Eastern Land Survey Associates, Inc.

Professional Land Surveyors & Civil Engineers
ESSEX SURVEY SERVICE 1958 - 1986
OSBORN PALMER 1911 - 1970
BRADFORD & WEED 1885 - 1972

STORMWATER MANAGEMENT REPORT
POST OFFICE CROSSING
ACTON, MASSACHUSETTS 10720

OCTOBER, 2012

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SECTION 1

NARRATIVE

Predevelopment Conditions

The site of Post Office Crossing is located on the easterly side of Post Office Square in Acton and consists of 3.59 acres of undeveloped woodland. The northerly portion of the site (approximately 1 acre) is sloping with surface gradients ranging from 6 to 15 percent. The central portion of the site is much flatter with surface gradients ranging from 1 to 2 percent.

The NCRS soil survey indicates the northerly side of the site to be underlain by Charlton Hollis soils, which are within hydrologic soil Group C. The central portion of the size is underlain by Canton Five Sandy Loam which is in hydrologic soil Group B. The most southerly portion of the site is underlain by deep, well drained deposits of sand.

Approximately 2.2 acres of the site (and adjacent land) flows westerly toward Post Office Square. The Acton Engineering Department provided Eastern Land Survey Associates with the original watershed maps and stormwater calculations for the Post Office Square (formerly Technology Drive) Subdivision. Those calculations were based on development characteristics for the lots in the subdivision. In addition, a stormwater detention facility was proposed on Lot 5 of the subdivision (see Watershed Map). During a site visit conducted on May 22, 2012, the stormwater facility was noted to exist and appeared similar to that which was shown on the design plan.

The portion of the site which was anticipated to be tributary to Post Office Square was analyzed using the criteria provided in the original analysis and Hydro CAD calculations (which are provided in Section 2 of this report and are summarized as follows:

Storm Frequency	Peak Runoff (CFS)
2 year	4.11
10 year	7.47
25 year	9.45
100 year	12.47

In the existing condition, peak runoff rates from the total site were analyzed using Hydro CAD software. The results of those calculations (provided in Section 2 of this report) are summarized as follows:

Storm Frequency	Peak Runoff (CFS) (Subcatchments A & B)
2 year	0.42
10 year	1.41
25 year	2.12
100 year	3.29

Peak run off rates from subcatchment B, only, are summarized as follows:

Storm Frequency	Peak Runoff (CFS) Subcatchment B
2 year	0.21
10 year	0.87
25 year	1.37
100 year	2.23

Description of Project

Approximately 2.7 acres of the site is proposed to be developed for twelve single family homes together with a 450 foot long, roadway terminating in a cul-de-sac, a common septic system, underground utilities, stormwater management facilities and grading.

Proposed roadway cut depths of 0 to 4.5 feet and fill depths of 0 to 4 feet are proposed. Roadway elevations are impacted by the steep hill in the north portion of the site and relatively shallow groundwater depths in the central portion of the site.

Proposed Stormwater Management System

The proposed storm drainage collection system for Post Office Crossing is to consist of a series of piped catch basins. Two such systems are proposed. Runoff from the first 200 feet of roadway as well as Lots 1-4, portions of Lots 5, 6 and 9-12 will be collected by the roadway drainage system, and in part, flow overland toward Post Office Square. Runoff from roadway and driveway surfaces will be routed through a stormceptor device prior to discharge into the existing 18" inch drain on Post Office Square.

Runoff from the balance of the new roadway (up to the proposed cul-de-sac) as well as from portions of Lots 6-11, inclusive will be collected by two catch basins in the cul-de-sac. Again, that runoff will be routed through a stormceptor device prior to discharge into an underground infiltration system in the half acre (approximately) most easterly portion of the site.

Runoff from the portion of property owned by AET Corp (north of the Post Office Crossing site) will continue to drain overland toward Post Office Square portions of roof runoff from Lots 5-7 will be infiltrated in order to mitigate impact on down stream properties in the two year storm.

