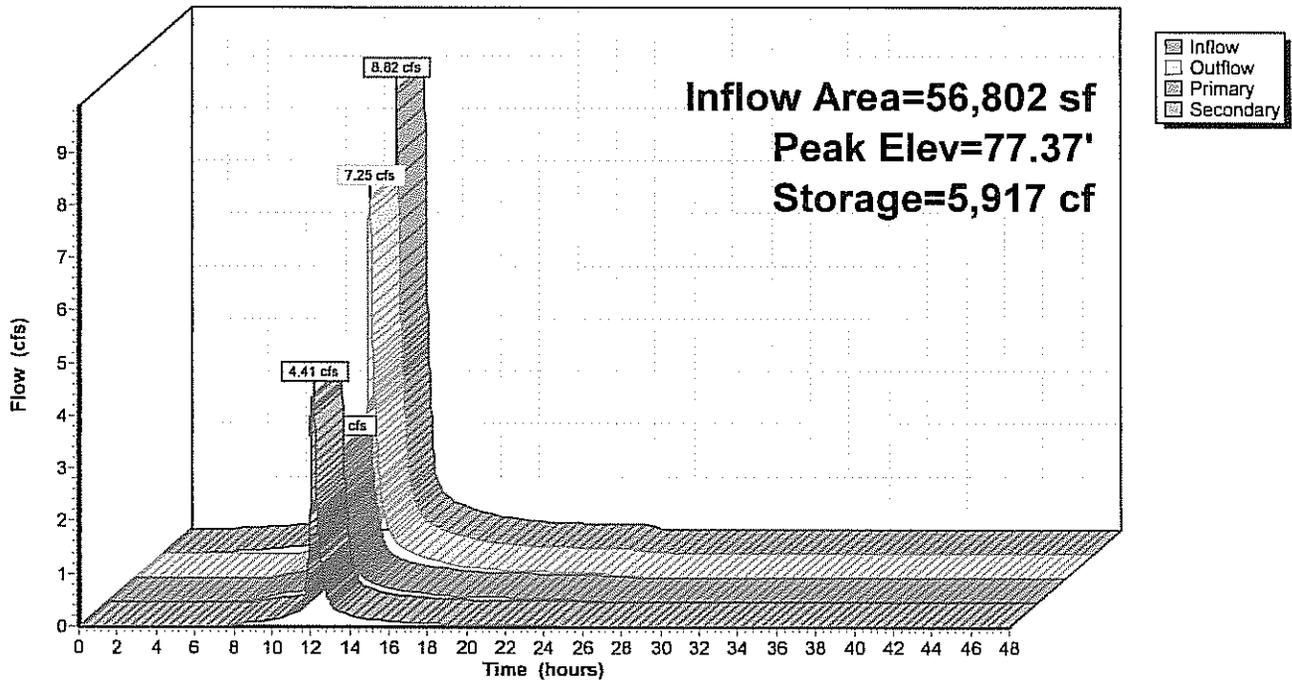
400.5 cy Field

296.4 cy Stone



Pond BASIN-2: Subsurface Detention System

Hydrograph



Summary for Pond BASIN-3: BioRetention Area 3

Inflow Area = 29,735 sf, 63.13% Impervious, Inflow Depth = 5.71" for 100 YR event
 Inflow = 4.34 cfs @ 12.08 hrs, Volume= 14,144 cf
 Outflow = 2.64 cfs @ 12.19 hrs, Volume= 14,089 cf, Atten= 39%, Lag= 6.1 min
 Primary = 2.64 cfs @ 12.19 hrs, Volume= 14,089 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 77.01' @ 12.19 hrs Surf.Area= 5,014 sf Storage= 4,355 cf
 Flood Elev= 78.00' Surf.Area= 6,149 sf Storage= 9,892 cf

Plug-Flow detention time= 111.6 min calculated for 14,086 cf (100% of inflow)
 Center-of-Mass det. time= 109.3 min (892.5 - 783.2)

Volume	Invert	Avail.Storage	Storage Description
#1	76.00'	9,892 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
76.00	3,624	0	0
77.00	5,005	4,315	4,315
78.00	6,149	5,577	9,892

Device	Routing	Invert	Outlet Devices
#1	Primary	75.00'	12.0" Round 12" HDPE L= 30.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.00' / 74.80' S= 0.0067 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf
#2	Device 1	76.00'	4.0" Vert. 4" Orifice C= 0.600
#3	Device 1	76.70'	4.0' long x 1.50' rise Sharp-Crested Rectangular Weir 2 End Contraction(s) 1.5' Crest Height

Primary OutFlow Max=2.64 cfs @ 12.19 hrs HW=77.01' TW=0.00' (Dynamic Tailwater)

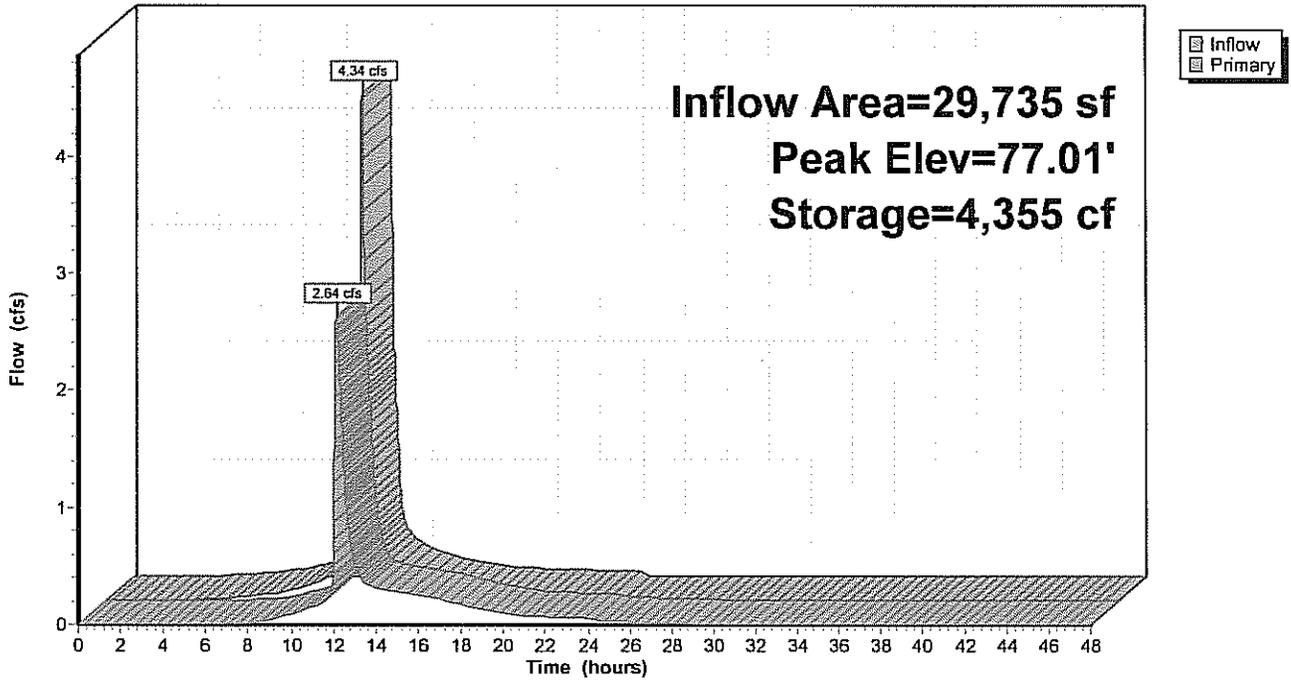
↑ **1=12" HDPE** (Passes 2.64 cfs of 4.64 cfs potential flow)

