Stormwater Management System Report
Addendum 2

RAW SEAFOODS INC.

PROPOSED COLD STORAGE FACILITY

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Project No. 2064

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CONSULTING ENGINEERS

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Section 1

Hydrologic Overview

1.0 Purpose of Addendum

The purpose of this Stormwater Management System Report-Addendum 2 is to present the updated Post-Development Hydrologic Analysis to address comments raised by the Conservation Commission Peer Review Consultant in their letter dated November 11, 2015. Revisions to the Post Development Hydrologic Analysis included modifications to the calculation Time of Concentrations for each of the subcatchment areas and the addition of some impervious surface to the subcatchment area to address future parking shown on the plans.

1.1 Pre-Development Hydrologic Summary

The Pre-Development Hydrologic Analysis remains unchanged from the original Stormwater Management System Report. A summary of the pre development hydrologic conditions for the 2, 10, 25, and 100-year storm events is submitted in Table 1.1 below.

Table 1.1 – Pre Development Hydrologic Summary

Storm Event	Analysis Point AP-1 Rate of Flow (c.f.s.)
2-year storm	0.85
10-year storm	3.69
25-year storm	6.23
100-year storm	11.56

1.2 Revised Post-Development Hydrologic Summary

As mentioned above, we have revised the Post-Development Hydrologic Analysis to account for modifications to the Time of Concentrations for each of the subcatchment areas. In addition we have also added impervious surface to subcatchment area Post 3 to account for additional future parking shown on the final drawings. A summary of the post-development hydrologic conditions for the 2, 10, 25, and 100-year storm events is submitted in Table 1.2 below.

Table 1.2 – Post Development Hydrologic Summary

Storm Event	Analysis Point AP-1 Rate of Flow (c.f.s.)
2-year storm	0.80
10-year storm	3.42
25-year storm	5.57
100-year storm	9.97

A summary of the pre and post-development hydrologic conditions for the 2, 10, 25, and 100-year storm events is submitted in Table 1.3 below. Results shown as a “negative” represent a decrease in post development condition rates of runoff.

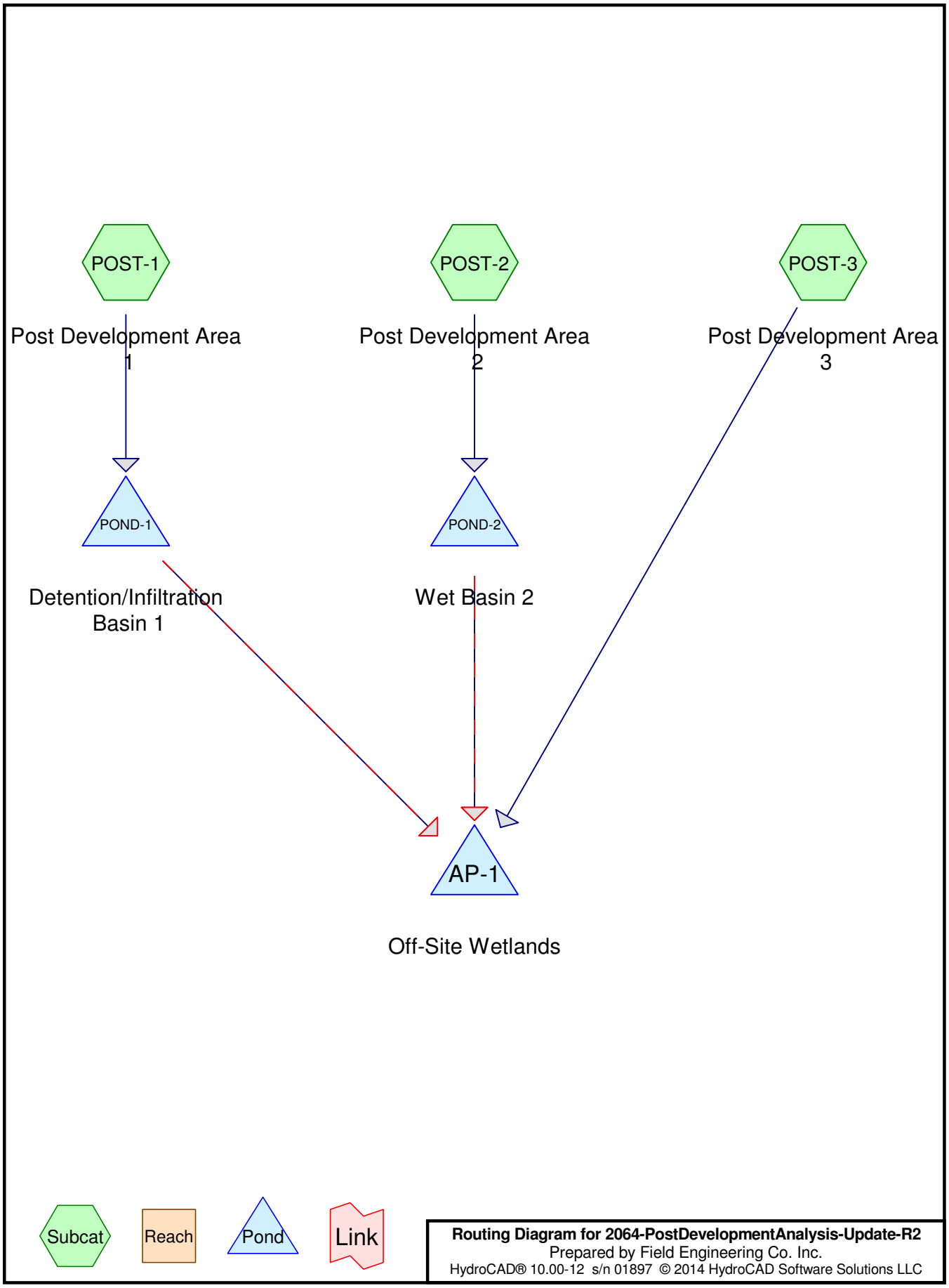
Table 1.3 – Pre-Post Development Hydrologic Results

Storm Event	Analysis Point AP-1 Rate of Flow
2-year storm	-5.9%
10-year storm	-7.3%
25-year storm	-10.6%
100-year storm	-13.8%

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 point. The analysis shows the proposed development of this project area will not result in an increase in the rates of runoff from the project site.

Section 2

Revised Post Development Hydrologic Analysis



Routing Diagram for 2064-PostDevelopmentAnalysis-Update-R2
Prepared by Field Engineering Co. Inc.
HydroCAD® 10.00-12 s/n 01897 © 2014 HydroCAD Software Solutions LLC

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 POST-1: Post Runoff Area=212,995 sf 74.25% Impervious Runoff Depth=2.84"
Flow Length=277' Tc=6.0 min CN=94 Runoff=15.13 cfs 50,331 cf

Subcatchment POST-2: Post Development Runoff Area=40,684 sf 47.95% Impervious Runoff Depth=0.90"
Flow Length=375' Tc=6.0 min CN=68 Runoff=0.87 cfs 3,056 cf

Subcatchment POST-3: Post Runoff Area=205,820 sf 11.90% Impervious Runoff Depth=0.35"
Flow Length=230' Tc=8.6 min CN=55 Runoff=0.77 cfs 5,930 cf

Pond AP-1: Off-Site Wetlands Inflow=0.80 cfs 8,845 cf
Primary=0.80 cfs 8,845 cf

Pond POND-1: Detention/Infiltration Basin Peak Elev=81.87' Storage=18,676 cf Inflow=15.13 cfs 50,331 cf
Discarded=1.60 cfs 50,331 cf Primary=0.00 cfs 0 cf Secondary=0.00 cfs 0 cf Outflow=1.60 cfs 50,331 cf

Pond POND-2: Wet Basin 2 Peak Elev=79.50' Storage=1,804 cf Inflow=0.87 cfs 3,056 cf
Primary=0.04 cfs 2,915 cf Secondary=0.00 cfs 0 cf Outflow=0.04 cfs 2,915 cf

Total Runoff Area = 459,499 sf Runoff Volume = 59,317 cf Average Runoff Depth = 1.55"
56.00% Pervious = 257,339 sf 44.00% Impervious = 202,160 sf

Summary for Subcatchment POST-1: Post Development Area 1

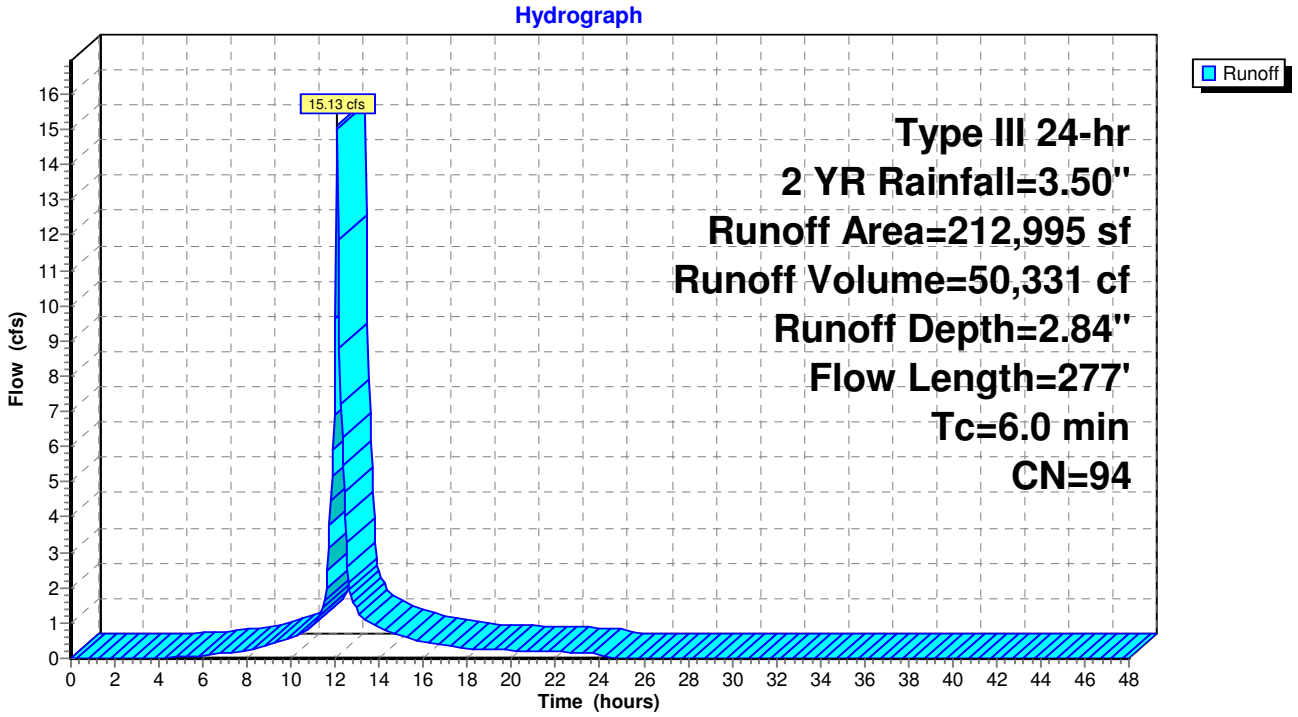
Runoff = 15.13 cfs @ 12.09 hrs, Volume= 50,331 cf, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.50"

	Area (sf)	CN	Description
	19,280	98	Roofs, HSG A
	126,684	98	Roofs, HSG B
	5,222	98	Paved parking, HSG B
	6,964	98	Paved parking, HSG D
	18,833	61	>75% Grass cover, Good, HSG B
	7,124	80	>75% Grass cover, Good, HSG D
*	23,414	98	Water Surface, 0% imp, HSG B (Basin Bottom)
*	5,474	98	Water Surface, 0% imp, HSG D (Basin Bottom)
	212,995	94	Weighted Average
	54,845		25.75% Pervious Area
	158,150		74.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0100	0.09		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
1.9	232	0.0100	2.03		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.2	30	0.0050	3.21	2.52	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
4.8	277	Total, Increased to minimum Tc = 6.0 min			

Subcatchment POST-1: Post Development Area 1



Summary for Subcatchment POST-2: Post Development Area 2

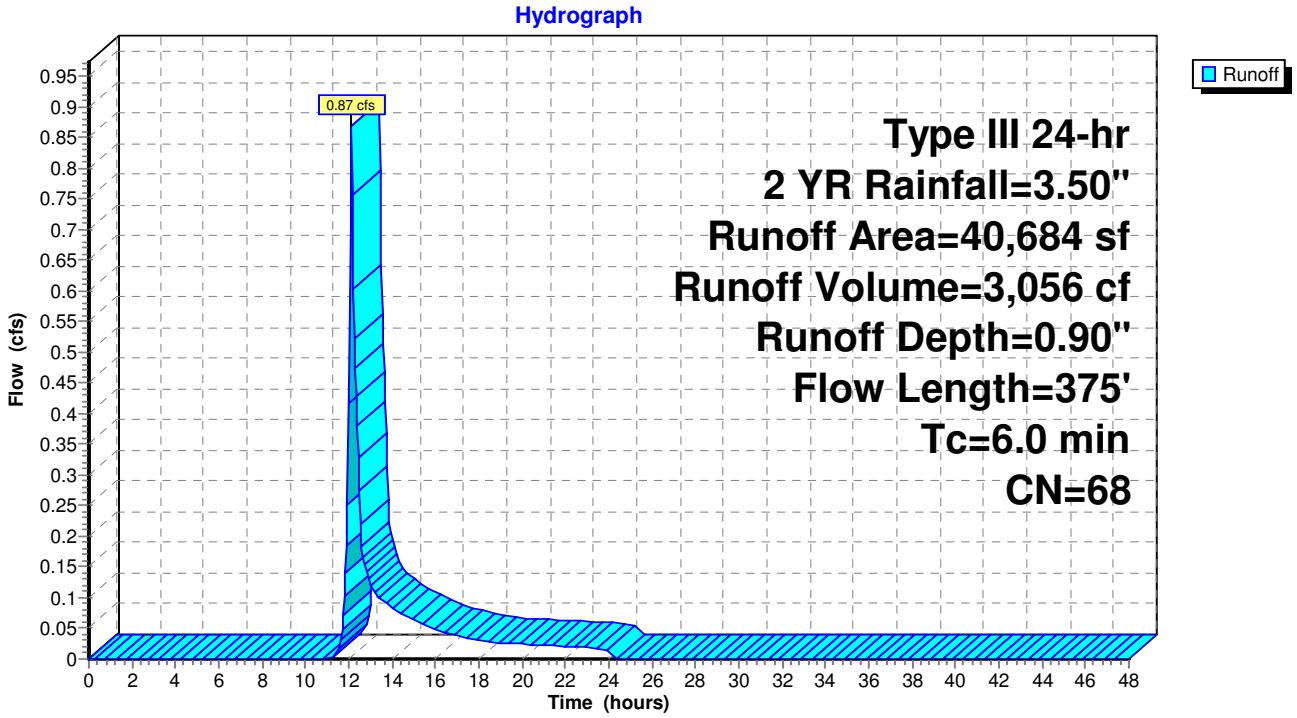
Runoff = 0.87 cfs @ 12.10 hrs, Volume= 3,056 cf, Depth= 0.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
10,044	98	Paved parking, HSG A
9,464	98	Paved parking, HSG B
20,139	39	>75% Grass cover, Good, HSG A
1,037	61	>75% Grass cover, Good, HSG B
40,684	68	Weighted Average
21,176		52.05% Pervious Area
19,508		47.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0100	0.09		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.1	250	0.0100	2.03		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.5	110	0.0075	3.93	3.09	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
5.3	375	Total, Increased to minimum Tc = 6.0 min			

