

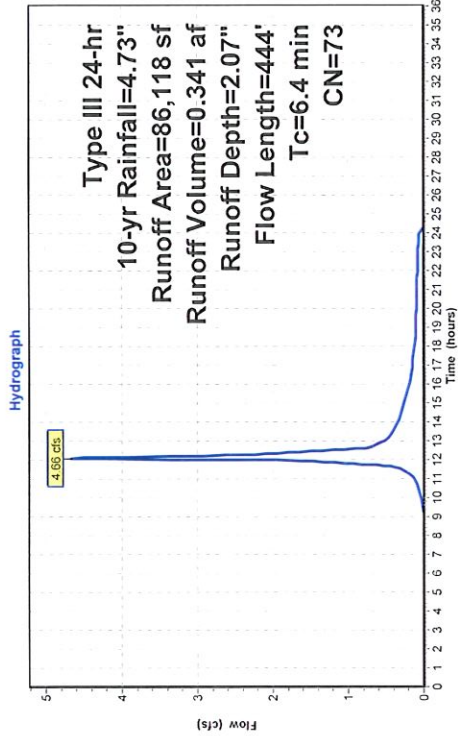
Summary for Subcatchment EX-4: Existing Building/ParkingArea

Runoff = 4.66 cfs @ 12.10 hrs, Volume= 0.341 af, Depth= 2.07"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 10-yr Rainfall=4.73"

Area (sf)	CN	Description
24,221	98	Roofs, HSG A
25,378	98	Paved parking, HSG A
36,519	39	>75% Grass cover, Good, HSG A
86,118	73	Weighted Average
36,519		42.41% Pervious Area
49,599		57.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass: Short n= 0.150 P2= 3.13"
0.6	70	0.0850	2.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	134	0.0246	3.18		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	139	0.0140	5.81	4.57	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Corrugated PP, smooth interior
0.4	51	0.0009	2.34	7.35	Pipe Channel, RCP_Round 24" 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Corrugated PP, smooth interior
6.4	444	Total			

Subcatchment EX-4: Existing Building/ParkingArea



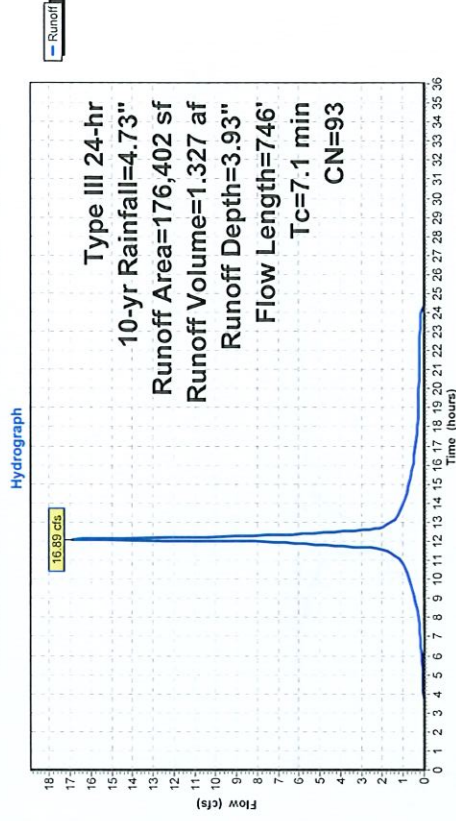
Summary for Subcatchment EX-5: 300 Concord Parking Lot (Offsite)

Runoff = 16.89 cfs @ 12.10 hrs, Volume= 1.327 af, Depth= 3.93"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 10-yr Rainfall=4.73"

Area (sf)	CN	Description
11,835	61	>75% Grass cover, Good, HSG B
158,372	98	Paved parking
6,195	39	>75% Grass cover, Good, HSG A
176,402	93	Weighted Average
18,030		10.22% Pervious Area
158,372		89.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.0610	0.22		Sheet Flow, A-B Grass, Short n= 0.150 P2= 3.13"
2.0	199	0.0227	1.64		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.13"
0.7	149	0.0047	3.37	2.65	Pipe Channel, C-D 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	95	0.0095	6.28	11.09	Pipe Channel, D-E 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.8	163	0.0018	3.31	10.40	Pipe Channel, E-F 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0059	5.99	18.82	Pipe Channel, F-G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.1	746	Total			

Subcatchment EX-5: 300 Concord Parking Lot (Offsite)



Summary for Pond E1P: Southern Pond

Inflow Area = 8.272 ac, 57.20% Impervious, Inflow Depth = 2.23" for 10-yr event
 Inflow = 17.33 cfs @ 12.10 hrs, Volume= 1.537 af
 Outflow = 5.04 cfs @ 12.50 hrs, Volume= 1.537 af, Atten= 71%, Lag= 24.3 min
 Discarded = 0.99 cfs @ 12.50 hrs, Volume= 0.252 af
 Primary = 4.06 cfs @ 12.50 hrs, Volume= 1.285 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Peak Elev= 183.40' @ 12.50 hrs Surf.Area= 17,726 sf Storage= 15,070 cf

Plug-Flow detention time= 21.0 min calculated for 1.536 af (100% of inflow)
 Center-of-Mass det. time= 21.0 min (822.6 - 801.6)

Volume #1	Invert	Avail. Storage	Storage Description
	182.00'	125,224 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation	Surf. Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
182.00	4,062	0	0
183.00	13,585	8,824	8,824
184.00	23,965	18,775	27,599
185.00	32,014	27,990	55,588
186.00	39,111	35,563	91,151
186.20	4,802	4,391	95,542
187.00	9,192	5,598	101,139
188.00	12,047	10,620	111,759
189.00	14,884	13,466	125,224

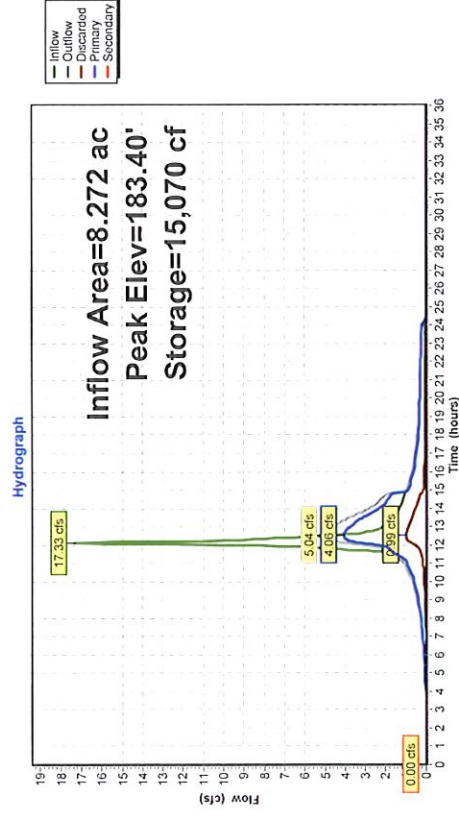
Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	2,410 in/hr Exfiltration over Surface area
#2	Secondary	186.00'	35.0' long x 8.0' breadth Broad-Crested Rectangular Weir
			Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00
			2.50 3.00 3.50 4.00 4.50 5.00 5.50
			Coef. (English) 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
#3	Primary	179.70'	15.0" Round Culvert
			L= 95.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 179.70' / 178.50' S= 0.0126 ' /' Cc= 0.900
#4	Device 3	182.30'	n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#5	Device 3	180.70'	8.0" Vert. Orifice/Gate C= 0.600
			8.0" Vert. Orifice/Gate C= 0.600

Discarded OutFlow Max=0.99 cfs @ 12.50 hrs HW=183.40' (Free Discharge)
 1=Exfiltration (Exfiltration Controls 0.99 cfs)

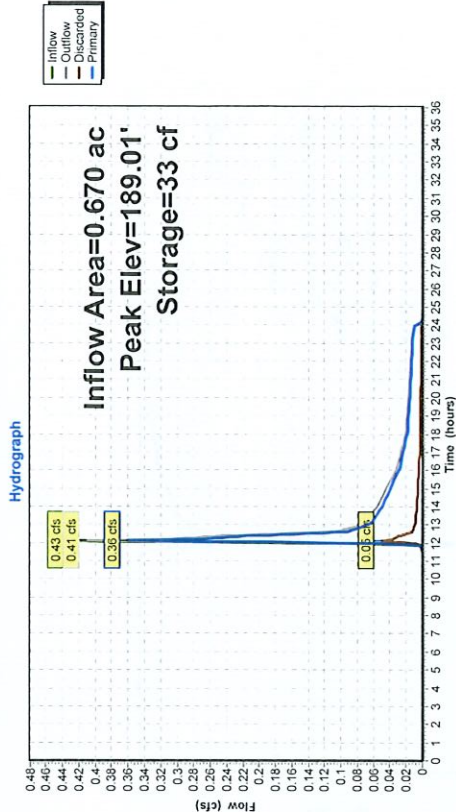
Primary OutFlow Max=4.06 cfs @ 12.50 hrs HW=183.40' (Free Discharge)
 2=Culvert (Passes 4.06 cfs of 10.36 cfs potential flow)
 4=Orifice/Gate (Orifice Controls 1.47 cfs @ 4.21 fps)
 5=Orifice/Gate (Orifice Controls 2.58 cfs @ 7.41 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond E1P: Southern Pond



Pond E2P: Northern Pond



Summary for Pond E2P: Northern Pond

Inflow Area = 0.670 ac, 22.98% Impervious, Inflow Depth = 0.74" for 10-yr event
 Inflow = 0.43 cfs @ 12.09 hrs, Volume= 0.041 af
 Outflow = 0.41 cfs @ 12.12 hrs, Volume= 0.041 af, Atten= 5%, Lag= 1.5 min
 Discarded = 0.05 cfs @ 12.12 hrs, Volume= 0.005 af
 Primary = 0.36 cfs @ 12.12 hrs, Volume= 0.036 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Peak Elev= 189.01' @ 12.12 hrs Surf.Area= 2,247 sf Storage= 33 cf

Plug-Flow detention time= 1.4 min calculated for 0.041 af (100% of inflow)
 Center-of-Mass det. time= 1.4 min (906.7 - 905.3)

Volume	Invert	Avail.Storage	Storage Description	Custom Stage Data (Prismatic)	Listed below (Recalc)
#1	189.00'	45,190 cf			
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)		
189.00	2,162	0	0		
190.00	7,890	5,026	5,026		
191.00	11,694	9,792	14,818		
192.00	14,847	13,271	28,089		
193.00	19,355	17,101	45,190		

Device	Routing	Invert	Outlet Devices
#1	Discarded	189.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	189.00'	50.0' 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 2.66 2.64 2.64
		2.64 2.65 2.65 2.66 2.66 2.70 2.74	

Discarded OutFlow Max=0.13 cfs @ 12.12 hrs HW=189.01' (Free Discharge)
 1=Exfiltration (Exfiltration Controls 0.13 cfs)

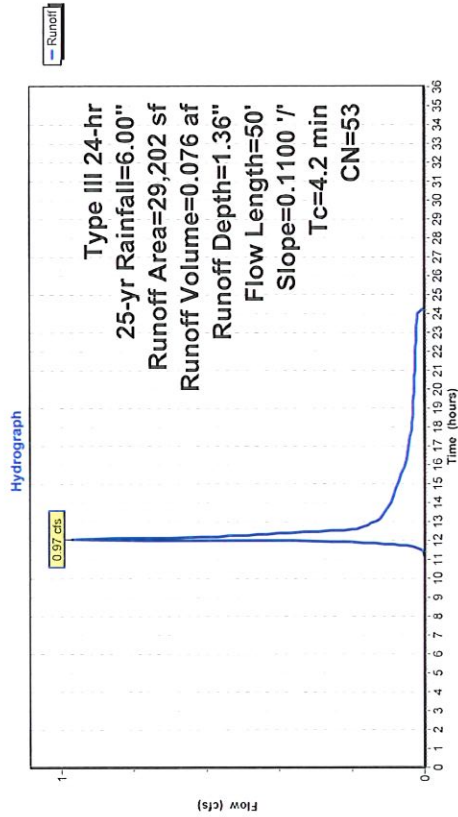
Primary OutFlow Max=0.22 cfs @ 12.12 hrs HW=189.01' (Free Discharge)
 2=Broad-Crested Rectangular Weir (Weir Controls 0.22 cfs @ 0.30 fps)

Summary for Subcatchment EX-1: NorthernAmenitySpace

Runoff = 0.97 cfs @ 12.08 hrs. Volume= 0.076 af, Depth= 1.36"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
6,712	98	Paved parking, HSG A
22,490	39	>75% Grass cover, Good, HSG A
29,202	53	Weighted Average
22,490		77.02% Pervious Area
6,712		22.98% Impervious Area
Tc (min)	Length (feet)	Slope Velocity Capacity Description
4.2	50	0.1100 0.20 Sheet Flow, Grass, Dense n= 0.240 P2= 3.13"

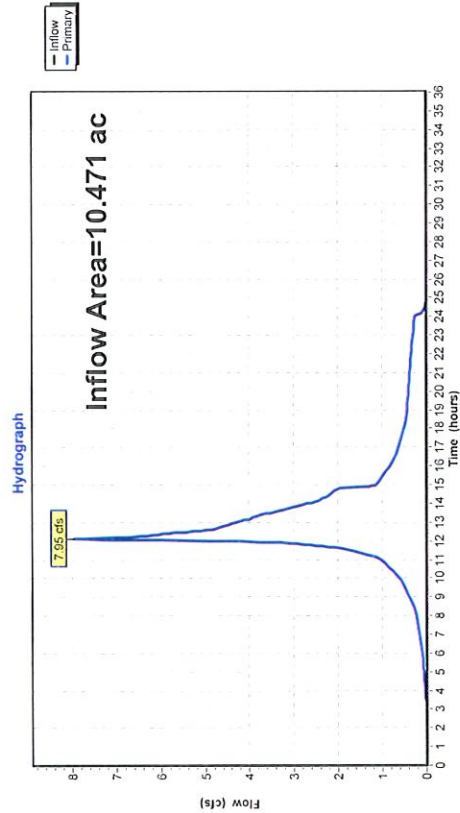
Subcatchment EX-1: NorthernAmenitySpace



Summary for Link DP1: Wetlands

Inflow Area = 10.471 ac, 56.07% Impervious, Inflow Depth = 1.86" for 10-yr event
Inflow = 7.95 cfs @ 12.11 hrs, Volume= 1.626 af
Primary = 7.95 cfs @ 12.11 hrs, Volume= 1.626 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

Link DP1: Wetlands



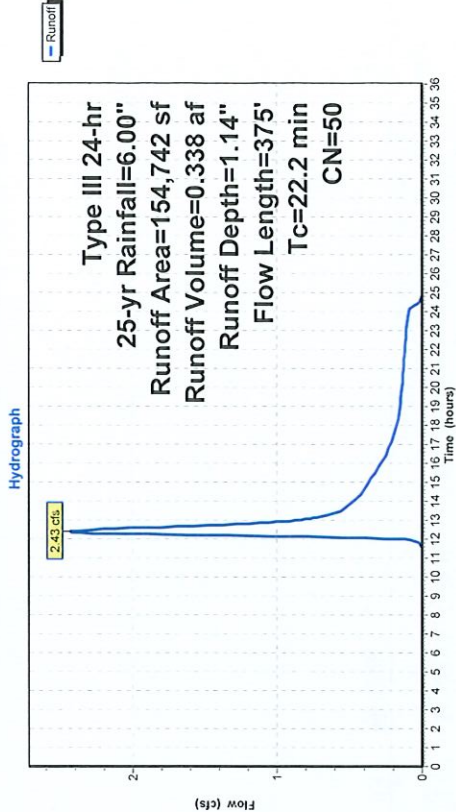
Summary for Subcatchment EX-2: Existing Building/StormwaterBasin

Runoff = 2.43 cfs @ 12.38 hrs, Volume= 0.338 af, Depth= 1.14"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
31,607	98	Roofs, HSG A
9,433	98	Paved parking, HSG A
113,702	32	Woods/grass comb., Good, HSG A
154,742	50	Weighted Average
113,702		73.48% Pervious Area
41,040		26.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0020	0.06		Sheet Flow, A-B Grass, Short n= 0.150 P2= 3.13"
3.4	160	0.0129	0.80		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
0.3	109	0.0129	6.70	5.26	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
4.2	56	0.0020	0.22		Shallow Concentrated Flow, Pipe to bottom of pond Woodland Kv= 5.0 fps
22.2	375	Total			

Subcatchment EX-2: Existing Building/StormwaterBasin



Summary for Subcatchment EX-4: Existing Building/Parking Area

Runoff = 7.02 cfs @ 12.10 hrs, Volume= 0.509 af, Depth= 3.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
24,221	98	Roofs, HSG A
25,378	98	Paved parking, HSG A
36,519	39	>75% Grass cover, Good, HSG A
86,118	73	Weighted Average
36,519		42.41% Pervious Area
49,599		57.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, n= 0.150 P2= 3.13"
0.6	70	0.0850	2.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	134	0.0246	3.18		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	139	0.0140	5.81	4.57	Pipe Channel, RCP Round 12" n= 0.012 Corrugated PP, smooth interior
0.4	51	0.0009	2.34	7.35	Pipe Channel, RCP Round 24" n= 0.012 Corrugated PP, smooth interior
6.4	444	Total			n= 0.012 Corrugated PP, smooth interior

Summary for Subcatchment EX-3: Southwest Portion

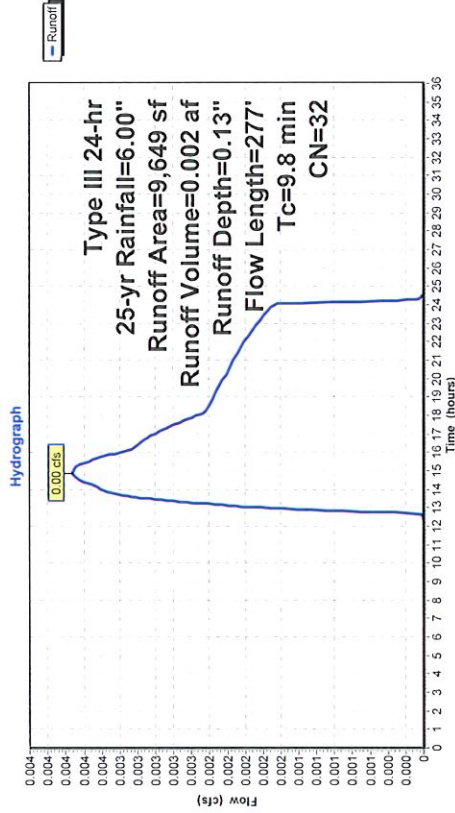
Runoff = 0.00 cfs @ 14.87 hrs, Volume= 0.002 af, Depth= 0.13"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 25-yr Rainfall=6.00"

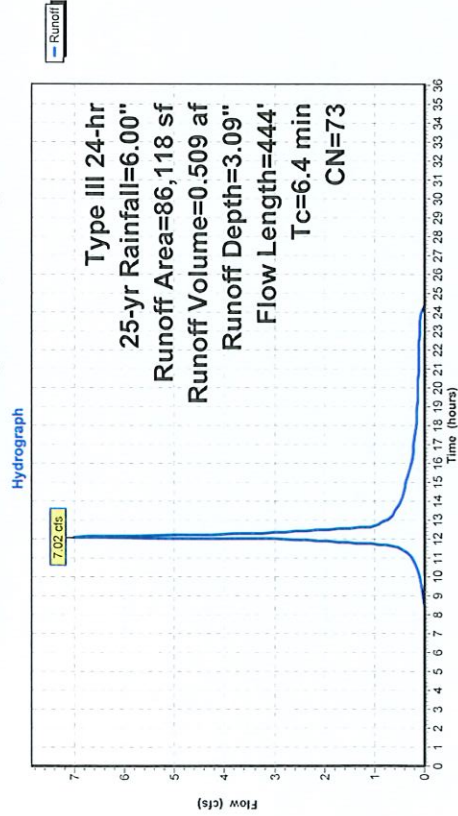
Area (sf)	CN	Description
9,649	32	Woods/grass comb., Good, HSG A
9,649		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	59	0.1000	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.13"
4.8	218	0.0116	0.75		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
9.8	277	Total			