↑ **2=4" Orifice** (Orifice Controls 0.39 cfs @ 4.42 fps)

↑ **3=Sharp-Crested Rectangular Weir** (Weir Controls 2.26 cfs @ 1.86 fps)

Pond BASIN-3: BioRetention Area 3

Hydrograph



Summary for Pond BASIN-4: BioRetention Area 4

Inflow Area = 83,887 sf, 85.69% Impervious, Inflow Depth = 6.41" for 100 YR event
 Inflow = 13.02 cfs @ 12.08 hrs, Volume= 44,780 cf
 Outflow = 11.86 cfs @ 12.12 hrs, Volume= 42,112 cf, Atten= 9%, Lag= 2.2 min
 Primary = 11.86 cfs @ 12.12 hrs, Volume= 42,112 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 78.33' @ 12.12 hrs Surf.Area= 5,067 sf Storage= 5,397 cf
 Flood Elev= 79.00' Surf.Area= 5,813 sf Storage= 9,041 cf

Plug-Flow detention time= 66.8 min calculated for 42,104 cf (94% of inflow)
 Center-of-Mass det. time= 33.5 min (793.5 - 760.0)

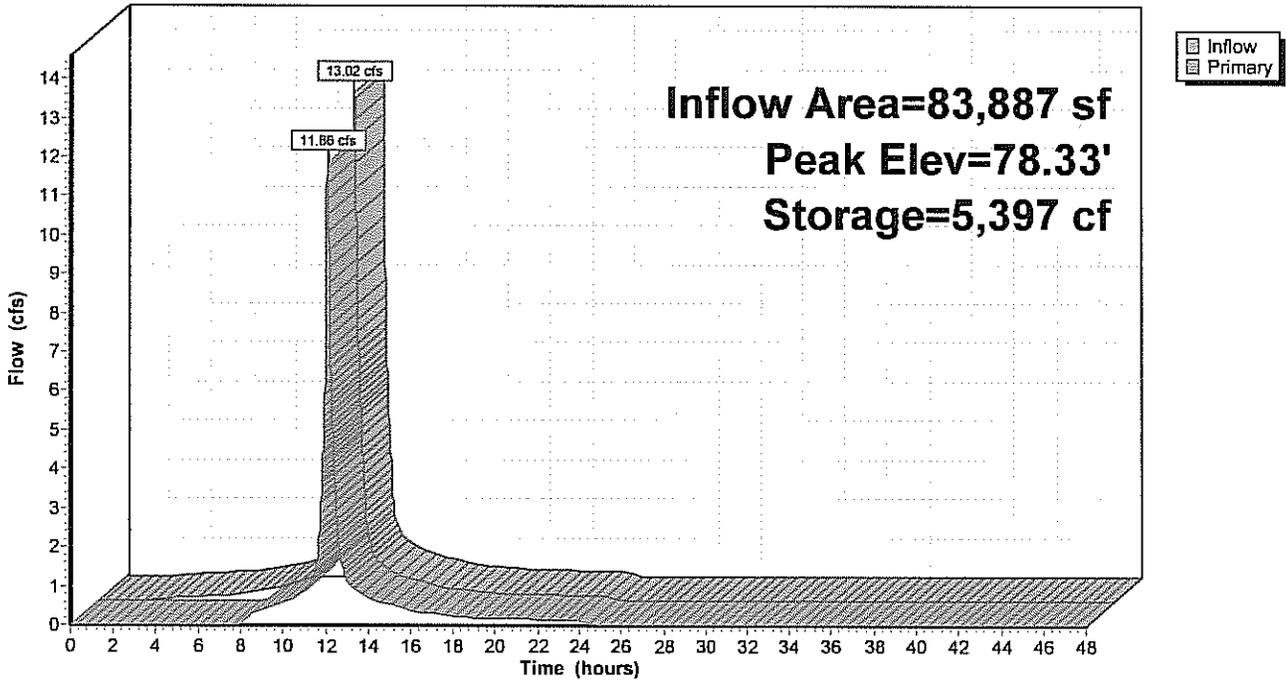
Volume	Invert	Avail.Storage	Storage Description
#1	77.00'	9,041 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
77.00	2,871	0	0
78.00	4,699	3,785	3,785
79.00	5,813	5,256	9,041

Device	Routing	Invert	Outlet Devices
#1	Primary	77.75'	10.0' long x 8.0' 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) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=11.86 cfs @ 12.12 hrs HW=78.33' TW=0.00' (Dynamic Tailwater)
 ↑1=Broad-Crested Rectangular Weir (Weir Controls 11.86 cfs @ 2.04 fps)

Pond BASIN-4: BioRetention Area 4

Hydrograph



Summary for Pond DMH-1: DMH-1

Inflow Area = 157,630 sf, 94.69% Impervious, Inflow Depth = 5.52" for 100 YR event
 Inflow = 17.75 cfs @ 12.09 hrs, Volume= 72,541 cf
 Outflow = 17.75 cfs @ 12.09 hrs, Volume= 72,541 cf, Atten= 0%, Lag= 0.0 min
 Primary = 17.75 cfs @ 12.09 hrs, Volume= 72,541 cf

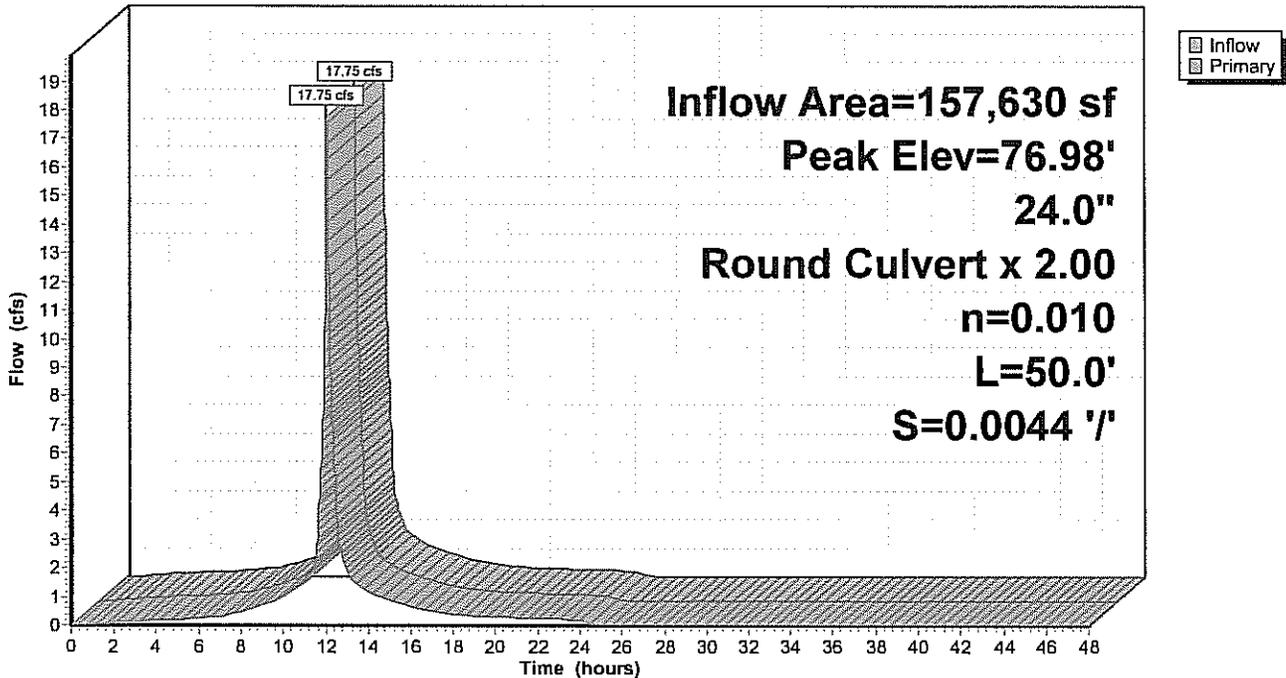
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.98' @ 12.09 hrs
 Flood Elev= 79.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	75.42'	24.0" Round Culvert X 2.00 L= 50.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.42' / 75.20' S= 0.0044 '/' Cc= 0.900 n= 0.010 Cast iron, coated, Flow Area= 3.14 sf