Subcatchment POST-2: Post Development Area 2



Summary for Subcatchment POST-3: Post Development Area 3

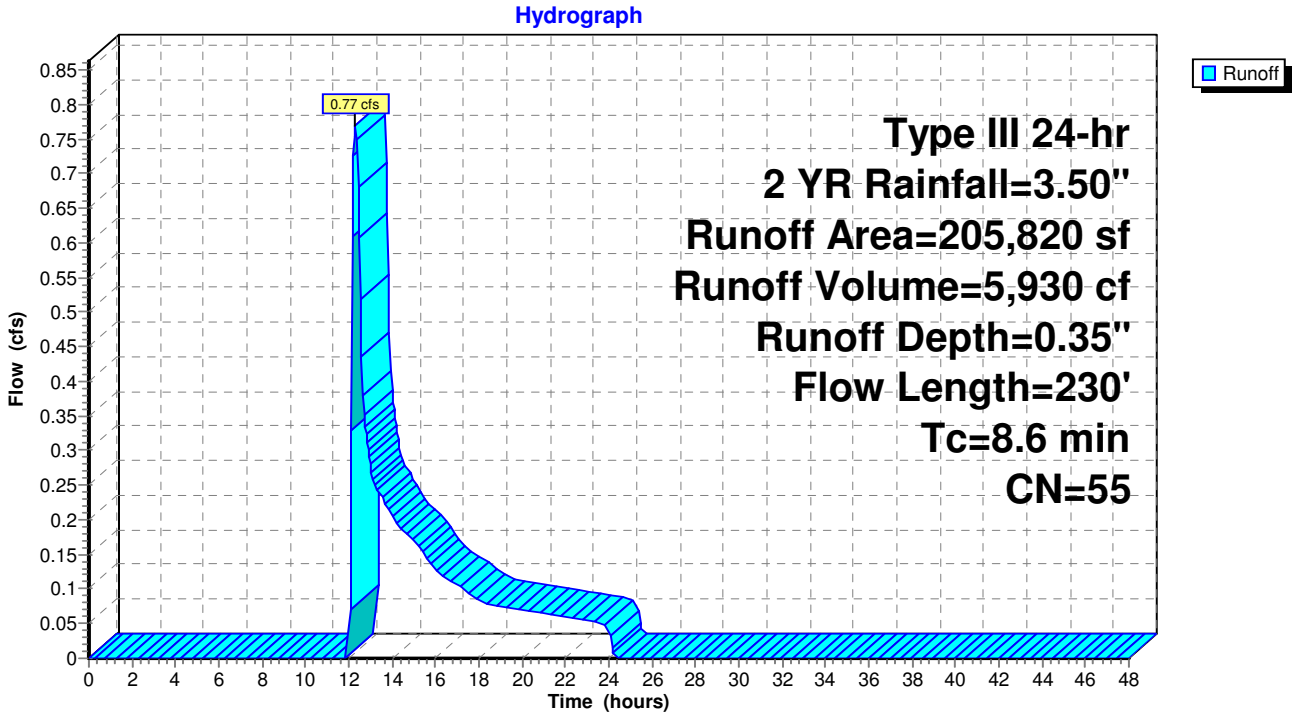
Runoff = 0.77 cfs @ 12.31 hrs, Volume= 5,930 cf, Depth= 0.35"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 2 YR Rainfall=3.50"

Area (sf)	CN	Description
56,448	30	Woods, Good, HSG A
71,512	55	Woods, Good, HSG B
11,545	77	Woods, Good, HSG D
19,166	39	>75% Grass cover, Good, HSG A
6,326	61	>75% Grass cover, Good, HSG B
1,640	76	Gravel roads, HSG A
14,681	85	Gravel roads, HSG B
13,377	98	Paved parking, HSG A
9,625	98	Paved parking, HSG B
1,500	98	Paved parking, HSG D
205,820	55	Weighted Average
181,318		88.10% Pervious Area
24,502		11.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0150	0.14		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.6	180	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.6	230	Total			

Subcatchment POST-3: Post Development Area 3



Summary for Pond AP-1: Off-Site Wetlands

Analysis Point 1 is taken at the boundary of the wetlands surrounding the property which contribute flow to the cross culverts under Samuel Barnet Boulevard.

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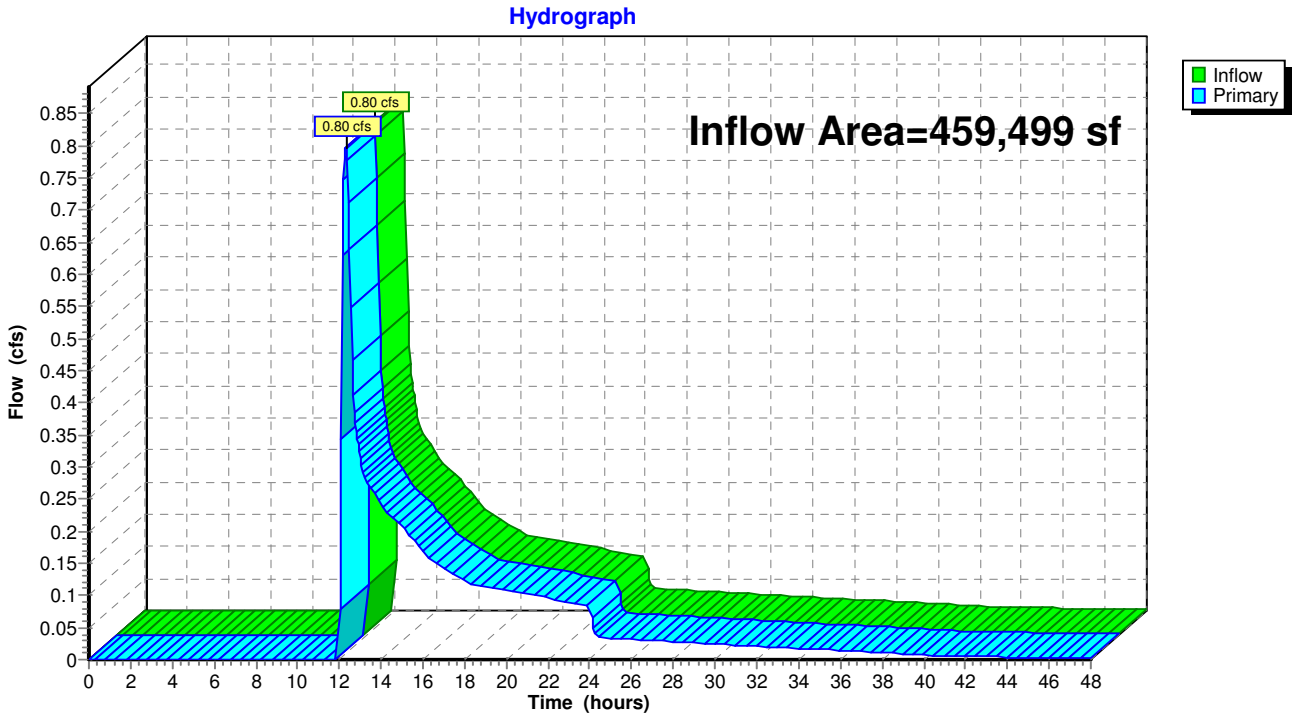
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	459,499 sf,	44.00% Impervious,	Inflow Depth >	0.23"	for 2 YR event
Inflow =	0.80 cfs @	12.31 hrs,	Volume=	8,845 cf	
Primary =	0.80 cfs @	12.31 hrs,	Volume=	8,845 cf,	Atten= 0%, Lag= 0.0 min

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

Pond AP-1: Off-Site Wetlands



Summary for Pond POND-1: Detention/Infiltration Basin 1

Inflow Area =	212,995 sf,	74.25% Impervious,	Inflow Depth =	2.84"	for 2 YR event
Inflow =	15.13 cfs @	12.09 hrs,	Volume=	50,331 cf	
Outflow =	1.60 cfs @	12.84 hrs,	Volume=	50,331 cf,	Atten= 89%, Lag= 44.9 min
Discarded =	1.60 cfs @	12.84 hrs,	Volume=	50,331 cf	
Primary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 81.87' @ 12.84 hrs Surf.Area= 28,591 sf Storage= 18,676 cf

Plug-Flow detention time= 92.4 min calculated for 50,331 cf (100% of inflow)
Center-of-Mass det. time= 92.3 min (876.5 - 784.2)

Volume	Invert	Avail.Storage	Storage Description
#1	81.20'	85,136 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.20	27,043	0	0
82.00	28,888	22,372	22,372
83.00	31,245	30,067	52,439
84.00	34,150	32,698	85,136

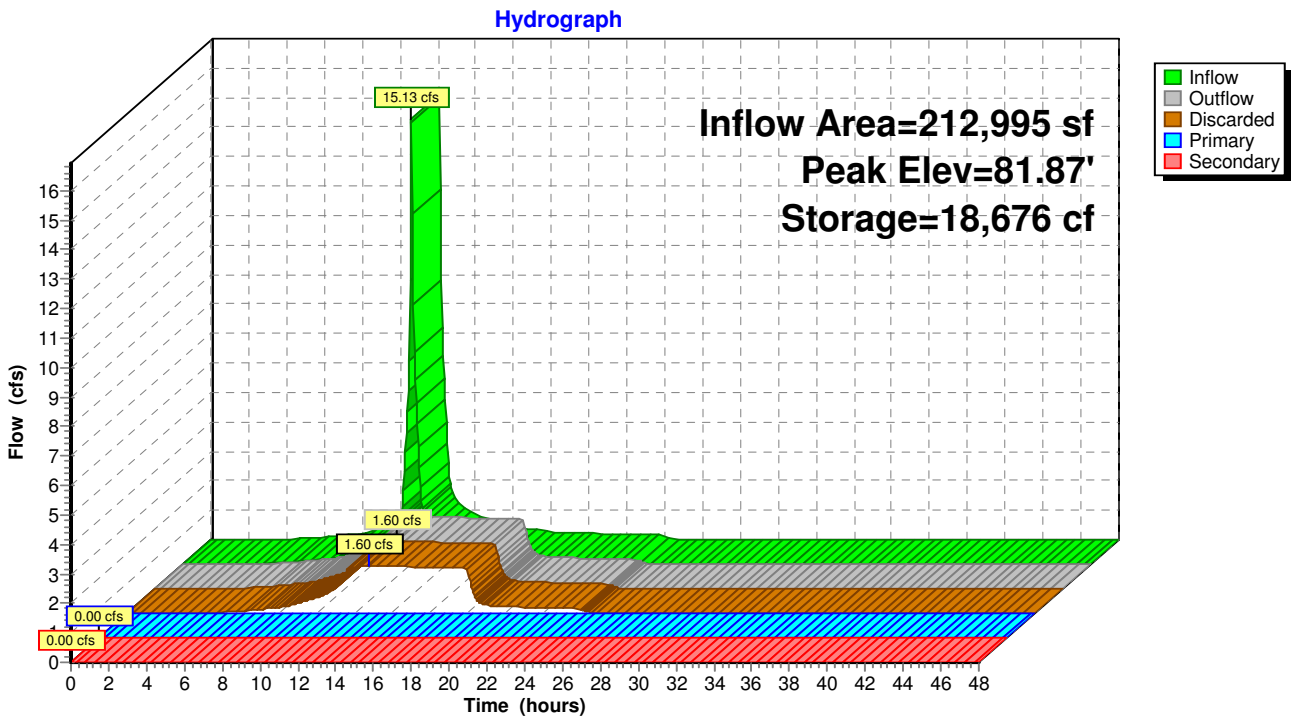
Device	Routing	Invert	Outlet Devices
#1	Primary	81.20'	**12.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.20' / 80.65' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	81.95'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	82.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	83.00'	**15.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	81.20'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=1.60 cfs @ 12.84 hrs HW=81.87' (Free Discharge)
└─**5=Exfiltration** (Exfiltration Controls 1.60 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.20' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Controls 0.00 cfs)
  ├─**2=Orifice/Grate** (Controls 0.00 cfs)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.20' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond POND-1: Detention/Infiltration Basin 1



Summary for Pond POND-2: Wet Basin 2

Inflow Area = 40,684 sf, 47.95% Impervious, Inflow Depth = 0.90" for 2 YR event
Inflow = 0.87 cfs @ 12.10 hrs, Volume= 3,056 cf
Outflow = 0.04 cfs @ 16.91 hrs, Volume= 2,915 cf, Atten= 96%, Lag= 288.5 min
Primary = 0.04 cfs @ 16.91 hrs, Volume= 2,915 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 79.50' @ 16.91 hrs Surf.Area= 3,835 sf Storage= 1,804 cf

Plug-Flow detention time= 600.9 min calculated for 2,912 cf (95% of inflow)
Center-of-Mass det. time= 577.6 min (1,453.7 - 876.0)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	28,790 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

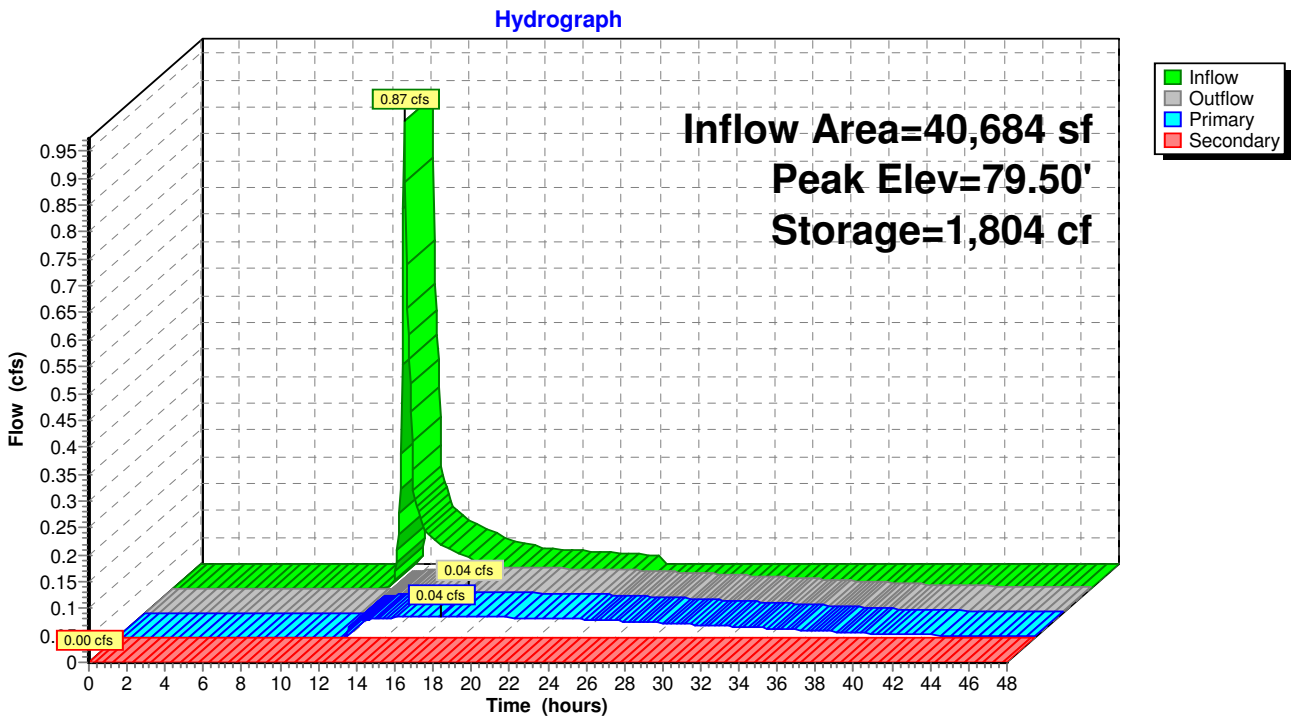
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	3,428	0	0
80.00	4,248	3,838	3,838
81.00	5,125	4,687	8,525
82.00	6,058	5,592	14,116
83.00	7,371	6,715	20,831
84.00	8,548	7,960	28,790

Device	Routing	Invert	Outlet Devices
#1	Primary	79.00'	**12.0" Round Culvert** L= 215.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 79.00' / 77.70' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	79.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	82.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	83.00'	**15.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.04 cfs @ 16.91 hrs HW=79.50' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.04 cfs of 0.79 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.04 cfs @ 3.17 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.00' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond POND-2: Wet Basin 2



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 POST-1: Post Runoff Area=212,995 sf 74.25% Impervious Runoff Depth=4.11"
Flow Length=277' Tc=6.0 min CN=94 Runoff=21.46 cfs 72,964 cf

Subcatchment POST-2: Post Development Runoff Area=40,684 sf 47.95% Impervious Runoff Depth=1.74"
Flow Length=375' Tc=6.0 min CN=68 Runoff=1.81 cfs 5,894 cf

Subcatchment POST-3: Post Runoff Area=205,820 sf 11.90% Impervious Runoff Depth=0.88"
Flow Length=230' Tc=8.6 min CN=55 Runoff=3.38 cfs 15,131 cf

Pond AP-1: Off-Site Wetlands Inflow=3.42 cfs 21,558 cf
Primary=3.42 cfs 21,558 cf

Pond POND-1: Detention/Infiltration Basin Peak Elev=82.25' Storage=29,755 cf Inflow=21.46 cfs 72,964 cf
Discarded=1.64 cfs 71,994 cf Primary=0.10 cfs 971 cf Secondary=0.00 cfs 0 cf Outflow=1.74 cfs 72,964 cf

Pond POND-2: Wet Basin 2 Peak Elev=80.01' Storage=3,899 cf Inflow=1.81 cfs 5,894 cf
Primary=0.06 cfs 5,456 cf Secondary=0.00 cfs 0 cf Outflow=0.06 cfs 5,456 cf