Subcatchment EX-3: Southwest Portion



Subcatchment EX-4: Existing Building/ParkingArea



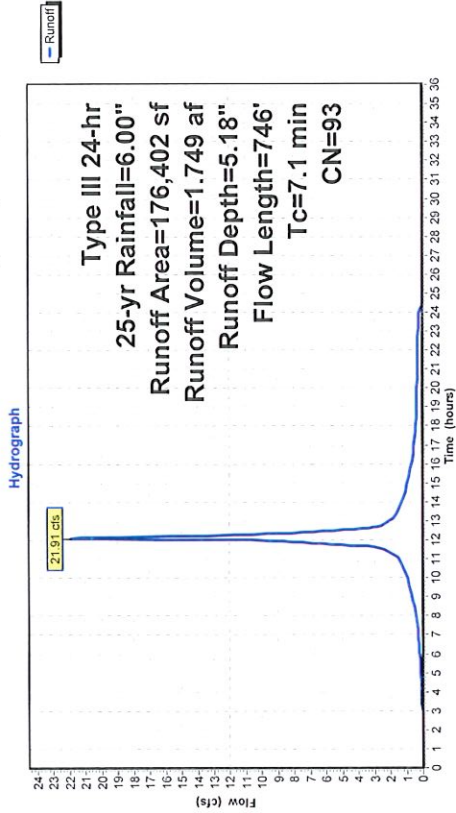
Summary for Subcatchment EX-5: 300 Concord Parking Lot (Offsite)

Runoff = 21.91 cfs @ 12.10 hrs, Volume= 1.749 af, Depth= 5.18"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
11,835	61	>75% Grass cover, Good, HSG B
158,372	98	Paved parking
6,195	39	>75% Grass cover, Good, HSG A
176,402	93	Weighted Average
18,030		10.22% Pervious Area
158,372		89.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.0610	0.22		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.13"
2.0	199	0.0227	1.64		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.13"
0.7	149	0.0047	3.37	2.65	Pipe Channel, C-D 12.0" Round Area= 0.8 sf Perim= 3.1' n= 0.012 Concrete pipe, finished
0.3	95	0.0095	6.28	11.09	Pipe Channel, D-E 18.0" Round Area= 1.8 sf Perim= 4.7' n= 0.012 Concrete pipe, finished
0.8	163	0.0018	3.31	10.40	Pipe Channel, E-F 24.0" Round Area= 3.1 sf Perim= 6.3' n= 0.012 Concrete pipe, finished
0.3	101	0.0059	5.99	18.82	Pipe Channel, F-G 24.0" Round Area= 3.1 sf Perim= 6.3' n= 0.012 Concrete pipe, finished
7.1	746	Total			

Subcatchment EX-5: 300 Concord Parking Lot (Offsite)



Summary for Pond E1P: Southern Pond

Inflow Area = 8,272 ac, 57.20% Impervious, Inflow Depth = 3.13" for 25-yr event
Inflow = 23.36 cfs @ 12.10 hrs, Volume= 2,154 af
Outflow = 5.91 cfs @ 12.57 hrs, Volume= 2,154 af, Atten= 75%, Lag= 28.4 min
Discarded = 1.25 cfs @ 12.57 hrs, Volume= 0.372 af
Primary = 4.66 cfs @ 12.57 hrs, Volume= 1.783 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

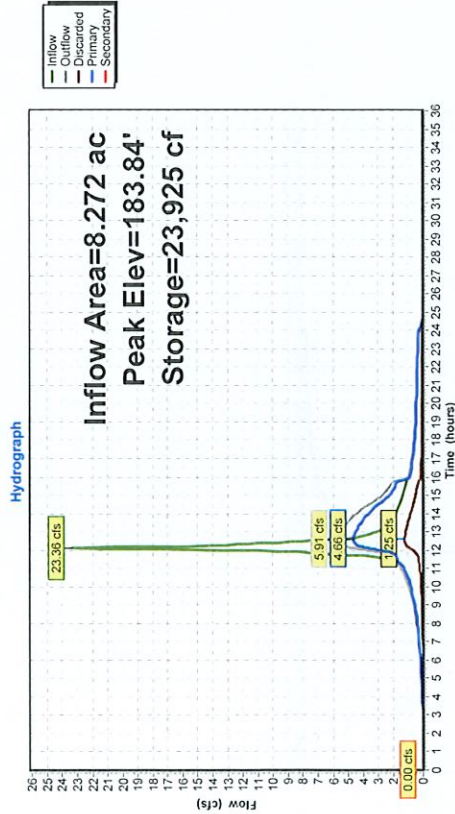
Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Peak Elev= 183.84' @ 12.57 hrs Surf.Area= 22,317 sf Storage= 23,925 cf
Plug-Flow detention time= 30.0 min calculated for 2,154 af (100% of inflow)
Center-of-Mass det. time= 30.0 min (828.6 - 798.7)

Volume	Invert	Avail. Storage	Storage Description
#1	182.00'	125,224 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf. Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
182.00	4,062	0	0
183.00	13,585	8,824	8,824
184.00	23,965	18,775	27,599
185.00	32,014	27,990	55,588
186.00	39,111	35,563	91,151
186.20	4,802	4,391	95,542
187.00	9,192	5,598	101,139
188.00	12,047	10,620	111,759
189.00	14,884	13,466	125,224

Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	2.410 in/hr Exfiltration over Surface area
#2	Secondary	186.00'	35.0' 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
#3	Primary	179.70'	15.0" Round Culvert
			L= 95.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 179.70' / 178.50' S= 0.0126 1' Cc= 0.900
#4	Device 3	182.30'	n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf
#5	Device 3	180.70'	8.0" Vert. Orifice/Grate C= 0.600
			8.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=1.24 cfs @ 12.57 hrs HW=183.84' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.24 cfs)
Primary OutFlow Max=4.66 cfs @ 12.57 hrs HW=183.84' (Free Discharge)
3=Culvert (Passes 4.66 cfs of 11.08 cfs potential flow)
4=Orifice/Grate (Orifice Controls 1.85 cfs @ 5.29 fps)
5=Orifice/Grate (Orifice Controls 2.82 cfs @ 8.07 fps)
Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond E1P: Southern Pond



Summary for Pond E2P: Northern Pond

Inflow Area = 0.670 ac, 22.98% Impervious, Inflow Depth = 1.36" for 25-yr event
Inflow = 0.97 cfs @ 12.08 hrs, Volume= 0.076 af
Outflow = 0.93 cfs @ 12.10 hrs, Volume= 0.076 af, Atten= 4%, Lag= 1.4 min
Discarded = 0.11 cfs @ 12.10 hrs, Volume= 0.009 af
Primary = 0.82 cfs @ 12.10 hrs, Volume= 0.067 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Peak Elev= 189.03' @ 12.10 hrs Surf.Area= 2,355 sf Storage= 76 cf

Plug-Flow detention time= 1.4 min calculated for 0.076 af (100% of inflow)
Center-of-Mass det. time= 1.4 min (883.3 - 881.9)

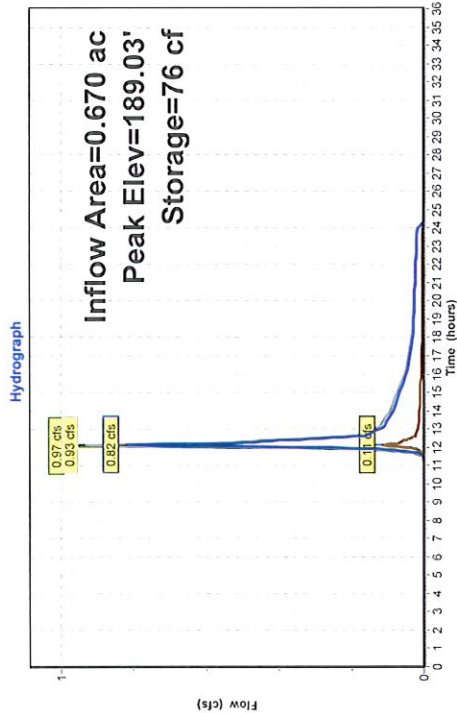
Volume	Invert	Avail. Storage	Storage Description
#1	189.00'	45,190 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf. Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
189.00	2,162	0	0
190.00	7,890	5,026	5,026
191.00	11,694	9,792	14,818
192.00	14,847	13,271	28,089
193.00	19,355	17,101	45,190

Device	Routing	Invert	Outlet Devices
#1	Discarded	189.00'	2,410 in/hr Exfiltration over Surface area
#2	Primary	189.00'	50.0' 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

Discarded OutFlow Max=0.13 cfs @ 12.10 hrs HW=189.03' (Free Discharge)
1=Exfiltration (Exfiltration Controls 0.13 cfs)

Primary OutFlow Max=0.73 cfs @ 12.10 hrs HW=189.03' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 0.73 cfs @ 0.44 fps)

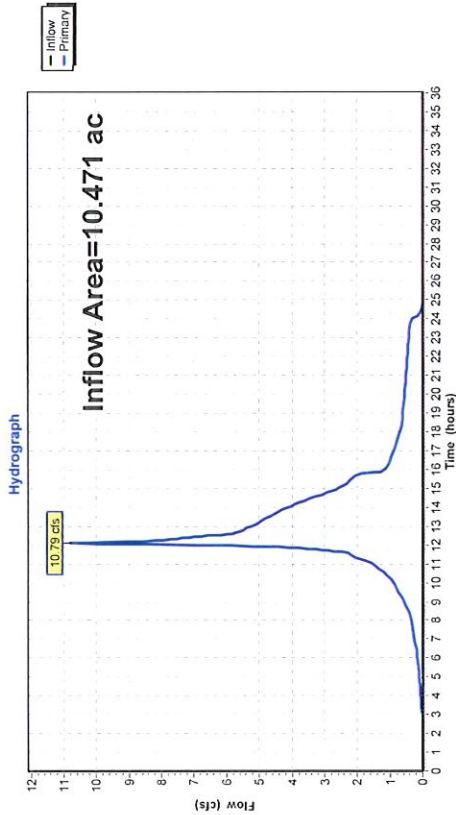
Pond E2P: Northern Pond



Summary for Link DP1: Wetlands

Inflow Area = 10.471 ac, 56.07% Impervious, Inflow Depth = 2.63" for 25-yr event
Inflow = 10.79 cfs @ 12.10 hrs, Volume= 2.294 af
Primary = 10.79 cfs @ 12.10 hrs, Volume= 2.294 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

Link DP1: Wetlands



Summary for Subcatchment EX-2: Existing Building/StormwaterBasin

Runoff = 6.53 cfs @ 12.34 hrs, Volume= 0.775 af, Depth= 2.62"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=8.59"

Area (sf)	CN	Description
31,607	98	Roofs, HSG A
9,433	98	Paved parking, HSG A
113,702	32	Woods/grass comb., Good, HSG A
154,742	50	Weighted Average
113,702		73.48% Pervious Area
41,040		26.52% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.3	50	0.0020	0.06		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.13"
3.4	160	0.0129	0.80		Shallow Concentrated Flow, B-C Short Grass Pasture Kv= 7.0 fps
0.3	109	0.0129	6.70	5.26	Pipe Channel, RCP_Round 12" 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.010 PVC, smooth interior
4.2	56	0.0020	0.22		Shallow Concentrated Flow, Pipe to bottom of pond Woodland Kv= 5.0 fps
22.2	375	Total			

Summary for Subcatchment EX-1: NorthernAmenitySpace

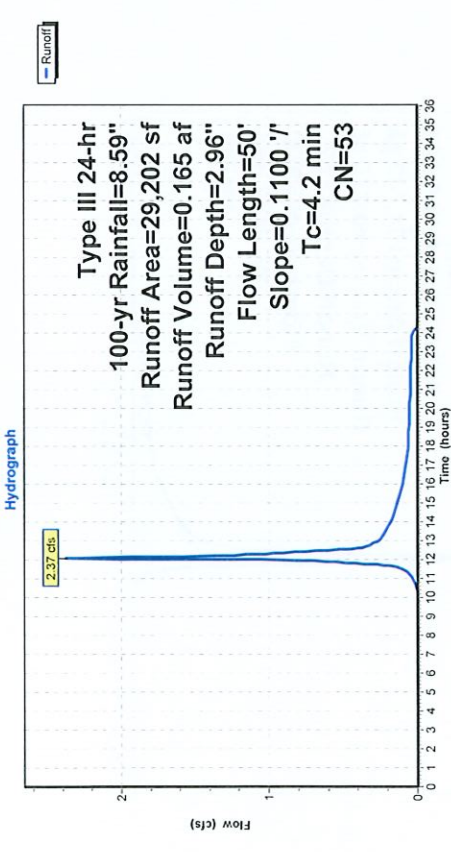
Runoff = 2.37 cfs @ 12.07 hrs, Volume= 0.165 af, Depth= 2.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=8.59"

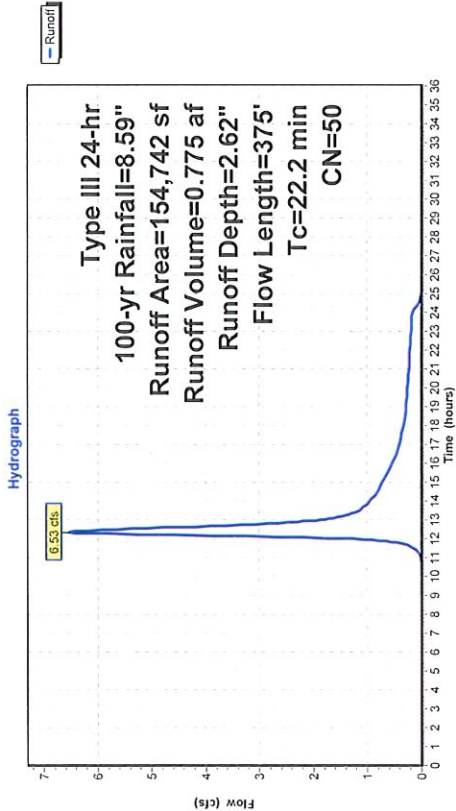
Area (sf)	CN	Description
6,712	98	Paved parking, HSG A
22,490	39	>75% Grass cover, Good, HSG A
29,202	53	Weighted Average
22,490		77.02% Pervious Area
6,712		22.98% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.2	50	0.1100	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.13"

Subcatchment EX-1: NorthernAmenitySpace



Subcatchment EX-2: Existing Building/StormwaterBasin



Summary for Subcatchment EX-3: Southwest Portion

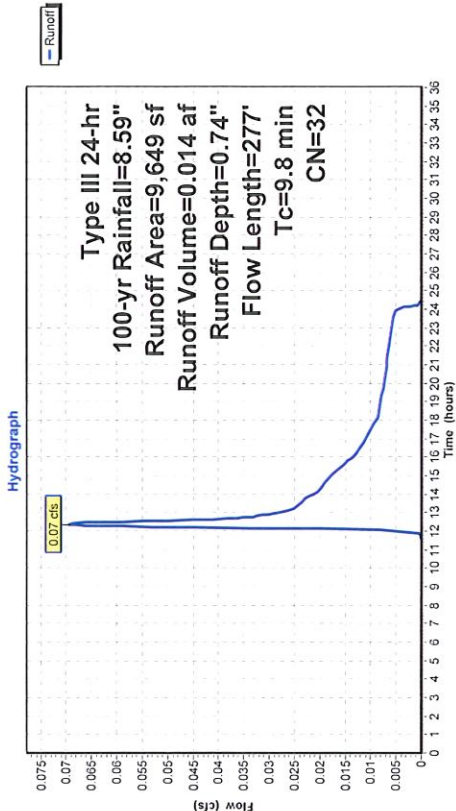
Runoff = 0.07 cfs @ 12.37 hrs, Volume= 0.014 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

Type III 24-hr 100-yr Rainfall=8.59"

Area (sf)	CN	Description			
9,649	32	Woods/grass comb., Good, HSG A			
9,649		100.00% Pervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.0	59	0.1000	0.20		Sheet Flow, Grass: Dense n= 0.240 P2= 3.13"
4.8	218	0.0116	0.75		Shallow Concentrated Flow, Short Grass Pasture KV= 7.0 fps
9.8	277	Total			

Subcatchment EX-3: Southwest Portion



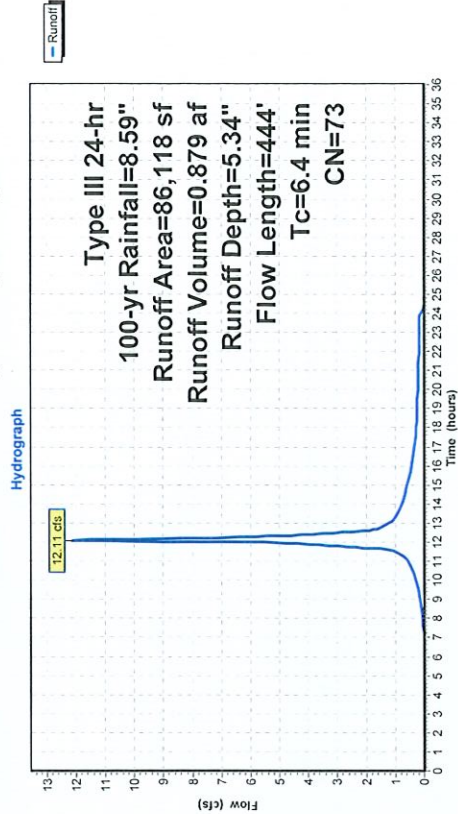
Summary for Subcatchment EX-4: Existing Building/ParkingArea

Runoff = 12.11 cfs @ 12.09 hrs, Volume= 0.879 af, Depth= 5.34"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 100-yr Rainfall=8.59"

Area (sf)	CN	Description
24,221	98	Roofs, HSG A
25,378	98	Paved parking, HSG A
36,519	39	>75% Grass cover, Good, HSG A
86,118	73	Weighted Average
36,519		42.41% Pervious Area
49,599		57.59% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.3	50	0.0400	0.19		Sheet Flow, Grass, Short n= 0.150 P2= 3.13"
0.6	70	0.0850	2.04		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
0.7	134	0.0246	3.18		Shallow Concentrated Flow, Paved Kv= 20.3 fps
0.4	139	0.0140	5.81	4.57	Pipe Channel, RCP, Round 12" n= 0.012 Corrugated PP, smooth interior
0.4	51	0.0009	2.34	7.35	Pipe Channel, RCP, Round 24" n= 0.012 Corrugated PP, smooth interior
6.4	444	Total			

Subcatchment EX-4: Existing Building/ParkingArea



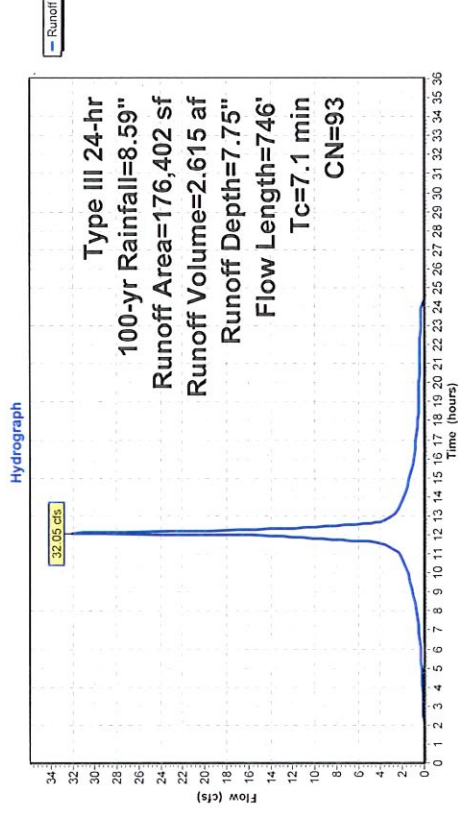
Summary for Subcatchment EX-5: 300 Concord Parking Lot (Offsite)

Runoff = 32.05 cfs @ 12.10 hrs, Volume= 2.615 af, Depth= 7.75"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 100-yr Rainfall=8.59"

Area (sf)	CN	Description
11,835	61	>75% Grass cover, Good, HSG B
158,372	98	Paved parking
6,195	39	>75% Grass cover, Good, HSG A
176,402	93	Weighted Average
18,030		10.22% Pervious Area
158,372		89.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.0610	0.22		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.13"
2.0	199	0.0227	1.64		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.13"
0.7	149	0.0047	3.37	2.65	Pipe Channel, C-D 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	95	0.0095	6.28	11.09	Pipe Channel, D-E 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.8	163	0.0018	3.31	10.40	Pipe Channel, E-F 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0059	5.99	18.82	Pipe Channel, F-G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.1	746	Total			

Subcatchment EX-5: 300 Concord Parking Lot (Offsite)



Summary for Pond E1P: Southern Pond

Inflow Area = 8.272 ac, 57.20% Impervious, Inflow Depth = 5.13" for 100-yr event
Inflow = 37.01 cfs @ 12.10 hrs, Volume= 3.537 af
Outflow = 7.34 cfs @ 12.73 hrs, Volume= 3.537 af, Atten= 80%, Lag= 37.7 min
Discarded = 1.67 cfs @ 12.73 hrs, Volume= 0.868 af
Primary = 5.67 cfs @ 12.73 hrs, Volume= 2.868 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Peak Elev= 184.74' @ 12.73 hrs Surf.Area= 29,911 sf Storage= 47,500 cf