Primary OutFlow Max=17.74 cfs @ 12.09 hrs HW=76.98' TW=0.00' (Dynamic Tailwater)
 1=Culvert (Barrel Controls 17.74 cfs @ 4.64 fps)

Pond DMH-1: DMH-1

Hydrograph



Summary for Pond DMH-2: DMH-2

Inflow = 4.41 cfs @ 12.14 hrs, Volume= 13,479 cf
 Outflow = 4.41 cfs @ 12.14 hrs, Volume= 13,479 cf, Atten= 0%, Lag= 0.0 min
 Primary = 4.41 cfs @ 12.14 hrs, Volume= 13,479 cf

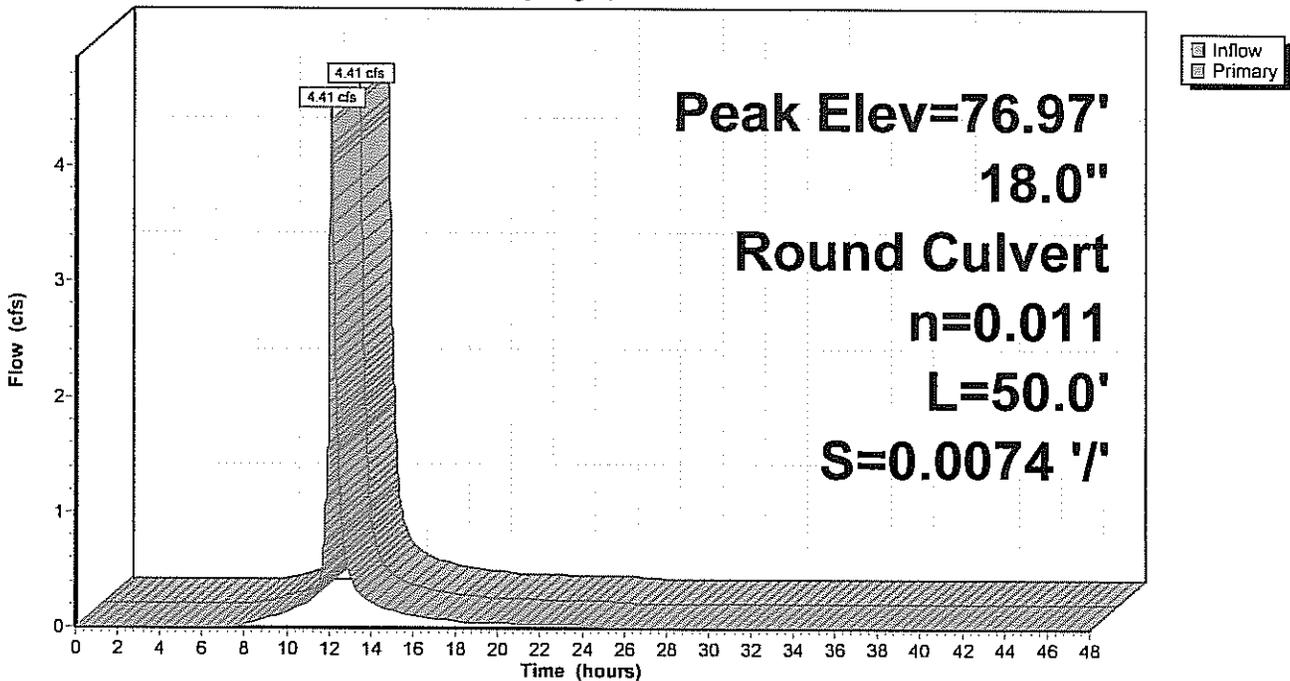
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 76.97' @ 12.14 hrs
 Flood Elev= 79.20'

Device	Routing	Invert	Outlet Devices
#1	Primary	75.87'	18.0" Round Culvert L= 50.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 75.87' / 75.50' S= 0.0074 '/ Cc= 0.900 n= 0.011, Flow Area= 1.77 sf

Primary OutFlow Max=4.41 cfs @ 12.14 hrs HW=76.97' TW=0.00' (Dynamic Tailwater)
 ↑1=Culvert (Barrel Controls 4.41 cfs @ 4.44 fps)

Pond DMH-2: DMH-2

Hydrograph



Summary for Pond DMH-3:

Inflow Area = 100,828 sf, 100.00% Impervious, Inflow Depth = 6.76" for 100 YR event
 Inflow = 15.90 cfs @ 12.08 hrs, Volume= 56,807 cf
 Outflow = 15.90 cfs @ 12.08 hrs, Volume= 56,807 cf, Atten= 0%, Lag= 0.0 min
 Primary = 15.90 cfs @ 12.08 hrs, Volume= 56,807 cf

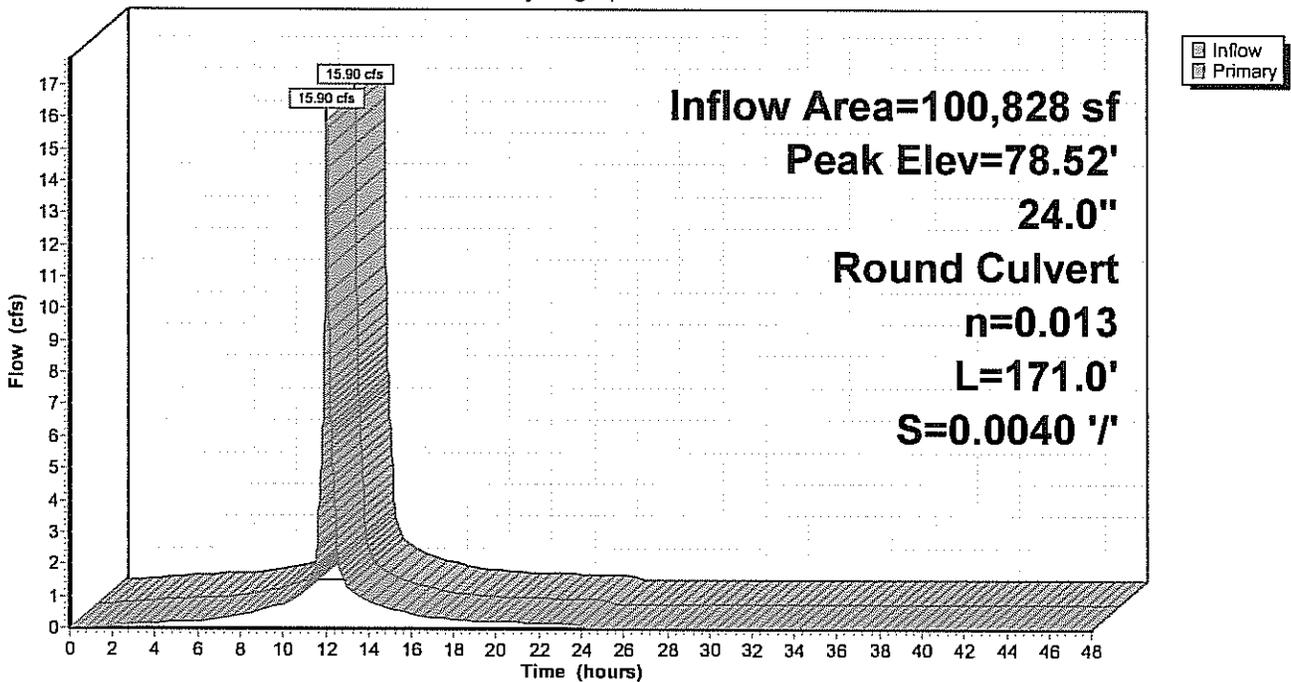
Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.01 hrs / 4
 Peak Elev= 78.52' @ 12.08 hrs
 Flood Elev= 79.80'