Total Runoff Area = 459,499 sf Runoff Volume = 93,989 cf Average Runoff Depth = 2.45"
56.00% Pervious = 257,339 sf 44.00% Impervious = 202,160 sf

Summary for Subcatchment POST-1: Post Development Area 1

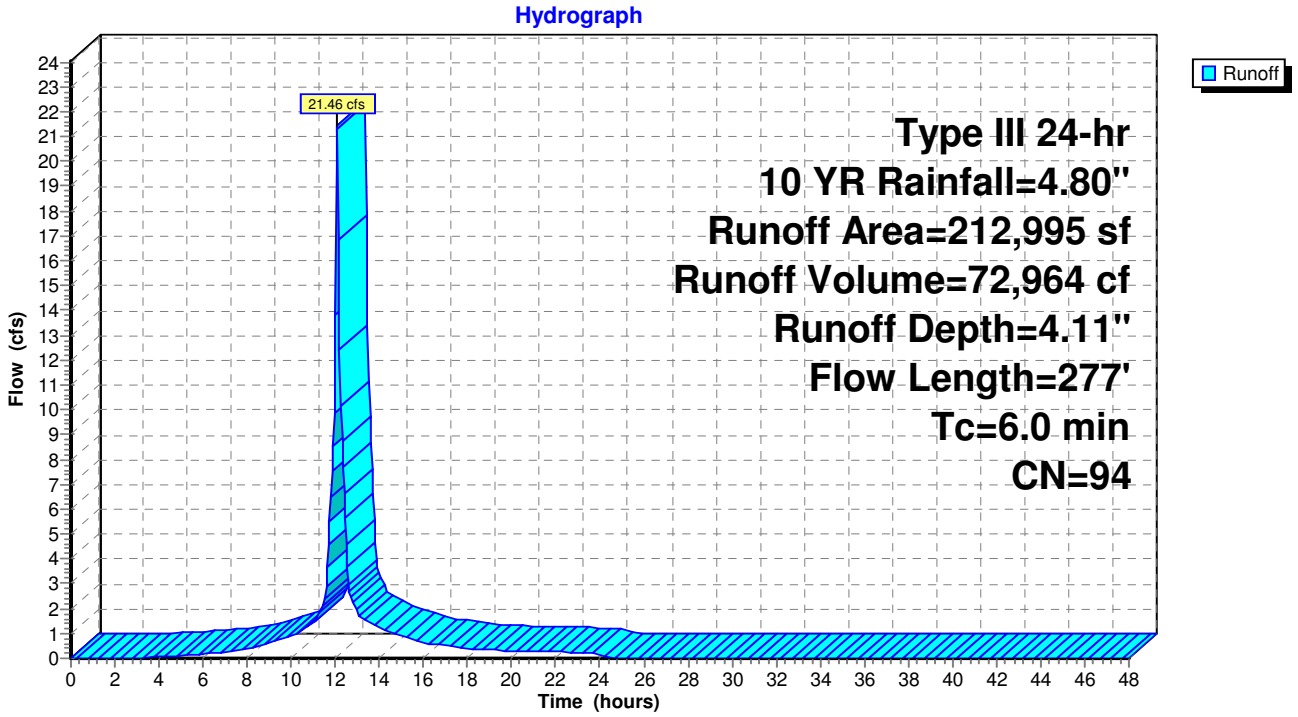
Runoff = 21.46 cfs @ 12.09 hrs, Volume= 72,964 cf, Depth= 4.11"

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

	Area (sf)	CN	Description
	19,280	98	Roofs, HSG A
	126,684	98	Roofs, HSG B
	5,222	98	Paved parking, HSG B
	6,964	98	Paved parking, HSG D
	18,833	61	>75% Grass cover, Good, HSG B
	7,124	80	>75% Grass cover, Good, HSG D
*	23,414	98	Water Surface, 0% imp, HSG B (Basin Bottom)
*	5,474	98	Water Surface, 0% imp, HSG D (Basin Bottom)
	212,995	94	Weighted Average
	54,845		25.75% Pervious Area
	158,150		74.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0100	0.09		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
1.9	232	0.0100	2.03		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.2	30	0.0050	3.21	2.52	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
4.8	277	Total, Increased to minimum Tc = 6.0 min			

Subcatchment POST-1: Post Development Area 1



Summary for Subcatchment POST-2: Post Development Area 2

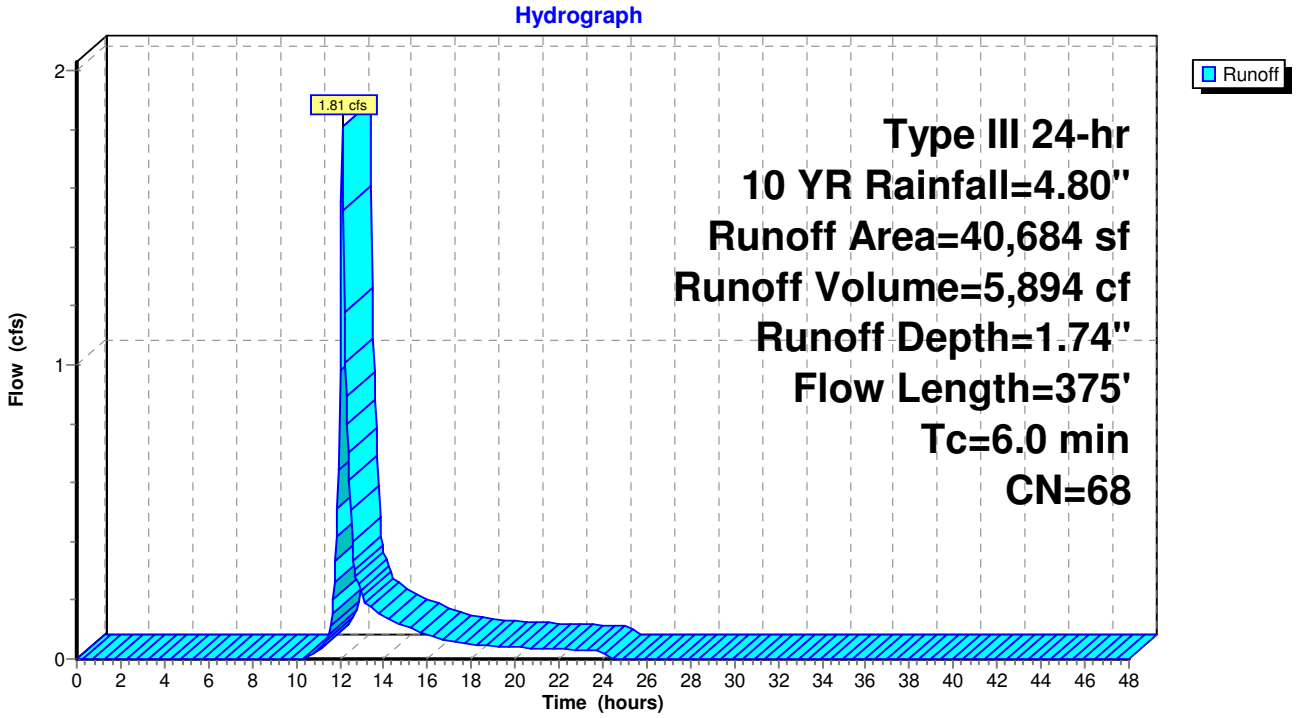
Runoff = 1.81 cfs @ 12.10 hrs, Volume= 5,894 cf, Depth= 1.74"

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

Area (sf)	CN	Description
10,044	98	Paved parking, HSG A
9,464	98	Paved parking, HSG B
20,139	39	>75% Grass cover, Good, HSG A
1,037	61	>75% Grass cover, Good, HSG B
40,684	68	Weighted Average
21,176		52.05% Pervious Area
19,508		47.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0100	0.09		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.1	250	0.0100	2.03		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.5	110	0.0075	3.93	3.09	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
5.3	375	Total, Increased to minimum Tc = 6.0 min			

Subcatchment POST-2: Post Development Area 2



Summary for Subcatchment POST-3: Post Development Area 3

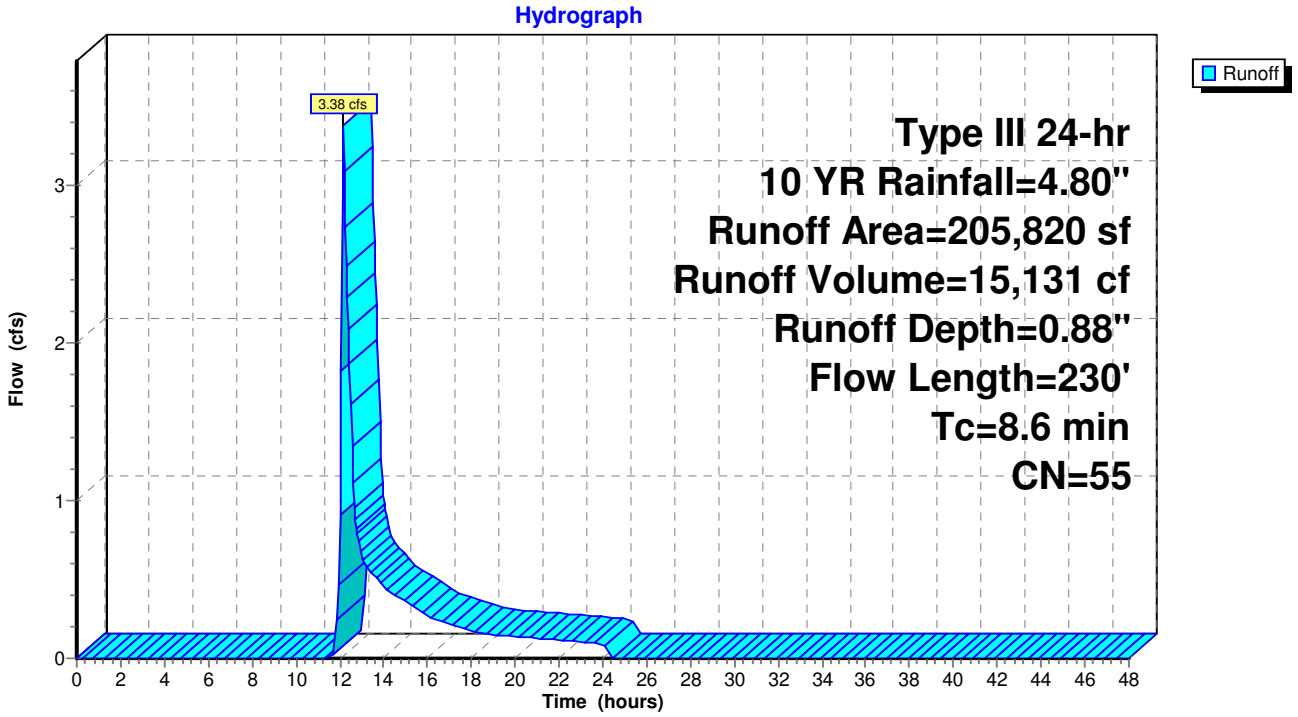
Runoff = 3.38 cfs @ 12.16 hrs, Volume= 15,131 cf, Depth= 0.88"

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

Area (sf)	CN	Description
56,448	30	Woods, Good, HSG A
71,512	55	Woods, Good, HSG B
11,545	77	Woods, Good, HSG D
19,166	39	>75% Grass cover, Good, HSG A
6,326	61	>75% Grass cover, Good, HSG B
1,640	76	Gravel roads, HSG A
14,681	85	Gravel roads, HSG B
13,377	98	Paved parking, HSG A
9,625	98	Paved parking, HSG B
1,500	98	Paved parking, HSG D
205,820	55	Weighted Average
181,318		88.10% Pervious Area
24,502		11.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0150	0.14		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.6	180	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.6	230	Total			

Subcatchment POST-3: Post Development Area 3



Summary for Pond AP-1: Off-Site Wetlands

Analysis Point 1 is taken at the boundary of the wetlands surrounding the property which contribute flow to the cross culverts under Samuel Barnet Boulevard.

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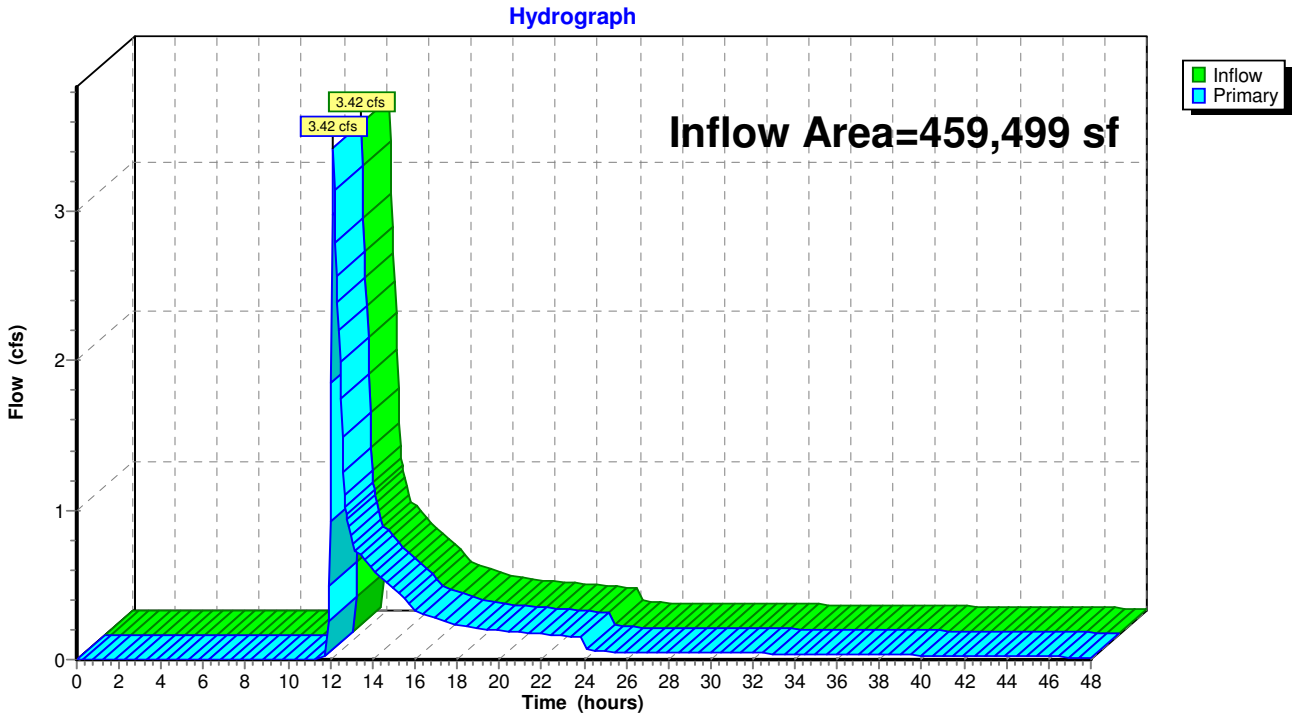
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	459,499 sf,	44.00% Impervious,	Inflow Depth >	0.56"	for 10 YR event
Inflow =	3.42 cfs @	12.16 hrs,	Volume=	21,558 cf	
Primary =	3.42 cfs @	12.16 hrs,	Volume=	21,558 cf,	Atten= 0%, Lag= 0.0 min

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

Pond AP-1: Off-Site Wetlands



Summary for Pond POND-1: Detention/Infiltration Basin 1

Inflow Area =	212,995 sf,	74.25% Impervious,	Inflow Depth =	4.11"	for 10 YR event
Inflow =	21.46 cfs @	12.09 hrs,	Volume=	72,964 cf	
Outflow =	1.74 cfs @	13.07 hrs,	Volume=	72,964 cf,	Atten= 92%, Lag= 59.2 min
Discarded =	1.64 cfs @	13.07 hrs,	Volume=	71,994 cf	
Primary =	0.10 cfs @	13.07 hrs,	Volume=	971 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 82.25' @ 13.07 hrs Surf.Area= 29,484 sf Storage= 29,755 cf

Plug-Flow detention time= 146.6 min calculated for 72,888 cf (100% of inflow)
Center-of-Mass det. time= 146.5 min (921.2 - 774.6)

Volume	Invert	Avail.Storage	Storage Description
#1	81.20'	85,136 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.20	27,043	0	0
82.00	28,888	22,372	22,372
83.00	31,245	30,067	52,439
84.00	34,150	32,698	85,136