Plug-Flow detention time= 52.5 min calculated for 3.534 af (100% of inflow)
Center-of-Mass det. time= 52.4 min (846.4 - 793.9)

Volume		Invert	Avail.Storage	Storage Description
#1	182.00'	125.224 cf	Custom Stage Data (Prismatic)	Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	
182.00	4,062	0	0	
183.00	13,585	8,824	8,824	
184.00	23,965	18,775	27,599	
185.00	32,014	27,990	55,588	
186.00	39,111	35,563	91,151	
186.20	4,802	4,391	95,542	
187.00	9,192	5,598	101,139	
188.00	12,047	10,620	111,759	
189.00	14,864	13,466	125,224	

Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	2.410 in/hr Exfiltration over Surface area
#2	Secondary	186.00'	35.0' 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 2.66 2.70 2.74
#3	Primary	179.70'	15.0" Round Culvert
			L= 95.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 179.70' / 178.50' S= 0.0126 ' S= 0.900
#4	Device 3	182.30'	8.0" Vert. Orifice/Grate C= 0.600
#5	Device 3	180.70'	8.0" Vert. Orifice/Grate C= 0.600

Discarded OutFlow Max=1.67 cfs @ 12.73 hrs HW=184.74' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.67 cfs)

Primary OutFlow Max=5.67 cfs @ 12.73 hrs HW=184.74' (Free Discharge)
3=Culvert (Passes 5.67 cfs of 12.41 cfs potential flow)

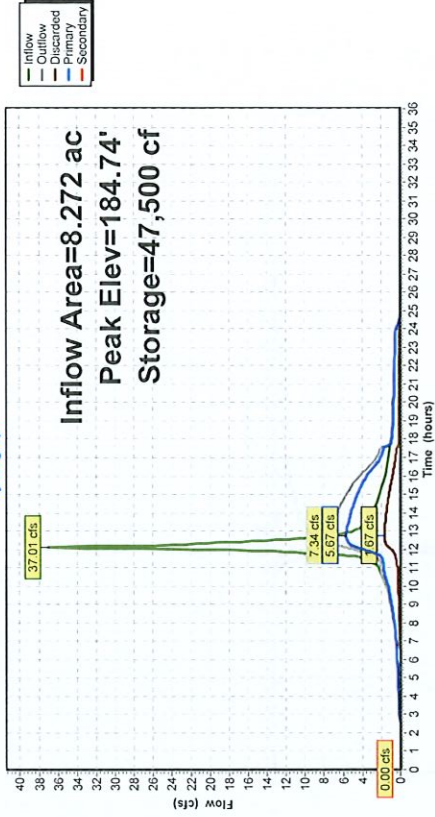
4=Orifice/Grate (Orifice Controls 2.44 cfs @ 6.99 fps)

5=Orifice/Grate (Orifice Controls 3.24 cfs @ 9.27 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond E1P: Southern Pond

Hydrograph



Summary for Pond E2P: Northern Pond

Inflow Area = 0.670 ac, 22.98% Impervious, Inflow Depth = 2.96" for 100-yr event
 Inflow = 2.37 cfs @ 12.07 hrs, Volume = 0.165 af
 Outflow = 2.32 cfs @ 12.09 hrs, Volume = 0.165 af, Atten = 2%, Lag = 1.1 min
 Discarded = 0.14 cfs @ 12.09 hrs, Volume = 0.018 af
 Primary = 2.17 cfs @ 12.09 hrs, Volume = 0.147 af

Routing by Stor-Ind method, Time Span = 0.00-36.00 hrs, dt = 0.03 hrs
 Peak Elev = 189.07' @ 12.09 hrs Surf Area = 2,546 sf Storage = 158 cf

Plug-Flow detention time = 1.3 min calculated for 0.165 af (100% of inflow)
 Center-of-Mass det. time = 1.3 min (857.9 - 856.6)

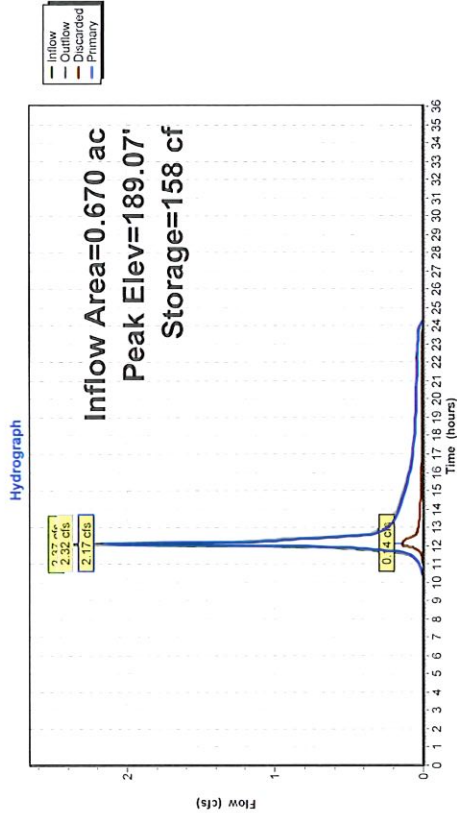
Volume	Invert	Avail Storage	Storage Description
#1	189.00'	45,190 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
189.00	2,162	0	0
190.00	7,890	5,026	5,026
191.00	11,694	9,792	14,818
192.00	14,847	13,271	28,089
193.00	19,355	17,101	45,190

Device	Routing	Invert	Outlet Devices
#1	Discarded	189.00'	2.410 in/hr Exfiltration over Surface area
#2	Primary	189.00'	50.0' 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 2.66 2.70 2.74

Discarded OutFlow Max = 0.14 cfs @ 12.09 hrs HW = 189.07' (Free Discharge)
 1-1 = Exfiltration (Exfiltration Controls 0.14 cfs)

Primary OutFlow Max = 2.10 cfs @ 12.09 hrs HW = 189.07' (Free Discharge)
 2-2 = Broad-Crested Rectangular Weir (Weir Controls 2.10 cfs @ 0.63 fps)

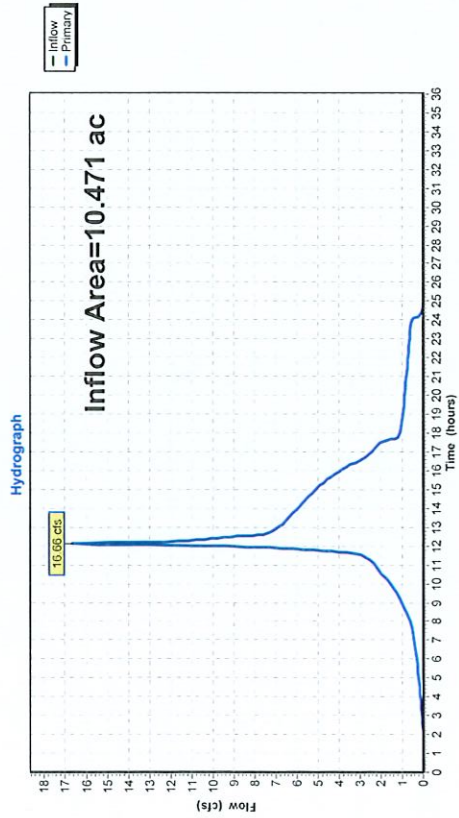
Pond E2P: Northern Pond



Summary for Link DP1: Wetlands

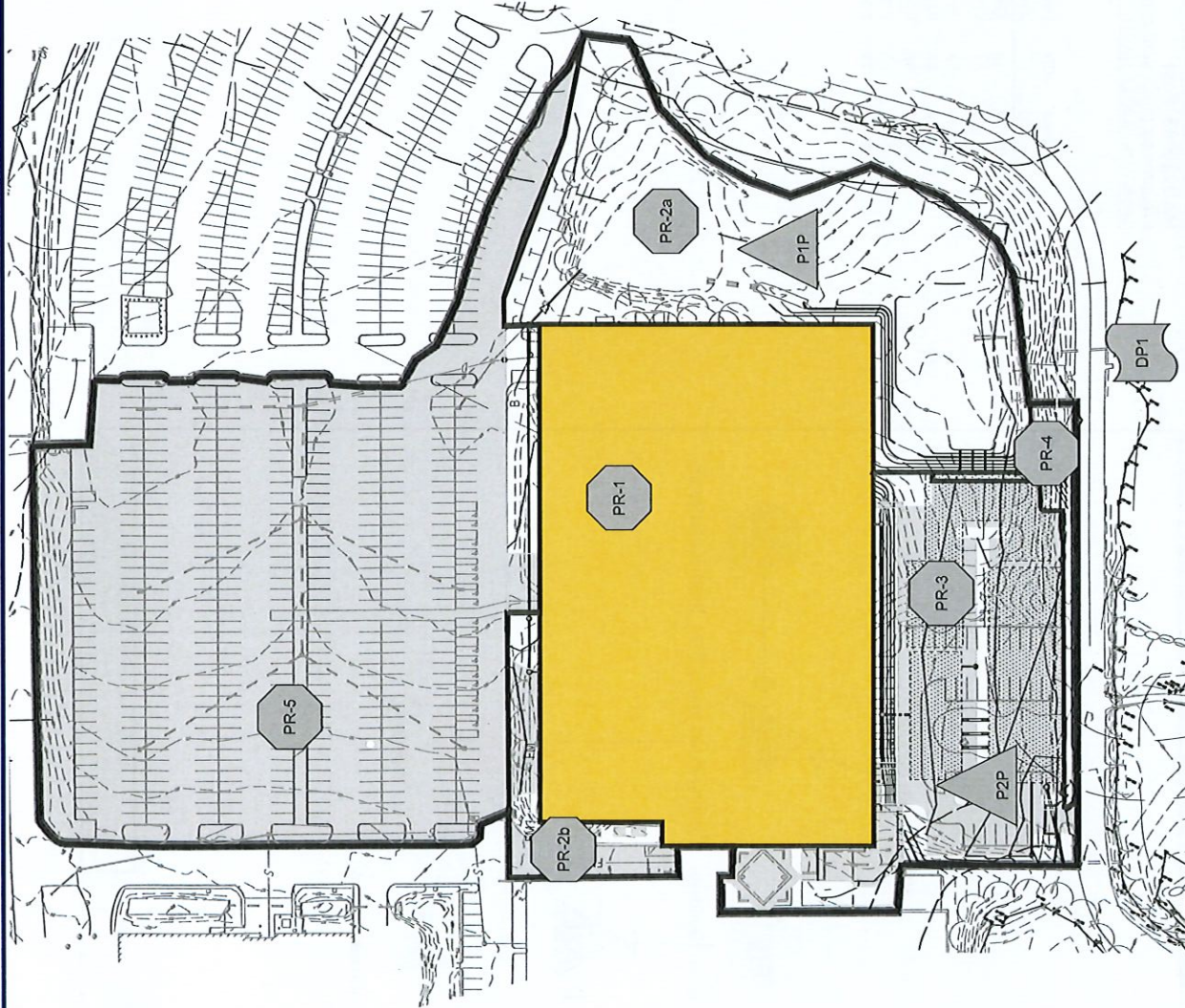
Inflow Area = 10.471 ac, 56.07% Impervious, Inflow Depth = 4.31" for 100-yr event
Inflow = 16.66 cfs @ 12.10 hrs, Volume= 3.761 af
Primary = 16.66 cfs @ 12.10 hrs, Volume= 3.761 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

Link DP1: Wetlands



APPENDIX E: PROPOSED CONDITIONS HYDROLOGIC ANALYSIS

- PROPOSED CONDITIONS DRAINAGE MAP
- PROPOSED CONDITIONS HYDROCAD CALCULATIONS



LEGEND

DP#
DESIGN POINT

PR-#
PROPOSED SUBCATCHMENT

XX#
BASIN OR MODELED DRAINAGE STRUCTURE

OVERALL ANALYSIS BOUNDARY

SUBCATCHMENT BOUNDARY

NRCS SOIL BOUNDARY

CONCRETE OR PAVEMENT

ROOF

**PROPOSED CONDITIONS
DRAINAGE AREA MAP**

298 CONCORD ROAD
BILLERICA, MA 01821
PREPARED BY

BOHLER

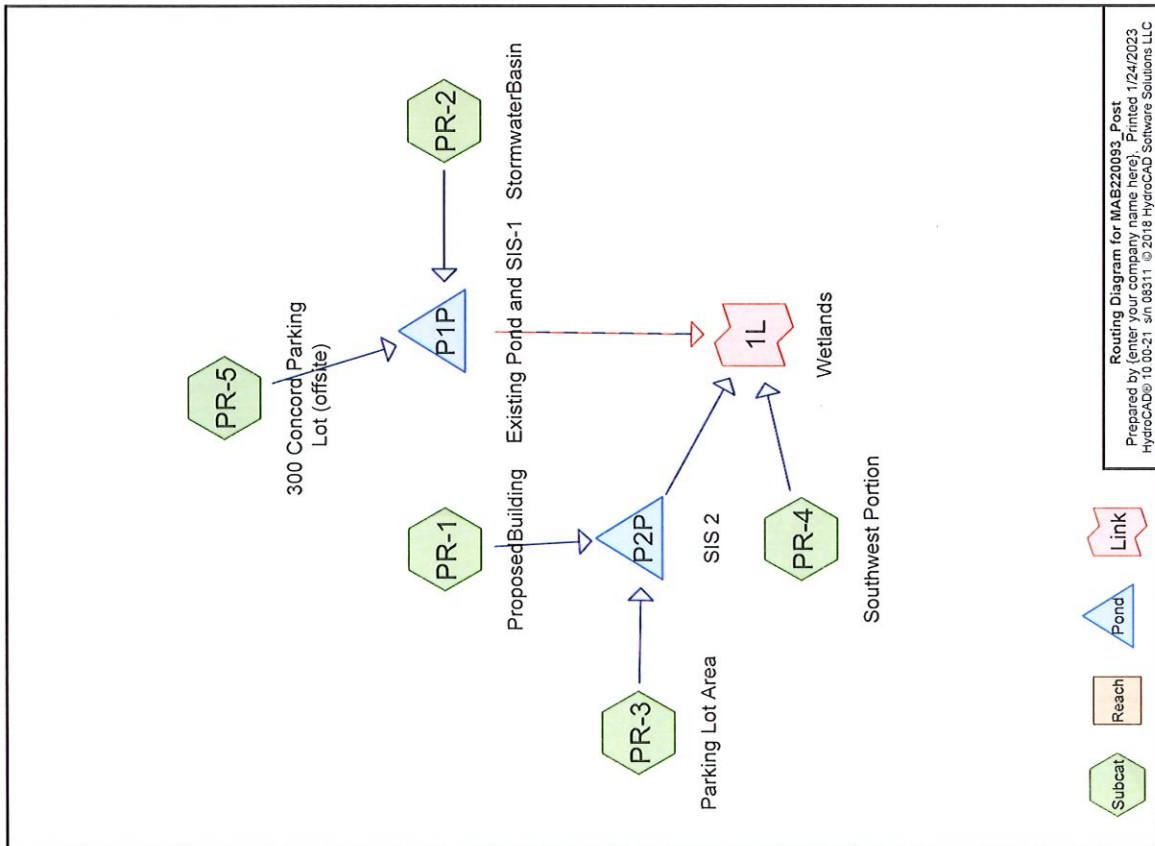
SCALE: 1"=80' DATE: 01/24/2023

MAB220093_Post

Prepared by {enter your company name here}
 HydroCAD® 10.00-21 s/n 08311 © 2018 HydroCAD Software Solutions LLC Printed 1/24/2023 Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.142	39	>75% Grass cover, Good, HSG A (PR-5)
0.272	61	>75% Grass cover, Good, HSG B (PR-5)
3.636	98	Paved parking (PR-5)
1.260	98	Paved parking, HSG A (PR-2, PR-3)
2.792	98	Roofs, HSG A (PR-1)
2.369	32	Woods/grass comb., Good, HSG A (PR-2, PR-3, PR-4)
10.471	81	TOTAL AREA



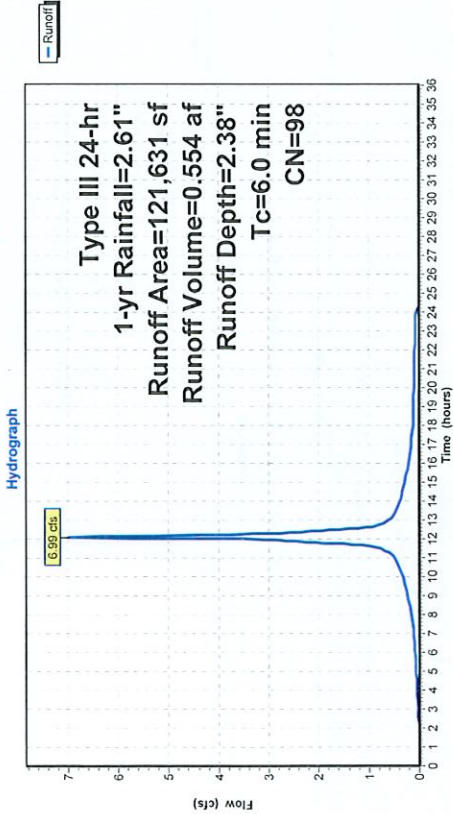
Summary for Subcatchment PR-1: ProposedBuilding

Runoff = 6.99 cfs @ 12.08 hrs, Volume= 0.554 af, Depth= 2.38"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (sf)	CN	Description
121,631	98	Roofs, HSG A
121,631	100.00%	Impervious Area

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

Subcatchment PR-1: ProposedBuilding

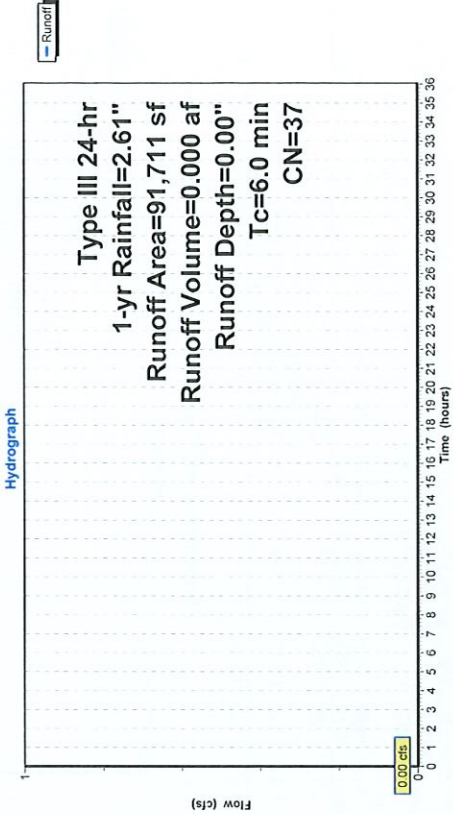


Summary for Subcatchment PR-2: StormwaterBasin

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 1-yr Rainfall=2.61"

Area (sf)	CN	Description
7,635	98	Paved parking, HSG A
84,076	32	Woods/grass comb., Good, HSG A
91,711	37	Weighted Average
84,076		91.67% Pervious Area
7,635		8.33% Impervious Area

Subcatchment PR-2: StormwaterBasin

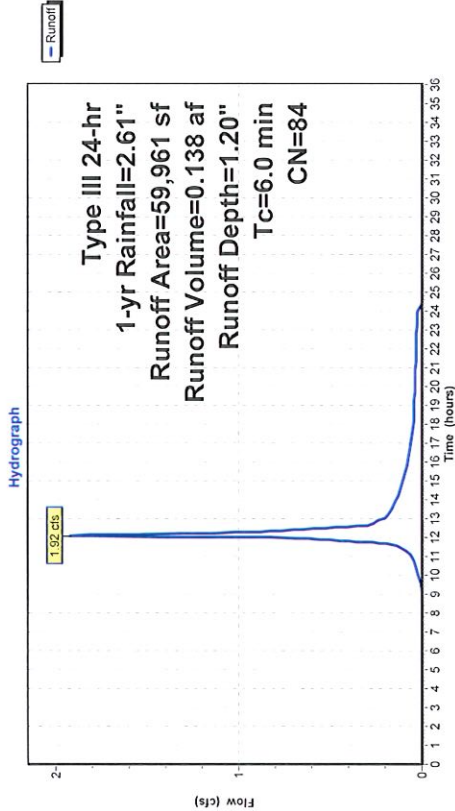


Summary for Subcatchment PR-3: Parking Lot Area

Runoff = 1.92 cfs @ 12.09 hrs, Volume= 0.138 af, Depth= 1.20"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 1-yr Rainfall=2.61"