Device	Routing	Invert	Outlet Devices
#1	Primary	76.14'	24.0" Round Culvert L= 171.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 76.14' / 75.45' S= 0.0040 '/ Cc= 0.900 n= 0.013 Concrete pipe, bends & connections, Flow Area= 3.14 sf

Primary OutFlow Max=15.87 cfs @ 12.08 hrs HW=78.52' TW=76.98' (Dynamic Tailwater)
 ←1=Culvert (Barrel Controls 15.87 cfs @ 5.36 fps)

Pond DMH-3:

Hydrograph



Section 4

Supplemental Data



Stormceptor Design Summary

PCSWMM for Stormceptor

Project Information

Date	6/9/2014
Project Name	LOGAL LLC
Project Number	1998
Location	New Loading Area Stormceptor

Designer Information

Company	Field Engineering Co. Inc.
Contact	Rich Riccio

Notes

N/A

Drainage Area

Total Area (ac)	1.3
Imperviousness (%)	85

The Stormceptor System model STC 450i achieves the water quality objective removing 75% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

Name	BOSTON WSFO AP
State	MA
ID	770
Years of Records	1948 to 2005
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	70
-----------------	----

Upstream Storage

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

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 450i	75
STC 900	84
STC 1200	84
STC 1800	84
STC 2400	87
STC 3600	88
STC 4800	90
STC 6000	91
STC 7200	92
STC 11000	94
STC 13000	95
STC 16000	95



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	Distribution	Specific Gravity	Settling Velocity		Particle Size	Distribution	Specific Gravity	Settling Velocity
µm	%		ft/s		µm	%		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



INSTRUCTIONS:

1. Sheet is nonautomated. Print sheet and complete using hand calculations. Column A and B: See MassDEP Structural BMP Table
2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C value within Row
5. Total TSS Removal = Sum All Values in Column D

Non-automated: Mar. 4, 2008

Location: 100 Duchaine - New Loading Area

A BMP ¹	B TSS Removal Rate ¹	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Street Sweeping	10%	1.00	0.10	0.90
Stormceptor 450i	70%	0.90	0.63	0.27
Subsurface Infiltration System	80%	0.27	0.22	0.05

**TSS Removal
Calculation Worksheet**

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

Total TSS Removal =

0.95

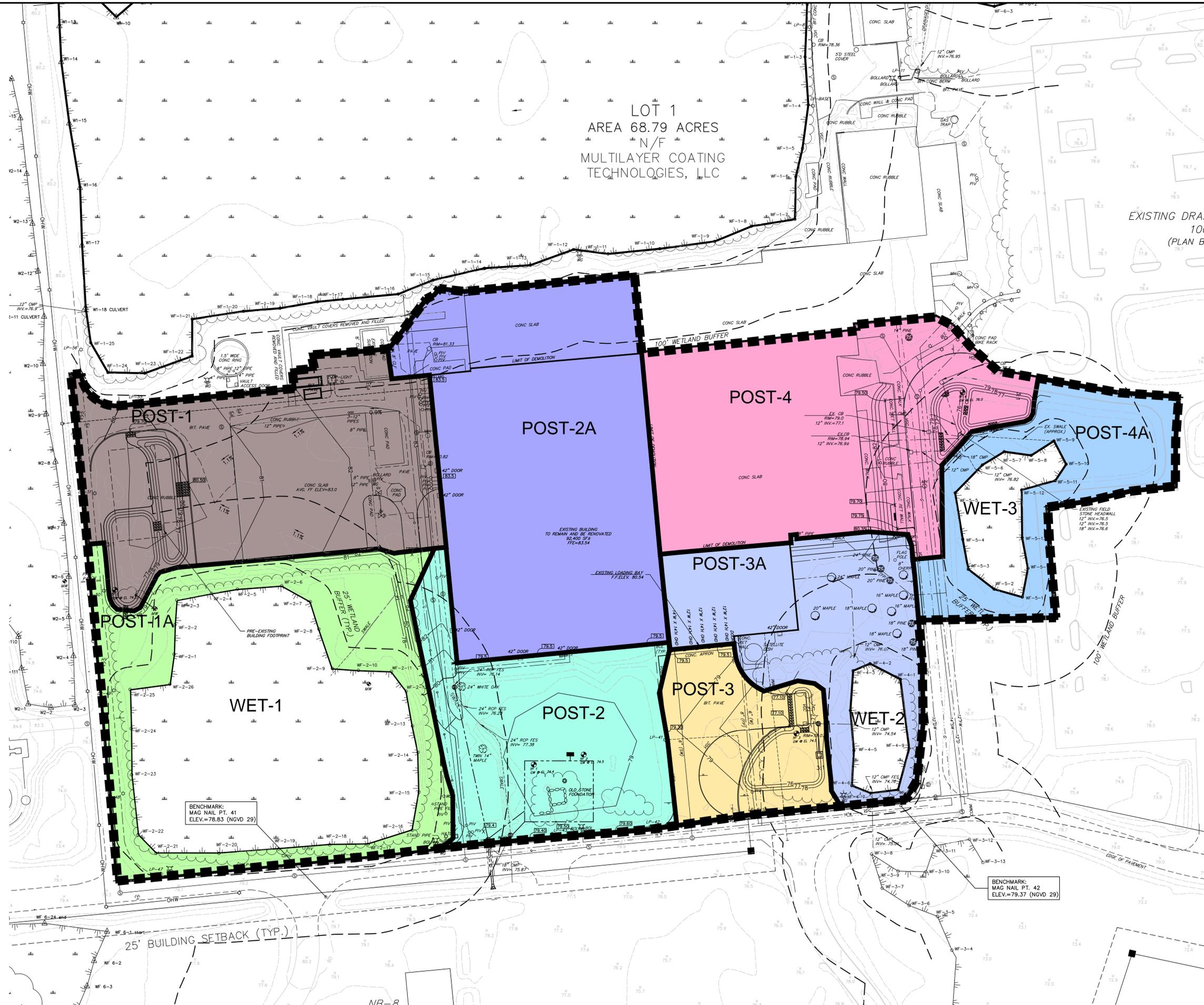
Project: 1998
 Prepared By: RRR
 Date: 6/9/14