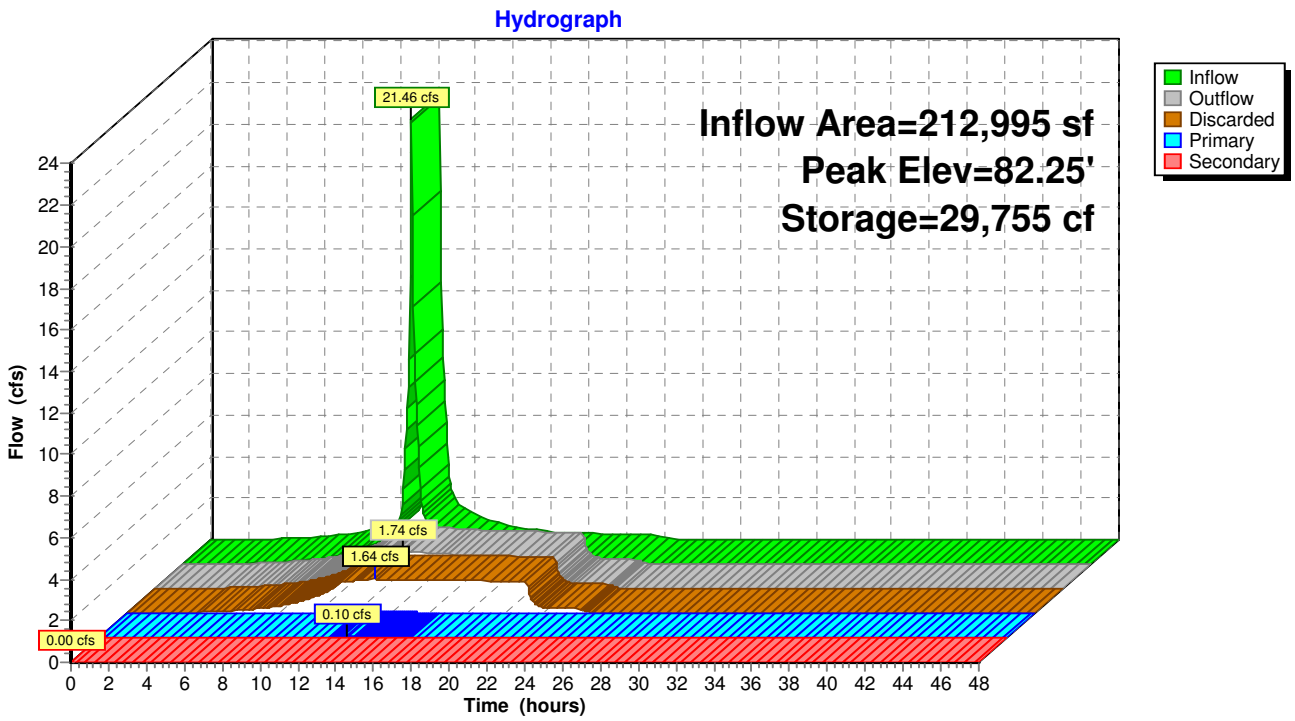
Device	Routing	Invert	Outlet Devices
#1	Primary	81.20'	**12.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.20' / 80.65' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	81.95'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	82.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	83.00'	**15.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	81.20'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=1.64 cfs @ 13.07 hrs HW=82.25' (Free Discharge)
└─**5=Exfiltration** (Exfiltration Controls 1.64 cfs)

Primary OutFlow Max=0.10 cfs @ 13.07 hrs HW=82.25' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.10 cfs of 2.81 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.10 cfs @ 2.03 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.20' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond POND-1: Detention/Infiltration Basin 1



Summary for Pond POND-2: Wet Basin 2

Inflow Area =	40,684 sf,	47.95% Impervious,	Inflow Depth =	1.74"	for 10 YR event
Inflow =	1.81 cfs @	12.10 hrs,	Volume=	5,894 cf	
Outflow =	0.06 cfs @	17.47 hrs,	Volume=	5,456 cf,	Atten= 97%, Lag= 322.5 min
Primary =	0.06 cfs @	17.47 hrs,	Volume=	5,456 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 80.01' @ 17.47 hrs Surf.Area= 4,261 sf Storage= 3,899 cf

Plug-Flow detention time= 793.3 min calculated for 5,451 cf (92% of inflow)
Center-of-Mass det. time= 756.2 min (1,611.4 - 855.2)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	28,790 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

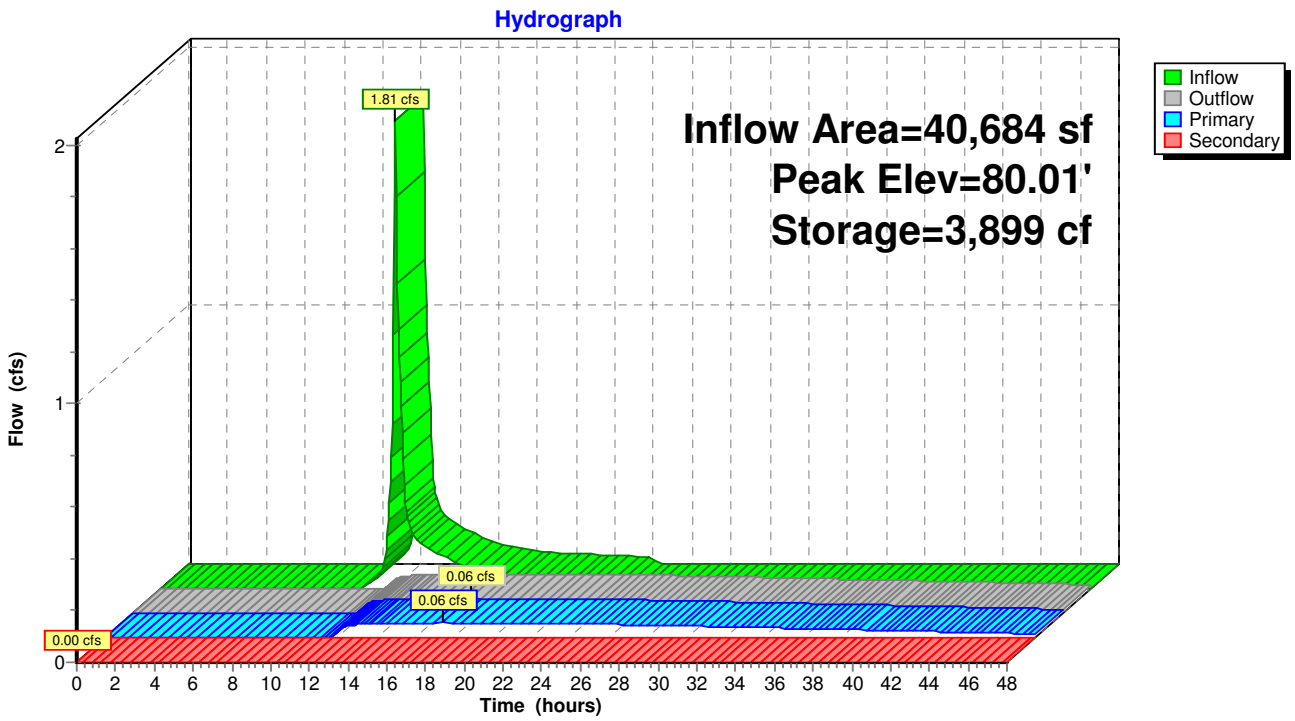
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	3,428	0	0
80.00	4,248	3,838	3,838
81.00	5,125	4,687	8,525
82.00	6,058	5,592	14,116
83.00	7,371	6,715	20,831
84.00	8,548	7,960	28,790

Device	Routing	Invert	Outlet Devices
#1	Primary	79.00'	**12.0" Round Culvert** L= 215.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 79.00' / 77.70' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	79.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	82.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	83.00'	**15.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.06 cfs @ 17.47 hrs HW=80.01' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.06 cfs of 2.47 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.06 cfs @ 4.70 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.00' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond POND-2: Wet Basin 2



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 POST-1: Post Runoff Area=212,995 sf 74.25% Impervious Runoff Depth=4.90"
Flow Length=277' Tc=6.0 min CN=94 Runoff=25.33 cfs 86,986 cf

Subcatchment POST-2: Post Development Runoff Area=40,684 sf 47.95% Impervious Runoff Depth=2.32"
Flow Length=375' Tc=6.0 min CN=68 Runoff=2.45 cfs 7,858 cf

Subcatchment POST-3: Post Runoff Area=205,820 sf 11.90% Impervious Runoff Depth=1.29"
Flow Length=230' Tc=8.6 min CN=55 Runoff=5.51 cfs 22,186 cf

Pond AP-1: Off-Site Wetlands Inflow=5.57 cfs 32,566 cf
Primary=5.57 cfs 32,566 cf

Pond POND-1: Detention/Infiltration Basin Peak Elev=82.48' Storage=36,520 cf Inflow=25.33 cfs 86,986 cf
Discarded=1.67 cfs 83,488 cf Primary=0.45 cfs 3,498 cf Secondary=0.00 cfs 0 cf Outflow=2.12 cfs 86,986 cf

Pond POND-2: Wet Basin 2 Peak Elev=80.36' Storage=5,428 cf Inflow=2.45 cfs 7,858 cf
Primary=0.07 cfs 6,882 cf Secondary=0.00 cfs 0 cf Outflow=0.07 cfs 6,882 cf

Total Runoff Area = 459,499 sf Runoff Volume = 117,030 cf Average Runoff Depth = 3.06"
56.00% Pervious = 257,339 sf 44.00% Impervious = 202,160 sf

Summary for Subcatchment POST-1: Post Development Area 1

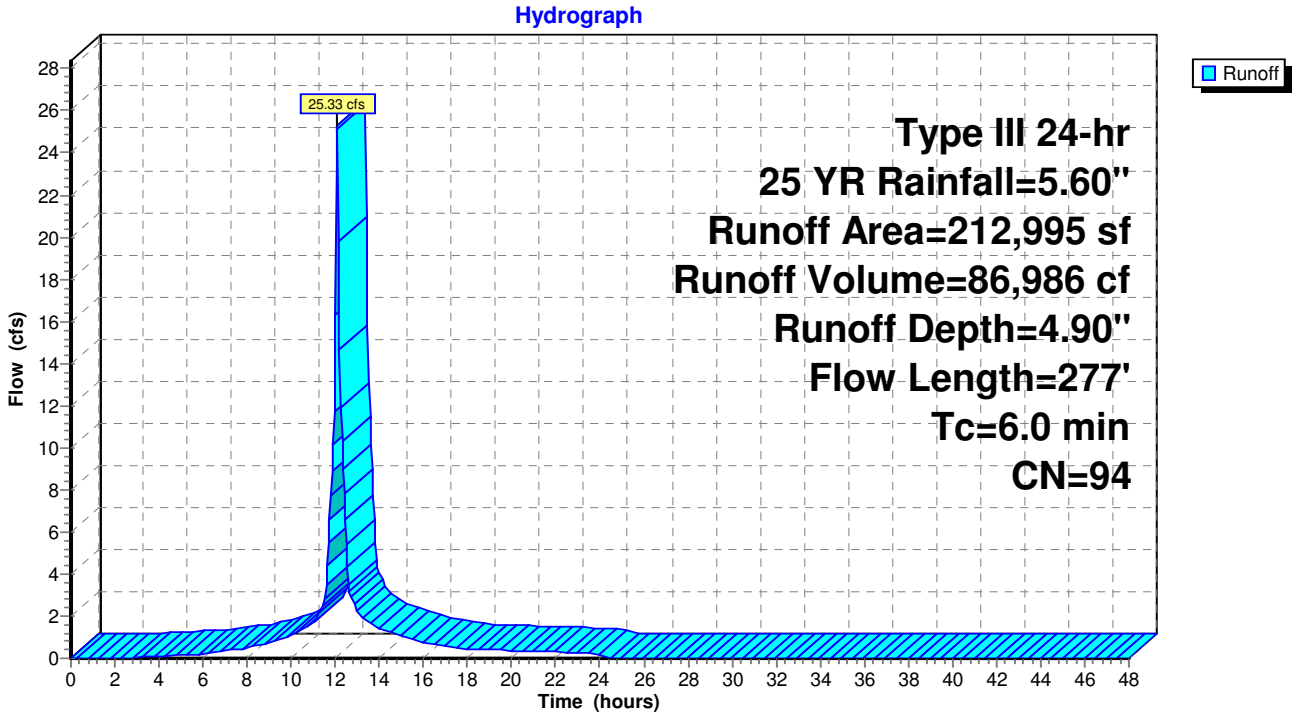
Runoff = 25.33 cfs @ 12.09 hrs, Volume= 86,986 cf, Depth= 4.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.60"

	Area (sf)	CN	Description
	19,280	98	Roofs, HSG A
	126,684	98	Roofs, HSG B
	5,222	98	Paved parking, HSG B
	6,964	98	Paved parking, HSG D
	18,833	61	>75% Grass cover, Good, HSG B
	7,124	80	>75% Grass cover, Good, HSG D
*	23,414	98	Water Surface, 0% imp, HSG B (Basin Bottom)
*	5,474	98	Water Surface, 0% imp, HSG D (Basin Bottom)
	212,995	94	Weighted Average
	54,845		25.75% Pervious Area
	158,150		74.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0100	0.09		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
1.9	232	0.0100	2.03		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.2	30	0.0050	3.21	2.52	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
4.8	277	Total, Increased to minimum Tc = 6.0 min			

Subcatchment POST-1: Post Development Area 1



Summary for Subcatchment POST-2: Post Development Area 2

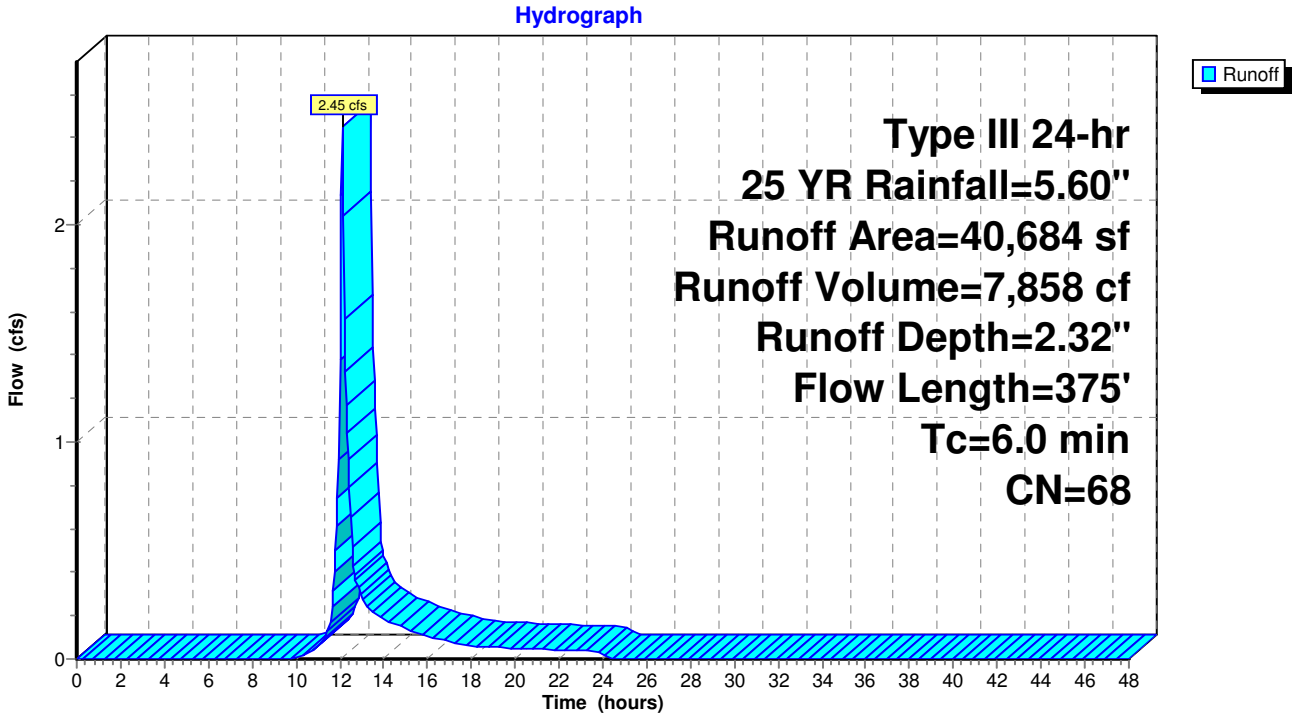
Runoff = 2.45 cfs @ 12.10 hrs, Volume= 7,858 cf, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
10,044	98	Paved parking, HSG A
9,464	98	Paved parking, HSG B
20,139	39	>75% Grass cover, Good, HSG A
1,037	61	>75% Grass cover, Good, HSG B
40,684	68	Weighted Average
21,176		52.05% Pervious Area
19,508		47.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0100	0.09		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.1	250	0.0100	2.03		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.5	110	0.0075	3.93	3.09	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
5.3	375	Total, Increased to minimum Tc = 6.0 min			