Area (sf)	CN	Description			
47,239	98	Paved parking, HSG A			
12,722	32	Woods/grass comb., Good, HSG A			
59,961	84	Weighted Average			
12,722		21.22% Pervious Area			
47,239		78.78% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description

Subcatchment PR-3: Parking Lot Area

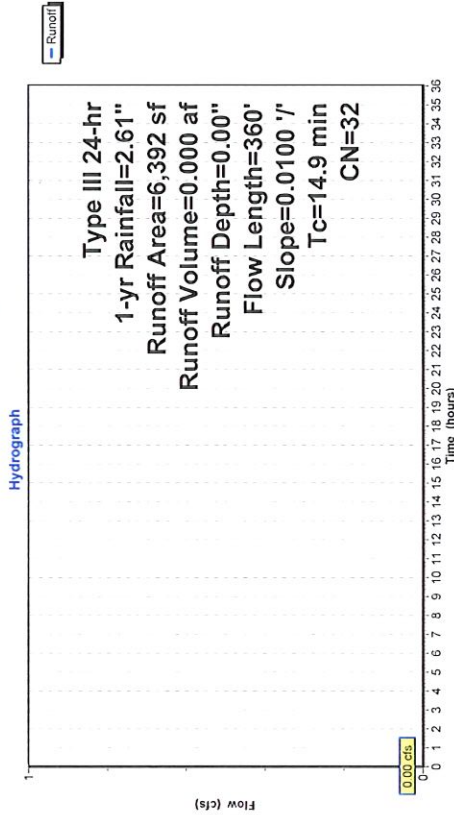


Summary for Subcatchment PR-4: Southwest Portion

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 1-yr Rainfall=2.61"

Area (sf)	CN	Description			
6,392	32	Woods/grass comb., Good, HSG A			
6,392	100.00% Pervious Area				
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		Sheet Flow, n= 0.150 P2= 3.13"
7.4	310	0.0100	0.70		Grass: Short Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps

Subcatchment PR-4: Southwest Portion



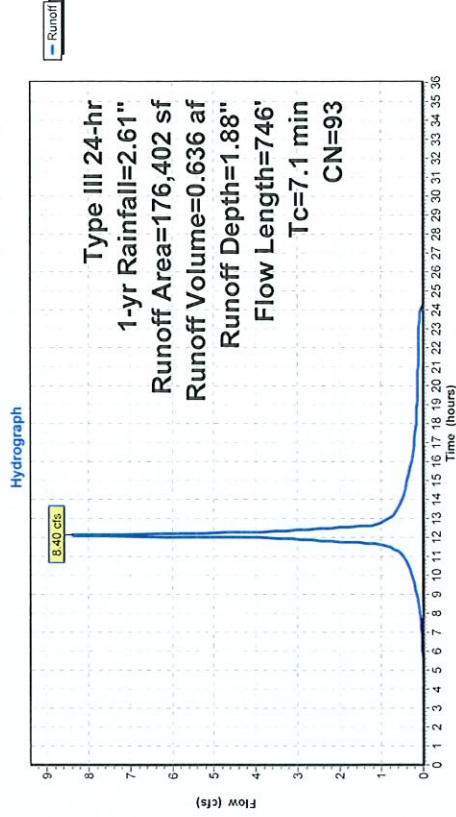
Summary for Subcatchment PR-5: 300 Concord Parking Lot (offsite)

Runoff = 8.40 cfs @ 12.10 hrs, Volume= 0.636 af, Depth= 1.88"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 1-yr Rainfall=2.61"

Area (sf)	CN	Description
11,835	61	>75% Grass cover, Good, HSG B
158,372	98	Paved parking
6,195	39	>75% Grass cover, Good, HSG A
176,402	93	Weighted Average
18,030		10.22% Pervious Area
158,372		89.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.0610	0.22		Sheet Flow, A-B Grass, Short n= 0.150 P2= 3.13"
2.0	199	0.0227	1.64		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.13"
0.7	149	0.0047	3.37	2.65	Pipe Channel, C-D 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	95	0.0095	6.28	11.09	Pipe Channel, D-E 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.8	163	0.0018	3.31	10.40	Pipe Channel, E-F 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0059	5.99	18.82	Pipe Channel, F-G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.1	746	Total			

Subcatchment PR-5: 300 Concord Parking Lot (offsite)



Summary for Pond P1P: Existing Pond and SIS-1

Inflow Area = 6.155 ac, 61.92% Impervious, Inflow Depth = 1.24" for 1-yr event
Inflow = 8.40 cfs @ 12.10 hrs, Volume= 0.636 af
Outflow = 3.41 cfs @ 12.34 hrs, Volume= 0.636 af, Atten= 59%, Lag= 14.6 min
Discarded = 1.01 cfs @ 12.34 hrs, Volume= 0.113 af
Primary = 2.40 cfs @ 12.34 hrs, Volume= 0.522 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Peak Elev= 182.60' @ 12.34 hrs Surf.Area= 18,099 sf Storage= 4.627 cf

Plug-Flow detention time= 8.8 min calculated for 0.635 af (100% of inflow)
Center-of-Mass det. time= 8.8 min (809.7 - 800.9)

Volume	Invert	Avail. Storage	Storage Description
#1A	182.50'	0 cf	72.67'W x 136.48' L x 3.50' H Field A
#2A	182.50'	26,599 cf	34,711 cf Overall - 34,711 cf Embedded = 0 cf x 40.0% Voids StormTrap ST2 SingleTrap 3-0 x 56 Inside #1 Inside= 101.7'W x 36.0'H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7'W x 42.0'H => 29.68 sf x 15.40'L = 456.9 cf 7 Rows of 8 Chambers 59.35' x 123.17' Core + 6.66' Border = 72.67' x 136.48' System Custom Stage Data (Prismatic) listed below (Recalc)
#3	182.00'	84,892 cf	Total Available Storage
		111,490 cf	

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
182.00	4,063	0	0
183.00	10,876	7,470	7,470
184.00	17,200	14,038	21,508
185.00	22,041	19,621	41,128
186.00	26,743	24,392	65,520
186.20	4,802	3,154	68,674
187.00	9,192	5,598	74,272
188.00	12,047	10,620	84,892

Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	2,410 in/hr Exfiltration over Surface area
#2	Secondary	186.00'	35.0' 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 2.66 2.64 2.64 2.64 2.65 2.66 2.66 2.68 2.70 2.74 15.0" Round Culvert L= 95.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.70' / 178.50' S= 0.0126 /' Co= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf 8.0" Vert. Orifice/Grate C= 0.600 8.0" Vert. Orifice/Grate C= 0.600
#3	Primary	179.70'	
#4	Device 3	182.30'	
#5	Device 3	180.70'	

Pond P1P: Existing Pond and SIS-1 - Chamber Wizard Field A

Chamber Model = StormTrap ST2 SingleTrap 3-0 (StormTrap ST2 SingleTrap® Type II+IV)

Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf

Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length

7 Rows x 101.7" Wide + 79.9" Side Border x 2 = 72.67' Base Width

42.0" Chamber Height = 3.50' Field Height

56 Chambers x 354.0 cf + 6,775.3 cf Border = 26,598.9 cf Chamber Storage

56 Chambers x 456.9 cf + 9,124.6 cf Border = 34,711.2 cf Displacement

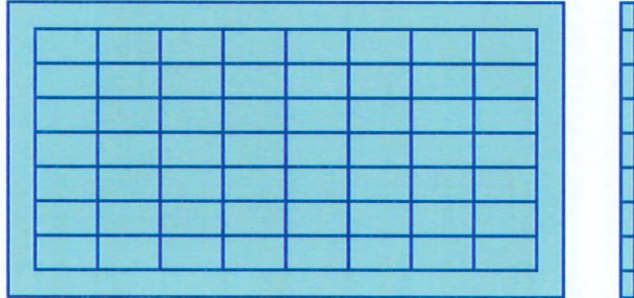
Chamber Storage = 26,598.9 cf = 0.611 af

Overall Storage Efficiency = 76.6%

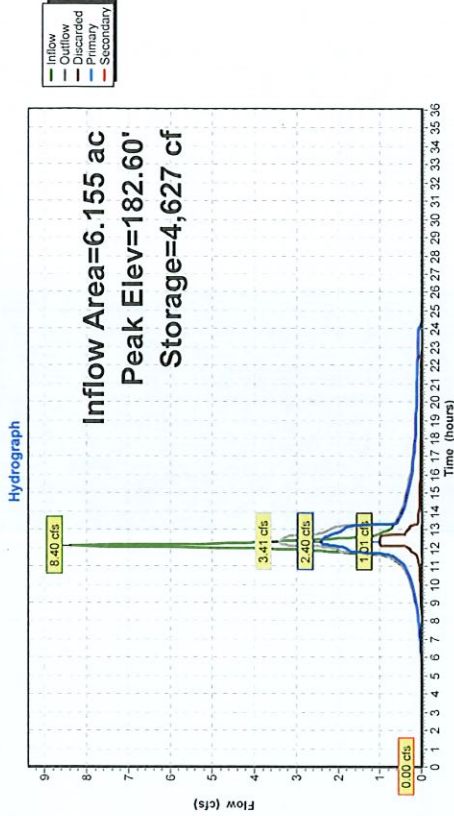
Overall System Size = 136.48' x 72.67' x 3.50'

56 Chambers (plus border)

1,285.6 cy Field

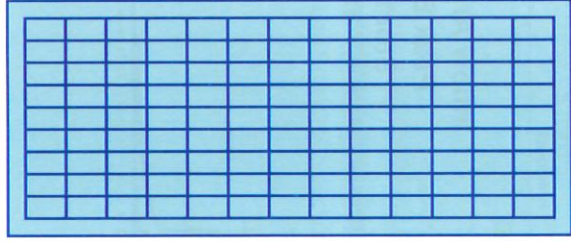


Pond P1P: Existing Pond and SIS-1



Pond P2P: SIS 2 - Chamber Wizard Field A

Chamber Model = StormTrap ST2 SingleTrap 2-6 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf
Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf
13 Chambers/Row x 15.40' Long = 200.15' Row Length +79.9" Border x 2 = 213.46' Base Length
9 Rows x 101.7" Wide + 79.9" Side Border x 2 = 89.63' Base Width
36.0" Chamber Height = 3.00' Field Height
117 Chambers x 289.8 cf + 8,253.9 cf Border = 42,161.7 cf Chamber Storage
117 Chambers x 391.6 cf + 11,572.7 cf Border = 57,393.6 cf Displacement
Chamber Storage = 42,161.7 cf = 0.968 af
Overall Storage Efficiency = 73.5%
Overall System Size = 213.46' x 89.63' x 3.00'
117 Chambers (plus border)
2,125.7 cy Field



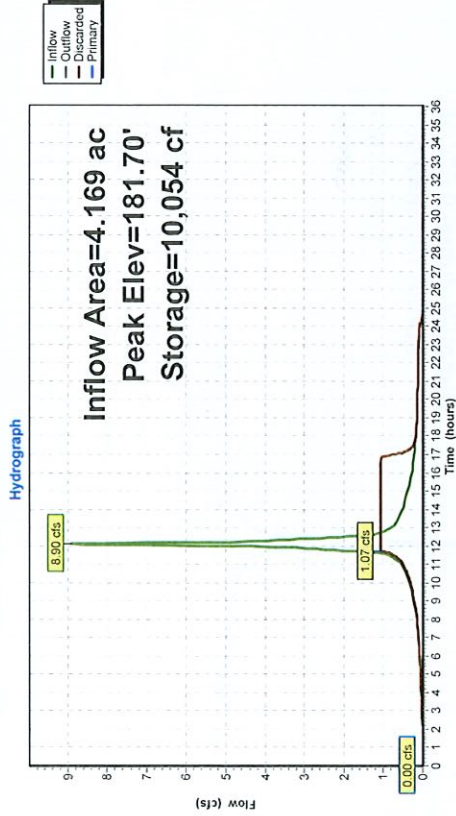
Summary for Pond P2P: SIS 2

Inflow Area =	4.169 ac, 92.99% Impervious, Inflow Depth = 1.99" for 1-yr event
Inflow =	8.90 cfs @ 12.09 hrs, Volume= 0.692 af
Outflow =	1.07 cfs @ 11.70 hrs, Volume= 0.692 af, Atten= 88%, Lag= 0.0 min
Discarded =	1.07 cfs @ 11.70 hrs, Volume= 0.692 af
Primary =	0.00 cfs @ 0.00 hrs, Volume= 0.000 af
Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs	
Peak Elev= 181.70' @ 12.71 hrs	Surf.Area= 19,131 sf Storage= 10,054 cf
Plug-Flow detention time= 68.5 min calculated for 0.692 af (100% of inflow)	
Center-of-Mass det. time= 68.4 min (844.9 - 776.5)	
Volume	Invert Avail. Storage Storage Description
#1A 181.10'	0 cf 89.63'W x 213.46'L x 3.00'H Field A
#2A 181.10'	57,394 cf Overall - 57,394 cf Embedded = 0 cf x 40.00% Voids StormTrap ST2 SingleTrap 2-6 x 117 Inside #1 Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 9 Rows of 13 Chambers 76.31' x 200.15' Core + 6.66' Border = 89.63' x 213.46' System 4.00'D x 2.70'H Catch Basins x 4 -Impervious
#3 183.00'	136 cf 42,297 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.10'	2.410 in/hr Exfiltration over Surface area
#2	Primary	181.60'	24.0" Round Culvert L= 100.0' RCP, sq cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 181.60' / 180.00" S= 0.0160' /' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf 4.0' long x 0.5' breadth Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef (English) 2.80 2.92 3.08 3.30 3.32 #3 Device 2 183.20' #4 Device 2 182.50' #5 Device 2 181.97' 6.0" Vert. Orifice/Grate X 4.00 C= 0.600 4.0" Vert. Orifice/Grate X 6.00 C= 0.600 Discarded OutFlow Max=1.07 cfs @ 11.70 hrs HW=181.15' (Free Discharge) 1-1=Exfiltration (Exfiltration Controls 1.07 cfs) Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=181.10' (Free Discharge) 2=Culvert (Controls 0.00 cfs) 3=Weir (Controls 0.00 cfs) 4=Orifice/Grate (Controls 0.00 cfs) 5=Orifice/Grate (Controls 0.00 cfs)

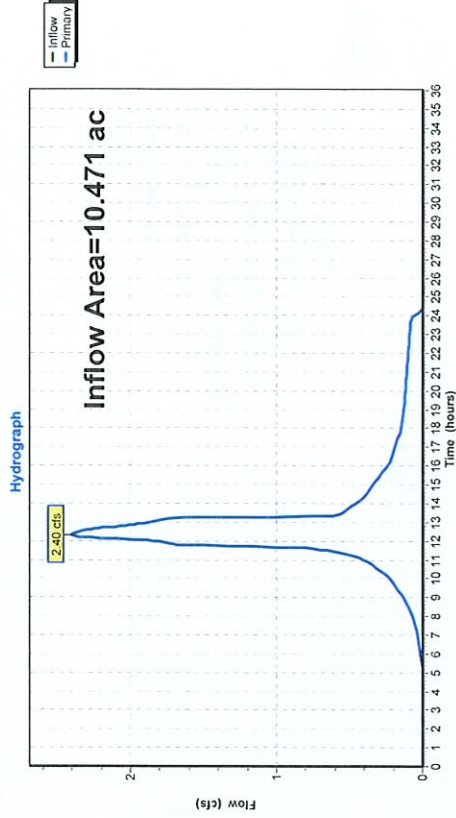
Pond P2P: SIS 2



Summary for Link 1L: Wetlands

Inflow Area = 10.471 ac, 73.42% Impervious, Inflow Depth = 0.60" for 1-yr event
Inflow = 2.40 cfs @ 12.34 hrs, Volume= 0.522 af
Primary = 2.40 cfs @ 12.34 hrs, Volume= 0.522 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

Link 1L: Wetlands



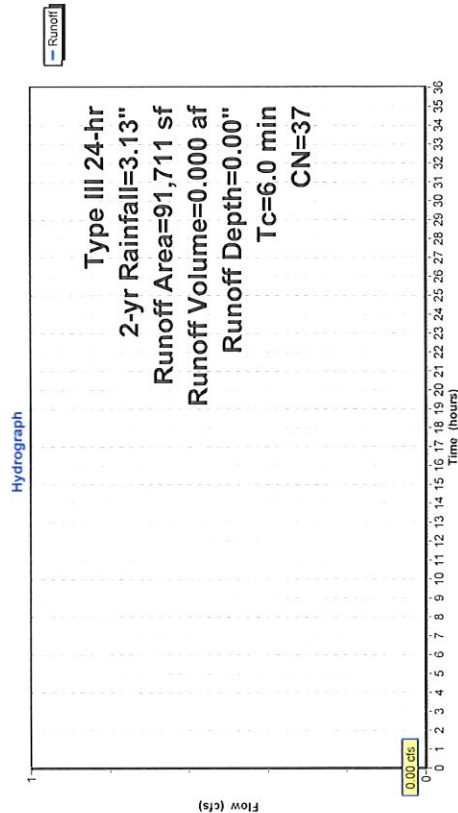
Summary for Subcatchment PR-2: StormwaterBasin

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

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.13"

Area (sf)		CN	Description		
7,635	98	Paved parking, HSG A			
84,076	32	Woods/grass comb., Good, HSG A			
91,711	37	Weighted Average			
84,076		91.67% Pervious Area			
7,635		8.33% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description

Subcatchment PR-2: StormwaterBasin



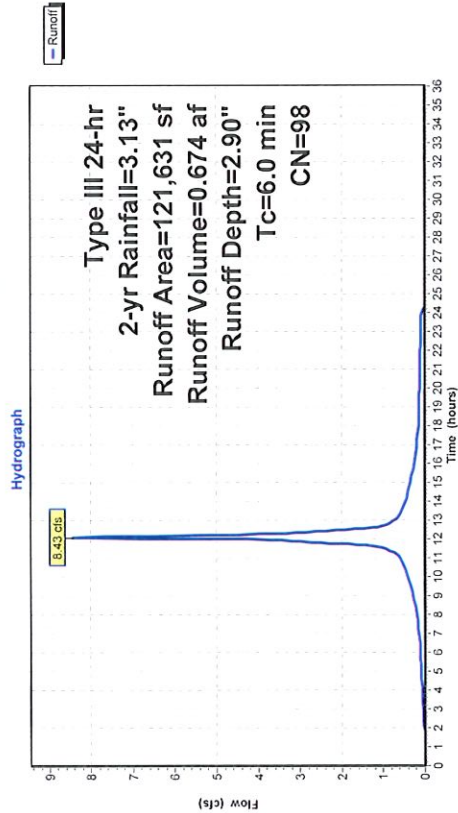
Summary for Subcatchment PR-1: ProposedBuilding

Runoff = 8.43 cfs @ 12.08 hrs, Volume= 0.674 af, Depth= 2.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.13"

Area (sf)	CN	Description			
121,631	98	Roofs, HSG A			
121,631		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry,

Subcatchment PR-1: ProposedBuilding



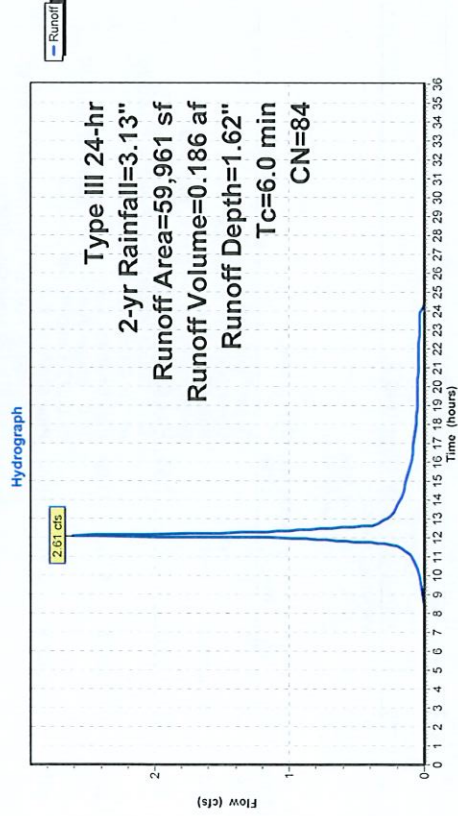
Summary for Subcatchment PR-3: Parking Lot Area

Runoff = 2.61 cfs @ 12.09 hrs, Volume= 0.186 af, Depth= 1.62"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.13"

Area (sf)	CN	Description
47,239	98	Paved parking, HSG A
12,722	32	Woods/grass comb., Good, HSG A
59,961	84	Weighted Average
12,722		21.22% Pervious Area
47,239		78.78% Impervious Area