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

Appendix A

Updated Post Development Watershed Plan

- POST-1
1.92 AC
- POST-1A
1.06 AC
- POST-2
1.30 AC
- POST-2A
2.31 AC
- POST-3
0.68 AC
- POST-3A
1.09 AC
- POST-4
1.93 AC
- POST-4A
0.80 AC



FIELD ENGINEERING CO., INC.
CONSULTING ENGINEERS

11D INDUSTRIAL DRIVE
P.O. BOX 1178
MATTAPAN, MA 02739
TEL: (508) 758-2749
FAX: (508) 758-2849

THE CROCKER BUILDING
4 COURT STREET, SUITE 104
TAUNTON, MA 02780
TEL: (508) 824-9279
FAX: (508) 824-9276

Revisions			
No.	Description	Date	Appvd.
3	REV PER CON COM CONSULTANT REVIEW	6/6/14	RRR
2	REV LOADING DOCK AREA	5/20/14	RRR
1	REV FOR SITE PLAN REVIEW	5/8/14	RRR

Date: 5/7/14

Scale: 1"=50'

Drawn By: DTB Designed By: RRR/DTB Checked By: RRR

Issued For: **PERMITTING**

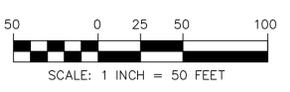
PROPOSED SITE DEVELOPMENT
LOGAL, LLC

100 DUCHAINE BOULEVARD
NEW BEDFORD, MASSACHUSETTS

Drawing Title: **POST DEVELOPMENT WATERSHED PLAN**

Project No. 1998 Sheet 1 OF 1

POST-1



NSR BASE

Appendix B

Soil Logs

Location Address or Lot No. 100 Duchaine Boulevard, New Bedford, MA

On-site Review

Deep Hole Number: TP-1 Date: 6/6/14 Time: 10:00 am Weather: Sunny, 65°F

Location (Identify on site plan): See site location plan

Land Use: Industrial Slope (%): 0-1% Surface Stones: Present

Vegetation: Wooded

Landform: Outwash Plains

Position on Landscape (sketch on the back): See design plan

Distances from:

Open Water Body: >100 Feet Drainage way: 0 feet

Possible Wet Area: > 25 Feet Property Line: >10 feet

Drinking Water Well: >100 Feet Other: _____

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0-24	A/FILL	Sandy Loam	10 YR 3/2	N/E	Friable
24-36	B	Sandy Loam	10 YR 5/6	N/E	Friable
36-48	C ₁	Loamy Sand	2.5 Y 6/3	@ 48"	Friable
48-72+	C ₂	Fine-Medium Loamy Sand	2.5 Y 5/4		Friable, Damp, Saturated @ 66"

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Fluvial Deposits Depth to Bedrock: N/E

Depth to Groundwater: Standing Water in the Hole 64" Weeping from Pit Face: N/E

Estimated Seasonal High Ground Water: 48"



Location Address or Lot No. 100 Duchaine Boulevard, New Bedford, MA

On-site Review

Deep Hole Number: TP-2 Date: 6/6/14 Time: 10:00 am Weather: Sunny, 65°F

Location (Identify on site plan): See site location plan

Land Use: Industrial Slope (%): 0-1% Surface Stones: Present

Vegetation: Wooded

Landform: Outwash Plains

Position on Landscape (sketch on the back): See design plan

Distances from:

Open Water Body: >100 Feet Drainage way: 0 feet

Possible Wet Area: > 25 Feet Property Line: >10 feet

Drinking Water Well: >100 Feet Other: _____

DEEP OBSERVATION HOLE LOG*					
Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0-24	A/FILL	Sandy Loam	10 YR 3/2	N/E	Friable
24-34	B	Sandy Loam	10 YR 5/6	N/E	Friable
34-72	C ₁	Medium-Coarse Sand	2.5 Y 5/3	@ 44"	Friable

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Fluvial Deposits Depth to Bedrock: N/E

Depth to Groundwater: Standing Water in the Hole 60" Weeping from Pit Face: N/E

Estimated Seasonal High Ground Water: 44"



Location Address or Lot No. 100 Duchaine Boulevard, New Bedford, MA

On-site Review

Deep Hole Number: TP-3 Date: 6/6/14 Time: 10:00 am Weather: Sunny, 65°F

Location (Identify on site plan): See site location plan

Land Use: Industrial Slope (%): 0-1% Surface Stones: Present

Vegetation: Wooded

Landform: Outwash Plains

Position on Landscape (sketch on the back): See design plan

Distances from:

Open Water Body: >100 Feet Drainage way: 0 feet

Possible Wet Area: > 25 Feet Property Line: >10 feet

Drinking Water Well: >100 Feet Other: _____

DEEP OBSERVATION HOLE LOG*					
Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0-12	A/FILL	Sandy Loam	10 YR 3/2	N/E	Friable
12-30	B	Sandy Loam	10 YR 5/6	N/E	Friable
30-72	C ₁	Medium-Coarse Sand	2.5 Y 5/3	@ 44"	Friable

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Fluvial Deposits Depth to Bedrock: N/E

Depth to Groundwater: Standing Water in the Hole 64" Weeping from Pit Face: N/E

Estimated Seasonal High Ground Water: 44"



Location Address or Lot No. 100 Duchaine Boulevard, New Bedford, MA

On-site Review

Deep Hole Number: TP-4 Date: 6/6/14 Time: 10:00 am Weather: Sunny, 65°F

Location (Identify on site plan): See site location plan

Land Use: Industrial Slope (%): 0-1% Surface Stones: Present

Vegetation: Wooded

Landform: Outwash Plains

Position on Landscape (sketch on the back): See design plan

Distances from:

Open Water Body: >100 Feet Drainage way: 0 feet

Possible Wet Area: > 25 Feet Property Line: >10 feet

Drinking Water Well: >100 Feet Other: _____

DEEP OBSERVATION HOLE LOG*

Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0-24	FILL	Sandy Loam	10 YR 3/2	N/E	Friable
24-48	C ₁	Fine Sand	2.5 Y 5/3	@ 24"	Friable

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Fluvial Deposits Depth to Bedrock: N/E

Depth to Groundwater: Standing Water in the Hole 48" Weeping from Pit Face: 36"

Estimated Seasonal High Ground Water: 24"



Location Address or Lot No. 100 Duchaine Boulevard, New Bedford, MA

On-site Review

Deep Hole Number: TP-5 Date: 6/6/14 Time: 10:00 am Weather: Sunny, 65°F

Location (Identify on site plan): See site location plan

Land Use: Industrial Slope (%): 0-1% Surface Stones: Present

Vegetation: Wooded

Landform: Outwash Plains

Position on Landscape (sketch on the back): See design plan

Distances from:

Open Water Body: >100 Feet Drainage way: 0 feet
 Possible Wet Area: > 25 Feet Property Line: >10 feet
 Drinking Water Well: >100 Feet Other: _____

DEEP OBSERVATION HOLE LOG*					
Depth from Surface (Inches)	Soil Horizon	Soil Texture (USDA)	Soil Color (Munsell)	Soil Mottling	Other (Structure, Stones, Boulders, Consistency, % Gravel)
0-36	FILL				
36-48	A	Sandy Loam	10 YR 3/2	N/E	Friable
48-72+	C ₁	Medium-Coarse Sand	2.5 Y 6/3	@ 48"	Friable

* MINIMUM OF 2 HOLES REQUIRED AT EVERY PROPOSED DISPOSAL AREA

Parent Material (geologic) Glacial Fluvial Deposits Depth to Bedrock: N/E

Depth to Groundwater: Standing Water in the Hole 72" Weeping from Pit Face: N/E

Estimated Seasonal High Ground Water: 48"



Appendix C

Updated Long Term Pollution Prevention Plan

Long Term Pollution Prevention Plan
LOGAL, LLC
100 Duchaine Boulevard
New Bedford, MA 02745

1.0 Introduction

This Long Term Pollution Prevention Plan has been prepared in accordance with the Massachusetts Stormwater Handbook for Compliance with Stormwater Standards 4-6.