Postdevelopment Conditions

Postdevelopment peak runoff rates from the site toward Post Office Square are summarized as follows:

Storm Frequency	Peak Runoff (CFS)	Peak Runoff Anticipated by Original Analysis (CFS)
2 year	1.60	4.11
10 year	3.08	7.47
25 year	3.97	9.45
100 year	5.34	12.47

Since runoff rated proposed to be discharged from the site into the existing Post Office Square drainage system (and, ultimately into the detention basin on Lot 5 of the original subdivision) are significantly lower in all analyzed events than were anticipated by the original design, it is proposed that no further runoff attenuation best management practices from that portion of the proposed development be provided.

Runoff from the development portion of the site which is tributary to the proposed catch basin in the cul-de-sac will be routed to an underground infiltration basin in the most easterly side of the site. That basin will consist of 90 – Cultec R-280 chambers. On site soil testing, conducted in March of 2012 and witnessed by the Acton Health Agent, indicated deep deposits of well drained sands with no indication of groundwater to at least 7.7 feet below existing grade.

Postdevelopment peak runoff rates from the central portion of the site flowing easterly are summarized as follows:

Storm Frequency	Peak Runoff (CFS)	Predevelopment Peak Runoff (CFS)
2 year	0.17*	0.21
10 year	0.71	0.87
25 year	0.97	1.37
100 year	1.49	2.23

*Accounts for partial roof infiltration on Lots 5-7, inclusive (2 year storm only)

It may be concluded from a comparison of predevelopment and postdevelopmemt runoff rates that sufficient infiltration capacity is proposed.

Water Quality and Groundwater Recharge

Stormwater quality from the front portion of the stormwater collection system (which discharges to Post Office Square) will be addressed by four, deep sump catch basins and a stormceptor hydrodynamic separator. The resultant total suspended solids removal rate would be 91.75 percent. The storm drainage collection system discharging to the proposed underground infiltration system will include two, deep sump catch basins, a stormceptor and infiltration. The result total suspended solids removal rate would be 98.6 percent.

Stormwater quality calculations are provided in Section 3 of this document.

Approximately 48 percent of the new impervious surfaces on site are to be infiltrated (for all impervious site coverages) are as follows:

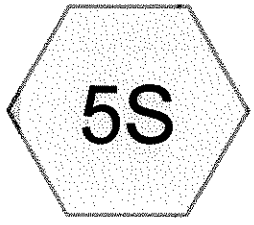
Required Groundwater Recharge Volume	Provided Groundwater Recharge Volume
2704 CF	6565 CF

An Operation and Maintenance Plan for the various proposed best management practices if provided in Section 3 of this document. A NPDES Stormwater Pollution Prevention Plan will be prepared prior to commencement of construction.

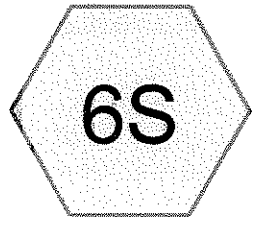
SECTION 2

CALCULATIONS

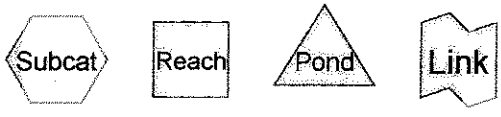
PREDEVELOPMENT CALCULATIONS



SC A (To Post Office Square)



SC B)To Rear of Property))



Drainage Diagram for Post Office Square Predevelopment1
Prepared by Eastern Land Survey, Printed 11/7/2012
HydroCAD® 9.10 s/n 06709 © 2010 HydroCAD Software Solutions LLC

Summary for Subcatchment 5S: SC A (To Post Office Square)