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

Subcatchment PR-3: Parking Lot Area



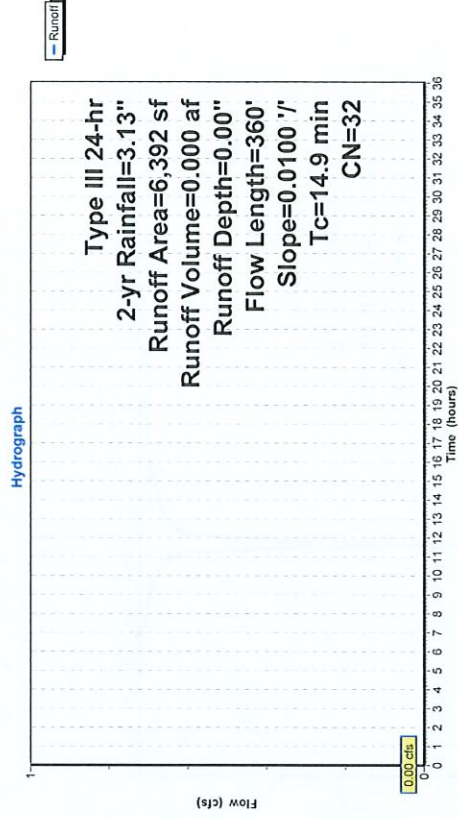
Summary for Subcatchment PR-4: Southwest Portion

Runoff = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af, Depth= 0.00"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 2-yr Rainfall=3.13"

Area (sf)	CN	Description
6,392	32	Woods/grass comb., Good, HSG A
6,392		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		Sheet Flow, Grass, Short
7.4	310	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture
14.9	360	Total			n= 0.150 P2= 3.13" Kv= 7.0 fps

Subcatchment PR-4: Southwest Portion

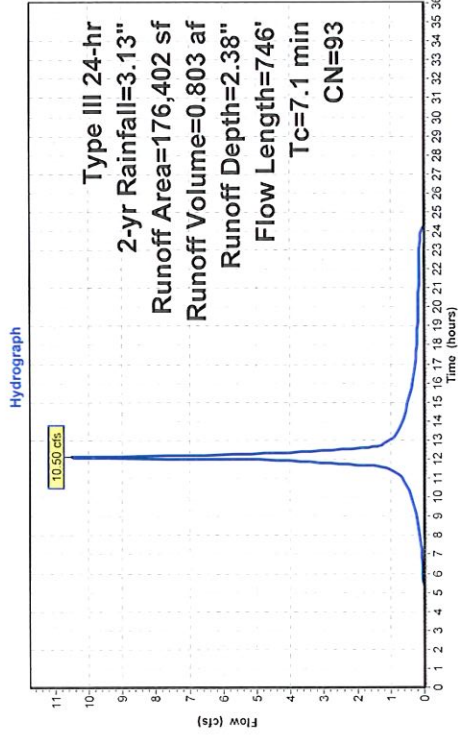


Summary for Subcatchment PR-5: 300 Concord Parking Lot (offsite)

Runoff = 10.50 cfs @ 12.10 hrs, Volume= 0.803 af, Depth= 2.38"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 2-yr Rainfall=3.13"

Area (sf)	CN	Description
11,835	61	>75% Grass cover, Good, HSG B
158,372	98	Paved parking
6,195	39	>75% Grass cover, Good, HSG A
176,402	93	Weighted Average
18,030		10.22% Pervious Area
158,372		89.78% Impervious Area

Tc (min)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.0610	0.22	Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.13"
2.0	199	0.0227	1.64	Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.13"
0.7	149	0.0047	3.37	Pipe Channel, C-D 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	95	0.0095	6.28	Pipe Channel, D-E 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.8	163	0.0018	3.31	Pipe Channel, E-F 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0059	5.99	Pipe Channel, F-G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.1	746	Total		



Summary for Pond P1P: Existing Pond and SIS-1

Inflow Area = 6.155 ac, 61.92% Impervious, Inflow Depth = 1.56" for 2-yr event
Inflow = 10.50 cfs @ 12.10 hrs, Volume= 0.803 af
Outflow = 3.76 cfs @ 12.38 hrs, Volume= 0.803 af, Atten= 64%, Lag= 17.1 min
Discarded = 1.06 cfs @ 12.38 hrs, Volume= 0.151 af
Primary = 2.70 cfs @ 12.38 hrs, Volume= 0.652 af
Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Peak Elev= 182.72' @ 12.38 hrs Surf Area= 18,913 sf Storage= 6,713 cf
Plug-Flow detention time= 11.4 min calculated for 0.802 af (100% of inflow)
Center-of-Mass det time= 11.4 min (805.9 - 794.5)

Volume	Invert	Avail Storage	Storage Description
#1A	182.50'	0 cf	72.67'W x 136.48'L x 3.50'H Field A 34,711 cf Overall - 34,711 cf Embedded = 0 cf x 40.0% Voids
#2A	182.50'	26,599 cf	StormTrap ST2 SingleTrap 3-0 x 56 Inside #1 Inside= 101.7'W x 36.0'H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7'W x 42.0'H => 29.68 sf x 15.40'L = 456.9 cf 7 Rows of 8 Chambers 59.35' x 123.17' Core + 6.66' Border = 72.67' x 136.48' System
#3	182.00'	84,892 cf	Custom Stage Data (Prismatic) listed below (Recalc)
		111,490 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf Area (sq-ft)	Inc Store (cubic-feet)	Cum Store (cubic-feet)
182.00	4,063	0	0
183.00	10,876	7,470	7,470
184.00	17,200	14,038	21,508
185.00	22,041	19,621	41,128
186.00	26,743	24,392	65,520
186.20	4,802	3,154	68,674
187.00	9,192	5,598	74,272
188.00	12,047	10,620	84,892

Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	2,410 in/hr Exfiltration over Surface area
#2	Secondary	186.00'	35.0' 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 15.0" Round Culvert L= 95.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.70' / 178.50' S= 0.0126' /' Co= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf 8.0" Vert. Orifice/Grate C= 0.600 8.0" Vert. Orifice/Grate C= 0.600
#3	Primary	179.70'	
#4	Device 3	182.30'	
#5	Device 3	180.70'	

Discarded OutFlow Max=1.06 cfs @ 12.38 hrs HW=182.72' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.06 cfs)
Primary OutFlow Max=2.70 cfs @ 12.38 hrs HW=182.72' (Free Discharge)
3=Culvert (Passes 2.70 cfs of 9.15 cfs potential flow)
4=Orifice/Grate (Orifice Controls 0.52 cfs @ 2.22 fps)
5=Orifice/Grate (Orifice Controls 2.19 cfs @ 6.26 fps)
Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P1P: Existing Pond and SIS-1 - Chamber Wizard Field A

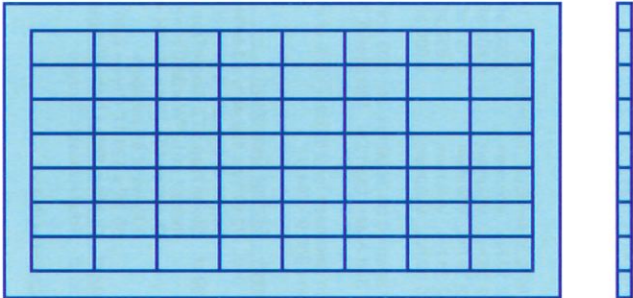
Chamber Model = StormTrap ST2 SingleTrap 3-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7'W x 36.0'H => 22.99 sf x 15.40'L = 354.0 cf
Outside= 101.7'W x 42.0'H => 29.68 sf x 15.40'L = 456.9 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
7 Rows x 101.7' Wide + 79.9" Side Border x 2 = 72.67' Base Width
42.0" Chamber Height = 3.50' Field Height

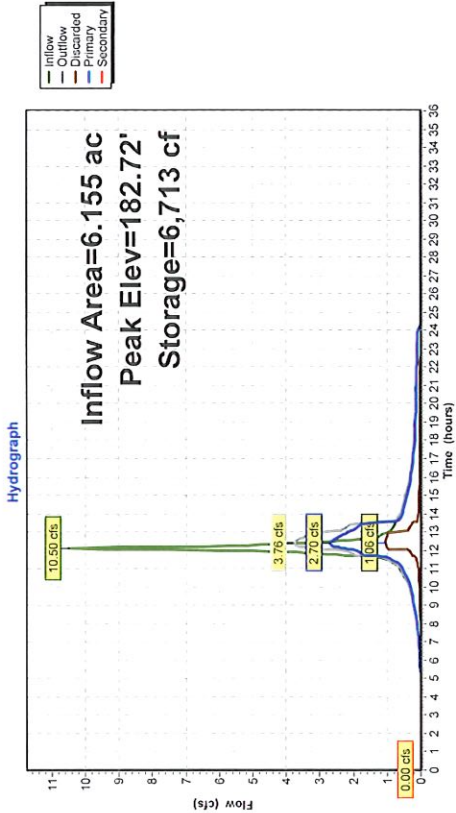
56 Chambers x 354.0 cf + 6,775.3 cf Border = 26,598.9 cf Chamber Storage
56 Chambers x 456.9 cf + 9,124.6 cf Border = 34,711.2 cf Displacement

Chamber Storage = 26,598.9 cf = 0.611 af
Overall Storage Efficiency = 76.6%
Overall System Size = 136.48' x 72.67' x 3.50'

56 Chambers (plus border)
1,285.6 cy Field



Pond P1P: Existing Pond and SIS-1



Pond P2P: SIS 2 - Chamber Wizard Field A

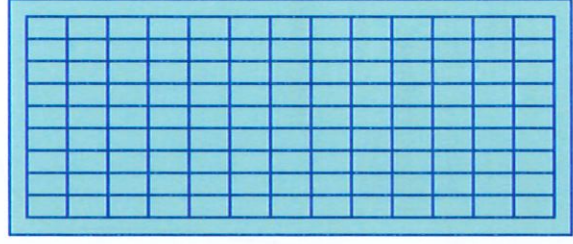
Chamber Model = StormTrap ST2 SingleTrap 2-6 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 30.0"H => 18,82 sf x 15.40'L = 289.8 cf
Outside= 101.7"W x 36.0"H => 25,44 sf x 15.40'L = 391.6 cf

13 Chambers/Row x 15.40' Long = 200.15' Row Length +79.9" Border x 2 = 213.46' Base Length
9 Rows x 101.7" Wide + 79.9" Side Border x 2 = 89.63' Base Width
36.0" Chamber Height = 3.00' Field Height

117 Chambers x 289.8 cf + 8,253.9 cf Border = 42,161.7 cf Chamber Storage
117 Chambers x 391.6 cf + 11,572.7 cf Border = 57,393.6 cf Displacement

Chamber Storage = 42,161.7 cf = 0.968 af
Overall Storage Efficiency = 73.5%
Overall System Size = 213.46' x 89.63' x 3.00'

117 Chambers (plus border)
2,125.7 cy Field



Summary for Pond P2P: SIS 2

Inflow Area = 4.169 ac, 92.99% Impervious, Inflow Depth = 2.48" for 2-yr event
Inflow = 11.03 cfs @ 12.09 hrs, Volume= 0.861 af
Outflow = 1.07 cfs @ 11.61 hrs, Volume= 0.861 af, Atten= 90%, Lag= 0.0 min
Discarded = 1.07 cfs @ 11.61 hrs, Volume= 0.861 af
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Peak Elev= 181.90' @ 12.92 hrs Surf Area= 19,131 sf Storage= 13,525 cf

Plug-Flow detention time= 96.1 min calculated for 0.860 af (100% of inflow)
Center-of-Mass det. time= 96.1 min (868.9 - 772.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	181.10'	0 cf	89.63'W x 213.46'L x 3.00'H Field A
#2A	181.10'	42,162 cf	StormTrap ST2 SingleTrap 2-6 x 117 Inside #1 Inside= 101.7"W x 30.0"H => 18,82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25,44 sf x 15.40'L = 391.6 cf 9 Rows of 13 Chambers 76.31' x 200.15' Core + 6.66' Border = 89.63' x 213.46' System
#3	183.00'	136 cf	4.00'D x 2.70'H Catch Basins x 4 -Impervious
		42,297 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.10'	2,410 in/hr Exfiltration over Surface area
#2	Primary	181.60'	24.0" Round Culvert L= 100.0' RCP, sq cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 181.60' / 180.00' S= 0.0160' /' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#3	Device 2	183.20'	4.0' long x 0.5' breadth Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	182.50'	6.0" Vert. Orifice/Grate X 4.00 C= 0.600
#5	Device 2	181.97'	4.0" Vert. Orifice/Grate X 6.00 C= 0.600

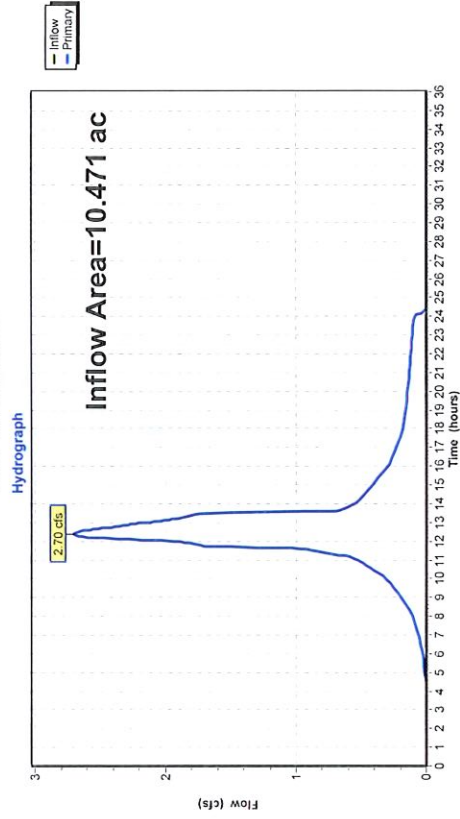
Discarded OutFlow Max=1.07 cfs @ 11.61 hrs HW=181.15' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.07 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=181.10' (Free Discharge)
2=Culvert (Controls 0.00 cfs)
3=Weir (Controls 0.00 cfs)
4=Orifice/Grate (Controls 0.00 cfs)
5=Orifice/Grate (Controls 0.00 cfs)

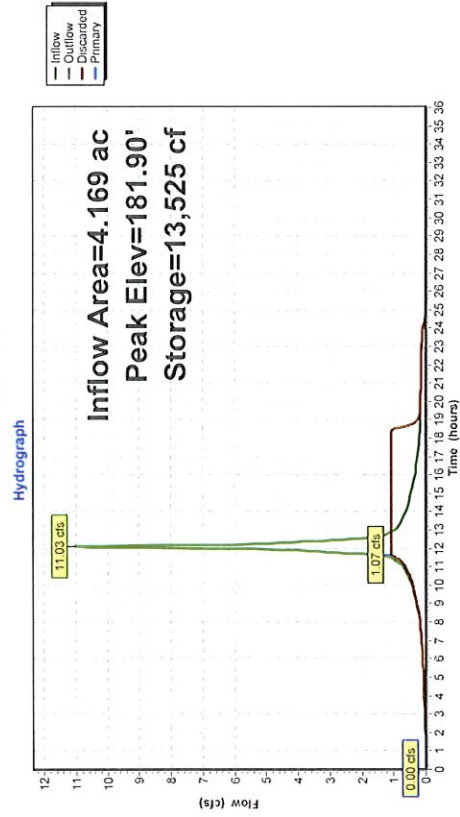
Summary for Link 1L: Wetlands

Inflow Area = 10.471 ac, 73.42% Impervious, Inflow Depth = 0.75" for 2-yr event
Inflow = 2.70 cfs @ 12.38 hrs, Volume= 0.652 af
Primary = 2.70 cfs @ 12.38 hrs, Volume= 0.652 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

Link 1L: Wetlands



Pond P2P: SIS 2



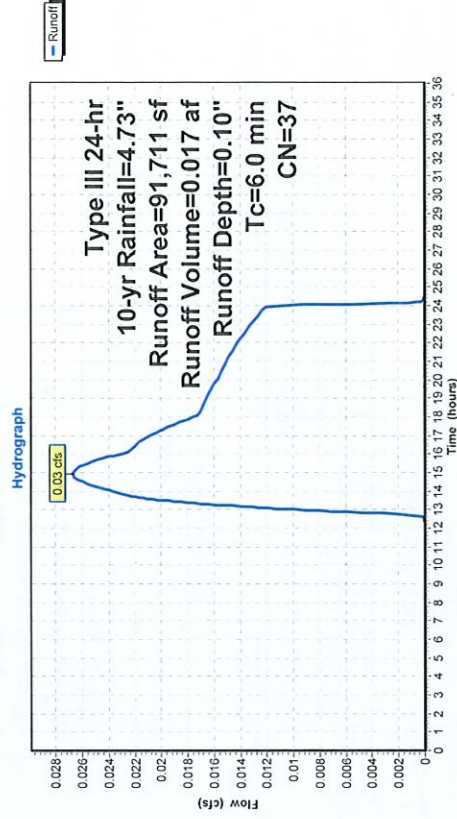
Summary for Subcatchment PR-2: StormwaterBasin

Runoff = 0.03 cfs @ 14.93 hrs, Volume= 0.017 af, Depth= 0.10"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 10-yr Rainfall=4.73"

Area (sf)	CN	Description
7,635	98	Paved parking, HSG A
84,076	32	Woods/grass comb., Good, HSG A
91,711	37	Weighted Average
84,076		91.67% Pervious Area
7,635		8.33% Impervious Area

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

Subcatchment PR-2: StormwaterBasin



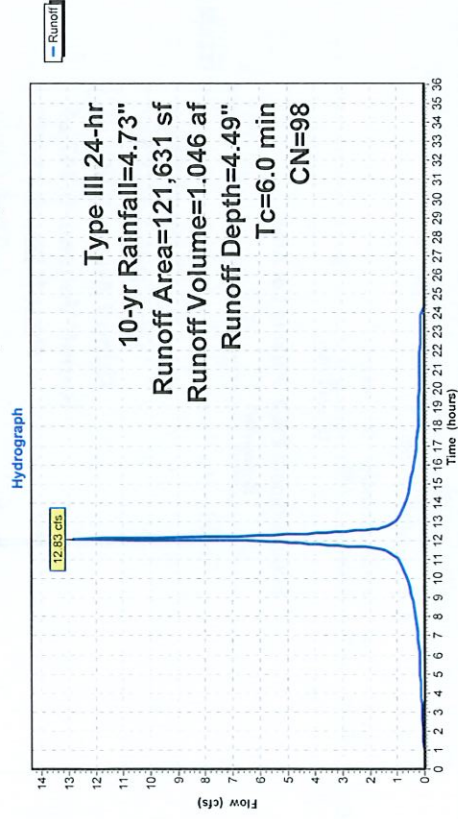
Summary for Subcatchment PR-1: ProposedBuilding

Runoff = 12.83 cfs @ 12.08 hrs, Volume= 1.046 af, Depth= 4.49"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 10-yr Rainfall=4.73"

Area (sf)	CN	Description
121,631	98	Roofs, HSG A
121,631		100.00% Impervious Area

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

Subcatchment PR-1: ProposedBuilding

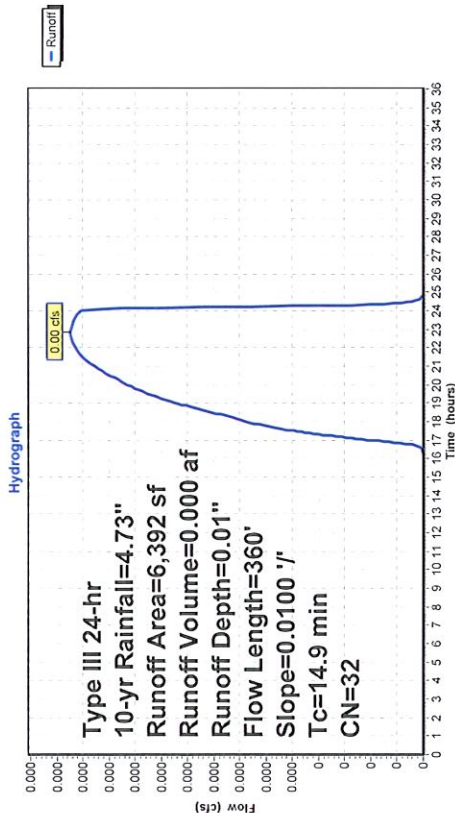


Summary for Subcatchment PR-4: Southwest Portion

Runoff = 0.00 cfs @ 22.82 hrs, Volume= 0.000 af, Depth= 0.01"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 10-yr Rainfall=4.73"

Area (sf)	CN	Description			
6,392	32	Woods/grass comb., Good, HSG A			
6,392		100.00% Pervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		Sheet Flow, n= 0.150 P2= 3.13"
7.4	310	0.0100	0.70		Grass: Short Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps

Subcatchment PR-4: Southwest Portion

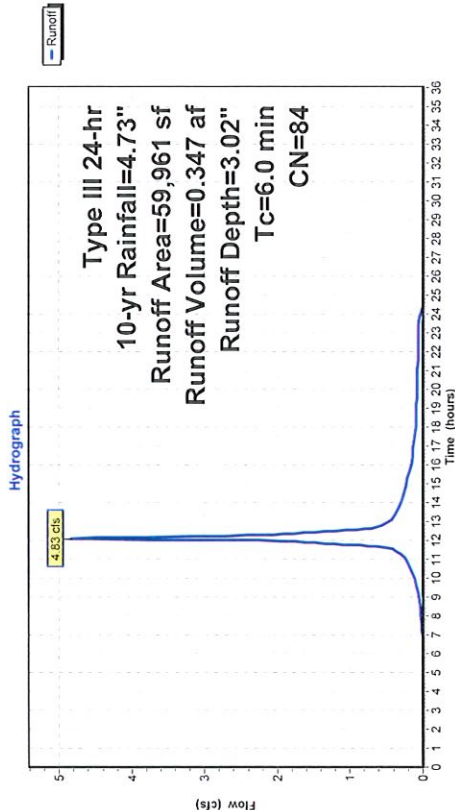


Summary for Subcatchment PR-3: Parking Lot Area

Runoff = 4.83 cfs @ 12.09 hrs, Volume= 0.347 af, Depth= 3.02"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 10-yr Rainfall=4.73"

Area (sf)	CN	Description			
47,239	98	Paved parking, HSG A			
12,722	32	Woods/grass comb., Good, HSG A			
59,961	84	Weighted Average			
12,722		21.22% Pervious Area			
47,239		78.78% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry.