2.0 Good Housekeeping Practices/Storage Provisions

Good housekeeping practices including periodic inspections of stormwater management system components will be performed in accordance with the Stormwater Management System Operation and Maintenance Plan. It is not anticipated that any high pollutant materials would be stored on site in areas that would discharge directly to the wetland systems. It would be anticipated that a property manager would be on-site and trained in the proper storage of materials and waste products on site.

3.0 Routine Maintenance of Stormwater BMP's

The Stormwater BMP's including the extended detention basins, sediment forebays, and grassed swales will all be operated and maintained in accordance with the Stormwater Management System Operation and Maintenance Plan which is discussed on the Site Development Plans.

4.0 Spill Prevention and Response Plans

Representatives of the property owner will be on site on a regular basis and will be trained in spill prevention and response. MSDS sheets are required to be on site for the handling of any chemicals or compounds that may be associated with any of the approved uses at the site. Emergency contact numbers will be posted and provided to any additional tenants that may occupy the building with a 24-hour contact number in the event of any spills on-site.

5.0 Landscaping Provisions

The landscaping on site will be maintained with generally accepted industry practices. Landscaping companies servicing the facility will be notified of the sensitivity of the wetland resource areas and stormwater management systems on site. Disposal of lawn and garden waste will be prohibited from any areas being used for stormwater management as well as in the wetland resource areas. Additionally, provisions shall be made to minimize the amount of fertilizers and other materials that will be allowed to be discharged within the landscaped areas on the site.

6.0 Pet Waste Management Provisions

It is not anticipated that there would be any pets on site at this commercial facility.

7.0 Provisions for Solid Waste Management

Dumpsters will be provided on-site for the disposal of solid waste. These dumpsters will be enclosed in fencing and emptied on a regular basis in accordance with Board of Health regulations and the Conditions of Site Plan Review approval.

8.0 Snow Disposal Guidelines

Plowing directly into the wetland resource areas or bio-retention areas will not be permitted. All snow stored on site will melt and flow through the stormwater management system.

9.0 Winter Road Salt and Sand Use

The use of road salt will not be allowed on the site. Sand will be used wherever possible. It is not anticipated that large quantities of road salt and/or sand will be stored on site.

10.0 Street Sweeping Schedules

Sweeping of the parking lots will be performed at least twice per year.

11.0 Illicit Discharge Prevention

Illicit connections to the stormwater management system will be strictly prohibited. Any contractors performing work at the site will be notified of the prohibition of any illicit connections to the stormwater management system. All work done on site shall be per the approved design plans.

12.0 Training for Staff

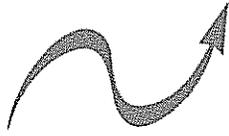
The property owner and their representative would be responsible for the operation and maintenance of the Stormwater Management System. Any Site Management Staff would be properly trained in the operation and maintenance of the Stormwater Management System.

13.0 Emergency Contacts

The applicants of the project, LOGAL, LLC and the company operating out of the facility, NWD Inc., would be the emergency contacts for any implementation measures that may be required on this Long-Term Pollution Prevention Plan. It would be anticipated that emergency contact numbers would be posted throughout the site building and facilities should any situations arise.

Appendix D

Correspondences



Nitsch Engineering

2 Center Plaza, Suite 430
Boston, MA 02108-1928
T: 617-338-0063
F: 617-338-6472
www.nitscheng.com

June 2, 2014

Mr. Kenneth Motta
Chairman
New Bedford Conservation Commission
New Bedford City Hall
133 William Street
New Bedford, MA 02744

RE: Nitsch Project #9972
100 Duchaine Boulevard
Review Letter
New Bedford, MA

Dear Mr. Motta:

This letter is in regard to the proposed Logal, LLC project located at 100 Duchaine Boulevard in New Bedford, Massachusetts. Nitsch Engineering has reviewed the following revised items submitted as part of the proposed project:

- Plan set entitled, "Proposed Site Development, Logal, LLC, 100 Duchaine Boulevard, New Bedford, Massachusetts," prepared by Field Engineering Co., Inc., dated May 7, 2014;
- Plan set entitled, "Proposed Site Development, Logal, LLC, 100 Duchaine Boulevard, New Bedford, Massachusetts," prepared by Field Engineering Co., Inc., revised May 21, 2014;
- "Notice of Intent, Proposed Site Improvements," prepared by Field Engineering Co., Inc., dated May 8, 2014;
- "Stormwater Management System Report, Logal, LLC, Proposed Site Improvements," prepared by Field Engineering Co., Inc., dated May 7, 2014; and
- "Stormwater Management System Report, Addendum 1, Logal, LLC, Proposed Site Improvements," prepared by Field Engineering Co., Inc., dated May 21, 2014.

Additionally, Nitsch Engineering performed a site visit on May 29, 2014 to review the existing conditions on the project site. We have the following comments with regard to the above-referenced information, pertaining to drainage design only:

1. The Applicant is proposing site and drainage improvements at an existing facility, including the construction of 16 loading docks, a gravel tractor trailer parking lot, a gravel driveway, 15 paved parking spaces, and new paved access to the loading dock. The existing site has approximately 267,540 square feet of impervious area, while the proposed site has approximately 239,231 square feet of impervious area plus an additional 55,522 square feet of gravel surface. The Stormwater Report indicates that the site is considered a redevelopment due to the decrease in impervious area.
 - a. Due to the potential impact on the design of the stormwater management system, we request that the Applicant evaluate the intended use and frequency of tractor trailer trips on the proposed gravel surfaces, and confirm that these surfaces will not be compacted by the proposed use. If the gravel surfaces should be considered impervious due to the potential for compaction, the project would no longer be considered a redevelopment.
 - b. A detail showing the proposed gravel parking and driveway sections should be provided in the site plans. The detail should demonstrate how stormwater quality treatment may occur in the proposed cross section.