Subcatchment POST-2: Post Development Area 2



Summary for Subcatchment POST-3: Post Development Area 3

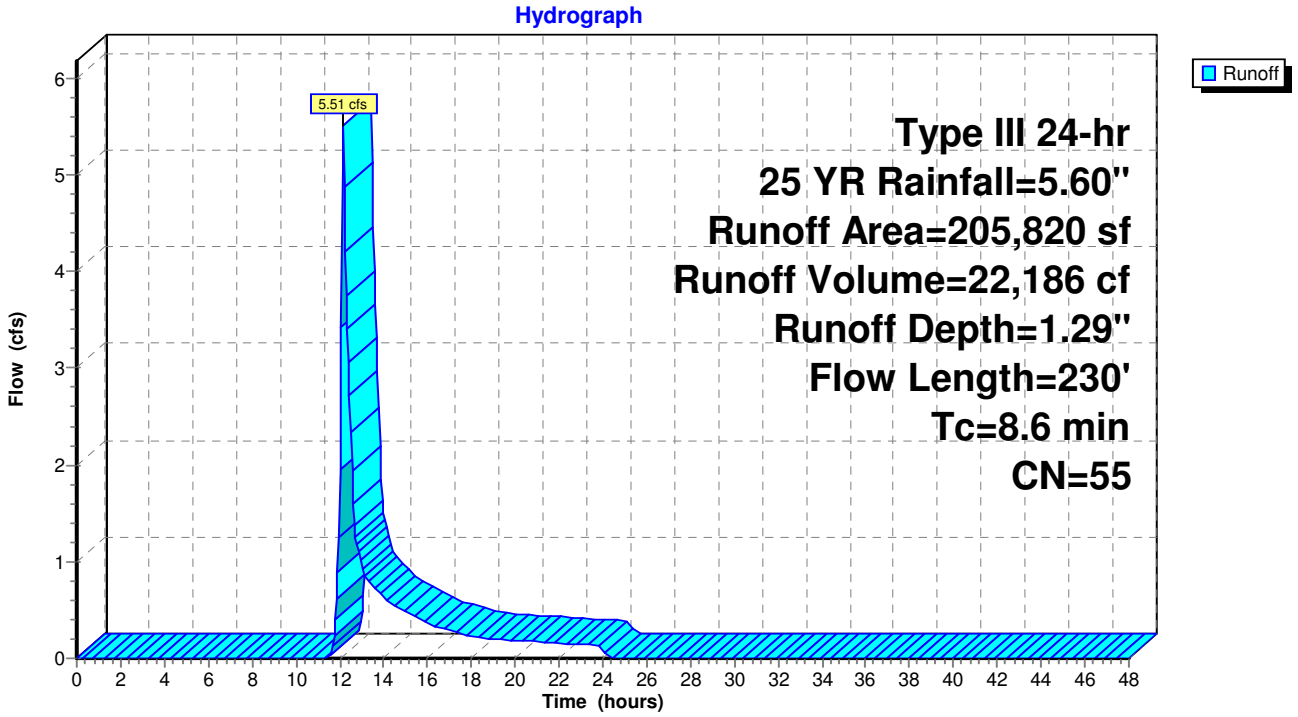
Runoff = 5.51 cfs @ 12.15 hrs, Volume= 22,186 cf, Depth= 1.29"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
56,448	30	Woods, Good, HSG A
71,512	55	Woods, Good, HSG B
11,545	77	Woods, Good, HSG D
19,166	39	>75% Grass cover, Good, HSG A
6,326	61	>75% Grass cover, Good, HSG B
1,640	76	Gravel roads, HSG A
14,681	85	Gravel roads, HSG B
13,377	98	Paved parking, HSG A
9,625	98	Paved parking, HSG B
1,500	98	Paved parking, HSG D
205,820	55	Weighted Average
181,318		88.10% Pervious Area
24,502		11.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0150	0.14		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.6	180	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.6	230	Total			

Subcatchment POST-3: Post Development Area 3



Summary for Pond AP-1: Off-Site Wetlands

Analysis Point 1 is taken at the boundary of the wetlands surrounding the property which contribute flow to the cross culverts under Samuel Barnet Boulevard.

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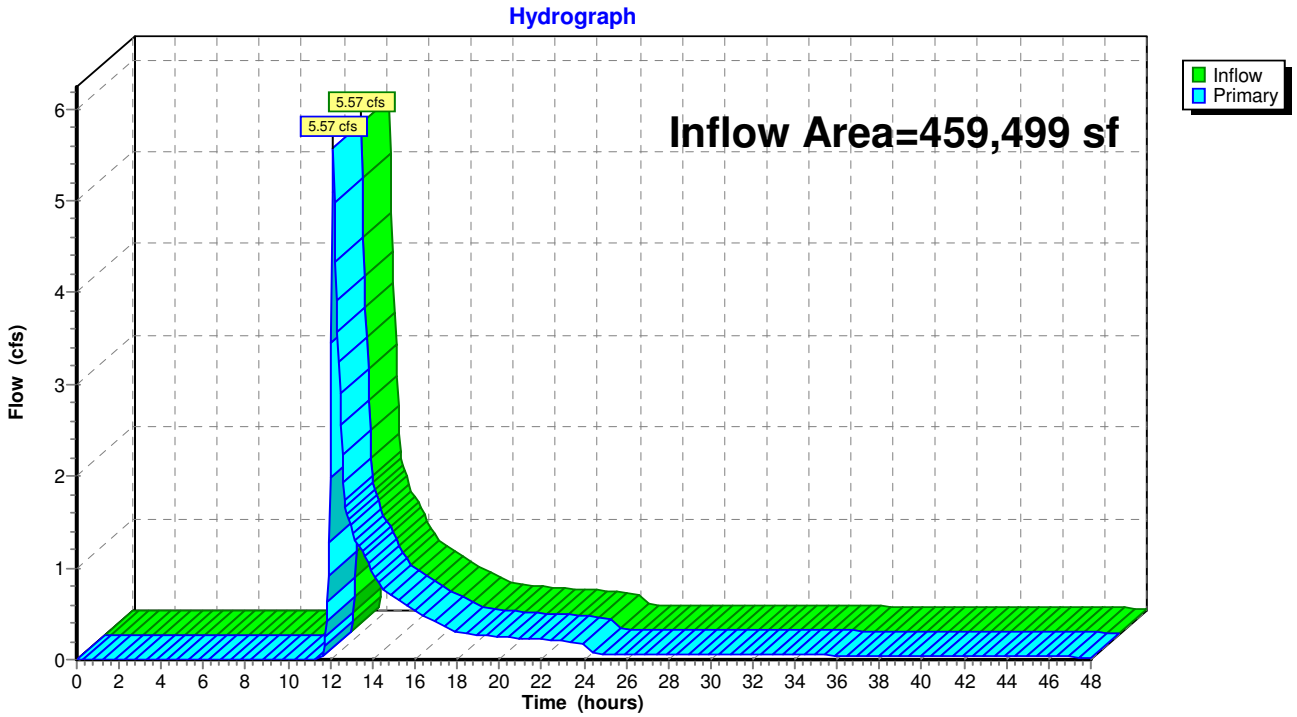
[40] Hint: Not Described (Outflow=Inflow)

Inflow Area =	459,499 sf,	44.00% Impervious,	Inflow Depth >	0.85"	for 25 YR event
Inflow =	5.57 cfs @	12.15 hrs,	Volume=	32,566 cf	
Primary =	5.57 cfs @	12.15 hrs,	Volume=	32,566 cf,	Atten= 0%, Lag= 0.0 min

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

Pond AP-1: Off-Site Wetlands



Summary for Pond POND-1: Detention/Infiltration Basin 1

Inflow Area =	212,995 sf,	74.25% Impervious,	Inflow Depth =	4.90"	for 25 YR event
Inflow =	25.33 cfs @	12.09 hrs,	Volume=	86,986 cf	
Outflow =	2.12 cfs @	13.04 hrs,	Volume=	86,986 cf,	Atten= 92%, Lag= 57.1 min
Discarded =	1.67 cfs @	13.04 hrs,	Volume=	83,488 cf	
Primary =	0.45 cfs @	13.04 hrs,	Volume=	3,498 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 82.48' @ 13.04 hrs Surf.Area= 30,020 sf Storage= 36,520 cf

Plug-Flow detention time= 172.2 min calculated for 86,895 cf (100% of inflow)
Center-of-Mass det. time= 172.1 min (942.4 - 770.4)

Volume	Invert	Avail.Storage	Storage Description
#1	81.20'	85,136 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.20	27,043	0	0
82.00	28,888	22,372	22,372
83.00	31,245	30,067	52,439
84.00	34,150	32,698	85,136

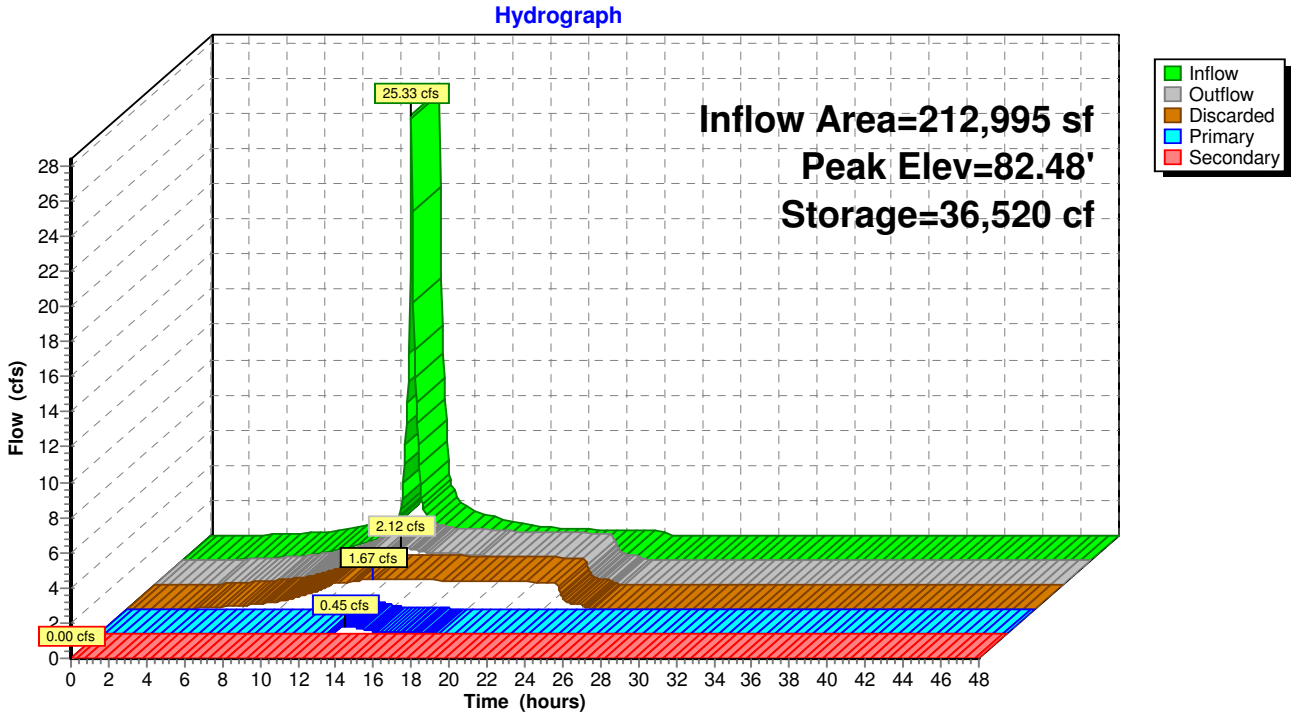
Device	Routing	Invert	Outlet Devices
#1	Primary	81.20'	**12.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.20' / 80.65' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	81.95'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	82.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	83.00'	**15.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	81.20'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=1.67 cfs @ 13.04 hrs HW=82.48' (Free Discharge)
└─**5=Exfiltration** (Exfiltration Controls 1.67 cfs)

Primary OutFlow Max=0.45 cfs @ 13.04 hrs HW=82.48' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.45 cfs of 3.34 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.15 cfs @ 3.07 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 0.30 cfs @ 0.93 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.20' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond POND-1: Detention/Infiltration Basin 1



Summary for Pond POND-2: Wet Basin 2

Inflow Area =	40,684 sf, 47.95% Impervious,	Inflow Depth =	2.32"	for 25 YR event	
Inflow =	2.45 cfs @	12.10 hrs, Volume=	7,858 cf		
Outflow =	0.07 cfs @	17.76 hrs, Volume=	6,882 cf,	Atten= 97%,	Lag= 339.7 min
Primary =	0.07 cfs @	17.76 hrs, Volume=	6,882 cf		
Secondary =	0.00 cfs @	0.00 hrs, Volume=	0 cf		

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 80.36' @ 17.76 hrs Surf.Area= 4,564 sf Storage= 5,428 cf

Plug-Flow detention time= 870.0 min calculated for 6,882 cf (88% of inflow)
Center-of-Mass det. time= 812.4 min (1,659.0 - 846.6)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	28,790 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

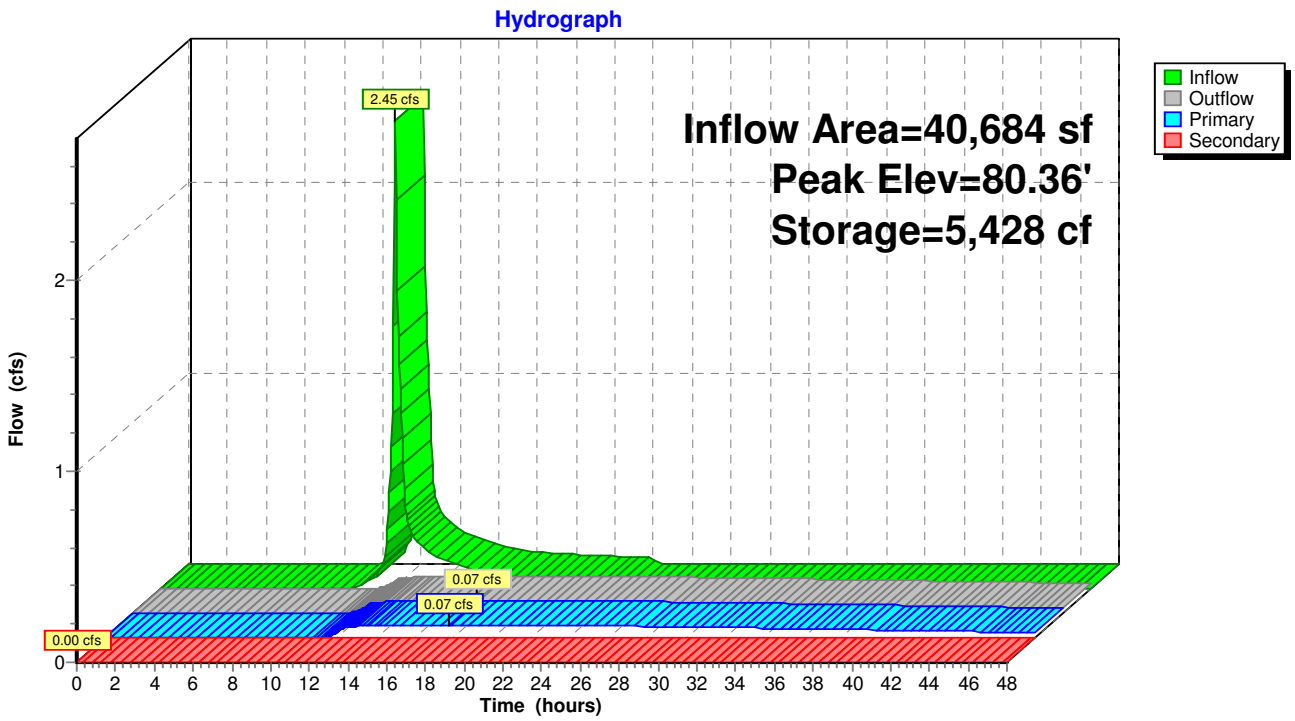
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	3,428	0	0
80.00	4,248	3,838	3,838
81.00	5,125	4,687	8,525
82.00	6,058	5,592	14,116
83.00	7,371	6,715	20,831
84.00	8,548	7,960	28,790

Device	Routing	Invert	Outlet Devices
#1	Primary	79.00'	**12.0" Round Culvert** L= 215.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 79.00' / 77.70' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	79.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	82.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	83.00'	**15.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.07 cfs @ 17.76 hrs HW=80.36' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.07 cfs of 2.83 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 5.49 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.00' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond POND-2: Wet Basin 2



Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 POST-1: Post Runoff Area=212,995 sf 74.25% Impervious Runoff Depth=6.29"
Flow Length=277' Tc=6.0 min CN=94 Runoff=32.05 cfs 111,615 cf

Subcatchment POST-2: Post Development Runoff Area=40,684 sf 47.95% Impervious Runoff Depth=3.41"
Flow Length=375' Tc=6.0 min CN=68 Runoff=3.65 cfs 11,562 cf

Subcatchment POST-3: Post Runoff Area=205,820 sf 11.90% Impervious Runoff Depth=2.12"
Flow Length=230' Tc=8.6 min CN=55 Runoff=9.82 cfs 36,428 cf

Pond AP-1: Off-Site Wetlands Inflow=9.97 cfs 62,832 cf
Primary=9.97 cfs 62,832 cf

Pond POND-1: Detention/Infiltration Peak Elev=82.77' Storage=45,171 cf Inflow=32.05 cfs 111,615 cf
Discarded=1.71 cfs 94,258 cf Primary=3.03 cfs 17,356 cf Secondary=0.00 cfs 0 cf Outflow=4.74 cfs 111,615 cf

Pond POND-2: Wet Basin 2 Peak Elev=80.98' Storage=8,408 cf Inflow=3.65 cfs 11,562 cf
Primary=0.08 cfs 9,048 cf Secondary=0.00 cfs 0 cf Outflow=0.08 cfs 9,048 cf

Total Runoff Area = 459,499 sf Runoff Volume = 159,604 cf Average Runoff Depth = 4.17"
56.00% Pervious = 257,339 sf 44.00% Impervious = 202,160 sf

Summary for Subcatchment POST-1: Post Development Area 1

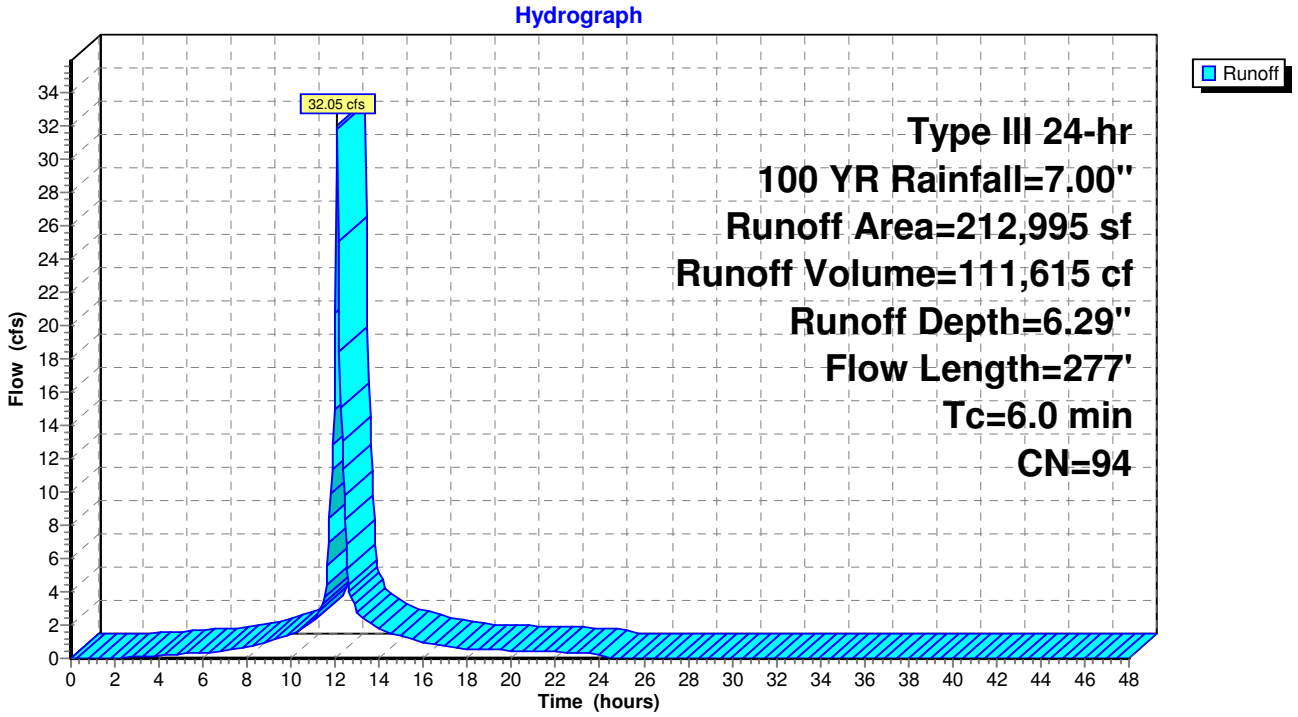
Runoff = 32.05 cfs @ 12.09 hrs, Volume= 111,615 cf, Depth= 6.29"

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

	Area (sf)	CN	Description
	19,280	98	Roofs, HSG A
	126,684	98	Roofs, HSG B
	5,222	98	Paved parking, HSG B
	6,964	98	Paved parking, HSG D
	18,833	61	>75% Grass cover, Good, HSG B
	7,124	80	>75% Grass cover, Good, HSG D
*	23,414	98	Water Surface, 0% imp, HSG B (Basin Bottom)
*	5,474	98	Water Surface, 0% imp, HSG D (Basin Bottom)
	212,995	94	Weighted Average
	54,845		25.75% Pervious Area
	158,150		74.25% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0100	0.09		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
1.9	232	0.0100	2.03		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.2	30	0.0050	3.21	2.52	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
4.8	277	Total, Increased to minimum Tc = 6.0 min			

Subcatchment POST-1: Post Development Area 1



Summary for Subcatchment POST-2: Post Development Area 2

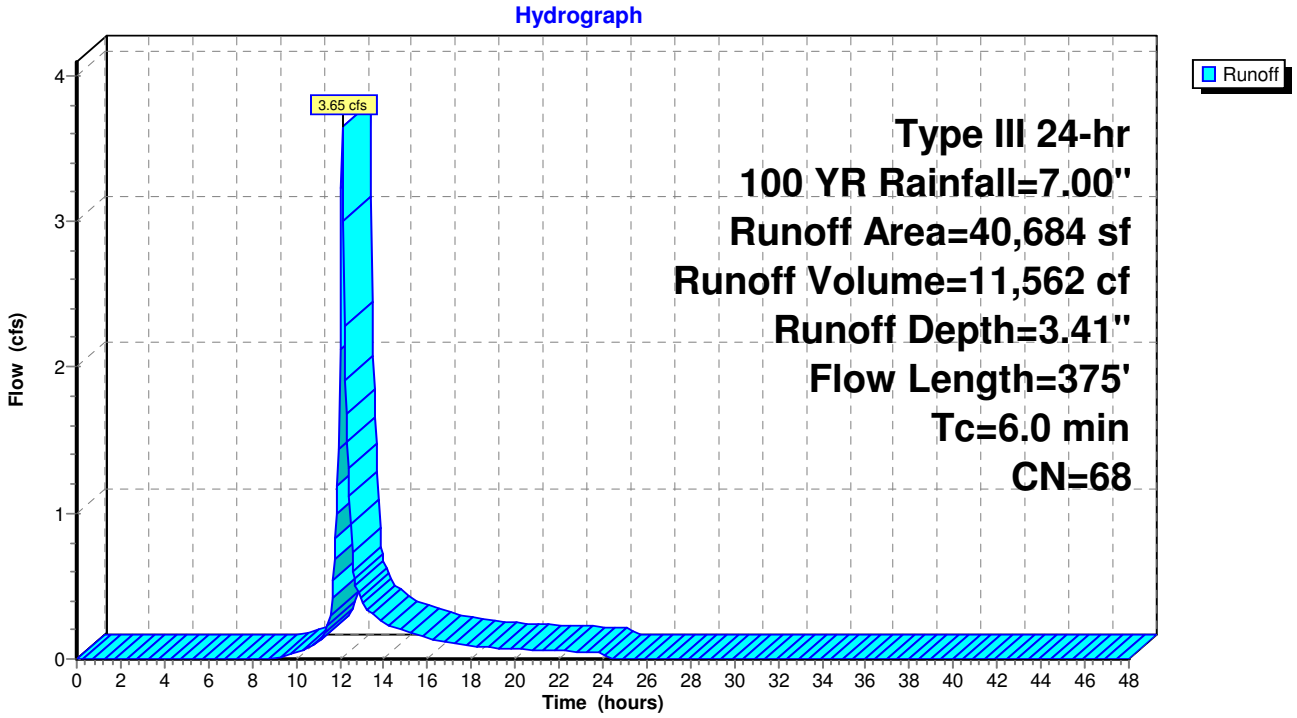
Runoff = 3.65 cfs @ 12.09 hrs, Volume= 11,562 cf, Depth= 3.41"

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

Area (sf)	CN	Description
10,044	98	Paved parking, HSG A
9,464	98	Paved parking, HSG B
20,139	39	>75% Grass cover, Good, HSG A
1,037	61	>75% Grass cover, Good, HSG B
40,684	68	Weighted Average
21,176		52.05% Pervious Area
19,508		47.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0100	0.09		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.1	250	0.0100	2.03		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.5	110	0.0075	3.93	3.09	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
5.3	375	Total, Increased to minimum Tc = 6.0 min			

Subcatchment POST-2: Post Development Area 2



Summary for Subcatchment POST-3: Post Development Area 3

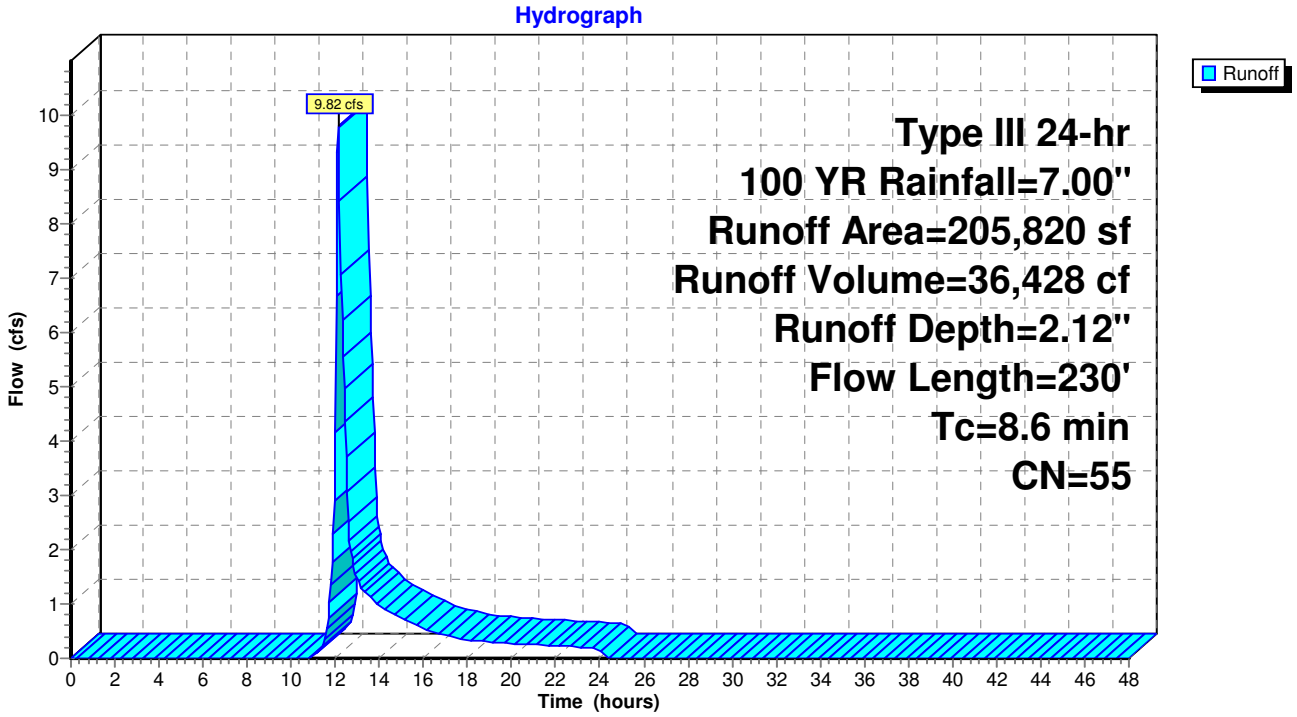
Runoff = 9.82 cfs @ 12.14 hrs, Volume= 36,428 cf, Depth= 2.12"

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

Area (sf)	CN	Description
56,448	30	Woods, Good, HSG A
71,512	55	Woods, Good, HSG B
11,545	77	Woods, Good, HSG D
19,166	39	>75% Grass cover, Good, HSG A
6,326	61	>75% Grass cover, Good, HSG B
1,640	76	Gravel roads, HSG A
14,681	85	Gravel roads, HSG B
13,377	98	Paved parking, HSG A
9,625	98	Paved parking, HSG B
1,500	98	Paved parking, HSG D
205,820	55	Weighted Average
181,318		88.10% Pervious Area
24,502		11.90% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0150	0.14		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.6	180	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.6	230	Total			

Subcatchment POST-3: Post Development Area 3



Summary for Pond AP-1: Off-Site Wetlands

Analysis Point 1 is taken at the boundary of the wetlands surrounding the property which contribute flow to the cross culverts under Samuel Barnet Boulevard.

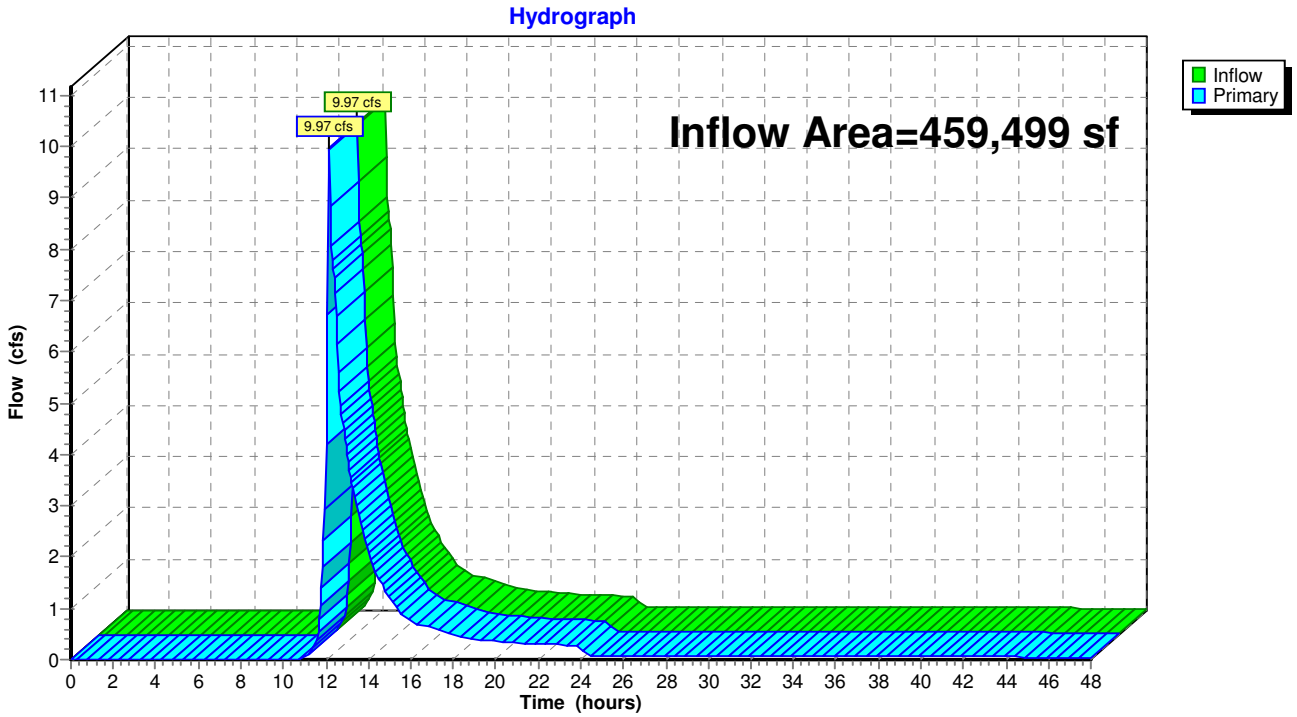
---

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

Inflow Area =	459,499 sf,	44.00% Impervious,	Inflow Depth >	1.64"	for 100 YR event
Inflow =	9.97 cfs @	12.14 hrs,	Volume=	62,832 cf	
Primary =	9.97 cfs @	12.14 hrs,	Volume=	62,832 cf,	Atten= 0%, Lag= 0.0 min