Subcatchment PR-3: Parking Lot Area

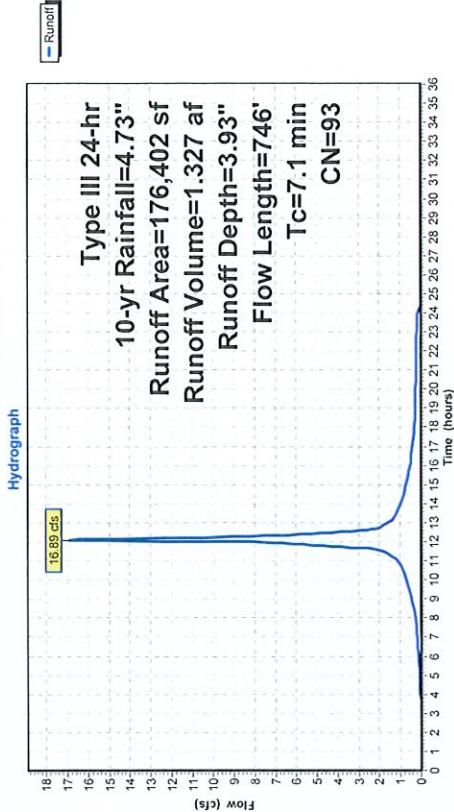


Summary for Subcatchment PR-5: 300 Concord Parking Lot (offsite)

Runoff = 16.89 cfs @ 12.10 hrs, Volume= 1.327 af, Depth= 3.93"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 10-yr Rainfall=4.73"

Area (sf)	CN	Description
11,835	61	>75% Grass cover, Good, HSG B
158,372	98	Paved parking
6,195	39	>75% Grass cover, Good, HSG A
176,402	93	Weighted Average
18,030		10.22% Pervious Area
158,372		89.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.0610	0.22		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.13"
2.0	199	0.0227	1.64		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.13"
0.7	149	0.0047	3.37	2.65	Pipe Channel, C-D 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	95	0.0095	6.28	11.09	Pipe Channel, D-E 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.8	163	0.0018	3.31	10.40	Pipe Channel, E-F 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0059	5.99	18.82	Pipe Channel, F-G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.1	746	Total			



Summary for Pond P1P: Existing Pond and SIS-1

Inflow Area = 6.155 ac, 61.92% Impervious, Inflow Depth = 2.62" for 10-yr event
 Inflow = 16.89 cfs @ 12.10 hrs, Volume= 1.344 af
 Outflow = 4.75 cfs @ 12.45 hrs, Volume= 1.344 af, Atten= 72%, Lag= 21.3 min
 Discarded = 1.19 cfs @ 12.45 hrs, Volume= 0.264 af
 Primary = 3.56 cfs @ 12.45 hrs, Volume= 1.080 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Peak Elev= 183.10' @ 12.45 hrs Surf.Area= 21,402 sf Storage= 13,831 cf

Plug-Flow detention time= 19.1 min calculated for 1.344 af (100% of inflow)
 Center-of-Mass det. time= 19.0 min (803.7 - 784.6)

Volume	Invert	Avail. Storage	Storage Description
#1A	182.50'	0 cf	72.67'W x 136.48'L x 3.50'H Field A
#2A	182.50'	26,599 cf	34,711 cf Overall - 34,711 cf Embedded = 0 cf x 40.0% Voids StormTrap ST2 SingleTrap 3-0 x 56 Inside #1 Inside= 101.7'W x 36.0'H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7'W x 42.0'H => 29.68 sf x 15.40'L = 456.9 cf 7 Rows of 8 Chambers 59.35' x 123.17' Core + 6.66' Border = 72.67' x 136.48' System
#3	182.00'	84,882 cf	Custom Stage Data (Prismatic) listed below (Recalc)
		111,490 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
182.00	4,063	0	0
183.00	10,876	7,470	7,470
184.00	17,200	14,038	21,508
185.00	22,041	19,621	41,128
186.00	26,743	24,392	65,520
186.20	4,802	3,154	68,674
187.00	9,192	5,598	74,272
188.00	12,047	10,620	84,892

Outlet Devices

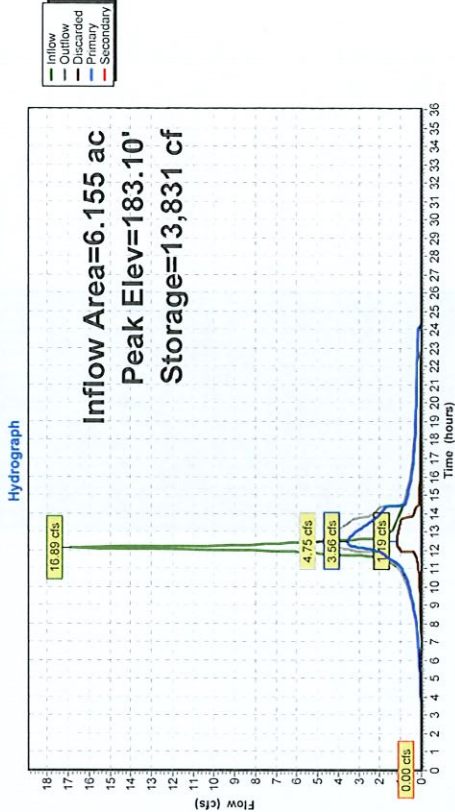
Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	2.410 in/hr Exfiltration over Surface area
#2	Secondary	186.00'	35.0' long x 8.0' breadth Broad-Crested Rectangular Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.66 2.66 2.66 2.66 2.70 2.74 15.0" Round Culvert L= 95.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.70' / 178.50' S= 0.0126' /' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf 8.0" Vert. Orifice/Grate C= 0.600 8.0" Vert. Orifice/Grate C= 0.600
#3	Primary	179.70'	
#4	Device 3	182.30'	
#5	Device 3	180.70'	

Discarded OutFlow Max=1.19 cfs @ 12.45 hrs HW=183.10' (Free Discharge)
 1-1=Exfiltration (Exfiltration Controls 1.19 cfs)

Primary OutFlow Max=3.56 cfs @ 12.45 hrs HW=183.10' (Free Discharge)
 2-Culvert (Passes 3.56 cfs of 9.84 cfs potential flow)
 4=Orifice/Grate (Orifice Controls 1.14 cfs @ 3.28 fps)
 5=Orifice/Grate (Orifice Controls 2.41 cfs @ 6.92 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P1P: Existing Pond and SIS-1



Pond P1P: Existing Pond and SIS-1 - Chamber Wizard Field A

Chamber Model = StormTrap ST2 SingleTrap 3-0 (StormTrap ST2 SingleTrap® Type II+IV)

Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf

Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length

7 Rows x 101.7" Wide + 79.9" Side Border x 2 = 72.67' Base Width

42.0" Chamber Height = 3.50' Field Height

56 Chambers x 354.0 cf + 6,776.3 cf Border = 26,598.9 cf Chamber Storage

56 Chambers x 456.9 cf + 9,124.6 cf Border = 34,711.2 cf Displacement

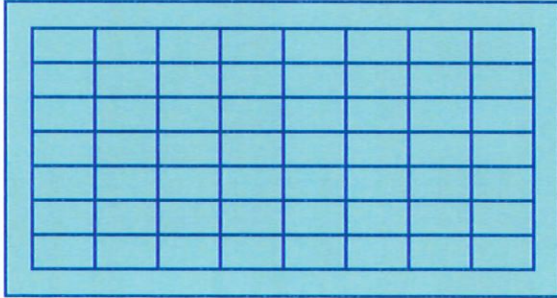
Chamber Storage = 26,598.9 cf = 0.611 af

Overall Storage Efficiency = 76.6%

Overall System Size = 136.48' x 72.67' x 3.50'

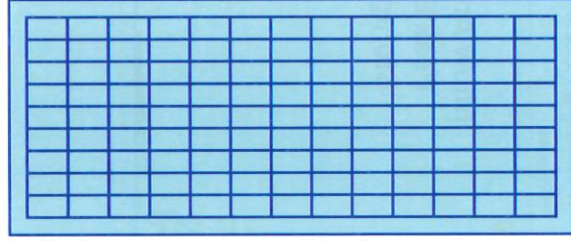
56 Chambers (plus border)

1,285.6 cy Field



Pond P2P: SIS 2 - Chamber Wizard Field A

Chamber Model = StormTrap ST2 SingleTrap 2-6 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf
Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf
13 Chambers/Row x 15.40' Long = 200.15' Row Length +79.9" Border x 2 = 213.46' Base Length
9 Rows x 101.7" Wide + 79.9" Side Border x 2 = 89.63' Base Width
36.0" Chamber Height = 3.00' Field Height
117 Chambers x 289.8 cf + 8,253.9 cf Border = 42,161.7 cf Chamber Storage
117 Chambers x 391.6 cf + 11,572.7 cf Border = 57,393.6 cf Displacement
Chamber Storage = 42,161.7 cf = 0.968 af
Overall Storage Efficiency = 73.5%
Overall System Size = 213.46' x 89.63' x 3.00'
117 Chambers (plus border)
2,125.7 cy Field



Summary for Pond P2P: SIS 2

Inflow Area =	4.169 ac, 92.99% Impervious, Inflow Depth = 4.01" for 10-yr event
Inflow =	17.66 cfs @ 12.09 hrs, Volume= 1.393 af
Outflow =	2.45 cfs @ 12.60 hrs, Volume= 1.393 af, Atten= 86%, Lag= 31.0 min
Discarded =	1.07 cfs @ 11.04 hrs, Volume= 1.189 af
Primary =	1.38 cfs @ 12.60 hrs, Volume= 0.203 af
Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs	
Peak Elev= 182.44' @ 12.60 hrs	Surf.Area= 19,131 sf Storage= 22,554 cf
Plug-Flow detention time= 119.3 min calculated for 1.391 af (100% of inflow)	
Center-of-Mass det. time= 119.3 min (884.1 - 784.8)	
Volume	Invert Avail. Storage Storage Description
#1A 181.10'	0 cf 89.63'W x 213.46'L x 3.00'H Field A
#2A 181.10'	57,394 cf Overall - 57,394 cf Embedded = 0 cf x 40.0% Voids StormTrap ST2 SingleTrap 2-6 x 117 Inside #1 Inside= 101.7"W x 30.0"H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7"W x 36.0"H => 25.44 sf x 15.40'L = 391.6 cf 9 Rows of 13 Chambers 76.31' x 200.15' Core + 6.66' Border = 89.63' x 213.46' System 4.00'D x 2.70'H Catch Basins x 4 -Impervious
#3 183.00'	136 cf 42,297 cf Total Available Storage

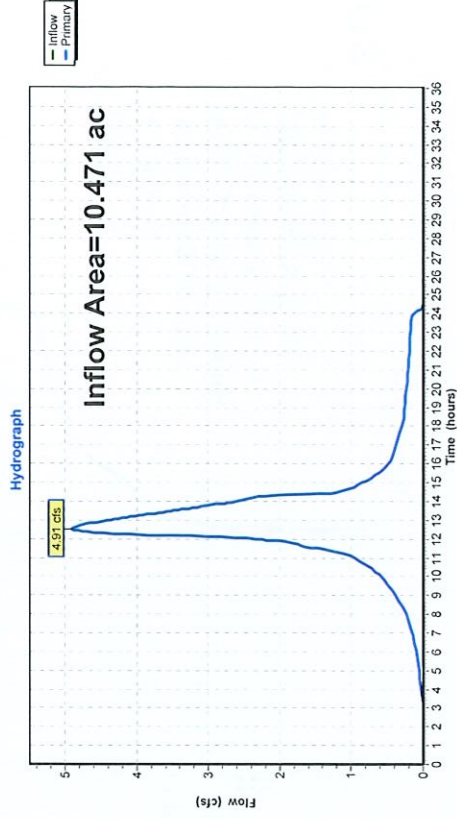
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.10'	2.410 in/hr Exfiltration over Surface area
#2	Primary	181.60'	24.0" Round Culvert L= 100.0' RCP, sq cut end projecting, Ke= 0.500 Inlet / Outlet Inverts= 181.60' / 180.00" S= 0.0160'/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf 4.0' long x 0.5' breadth Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32 6.0" Vert. Orifice/Grate X 4.00 C= 0.600 4.0" Vert. Orifice/Grate X 6.00 C= 0.600
#3	Device 2	183.20'	
#4	Device 2	182.50'	
#5	Device 2	181.97'	
Discarded OutFlow Max=1.07 cfs @ 11.04 hrs HW=181.15' (Free Discharge)			
1=Exfiltration (Exfiltration Controls 1.07 cfs)			
Primary OutFlow Max=1.38 cfs @ 12.60 hrs HW=182.44' (Free Discharge)			
2=Culvert (Passes 1.38 cfs of 3.88 cfs potential flow)			
3=Weir (Controls 0.00 cfs)			
4=Orifice/Grate (Controls 0.00 cfs)			
5=Orifice/Grate (Orifice Controls 1.38 cfs @ 2.64 fps)			

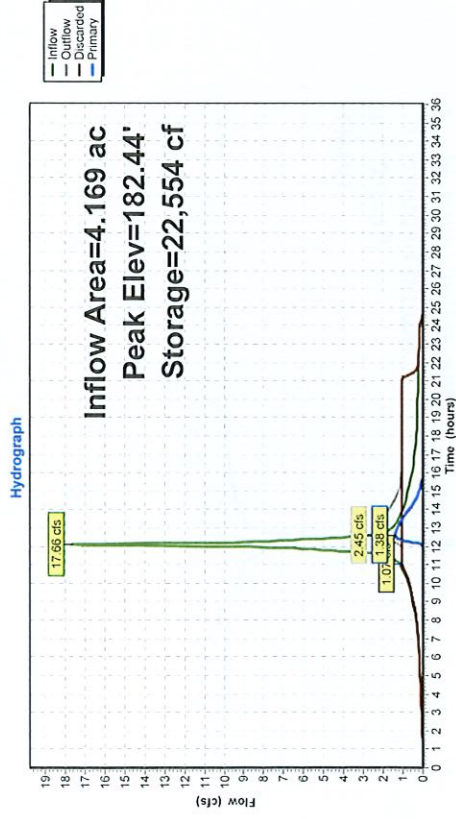
Summary for Link 1L: Wetlands

Inflow Area = 10.471 ac, 73.42% Impervious, Inflow Depth = 1.47" for 10-yr event
 Inflow = 4.91 cfs @ 12.53 hrs, Volume= 1.283 af
 Primary = 4.91 cfs @ 12.53 hrs, Volume= 1.283 af, Atten= 0%, Lag= 0.0 min
 Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

Link 1L: Wetlands



Pond P2P: SIS 2



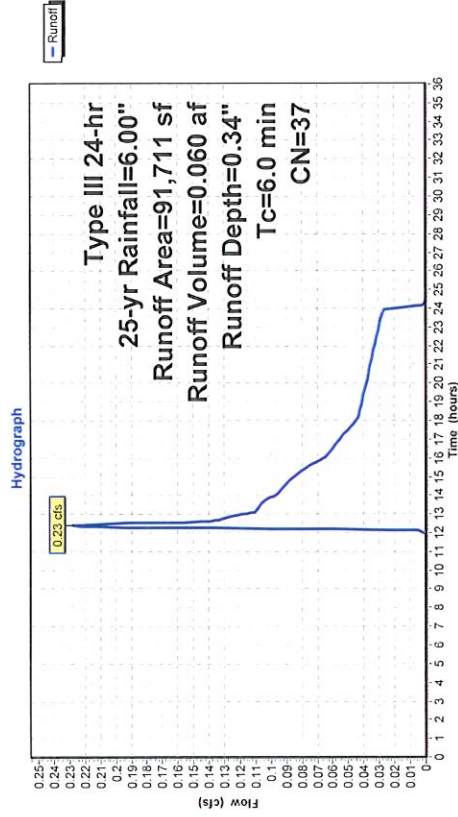
Summary for Subcatchment PR-2: StormwaterBasin

Runoff = 0.23 cfs @ 12.40 hrs, Volume= 0.060 af, Depth= 0.34"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
7,635	98	Paved parking, HSG A
84,076	32	Woods/grass comb., Good, HSG A
91,711	37	Weighted Average
84,076		91.67% Pervious Area
7,635		8.33% Impervious Area

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

Subcatchment PR-2: StormwaterBasin



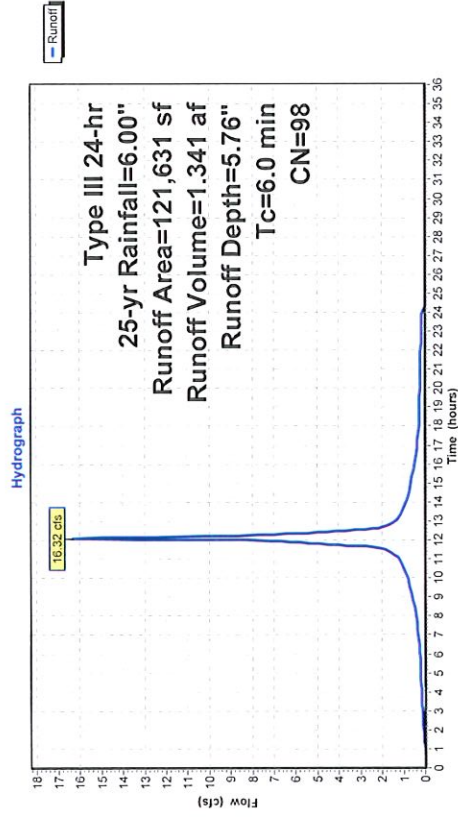
Summary for Subcatchment PR-1: ProposedBuilding

Runoff = 16.32 cfs @ 12.08 hrs, Volume= 1.341 af, Depth= 5.76"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
121,631	98	Roofs, HSG A
121,631		100.00% Impervious Area

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

Subcatchment PR-1: ProposedBuilding



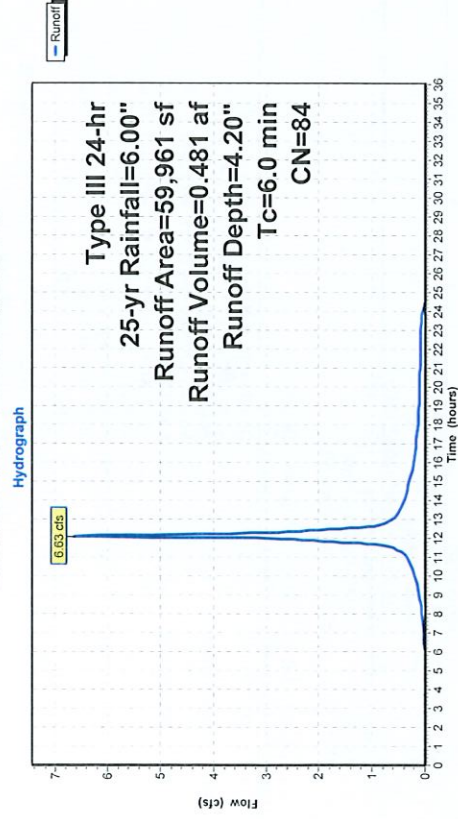
Summary for Subcatchment PR-3: Parking Lot Area