2. The Site Layout Plan indicates that there is a proposed above-ground fueling facility to be located west of the existing building and within the 100-foot Buffer Zone to Bordering Vegetated Wetland (BVW). This proposed use is a Land Use with Higher Potential Pollutant Loads (LUHPPLs) under the Massachusetts Department of Environmental Protection (MassDEP) Stormwater Management Standards.
 - a. A detail of the fueling facility and associate tanks should be provided in the Site Plans, including detailed grading of the area.
 - b. We also recommend that the proposed fuel tank and pump area include a fuel detection system to notify the owner of any fuel spills or leaks as well as some type of fuel containment device that can prevent fuel from flowing to the wetlands during a spill.
 - c. Other LUHPPLs include industrial sectors regulated by the NPDES Multi-Sector General Permit, exterior fleet storage areas and parking lots with high-intensity uses (refer to the MassDEP Stormwater Handbook for the full list). The Applicant should confirm that there are no other areas considered LUHPPLs on the project site.
3. Soil testing results were not included in the Stormwater Report or indicated on the plans; therefore, soil texture, soil infiltrative capacity (hydrologic soil group), and estimated seasonal high groundwater elevations were not provided. Due to the site's close proximity to several BVWs, groundwater is anticipated to be close to the surface and may encroach on the bottom surface of the proposed bioretention basins and subsurface detention system. In accordance with the Standards, Nitsch Engineering recommends that soil testing be performed within the footprint of all proposed stormwater best management practices (BMPs).
4. The project includes work within the 25 feet of the easternmost BVW. This work is a reconstruction of an existing driveway, which is currently paved.
5. A Total Suspended Solids (TSS) Removal Spreadsheet was not provided for the double catch basin and subsurface detention system treatment train. Based on the MassDEP Stormwater Handbook, this treatment train appears to achieve 25% TSS removal, which is substantially less than the target 80% TSS removal under the MassDEP Standards.
6. The Proposed Conditions HydroCAD Report (revised May 21, 2014) indicates a total modelled area of 459,655 square feet, while the Existing Conditions HydroCAD Report has a total modelled area of 483,284 square feet. The analyzed areas should be consistent.
7. The Existing Conditions HydroCAD Report indicates that the wooded areas in PRE-B and PRE-D are considered "woods/grass comb", while the Narrative describes them as "heavily wooded", and the Proposed Conditions HydroCAD Report indicates them as "woods". The existing conditions model should be revised to be consistent with the Narrative and proposed conditions model.
8. The Existing Conditions HydroCAD Report indicates that the existing concrete rubble areas are modelled as impervious. However, Nitsch Engineering observed these areas to be pervious with concrete debris. The existing conditions model should be revised to denote this area as pervious, similar to the gravel in the proposed conditions model.
9. There is an existing swale that extends from the eastern portion of the site towards the easternmost BVW, labelled at WET-3 in the HydroCAD model. We observed this swale during a site visit on May 29, 2014, and it appears that it flows around the BVW to the north, without actually flowing into the

wetland. The hydrology of this area should be confirmed to ensure that assumptions made in the existing and proposed HydroCAD model are accurate.

10. There is an existing concrete slab located within drainage areas PRE-E and POST-4 that appears to be maintained in the proposed condition. There is minimal topographic data provided for the concrete slab and therefore difficult to confirm the direction that stormwater will flow from the slab. Since the slab was from the interior of the existing building, it is likely flat. The existing and proposed HydroCAD models indicate that runoff generated by the slab will flow to the east and into the BWV labelled as WET-3. In the proposed condition, the model assumes that the slab will be treated in Bioretention Basin 4. The Applicant should confirm that it is possible to direct all of the runoff from the slab into the basin for treatment.
11. The boundaries for proposed watersheds POST-4 and POST-4A appear to be incorrect based on the proposed grading. It does not appear that the southern portion of the driveway in POST-4 is graded to drain to Bioretention Basin 4, and will therefore not be treated. The Applicant should confirm the intended treatment of the driveway and revised the drainage boundaries as necessary. There are existing catch basins on the driveway that appear to drain to the existing swale that are not shown on the plans. It is unclear whether these catch basins will remain. We recommend that the entire driveway and proposed parking spaces within the limit of work be treated to achieve 80% TSS removal before discharging into the wetland.
12. There does not appear to be infiltration proposed from the Bioretention Basins; however, there are no underdrains proposed which may result in extended ponding within the subsurface and above-grade areas of the basins. If soil testing confirms that infiltration is not feasible due to high groundwater, we recommend that each bioretention basin have an underdrain as shown in the MassDEP Stormwater Handbook.
13. The 12-inch outlet pipe from the subsurface detention system should be labelled on the Site Plans.
14. The outlet control structure for Bioretention Basin 3 appears to be at an elevation less than the bottom surface elevation of the basin.
15. We recommend that the Long-Term Pollution Prevention Plan be updated to include language that prohibits snow storage within the proposed stormwater management system, including bioretention basins.
16. The Site Grading and Drainage plan indicates that there are two (2) curb cuts for Bioretention Basin 1. The grading associated with the northern curb cut and swale should be refined to provide a direct path to the sediment forebay and not into the main basin. The berm between the curb cut swale and main basin should be further elevated to avoid short-circuiting of flow around the sediment forebay.
17. Nitsch Engineering observed silt within the existing drainage swale that is located at the outfall of the 18-inch drainage pipe that flows under the driveway along the southern boundary of the project site. We recommend that the Applicant remove the silt and stabilize the swale as part of the proposed improvements.
18. The notes on the Bioretention Area Landscaping Plan provide for 2-inch plugs of herbaceous plants (grasses/sedges) to be spaced 24 inches on-center in the bottom of the basin and a conservation/wildlife seed mix for the basin sideslopes. We recommend that the bottom of the basin also be seeded with the conservation/wildlife seed mix to provide additional coverage and erosion protection while the plugs are becoming established.

Mr. Kenneth Motta: Nitsch Project #9972
June 2, 2014
Page 4 of 4

If you have any questions, please call us at 617-338-0063.

Very truly yours,

Nitsch Engineering, Inc.



Jennifer L. Johnson, PE, LEED AP BD+C, CPSWQ
Senior Project Engineer



Scott D. Turner, PE, AICP, LEED AP ND
Director of Planning

JLJ/fmk

June 9, 2014
Project No. 1998

Ms. Sarah Porter, Agent
City of New Bedford Conservation Commission
New Bedford City Hall
133 William Street
New Bedford, MA 02744

The Crocker Building
Four Court Street, Suite 104
Taunton, Massachusetts 02780
Telephone: (508) 824-9279
Facsimile: (508) 824-9276

RE: NEW BEDFORD-LOGAL LLC
DEP File No. SE 049-0702 - Response to Notice of Intent (NOI) Review Comments
100 Duchaine Boulevard

Dear Ms. Porter:

Field Engineering Co., Inc. has received the NOI review comment letter dated June 2, 2014 prepared by Nitsch Engineering and has prepared the following response narrative and supporting documentation for consideration by the Commission.

Numbering below corresponds to the numbering in Nitsch's letter.

- 1.a. Based on the discussions with the owner, it is our understanding that the gravel area will be used sparingly by everyday truck traffic. The owner has approximately 30 trucks on the road, and this area will be used to keep empty trailers parked on site. The main truck route for the trucks coming to and leaving the facility will remain on the asphalt surfaces that currently exist and which are being proposed to access the new loading area along the southern portion of the building.

With that being said, in order to be even more conservative, we have revised the CN number for the gravel parking area and driveway to 96 in the updated Post Development watershed analysis. Gravel with a CN of 96 would still be considered pervious material but takes into account the compaction of the gravel surface that may occur over time. It should be noted, that the majority of this area was previously occupied by a building and the concrete rubble that exists on-site is the result of on-going demolition activities at the facility.