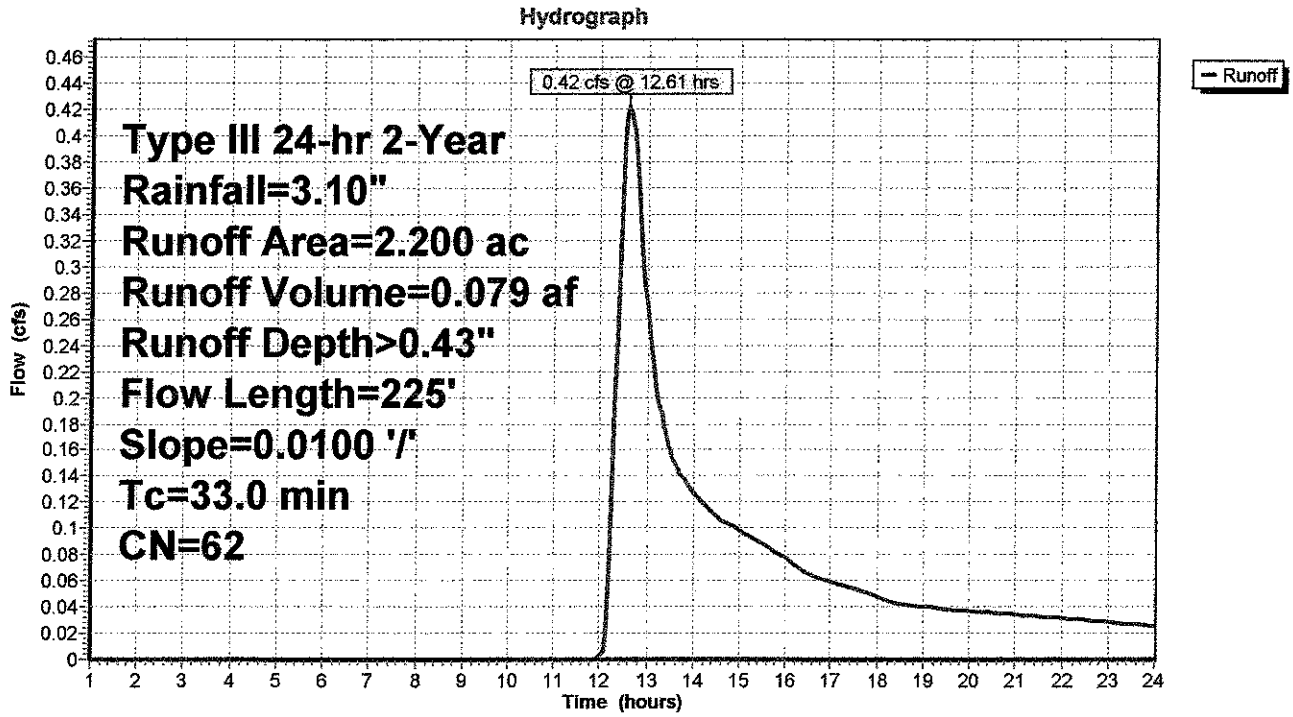
Runoff = 0.42 cfs @ 12.61 hrs, Volume= 0.079 af, Depth> 0.43"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.450	70	Woods, Good, HSG C
1.750	60	Woods, Fair, HSG B
2.200	62	Weighted Average
2.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.8	100	0.0100	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
4.2	125	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.0	225	Total			

Subcatchment 5S: SC A (To Post Office Square)



Summary for Subcatchment 6S: SC B)To Rear of Property))