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

Pond AP-1: Off-Site Wetlands



Summary for Pond POND-1: Detention/Infiltration Basin 1

Inflow Area =	212,995 sf,	74.25% Impervious,	Inflow Depth =	6.29"	for 100 YR event
Inflow =	32.05 cfs @	12.09 hrs,	Volume=	111,615 cf	
Outflow =	4.74 cfs @	12.59 hrs,	Volume=	111,615 cf,	Atten= 85%, Lag= 30.0 min
Discarded =	1.71 cfs @	12.59 hrs,	Volume=	94,258 cf	
Primary =	3.03 cfs @	12.59 hrs,	Volume=	17,356 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 82.77' @ 12.59 hrs Surf.Area= 30,692 sf Storage= 45,171 cf

Plug-Flow detention time= 165.8 min calculated for 111,498 cf (100% of inflow)
Center-of-Mass det. time= 165.7 min (930.3 - 764.6)

Volume	Invert	Avail.Storage	Storage Description
#1	81.20'	85,136 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
81.20	27,043	0	0
82.00	28,888	22,372	22,372
83.00	31,245	30,067	52,439
84.00	34,150	32,698	85,136

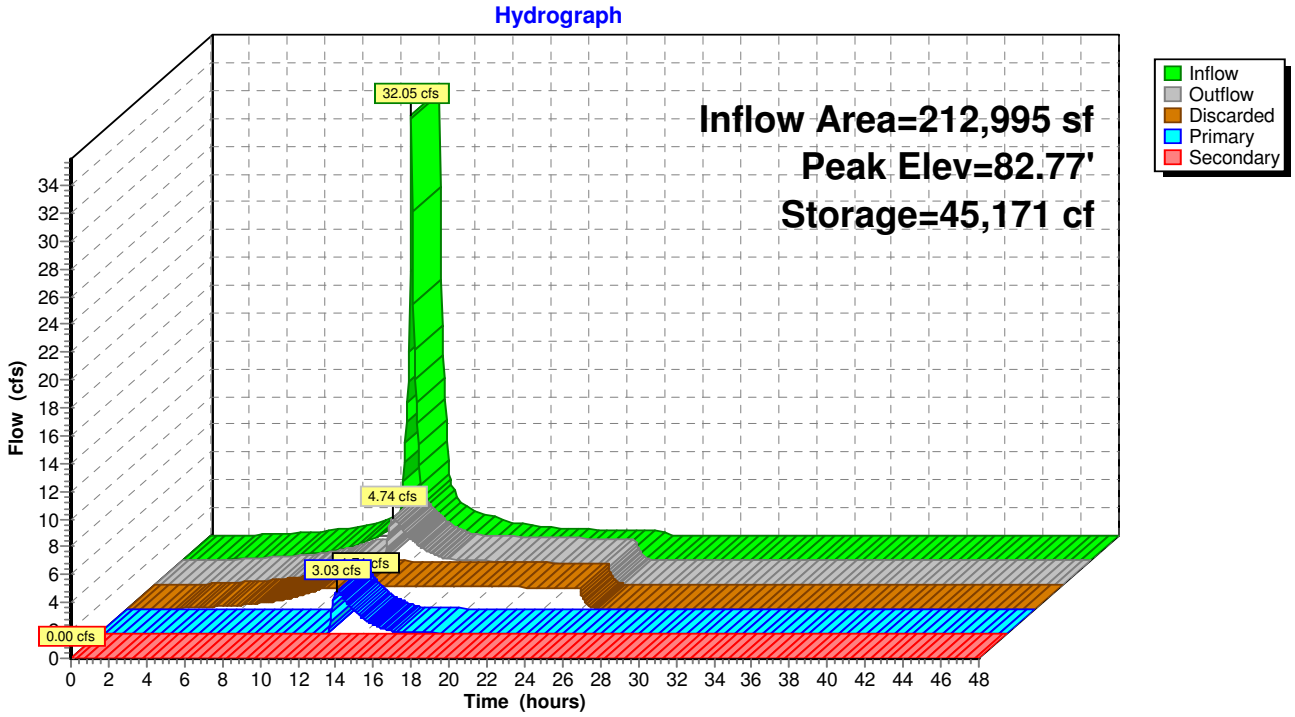
Device	Routing	Invert	Outlet Devices
#1	Primary	81.20'	**12.0" Round Culvert** L= 55.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 81.20' / 80.65' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	81.95'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	82.40'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	83.00'	**15.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64
#5	Discarded	81.20'	**2.410 in/hr Exfiltration over Surface area** Phase-In= 0.05'

Discarded OutFlow Max=1.71 cfs @ 12.59 hrs HW=82.76' (Free Discharge)
└─**5=Exfiltration** (Exfiltration Controls 1.71 cfs)

Primary OutFlow Max=3.03 cfs @ 12.59 hrs HW=82.76' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 3.03 cfs of 3.70 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.20 cfs @ 4.00 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Weir Controls 2.83 cfs @ 1.98 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=81.20' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond POND-1: Detention/Infiltration Basin 1



Summary for Pond POND-2: Wet Basin 2

Inflow Area = 40,684 sf, 47.95% Impervious, Inflow Depth = 3.41" for 100 YR event
Inflow = 3.65 cfs @ 12.09 hrs, Volume= 11,562 cf
Outflow = 0.08 cfs @ 18.30 hrs, Volume= 9,048 cf, Atten= 98%, Lag= 372.4 min
Primary = 0.08 cfs @ 18.30 hrs, Volume= 9,048 cf
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 80.98' @ 18.30 hrs Surf.Area= 5,105 sf Storage= 8,408 cf

Plug-Flow detention time= 948.2 min calculated for 9,048 cf (78% of inflow)
Center-of-Mass det. time= 865.5 min (1,700.7 - 835.3)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	28,790 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

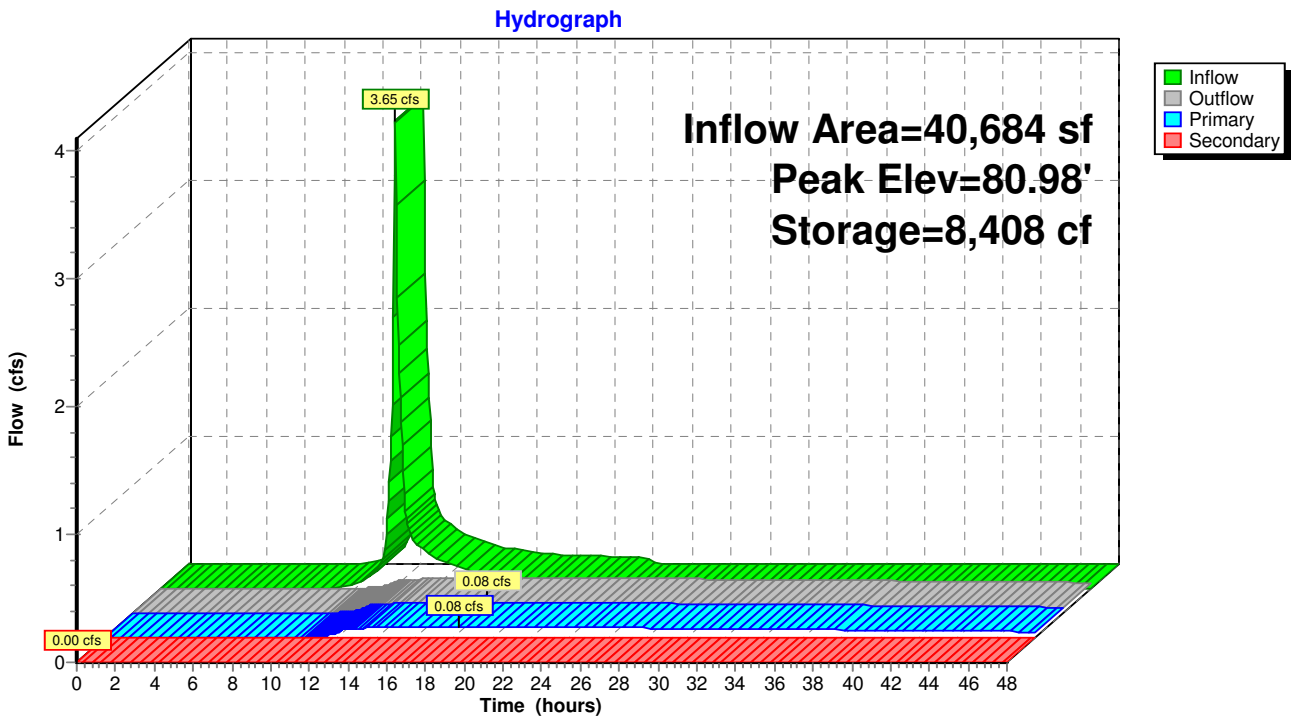
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	3,428	0	0
80.00	4,248	3,838	3,838
81.00	5,125	4,687	8,525
82.00	6,058	5,592	14,116
83.00	7,371	6,715	20,831
84.00	8,548	7,960	28,790

Device	Routing	Invert	Outlet Devices
#1	Primary	79.00'	**12.0" Round Culvert** L= 215.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 79.00' / 77.70' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	79.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	82.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	83.00'	**15.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.08 cfs @ 18.30 hrs HW=80.98' TW=0.00' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.08 cfs of 3.31 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.08 cfs @ 6.66 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

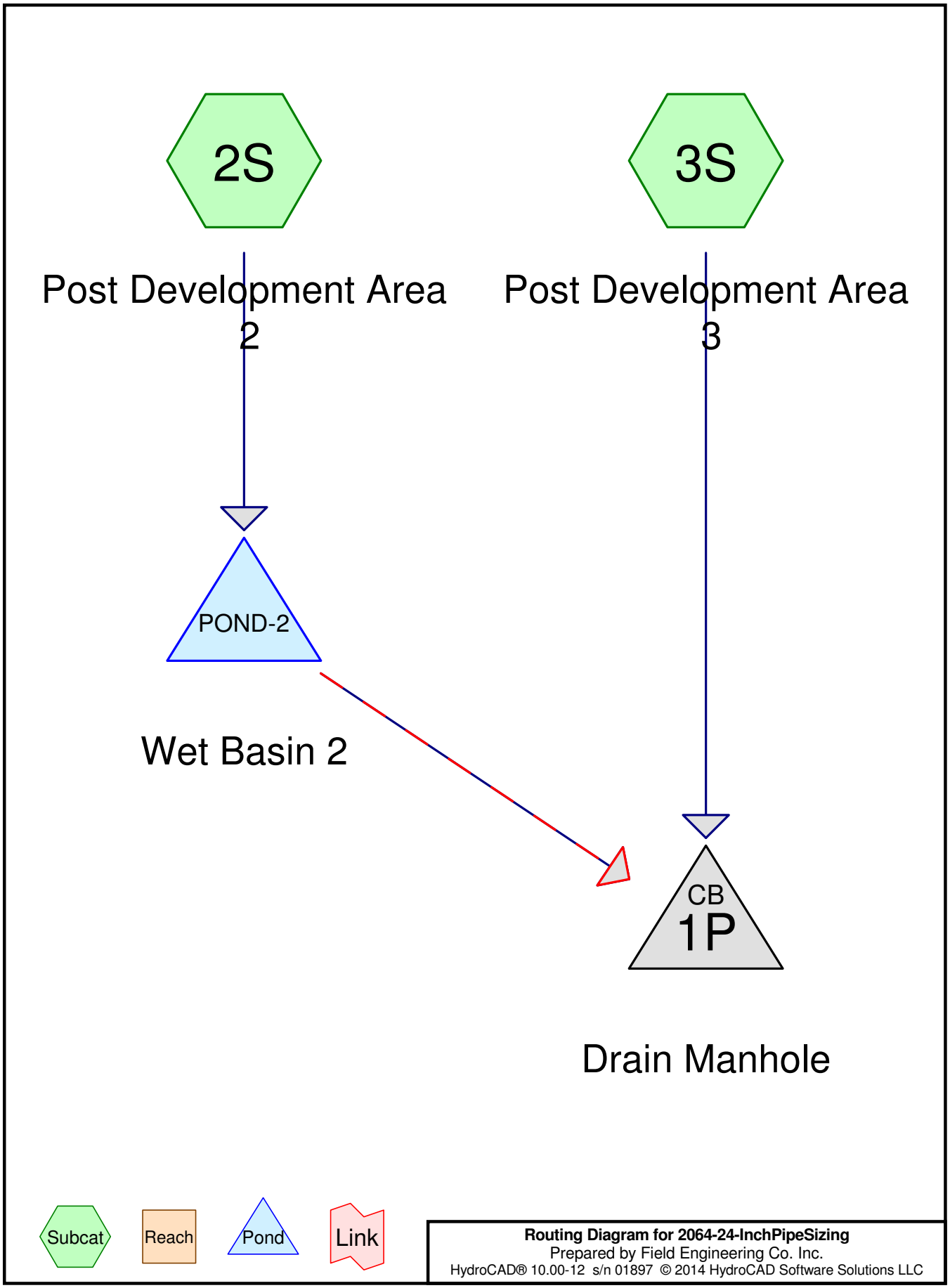
Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.00' TW=0.00' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond POND-2: Wet Basin 2



Section 3

Supplemental Data



Routing Diagram for 2064-24-InchPipeSizing
Prepared by Field Engineering Co. Inc.
HydroCAD® 10.00-12 s/n 01897 © 2014 HydroCAD Software Solutions LLC

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	2S	0.00	0.00	110.0	0.0075	0.013	12.0	0.0	0.0
2	1P	77.68	76.20	535.0	0.0028	0.013	24.0	0.0	0.0
3	POND-2	79.00	77.70	215.0	0.0060	0.013	12.0	0.0	0.0

Time span=0.00-48.00 hrs, dt=0.05 hrs, 961 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 2S: Post Development Area Runoff Area=40,684 sf 47.95% Impervious Runoff Depth=2.32"
Flow Length=375' Tc=6.0 min CN=68 Runoff=2.45 cfs 7,858 cf

Subcatchment 3S: Post Development Runoff Area=23,002 sf 100.00% Impervious Runoff Depth=5.36"
Flow Length=230' Tc=8.6 min CN=98 Runoff=2.62 cfs 10,279 cf

Pond 1P: Drain Manhole Peak Elev=78.54' Inflow=2.66 cfs 17,161 cf
24.0" Round Culvert n=0.013 L=535.0' S=0.0028 '/' Outflow=2.66 cfs 17,161 cf

Pond POND-2: Wet Basin 2 Peak Elev=80.36' Storage=5,428 cf Inflow=2.45 cfs 7,858 cf
Primary=0.07 cfs 6,882 cf Secondary=0.00 cfs 0 cf Outflow=0.07 cfs 6,882 cf

Total Runoff Area = 63,686 sf Runoff Volume = 18,136 cf Average Runoff Depth = 3.42"
33.25% Pervious = 21,176 sf 66.75% Impervious = 42,510 sf