- 1.b. We have added a cross sectional detail of the gravel parking and driveway sections to the plan set as requested. The cross section will consist of 6" dense graded crushed stone over a 12" gravel base.
- 2.a. Additional information on the fueling facility layout and design has been included on the site plans and shop cuts of the proposed fuel storage tank are included with this response letter. The above ground storage tank will be a double walled tank with leak detection within the secondary containment envelope of the tank. An additional concrete pad has been proposed where vehicles will park during fueling to minimize the chance for infiltration of the fuel into the ground due to a spill. This concrete pad will be level and equipped with notches cut into the concrete to retain any minor spills that could potentially occur during refueling. The notches have been sized and designed to retain approximately 15 gallons of fuel should a spill occur while fueling.

Spill kits will be required on-site in accordance with all local, state, and federal regulations. In addition, the locking latch on the fuel nozzle will be removed to minimize the chance of overfilling and signs will be in place on the facility to instruct the operators to not leave the nozzle while refueling their vehicles. Finally, the fuel management key system can be programmed to limit the amount of fuel to be dispensed at one time, further minimizing the opportunity for substantial spills during refueling of the vehicles.

- 2.b. We take no exception to this recommendation as this would be required for the fuel storage facility under the applicable regulations.
- 2.c. Based on discussions with the owner, there would be no other areas on the project site that would be considered LUHPPL's. The parking areas will not be handling high-intensity uses. The trailer parking area will be mainly used to park empty trailers and would not be used for fleet storage. It is my understanding that the owner has approximately 30 trucks on the road and they will be coming and going from the facility on a daily basis. The trip generation for this number of trucks would not approach the criteria to be considered a high-intensity use.
3. We have performed test pit excavations with a backhoe in each of the proposed stormwater best management practices (BMP's) as recommended by Nitsch. The test pits revealed sandy soils with groundwater mottling between two and four feet below existing grade, depending on location. As the plans show, none of the proposed BMP's will intercept groundwater and we are providing a minimum of one foot of vertical separation between the mottling and the bottom of the BMP's in all stormwater BMP's with the exception of Bio-Retention Area 4. In this area we are limited by the existing piping system and driveway elevations and will provide separation to the maximum extent practicable while maintain the pre-existing pipe outfalls.
4. We have revised the design in this location to eliminate any work within the 25' buffer to the wetland. We are now proposing to retain the existing driveway and drainage system in this location and construct a bioretention area in the open area outside of the 25' buffer.
5. We have updated the proposed design to include an inlet Stormceptor 450i at the double grate catch basin to provide additional TSS removal prior to discharge to the subsurface detention area. A TSS Removal Spreadsheet for this treatment train is provided in the Stormwater Management System Report-Addendum 2, attached to this response.
6. We have reviewed and revised the Post Development watershed analysis as requested. An updated Post Development watershed analysis has been provided in Addendum 2.
7. We have updated the Pre Development watershed analysis to separate the grass and woods areas in PRE-B and PRE-E as applicable and removed the "woods/grass comb" designation. An updated Pre Development watershed analysis has been provided in Addendum 2.
8. The areas of existing concrete rubble were modeled as impervious due to the fact that there were buildings in these locations in the pre-developed condition. The Pre-Development analysis took into account the pre-existing building footprints to provide an accurate rate of runoff to the wetlands in the Pre-Developed condition, prior to demolition of the existing buildings.
9. A representative of Field Engineering walked the swale in question in the vicinity of the BVW and confirmed that this area all contributes flow to the BVW labeled as WET-3. Upon further investigation, it was determined that there are actually two swales in this area as shown on the updated Site Development Plans and these swales appear to eventually merge further down gradient within or in close proximity to the BVW labeled as WET-3. Based on the record topography of this entire vegetated area, it appears that the entire "island" drains towards the BVW labeled as WET-3.
10. The existing slab area corresponds with a pre-existing portion of the building with roof drains that were directly piped to the BVW labeled as WET-3. We conservatively assumed that this entire area would continue to flow to WET-3 in proposed conditions as there are currently no plans to demolish or improve the slab. The existing slab is relatively flat and the majority of the water sits on the slab and eventually makes its way overland towards the paved driveway and proposed paved parking spaces. We have conservatively assumed that this entire footprint will continue to flow to the BVW labeled as WET-3 in proposed conditions.

11. We have reviewed and revised the proposed design in this location. We are now proposing to retain the existing driveway and three existing catch basins as they currently stand. We are still proposing to construct Bio-Retention Area 4 and will direct the discharge from the existing catch basins to the sediment forebay. The area of the existing driveway to the south of the proposed parking area will remain unchanged and continue to drain as it does currently. We have also updated the Post Development watershed analysis to account for this plan revision.
12. We have performed a test pit at the bottom of each bioretention area and have confirmed very sandy soils within the subgrade. The mottling line indicating seasonal high groundwater was a minimum of one foot below the bottom of the bioretention areas (with the exception of Bio-Retention Area 4) and subsurface detention system, therefore we feel that some infiltration will occur from the bottom of the areas and the underdrain systems are not necessary.
13. The 12-inch outlet pipe from the subsurface detention system is now labeled as such on the updated Site Plans.
14. The outlet control structure labels for Bio-Retention Area 3 have been revised on the Site Grading Plan and Detail sheets to be consistent with the updated hydrologic model
15. The Long-Term Pollution Prevention Plan and Stormwater Management System Operation and Maintenance Plan on the Site Plans have been updated to prohibit snow storage directly within the stormwater management system.
16. The grading around Bio-Retention Area 1 has been revised as recommended to minimize the opportunity for runoff from the gravel parking area to short-circuit the sediment forebay. It should also be noted that we have also revised the design of Bio-Retention Area 1 to shift some of the work to the south which will minimize the amount of excavation and removal of the concrete foundations of the building which previously existed in this location. We have also placed a low flow drain at the bottom of Bio-Retention Area 1 to minimize the potential for extended ponding in this location. The updated Post Development watershed analysis takes these revisions into account.
17. We have added a notation to the plans directing the site contractor to remove the silt build-up within the existing drainage swale located at the outfall of the 18-inch drainage pipe. Riprap pads shall be placed at the outfalls of each drain to minimize erosion and stabilize the swale.
18. We have updated the notes related to the landscaping of the bioretention areas to require that the bottom of the basin also be seeded with a conservation/wildlife seed mix to provide erosion protection while the planting are becoming established.

It should also be noted that we have added a line of overhead poles and wires to the site plans. The applicant has been in discussions with NStar to bring new electrical service to the facility as the previous electrical service is out-dated and not necessary for their operations. As the plans show, we are proposing a number of poles along the existing paved access road to the west of the proposed re-development. A number of these poles will be located within the buffer zone to the existing bordering vegetated wetlands. As we discussed, we will refresh the wetland flags within 100' of this proposed work prior to issuance of the final Order of Conditions.

We feel that we have adequately addressed the Consultant's comments with this letter and the attached plans and documentation and look forward to discussing this exciting project with the Commission at the next Hearing on June 17. Please do not hesitate to contact me should you have any questions or require additional information.

Sincerely,

Field Engineering Co., Inc.



Richard R. Riccio III, P.E.
Project Manager

cc: Judith Nitsch Engineering (Scott Turner)
Eric DeCosta, NWD, Inc.

Attachments

1. Revised Site Development Plan Set (Dated 6/6/14)
2. Stormwater Management System Report Addendum 2 (Dated 6/5/14)
3. Cut Sheets on Fuel Storage System