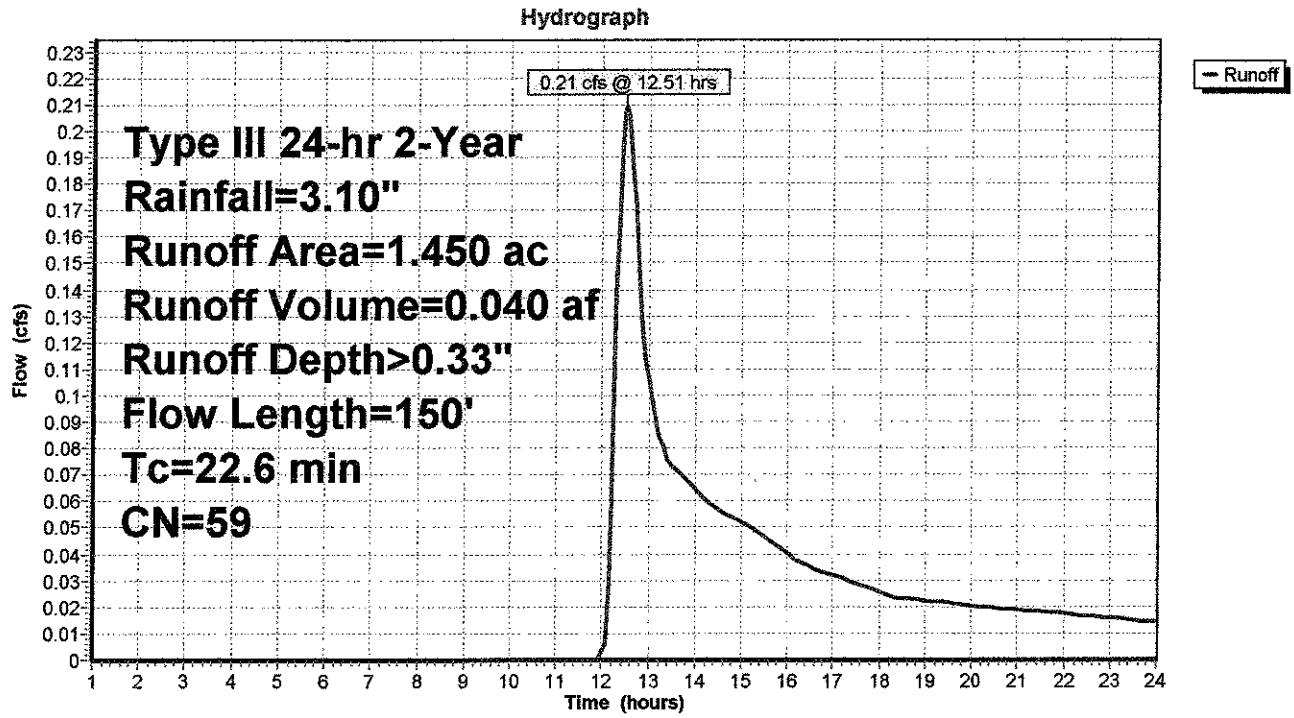
Runoff = 0.21 cfs @ 12.51 hrs, Volume= 0.040 af, Depth> 0.33"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.400	70	Woods, Good, HSG C
1.050	55	Woods, Good, HSG B
1.450	59	Weighted Average
1.450		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.8	50	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.6	150	Total			

Subcatchment 6S: SC B)To Rear of Property))



Summary for Subcatchment 5S: SC A (To Post Office Square)