Summary for Subcatchment 2S: Post Development Area 2

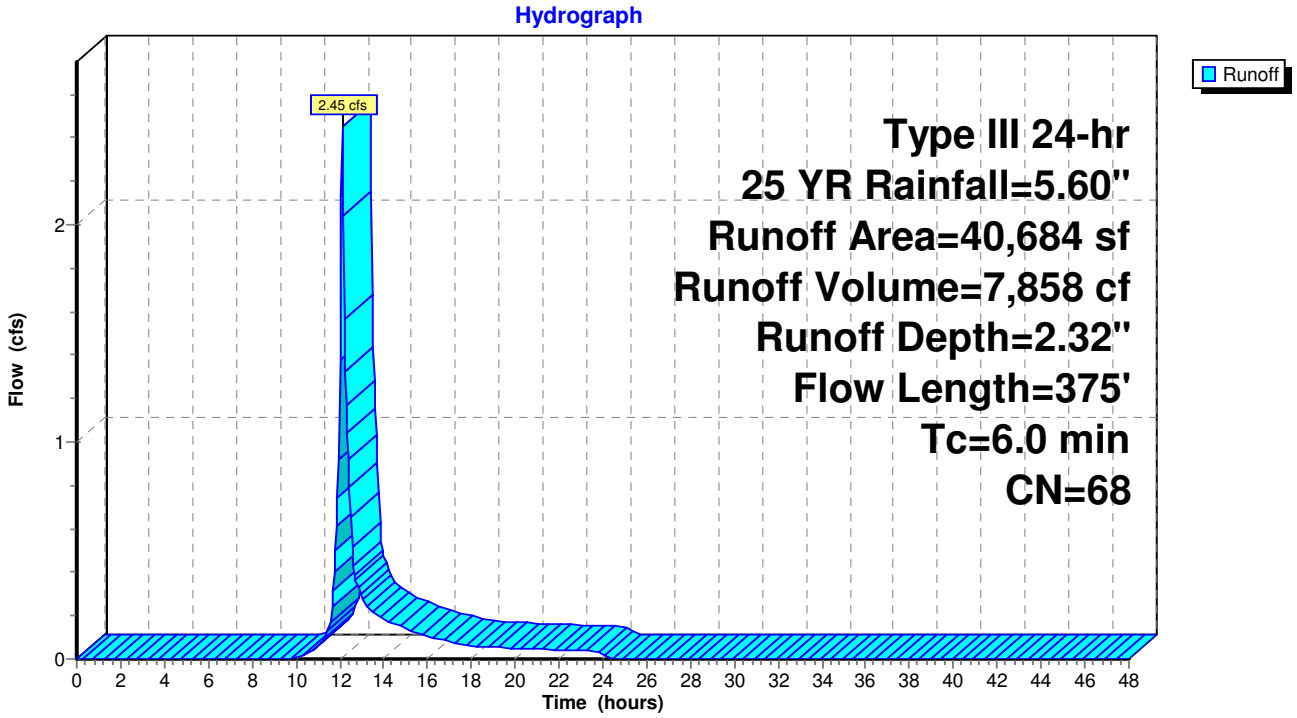
Runoff = 2.45 cfs @ 12.10 hrs, Volume= 7,858 cf, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
10,044	98	Paved parking, HSG A
9,464	98	Paved parking, HSG B
20,139	39	>75% Grass cover, Good, HSG A
1,037	61	>75% Grass cover, Good, HSG B
40,684	68	Weighted Average
21,176		52.05% Pervious Area
19,508		47.95% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	15	0.0100	0.09		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.1	250	0.0100	2.03		**Shallow Concentrated Flow, B-C** Paved Kv= 20.3 fps
0.5	110	0.0075	3.93	3.09	**Pipe Channel, C-D** 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.013 Corrugated PE, smooth interior
5.3	375	Total, Increased to minimum Tc = 6.0 min			

Subcatchment 2S: Post Development Area 2



Summary for Subcatchment 3S: Post Development Area 3

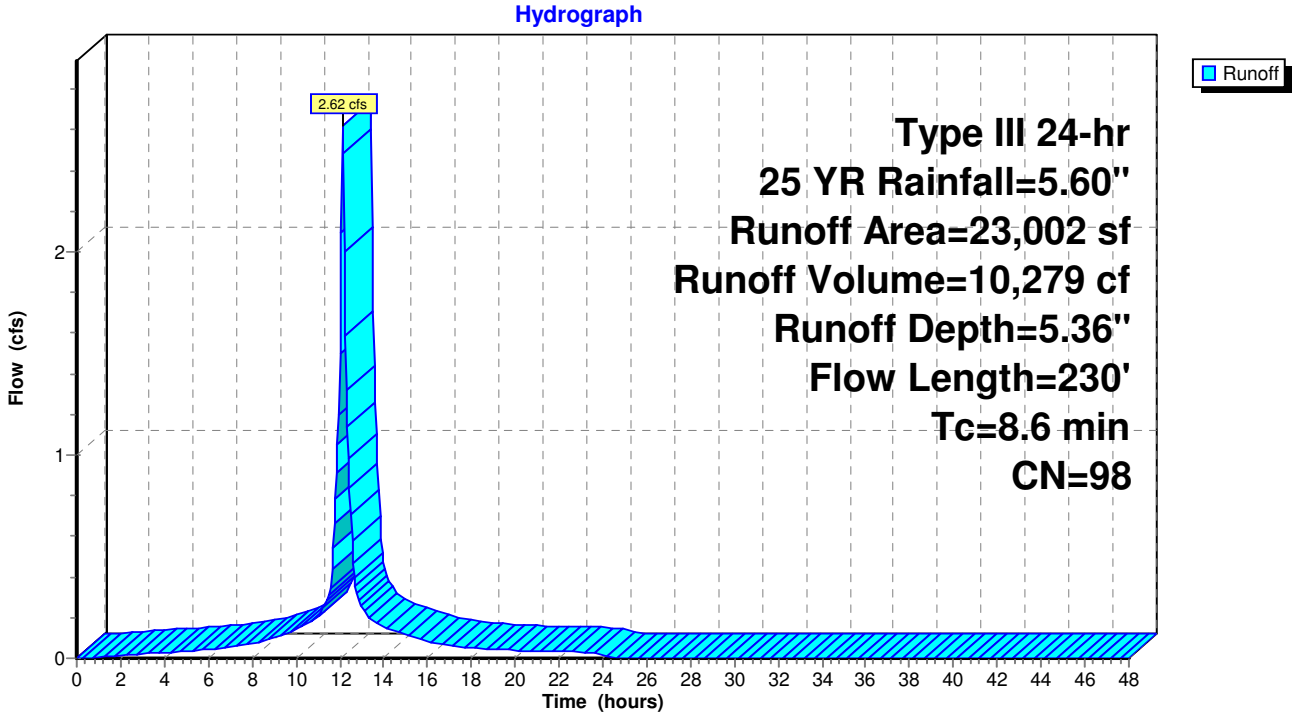
Runoff = 2.62 cfs @ 12.12 hrs, Volume= 10,279 cf, Depth= 5.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Type III 24-hr 25 YR Rainfall=5.60"

Area (sf)	CN	Description
13,377	98	Paved parking, HSG A
9,625	98	Paved parking, HSG B
23,002	98	Weighted Average
23,002		100.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0	50	0.0150	0.14		**Sheet Flow, A-B** Grass: Short n= 0.150 P2= 3.50"
2.6	180	0.0050	1.14		**Shallow Concentrated Flow, B-C** Unpaved Kv= 16.1 fps
8.6	230	Total			

Subcatchment 3S: Post Development Area 3



Summary for Pond 1P: Drain Manhole

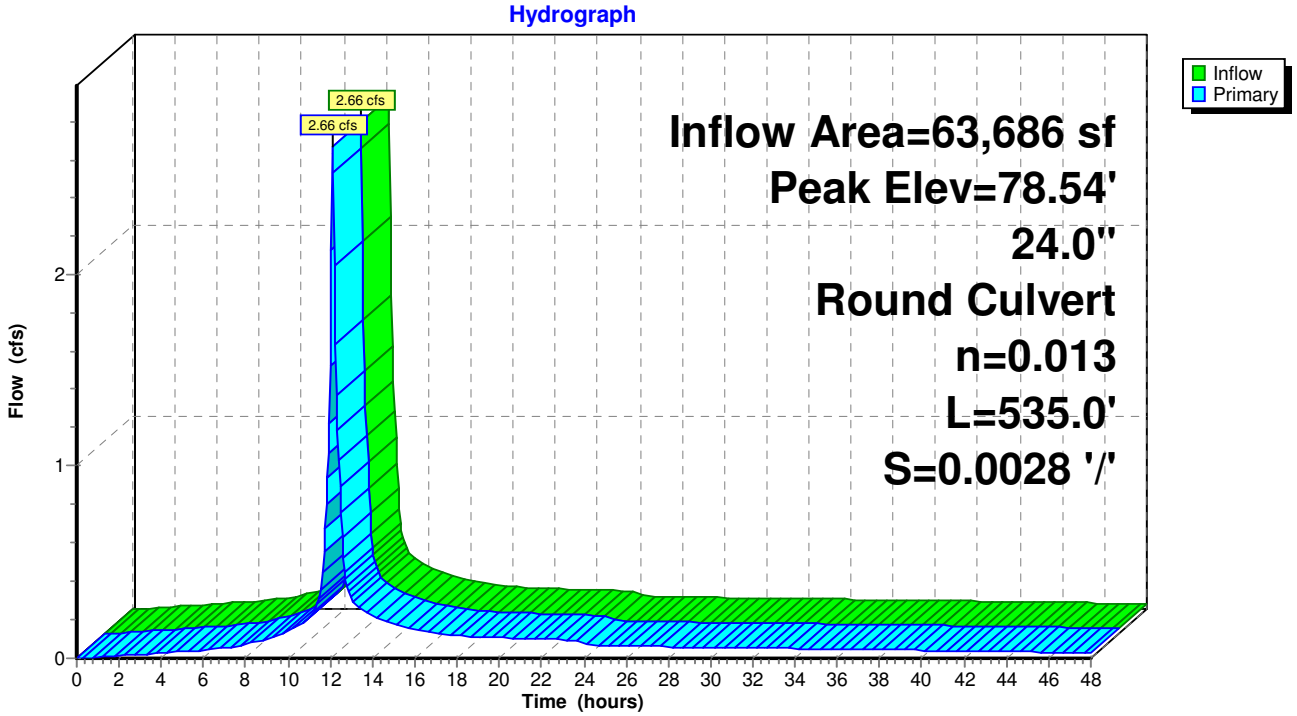
Inflow Area = 63,686 sf, 66.75% Impervious, Inflow Depth > 3.23" for 25 YR event
Inflow = 2.66 cfs @ 12.12 hrs, Volume= 17,161 cf
Outflow = 2.66 cfs @ 12.12 hrs, Volume= 17,161 cf, Atten= 0%, Lag= 0.0 min
Primary = 2.66 cfs @ 12.12 hrs, Volume= 17,161 cf

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 78.54' @ 12.12 hrs
Flood Elev= 82.00'

Device	Routing	Invert	Outlet Devices
#1	Primary	77.68'	**24.0" Round Culvert** L= 535.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 77.68' / 76.20' S= 0.0028 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf

Primary OutFlow Max=2.60 cfs @ 12.12 hrs HW=78.53' (Free Discharge)
└**1=Culvert** (Barrel Controls 2.60 cfs @ 3.03 fps)

Pond 1P: Drain Manhole



Summary for Pond POND-2: Wet Basin 2

Inflow Area =	40,684 sf, 47.95% Impervious, Inflow Depth = 2.32" for 25 YR event				
Inflow =	2.45 cfs @	12.10 hrs,	Volume=	7,858 cf	
Outflow =	0.07 cfs @	17.76 hrs,	Volume=	6,882 cf,	Atten= 97%, Lag= 339.7 min
Primary =	0.07 cfs @	17.76 hrs,	Volume=	6,882 cf	
Secondary =	0.00 cfs @	0.00 hrs,	Volume=	0 cf	

Routing by Dyn-Stor-Ind method, Time Span= 0.00-48.00 hrs, dt= 0.05 hrs
Peak Elev= 80.36' @ 17.76 hrs Surf.Area= 4,564 sf Storage= 5,428 cf

Plug-Flow detention time= 869.1 min calculated for 6,875 cf (87% of inflow)
Center-of-Mass det. time= 812.4 min (1,659.0 - 846.6)

Volume	Invert	Avail.Storage	Storage Description
#1	79.00'	28,790 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

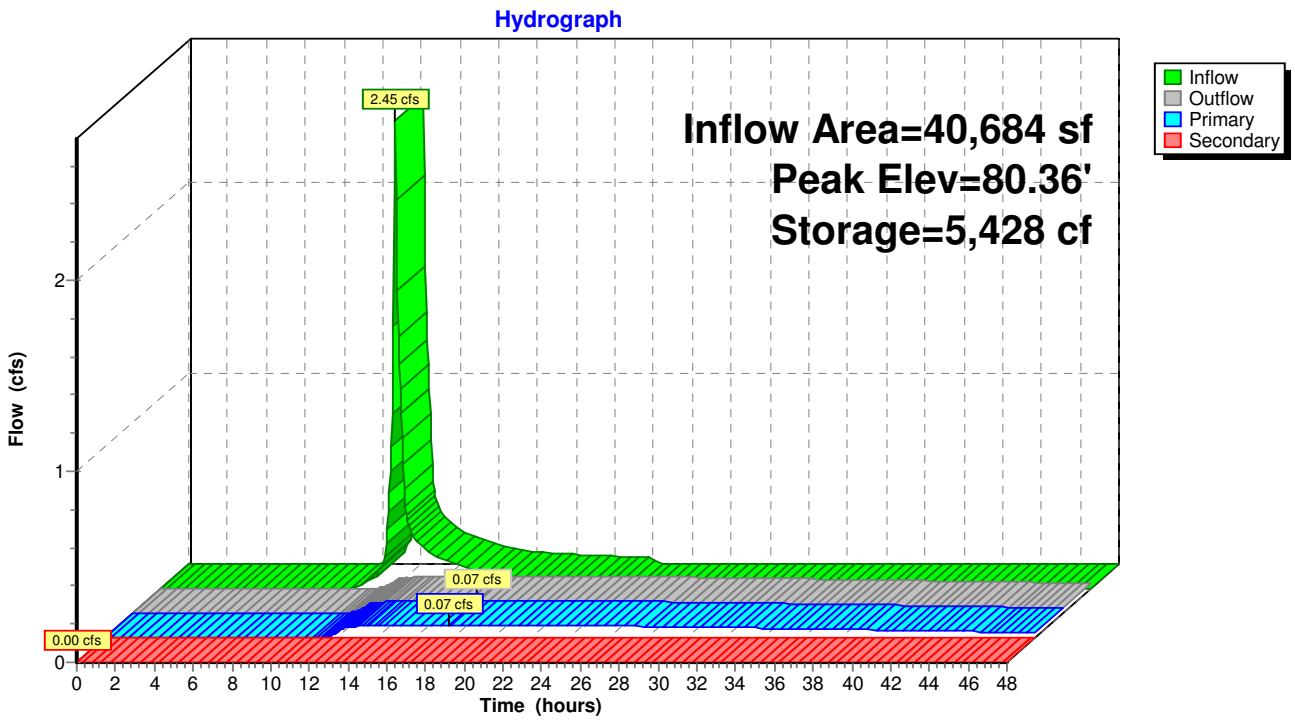
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
79.00	3,428	0	0
80.00	4,248	3,838	3,838
81.00	5,125	4,687	8,525
82.00	6,058	5,592	14,116
83.00	7,371	6,715	20,831
84.00	8,548	7,960	28,790

Device	Routing	Invert	Outlet Devices
#1	Primary	79.00'	**12.0" Round Culvert** L= 215.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 79.00' / 77.70' S= 0.0060 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.79 sf
#2	Device 1	79.00'	**1.5" Vert. Orifice/Grate** C= 0.600
#3	Device 1	82.00'	**4.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#4	Secondary	83.00'	**15.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.07 cfs @ 17.76 hrs HW=80.36' TW=77.87' (Dynamic Tailwater)
└─**1=Culvert** (Passes 0.07 cfs of 2.83 cfs potential flow)
  ├─**2=Orifice/Grate** (Orifice Controls 0.07 cfs @ 5.49 fps)
  └─**3=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=79.00' TW=77.68' (Dynamic Tailwater)
└─**4=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Pond POND-2: Wet Basin 2



Appendix A

Revised Post Development Watershed Plan

WATERSHED AREA POST 1 4.9 AC.

WATERSHED AREA POST 2 0.9 AC.

WATERSHED AREA POST 3 4.7 AC.

40 0 20 40 80

SCALE: 1 INCH = 40 FEET

2064_SITE-R3

FIELD ENGINEERING CO., INC.
CONSULTING ENGINEERS

11D INDUSTRIAL DRIVE
P.O. BOX 1178
MATTAPOISETT, 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	Apprvd.
2	REVISED PER CON COM REVIEW COMMENTS	11/13/15	RRR
1	REVISED FOR NOI FILING	10/22/15	RRR

Date: 10/8/2015

Scale: 1"=40'

Drawn By	Designed By	Checked By
RMS	JCC/RRR	RMF

Issued For: PERMITTING

PROPOSED SITE DEVELOPMENT
RAW SEAFOODS

SAMUEL BARNET BOULEVARD
NEW BEDFORD, MASSACHUSETTS

Drawing Title: POST DEVELOPMENT WATERSHED PLAN

Project No.	Sheet
2064	1 OF 1

POST-1

Appendix B

Revised Long Term Pollution Prevention Plan

Long Term Pollution Prevention Plan
Proposed Cold Storage Facility
Raw Seafoods Inc.
New Bedford, MA

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 basin, wet basin, sediment forebays, catch basins 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

It is anticipated that a property manager would be under contract and on site on a regular basis 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 the various 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 will not be permitted. All snow stored on site will melt and flow through the stormwater management system. No snow shall be stored in the bottom area of the proposed wet basin or extended detention/infiltration basin shown on the site plans.

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. In is not anticipated that large quantities of road salt and/or sand will be stored on site.

10.0 Street Sweeping Schedule

Sweeping of the parking lots will be performed twice annually. Sweeping shall occur in the spring following the winter season and again in the fall.

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

It is expected that a Property Management Company would be contracted to manage the site property as a whole. Included in this contract would be 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, Raw Seafoods, 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.