Runoff = 6.63 cfs @ 12.09 hrs, Volume= 0.481 af, Depth= 4.20"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
47,239	98	Paved parking, HSG A
12,722	32	Woods/grass comb., Good, HSG A
59,961	84	Weighted Average
12,722		21.22% Pervious Area
47,239		78.78% Impervious Area

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

Subcatchment PR-3: Parking Lot Area



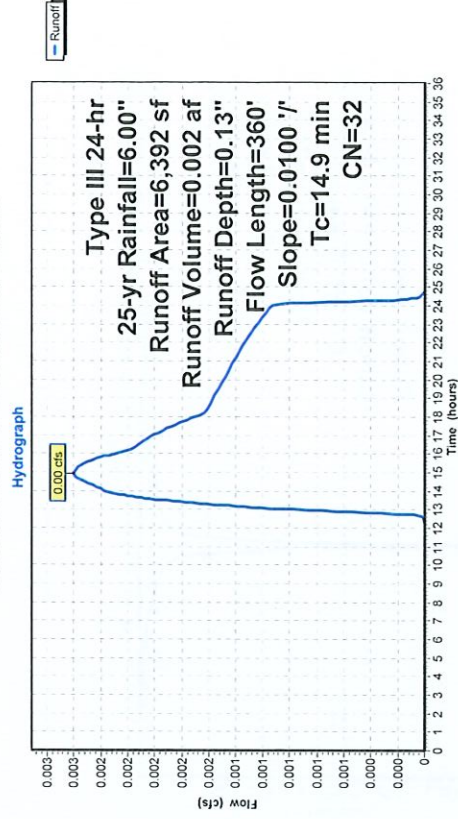
Summary for Subcatchment PR-4: Southwest Portion

Runoff = 0.00 cfs @ 14.96 hrs, Volume= 0.002 af, Depth= 0.13"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
6,392	32	Woods/grass comb., Good, HSG A
6,392		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		Sheet Flow, Grass: Short n= 0.150 P2= 3.13"
7.4	310	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps
14.9	360	Total			

Subcatchment PR-4: Southwest Portion



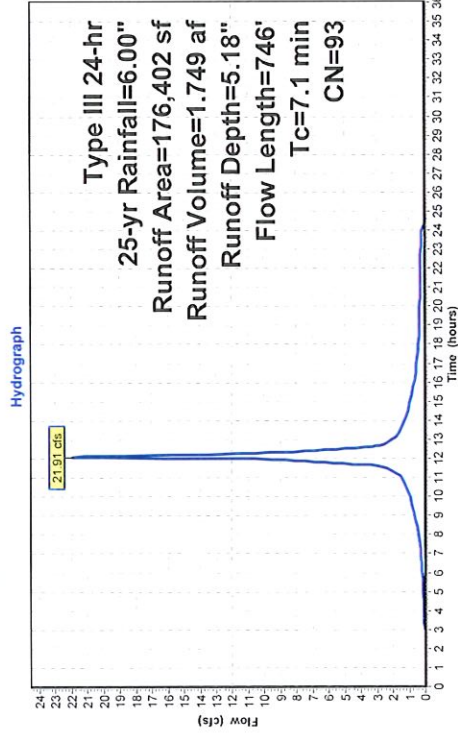
Summary for Subcatchment PR-5: 300 Concord Parking Lot (offsite)

Runoff = 21.91 cfs @ 12.10 hrs, Volume= 1,749 af, Depth= 5.18"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 25-yr Rainfall=6.00"

Area (sf)	CN	Description
11,835	61	>75% Grass cover, Good, HSG B
158,372	98	Paved parking
6,195	39	>75% Grass cover, Good, HSG A
176,402	93	Weighted Average
18,030		10.22% Pervious Area
158,372		89.78% Impervious Area

Tc (min)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.0610	0.22	Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.13"
2.0	199	0.0227	1.64	Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.13"
0.7	149	0.0047	3.37	Pipe Channel, C-D 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	95	0.0095	6.28	Pipe Channel, D-E 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.8	163	0.0018	3.31	Pipe Channel, E-F 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0059	5.99	Pipe Channel, F-G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.1	746	Total		

Subcatchment PR-5: 300 Concord Parking Lot (offsite)



Summary for Pond P1P: Existing Pond and SIS-1

Inflow Area = 6.155 ac, 61.92% Impervious, Inflow Depth = 3.53" for 25-yr event
 Inflow = 21.92 cfs @ 12.10 hrs, Volume= 1,809 af
 Outflow = 5.36 cfs @ 12.50 hrs, Volume= 1,809 af, Atten= 76%, Lag= 24.1 min
 Discarded = 1.30 cfs @ 12.50 hrs, Volume= 0.362 af
 Primary = 4.06 cfs @ 12.50 hrs, Volume= 1.447 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Peak Elev= 183.40' @ 12.50 hrs Surf.Area= 23,327 sf Storage= 20,319 cf

Plug-Flow detention time= 25.6 min calculated for 1,808 af (100% of inflow)
 Center-of-Mass det. time= 25.6 min (806.5 - 780.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.50'	0 cf	72.67'W x 136.48'L x 3.50'H Field A
#2A	182.50'	26,599 cf	34,711 cf Overall - 34,711 cf Embedded = 0 cf x 40.0% Voids StormTrap ST2 SingleTrap 3-0 x 56 Inside #1 Inside= 101.7'W x 36.0'H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7'W x 42.0'H => 29.68 sf x 15.40'L = 456.9 cf 7 Rows of 8 Chambers 59.35' x 123.17' Core + 6.66' Border = 72.67' x 136.48' System
#3	182.00'	84,892 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
		111,490 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf Area (sq-ft)	Inc. Store (cubic-feet)	Cum. Store (cubic-feet)
182.00	4,063	0	0
183.00	10,876	7,470	7,470
184.00	17,200	14,038	21,508
185.00	22,041	19,621	41,128
186.00	26,743	24,392	65,520
187.00	31,154	29,154	94,674
188.00	35,192	33,916	128,590

Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	2,410 in/hr Exfiltration over Surface area
#2	Secondary	186.00'	35.0' 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 15.0" Round Culvert L= 95.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.70' / 178.50' S= 0.0126 1' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf 8.0" Vert. Orifice/Grate C= 0.600 8.0" Vert. Orifice/Grate C= 0.600
#3	Primary	179.70'	
#4	Device 3	182.30'	
#5	Device 3	180.70'	

Discarded OutFlow Max=1.30 cfs @ 12.50 hrs HW=183.40' (Free Discharge)
 1=Exfiltration (Exfiltration Controls 1.30 cfs)

Primary OutFlow Max=4.06 cfs @ 12.50 hrs HW=183.40' (Free Discharge)
 3=Culvert (Passes 4.06 cfs of 10.36 cfs potential flow)
 4=Orifice/Grate (Orifice Controls 1.47 cfs @ 4.22 fps)
 5=Orifice/Grate (Orifice Controls 2.59 cfs @ 7.41 fps)

Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P1P: Existing Pond and SIS-1 - Chamber Wizard Field A

Chamber Model = StormTrapST2 SingleTrap 3-0 (StormTrapST2 SingleTrap@ Type II+IV)

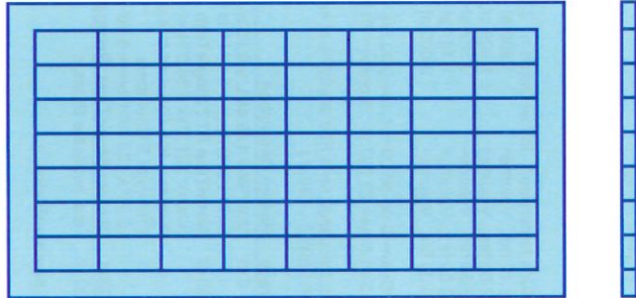
Inside= 101.7'W x 36.0'H => 22,99 sf x 15.40'L = 354.0 cf
Outside= 101.7'W x 42.0'H => 29,68 sf x 15.40'L = 456.9 cf

8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
7 Rows x 101.7' Wide + 79.9" Side Border x 2 = 72.67' Base Width
42.0" Chamber Height = 3.50' Field Height

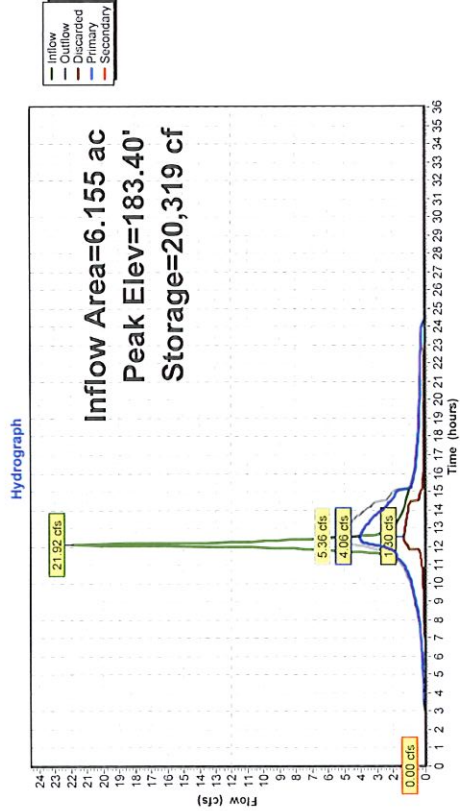
56 Chambers x 354.0 cf + 6,775.3 cf Border = 26,598.9 cf Chamber Storage
56 Chambers x 456.9 cf + 9,124.6 cf Border = 34,711.2 cf Displacement

Chamber Storage = 26,598.9 cf = 0.611 af
Overall Storage Efficiency = 76.6%
Overall System Size = 136.48' x 72.67' x 3.50'

56 Chambers (plus border)
1,285.6 cy Field



Pond P1P: Existing Pond and SIS-1



Summary for Pond P2P: SIS 2

Inflow Area = 4.169 ac, 92.99% Impervious, Inflow Depth = 5.24" for 25-yr event
Inflow = 22.95 cfs @ 12.09 hrs, Volume= 1,822 af
Outflow = 4.35 cfs @ 12.52 hrs, Volume= 1,822 af, Atten= 81%, Lag= 26.4 min
Discarded = 1.07 cfs @ 10.41 hrs, Volume= 1,353 af
Primary = 3.28 cfs @ 12.52 hrs, Volume= 0.469 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Peak Elev= 182.85' @ 12.52 hrs Surf Area= 19,131 sf Storage= 29,438 cf

Plug-Flow detention time= 117.1 min calculated for 1,821 af (100% of inflow)
Center-of-Mass det. time= 117.0 min (877.5 - 760.6)

Volume	Invert	Avail Storage	Storage Description
#1A	181.10'	0 cf	89.63'W x 213.46'L x 3.00'H Field A
#2A	181.10'	42,162 cf	StormTrap ST2 SingleTrap 2-6 x 117 Inside #1 Inside= 101.7'W x 30.0'H => 18,82 sf x 15.40'L = 289.8 cf Outside= 101.7'W x 36.0'H => 25,44 sf x 15.40'L = 391.6 cf 9 Rows of 13 Chambers 76.31' x 200.15' Core + 6.66' Border = 89.63' x 213.46' System
#3	183.00'	136 cf	4.00'D x 2.70'H Catch Basins x 4 -Impervious
		42,297 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.10'	2,410 in/hr Exfiltration over Surface area
#2	Primary	181.60'	24.0" Round Culvert L= 100.0' RCP, sq cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 181.60' / 180.00' S= 0.0160' /' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf
#3	Device 2	183.20'	4.0' long x 0.5' breadth Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef. (English) 2.80 2.92 3.08 3.30 3.32
#4	Device 2	182.50'	6.0" Vert. Orifice/Grate X 4.00 C= 0.600
#5	Device 2	181.97'	4.0" Vert. Orifice/Grate X 6.00 C= 0.600

Discarded OutFlow Max=1.07 cfs @ 10.41 hrs HW=181.15' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.07 cfs)

Primary OutFlow Max=3.28 cfs @ 12.52 hrs HW=182.85' (Free Discharge)
2=Culvert (Passes 3.28 cfs of 7.81 cfs potential flow)
3=Weir (Controls 0.00 cfs)
4=Orifice/Grate (Orifice Controls 1.16 cfs @ 2.00 fps)
5=Orifice/Grate (Orifice Controls 2.12 cfs @ 4.05 fps)

Pond P2P: SIS 2 - Chamber Wizard Field A

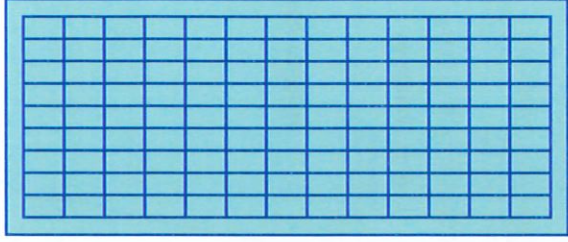
Chamber Model = StormTrap ST2 SingleTrap 2-6 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7'W x 30.0'H => 18,82 sf x 15.40'L = 289.8 cf
Outside= 101.7'W x 36.0'H => 25,44 sf x 15.40'L = 391.6 cf

13 Chambers/Row x 15.40' Long = 200.15' Row Length +79.9" Border x 2 = 213.46' Base Length
9 Rows x 101.7" Wide + 79.9" Side Border x 2 = 89.63' Base Width
36.0" Chamber Height = 3.00' Field Height

117 Chambers x 289.8 cf + 8,253.9 cf Border = 42,161.7 cf Chamber Storage
117 Chambers x 391.6 cf + 11,572.7 cf Border = 57,393.6 cf Displacement

Chamber Storage = 42,161.7 cf = 0.968 af
Overall Storage Efficiency = 73.5%
Overall System Size = 213.46' x 89.63' x 3.00'

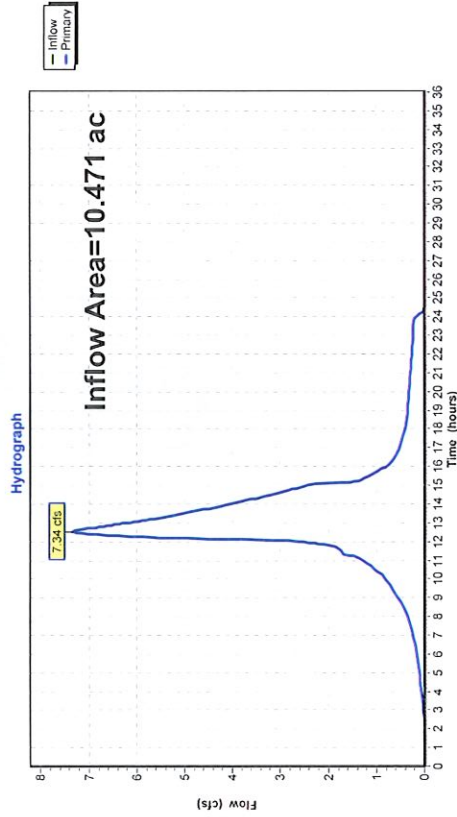
117 Chambers (plus border)
2,125.7 cy Field



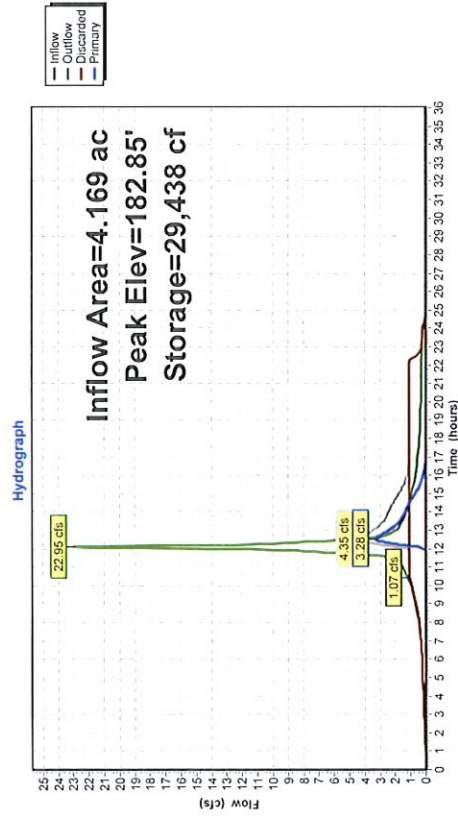
Summary for Link 1L: Wetlands

Inflow Area = 10.471 ac, 73.42% Impervious, Inflow Depth = 2.20" for 25-yr event
Inflow = 7.34 cfs @ 12.52 hrs, Volume= 1.918 af
Primary = 7.34 cfs @ 12.52 hrs, Volume= 1.918 af, Atten= 0%, Lag= 0.0 min
Primary outflow = inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

Link 1L: Wetlands



Pond P2P: SIS 2



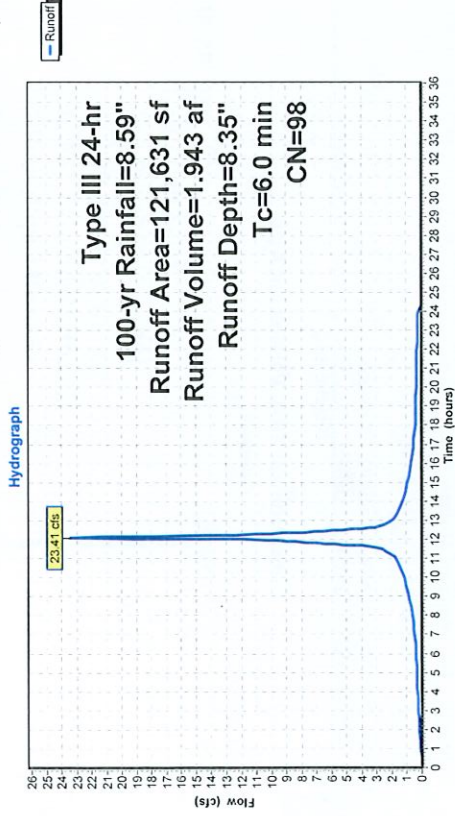
Summary for Subcatchment PR-1: ProposedBuilding

Runoff = 23.41 cfs @ 12.08 hrs, Volume= 1.943 af, Depth= 8.35"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=8.59"

Area (sf)	CN	Description			
121,631	98	Roofs, HSG A			
121,631		100.00% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description

Direct Entry,

Subcatchment PR-1: ProposedBuilding



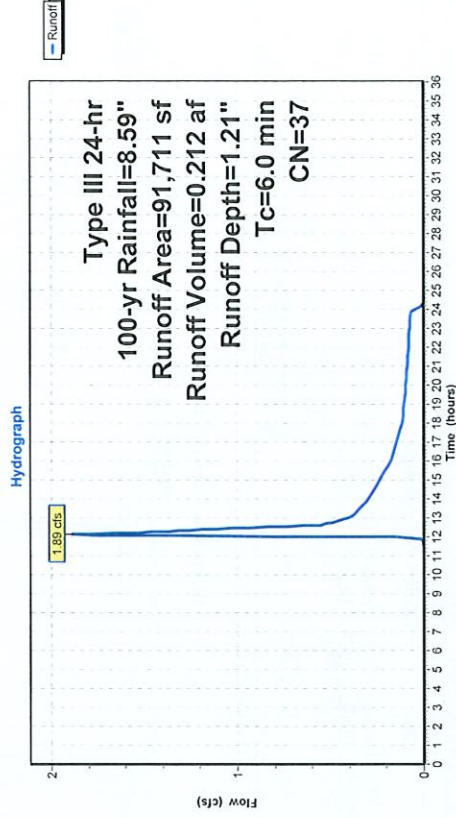
Summary for Subcatchment PR-2: StormwaterBasin

Runoff = 1.89 cfs @ 12.12 hrs, Volume= 0.212 af, Depth= 1.21"
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Type III 24-hr 100-yr Rainfall=8.59"

Area (sf)	CN	Description
7,635	98	Paved parking, HSG A
84,076	32	Woods/grass comb., Good, HSG A
91,711	37	Weighted Average
84,076		91.67% Pervious Area
7,635		8.33% Impervious Area

Direct Entry,

Subcatchment PR-2: StormwaterBasin

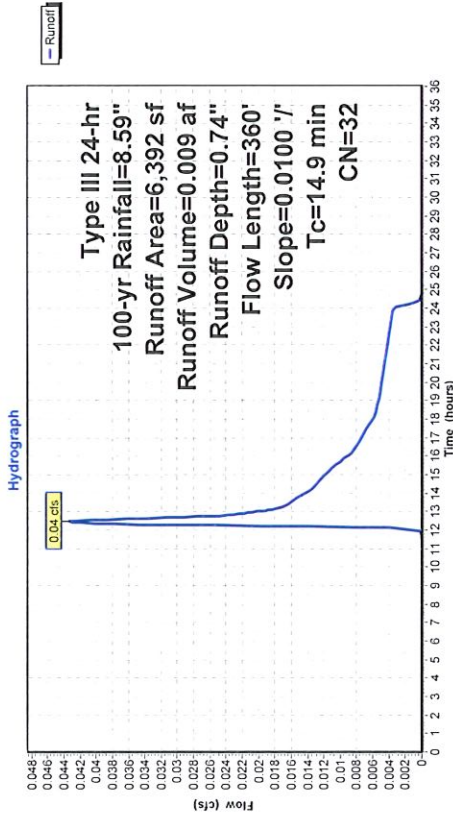


Summary for Subcatchment PR-4: Southwest Portion

Runoff = 0.04 cfs @ 12.45 hrs, Volume= 0.009 af, Depth= 0.74"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 100-yr Rainfall=8.59"

Area (sf)	CN	Description			
6,392	32	Woods/grass comb., Good, HSG A			
6,392		100.00% Pervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.5	50	0.0100	0.11		Sheet Flow, n = 0.150 P2= 3.13" Grass: Short
7.4	310	0.0100	0.70		Shallow Concentrated Flow, Short Grass Pasture Kv= 7.0 fps

Subcatchment PR-4: Southwest Portion

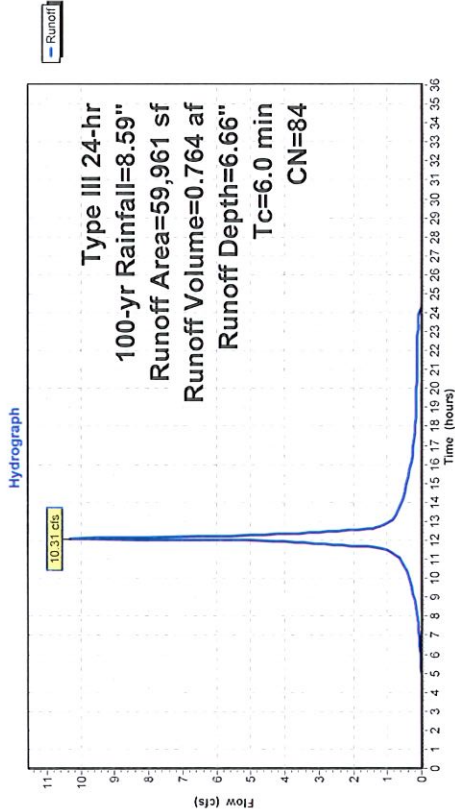


Summary for Subcatchment PR-3: Parking Lot Area

Runoff = 10.31 cfs @ 12.09 hrs, Volume= 0.764 af, Depth= 6.66"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 100-yr Rainfall=8.59"

Area (sf)	CN	Description			
47,239	98	Paved parking, HSG A			
12,722	32	Woods/grass comb., Good, HSG A			
59,961	84	Weighted Average			
12,722		21.22% Pervious Area			
47,239		78.78% Impervious Area			
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					Direct Entry.