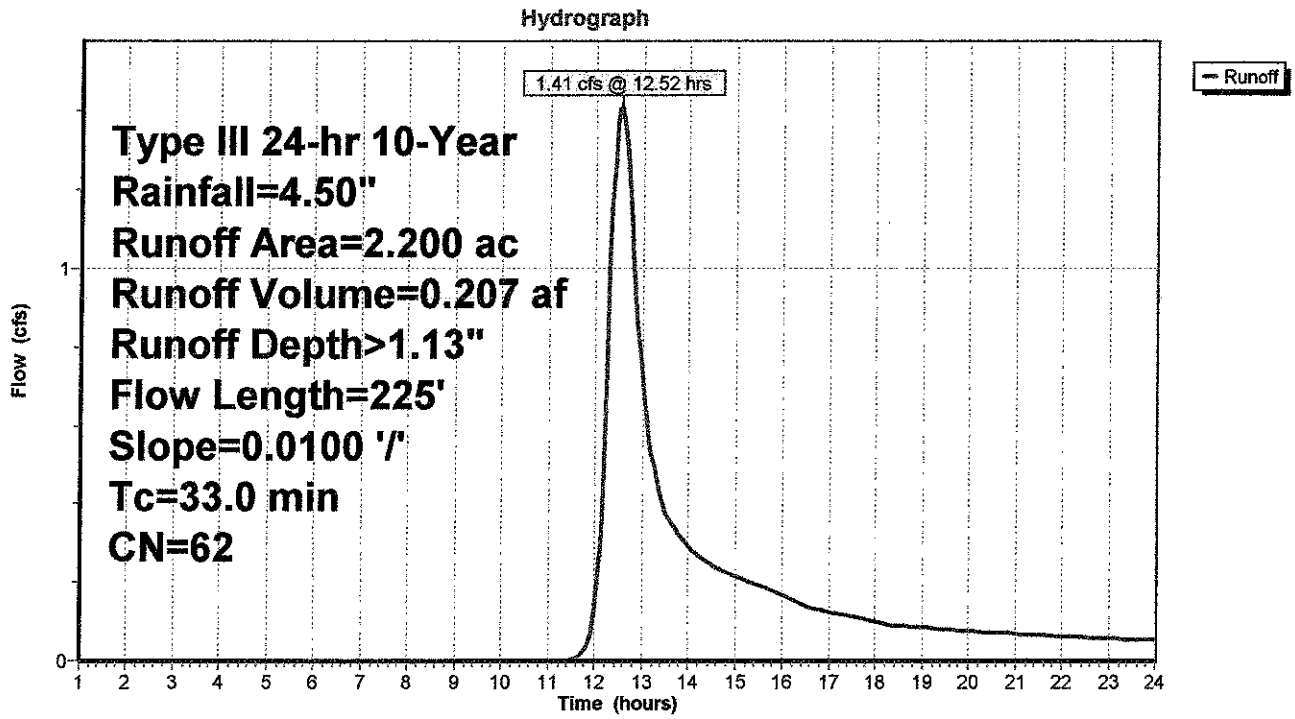
Runoff = 1.41 cfs @ 12.52 hrs, Volume= 0.207 af, Depth> 1.13"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (ac)	CN	Description
0.450	70	Woods, Good, HSG C
1.750	60	Woods, Fair, HSG B
2.200	62	Weighted Average
2.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.8	100	0.0100	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
4.2	125	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.0	225	Total			

Subcatchment 5S: SC A (To Post Office Square)



Summary for Subcatchment 6S: SC B)To Rear of Property))

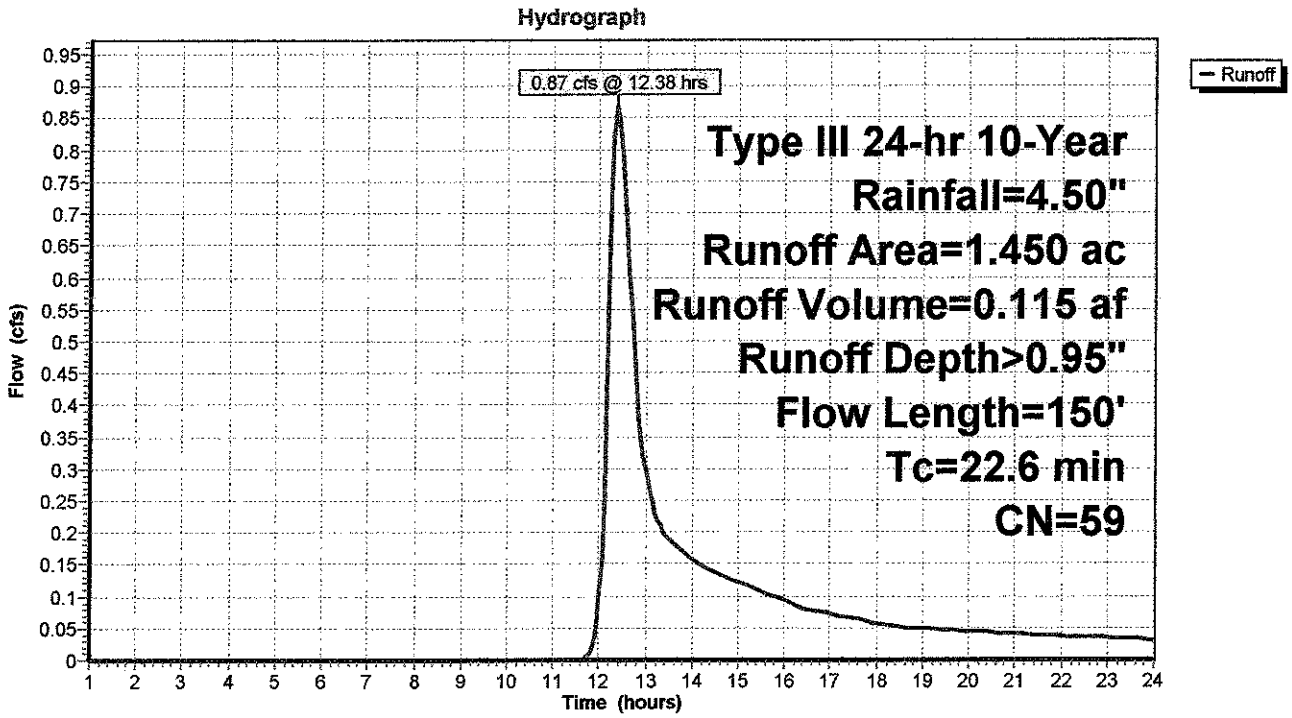
Runoff = 0.87 cfs @ 12.38 hrs, Volume= 0.115 af, Depth> 0.95"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (ac)	CN	Description
0.400	70	Woods, Good, HSG C
1.050	55	Woods, Good, HSG B
1.450	59	Weighted Average
1.450		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.8	50	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.6	150	Total			

Subcatchment 6S: SC B)To Rear of Property))



Summary for Subcatchment 5S: SC A (To Post Office Square)

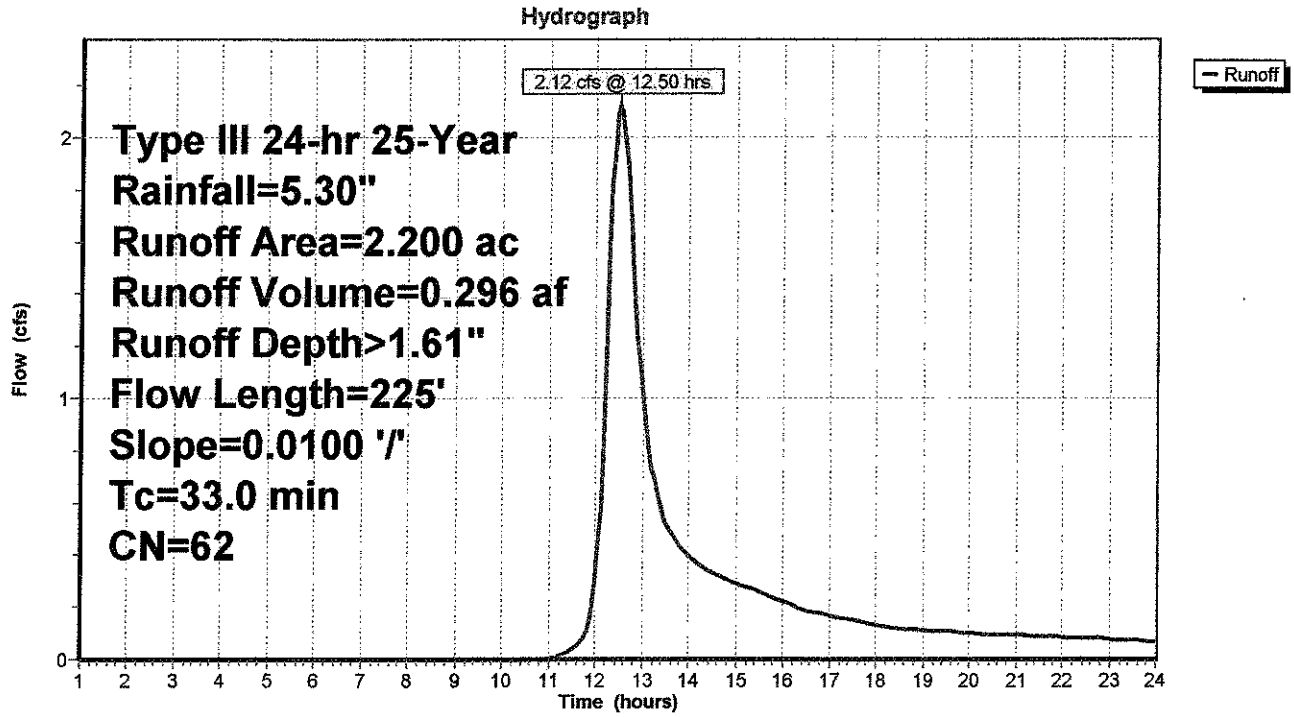
Runoff = 2.12 cfs @ 12.50 hrs, Volume= 0.296 af, Depth> 1.61"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (ac)	CN	Description
0.450	70	Woods, Good, HSG C
1.750	60	Woods, Fair, HSG B
2.200	62	Weighted Average
2.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.8	100	0.0100	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
4.2	125	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.0	225	Total			