Subcatchment PR-3: Parking Lot Area



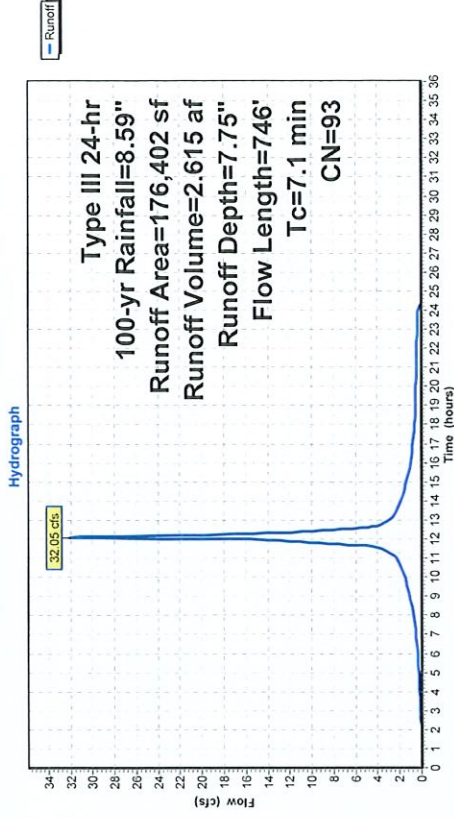
Summary for Subcatchment PR-5: 300 Concord Parking Lot (offsite)

Runoff = 32.05 cfs @ 12.10 hrs, Volume= 2.615 af, Depth= 7.75"
 Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Type III 24-hr 100-yr Rainfall=8.59"

Area (sf)	CN	Description
11,835	61	>75% Grass cover, Good, HSG B
158,372	98	Paved parking
6,195	39	>75% Grass cover, Good, HSG A
176,402	93	Weighted Average
18,030		10.22% Pervious Area
158,372		89.78% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.0	39	0.0610	0.22		Sheet Flow, A-B Grass: Short n= 0.150 P2= 3.13"
2.0	199	0.0227	1.64		Sheet Flow, B-C Smooth surfaces n= 0.011 P2= 3.13"
0.7	149	0.0047	3.37	2.65	Pipe Channel, C-D 12.0" Round Area= 0.8 sf Perim= 3.1' r= 0.25' n= 0.012 Concrete pipe, finished
0.3	95	0.0095	6.28	11.09	Pipe Channel, D-E 18.0" Round Area= 1.8 sf Perim= 4.7' r= 0.38' n= 0.012 Concrete pipe, finished
0.8	163	0.0018	3.31	10.40	Pipe Channel, E-F 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
0.3	101	0.0059	5.99	18.82	Pipe Channel, F-G 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.012 Concrete pipe, finished
7.1	746	Total			

Subcatchment PR-5: 300 Concord Parking Lot (offsite)



Summary for Pond P1P: Existing Pond and SIS-1

Inflow Area = 6.155 ac, 61.92% Impervious, Inflow Depth = 5.51" for 100-yr event
 Inflow = 33.85 cfs @ 12.10 hrs, Volume= 2.827 af
 Outflow = 6.47 cfs @ 12.56 hrs, Volume= 2.827 af, Atten= 81%, Lag= 27.5 min
 Discarded = 1.53 cfs @ 12.56 hrs, Volume= 0.584 af
 Primary = 4.94 cfs @ 12.56 hrs, Volume= 2.243 af
 Secondary = 0.00 cfs @ 0.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
 Peak Elev= 184.07' @ 12.56 hrs Surf.Area= 27,442 sf Storage= 36,565 cf

Plug-Flow detention time= 41.5 min calculated for 2.825 af (100% of inflow)
 Center-of-Mass det. time= 41.5 min (817.3 - 775.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	182.50'	0 cf	72.67'W x 136.48'L x 3.50'H Field A
#2A	182.50'	26,599 cf	34,711 cf Overall - 34,711 cf Embedded = 0 cf x 40.0% Voids StormTrap ST2 SingleTrap 3-0 x 56 Inside #1 Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf 7 Rows of 8 Chambers 59.35 x 123.17 Core + 6.66' Border = 72.67' x 136.48' System 84,892 cf Custom Stage Data (Prismatic) Listed below (Recalc)
#3	182.00'	84,892 cf	111,490 cf Total Available Storage

Storage Group A created with Chamber Wizard

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
182.00	4,063	0	0
183.00	10,876	7,470	7,470
184.00	17,200	14,038	21,508
185.00	22,041	19,621	41,128
186.00	26,743	24,392	65,520
186.20	4,802	3,154	68,674
187.00	9,192	5,598	74,272
188.00	12,047	10,620	84,892

Device	Routing	Invert	Outlet Devices
#1	Discarded	182.00'	2,410 m/hr Exfiltration over Surface area
#2	Secondary	186.00'	35.0' 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 2.66 2.64 2.64 2.64 2.65 2.66 2.66 2.68 2.70 2.74 #3 Primary 179.70' 15.0" Round Culvert L= 95.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 179.70' / 178.50' S= 0.0126 /' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.23 sf #4 Device 3 182.30' 8.0" Vert. Orifice/Grate C= 0.600 #5 Device 3 180.70' 8.0" Vert. Orifice/Grate C= 0.600

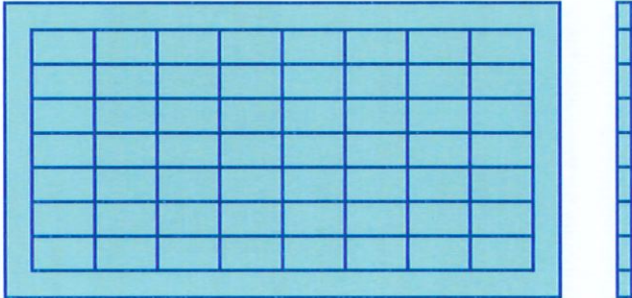
Discarded OutFlow Max=1.53 cfs @ 12.56 hrs HW=184.07' (Free Discharge)
 1=Exfiltration (Exfiltration Controls 1.53 cfs)

Primary OutFlow Max=4.94 cfs @ 12.56 hrs HW=184.07' (Free Discharge)
 2=Culvert (Passes 4.94 cfs of 11.43 cfs potential flow)
 4=Orifice/Grate (Orifice Controls 2.01 cfs @ 5.76 fps)
 5=Orifice/Grate (Orifice Controls 2.93 cfs @ 8.39 fps)

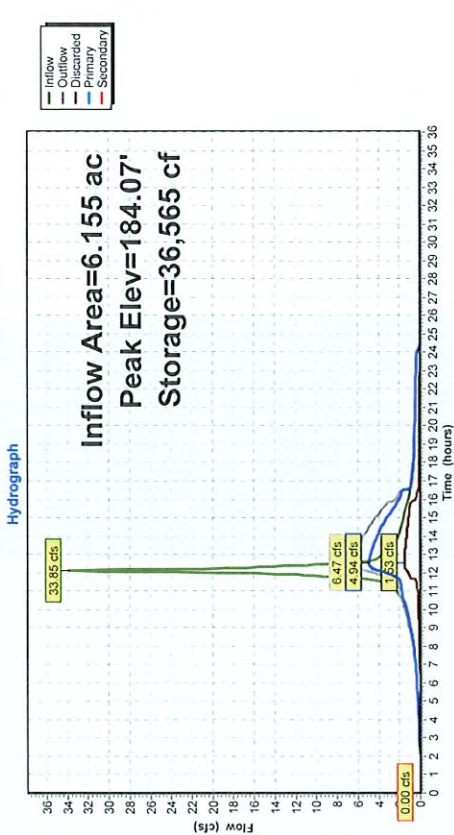
Secondary OutFlow Max=0.00 cfs @ 0.00 hrs HW=182.00' (Free Discharge)
 2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Pond P1P: Existing Pond and SIS-1 - Chamber Wizard Field A

Chamber Model = StormTrap ST2 SingleTrap 3-0 (StormTrap ST2 SingleTrap® Type II+IV)
Inside= 101.7"W x 36.0"H => 22.99 sf x 15.40'L = 354.0 cf
Outside= 101.7"W x 42.0"H => 29.68 sf x 15.40'L = 456.9 cf
8 Chambers/Row x 15.40' Long = 123.17' Row Length +79.9" Border x 2 = 136.48' Base Length
7 Rows x 101.7" Wide + 79.9" Side Border x 2 = 72.67' Base Width
42.0" Chamber Height = 3.50' Field Height
56 Chambers x 354.0 cf + 6,775.3 cf Border = 26,598.9 cf Chamber Storage
56 Chambers x 456.9 cf + 9,124.6 cf Border = 34,711.2 cf Displacement
Chamber Storage = 26,598.9 cf = 0.611 af
Overall Storage Efficiency = 76.6%
Overall System Size = 136.48' x 72.67' x 3.50'
56 Chambers (plus border)
1,285.6 cy Field

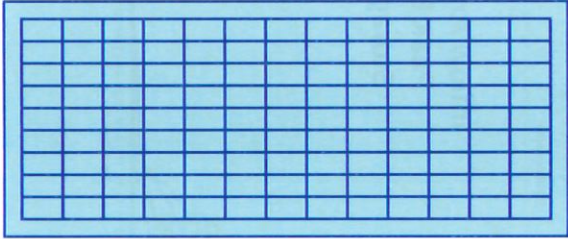


Pond P1P: Existing Pond and SIS-1



Pond P2P: SIS 2 - Chamber Wizard Field A

Chamber Model = StormTrap ST2 SingleTrap 2-6 (StormTrap ST2 SingleTrap@Type II+IV)
Inside= 101.7'W x 30.0'H => 18.82 sf x 15.40'L = 289.8 cf
Outside= 101.7'W x 36.0'H => 25.44 sf x 15.40'L = 391.6 cf
13 Chambers/Row x 15.40' Long = 200.15' Row Length +79.9' Border x 2 = 213.46' Base Length
9 Rows x 101.7' Wide + 79.9' Side Border x 2 = 89.63' Base Width
36.0' Chamber Height = 3.00' Field Height
117 Chambers x 289.8 cf + 8,253.9 cf Border = 42,161.7 cf Chamber Storage
117 Chambers x 391.6 cf + 11,572.7 cf Border = 57,393.6 cf Displacement
Chamber Storage = 42,161.7 cf = 0.968 af
Overall Storage Efficiency = 73.5%
Overall System Size = 213.46' x 89.63' x 3.00'
117 Chambers (plus border)
2,125.7 cy Field



Summary for Pond P2P: SIS 2

Inflow Area = 4.169 ac, 92.99% Impervious, Inflow Depth = 7.79" for 100-yr event
Inflow = 33.72 cfs @ 12.08 hrs, Volume= 2,707 af
Outflow = 10.18 cfs @ 12.40 hrs, Volume= 2,707 af, Atten= 70%, Lag= 18.9 min
Discarded = 1.07 cfs @ 9.15 hrs, Volume= 1,600 af
Primary = 9.11 cfs @ 12.40 hrs, Volume= 1,107 af
Routing by Stor-Ind method, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs
Peak Elev= 183.57' @ 12.40 hrs Surf.Area= 19,131 sf Storage= 41,750 cf
Plug-Flow detention time= 108.4 min calculated for 2,707 af (100% of inflow)
Center-of-Mass det. time= 108.3 min (862.9 - 754.5)

Volume	Invert	Avail Storage	Storage Description
#1A	181.10'	0 cf	89.63'W x 213.46'L x 3.00'H Field A
#2A	181.10'	42,162 cf	57,394 cf Overall - 57,394 cf Embedded = 0 cf x 40.0% Voids StormTrap ST2 SingleTrap 2-6 x 117 Inside #1 Inside= 101.7'W x 30.0'H => 18.82 sf x 15.40'L = 289.8 cf Outside= 101.7'W x 36.0'H => 25.44 sf x 15.40'L = 391.6 cf 9 Rows of 13 Chambers 76.31' x 200.15' Core + 6.66' Border = 89.63' x 213.46' System 4.00'D x 2.70'H Catch Basins x 4-Impervious
#3	183.00'	136 cf	
		42,297 cf	Total Available Storage

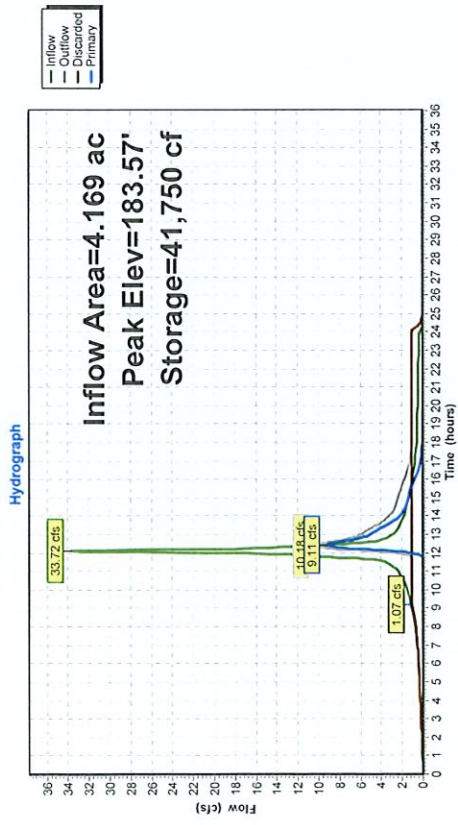
Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	181.10'	2,410 in/hr Exfiltration over Surface area
#2	Primary	181.60'	24.0' Round Culvert L= 100.0' RCP, sq cut end projecting, Ke= 0.500 Inlet / Outlet Invert= 181.60' / 180.00' S= 0.0160' /' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 3.14 sf #3 Device 2 183.20' 4.0' long x 0.5' breadth Weir Head (feet) 0.20 0.40 0.60 0.80 1.00 Coef (English) 2.80 2.92 3.08 3.30 3.32 #4 Device 2 182.50' 6.0" Vert. Orifice/Grate X 4.00 C= 0.600 #5 Device 2 181.97' 4.0" Vert. Orifice/Grate X 6.00 C= 0.600

Discarded OutFlow Max=1.07 cfs @ 9.15 hrs HW=181.15' (Free Discharge)
1=Exfiltration (Exfiltration Controls 1.07 cfs)

Primary OutFlow Max=9.10 cfs @ 12.40 hrs HW=183.57' (Free Discharge)
2=Culvert (Passes 9.10 cfs of 14.99 cfs potential flow)
3=Weir (Weir Controls 2.65 cfs @ 1.77 fps)
4=Orifice/Grate (Orifice Controls 3.43 cfs @ 4.37 fps)
5=Orifice/Grate (Orifice Controls 3.02 cfs @ 5.77 fps)

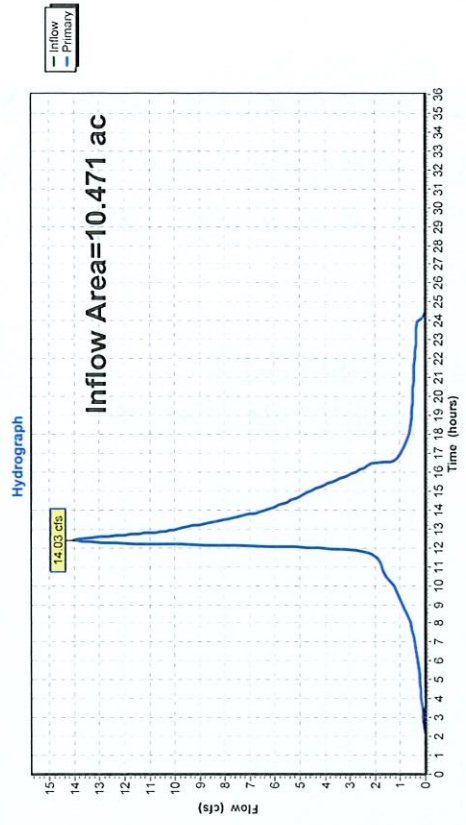
Pond P2P: SIS 2



Summary for Link 1L: Wetlands

Inflow Area = 10.471 ac, 73.42% Impervious, Inflow Depth = 3.85" for 100-yr event
Inflow = 14.03 cfs @ 12.41 hrs, Volume= 3,360 af
Primary = 14.03 cfs @ 12.41 hrs, Volume= 3,360 af, Atten= 0%, Lag= 0.0 min
Primary outflow = Inflow, Time Span= 0.00-36.00 hrs, dt= 0.03 hrs

Link 1L: Wetlands



APPENDIX F: STORMWATER CALCULATIONS

- MA STANDARD #3 – RECHARGE AND DRAWDOWN TIME
- MA STANDARD #4 – WATER QUALITY AND TSS REMOVAL
- CORNELL RAINFALL DATA
- PIPE SIZING
- MOUNDING ANALYSIS AND NARRATIVE
- PHOSPHORUS AND NITROGEN CALCULATIONS

GMP Lab Facility
298 Concord Road
Billerica, MA
Bohler Job Number: MAB220093
January 24, 2023

MA DEP Standard 3: Recharge Volume Calculations

Required Recharge Volume - A Soils (0.60 in.)	
Existing Site Impervious Area (ac)	2.253
Proposed Site Impervious Area (ac)	4.001
Proposed Increase in Site Impervious Area (ac)	1.748
Recharge Volume Required (cf)	3,808

Recharge Volume Adjustment Factor	
Impervious Area Directed to Infiltration BMP (ac)	3.827
%Impervious Directed to Infiltration BMP	96%
Adjustment Factor	1.05
Adjusted Total Recharge Volume Required (cf)	3,981

Provided Recharge Volume*	
P2P	14,672
Total Recharge Volume Provided (cf)	14,672

Provided greater than or Equal to Required

*Volume provided below lowest outlet in cubic feet (cf)

Prepared By:

BOHLER //

45 Franklin Street, Floor 5

Boston, MA 02110

(617) 849-8040

1/24/2023