Subcatchment 5S: SC A (To Post Office Square)



Summary for Subcatchment 6S: SC B)To Rear of Property))

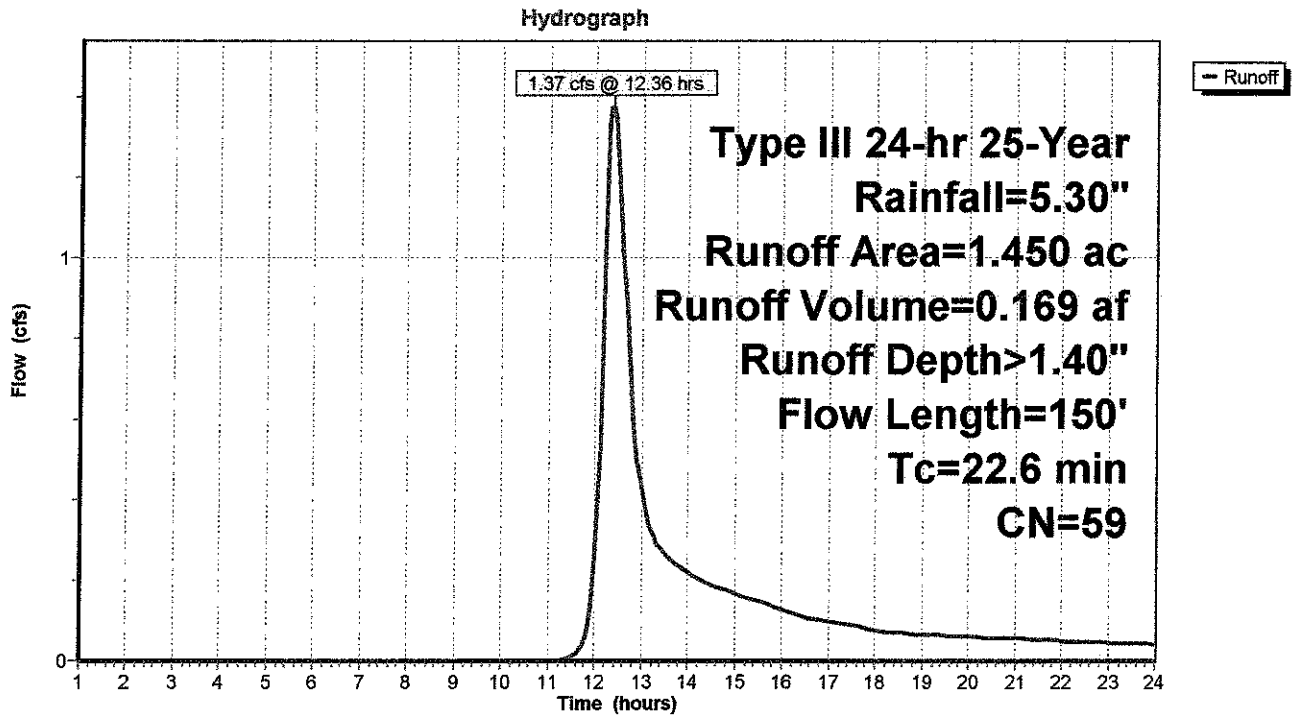
Runoff = 1.37 cfs @ 12.36 hrs, Volume= 0.169 af, Depth> 1.40"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (ac)	CN	Description
0.400	70	Woods, Good, HSG C
1.050	55	Woods, Good, HSG B
1.450	59	Weighted Average
1.450		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.8	50	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.6	150	Total			

Subcatchment 6S: SC B)To Rear of Property))



Summary for Subcatchment 5S: SC A (To Post Office Square)

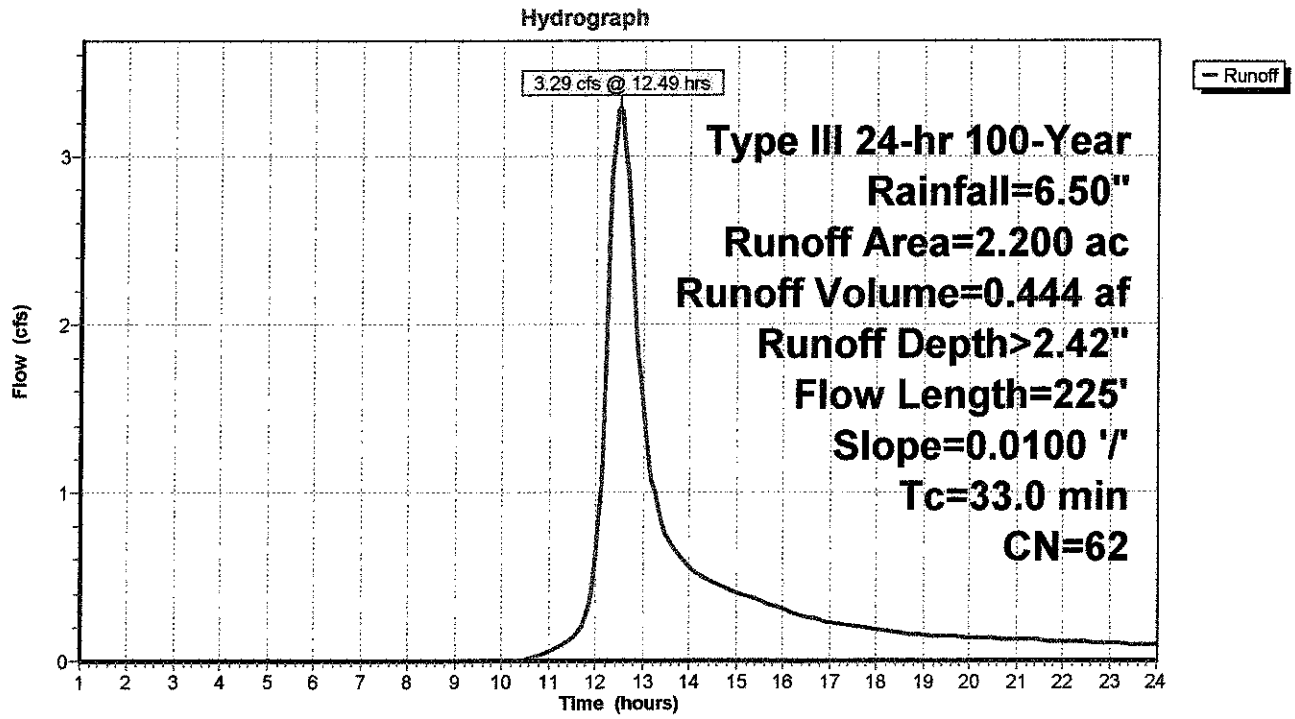
Runoff = 3.29 cfs @ 12.49 hrs, Volume= 0.444 af, Depth> 2.42"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (ac)	CN	Description
0.450	70	Woods, Good, HSG C
1.750	60	Woods, Fair, HSG B
2.200	62	Weighted Average
2.200		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.8	100	0.0100	0.06		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
4.2	125	0.0100	0.50		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
33.0	225	Total			

Subcatchment 5S: SC A (To Post Office Square)



Summary for Subcatchment 6S: SC B)To Rear of Property))

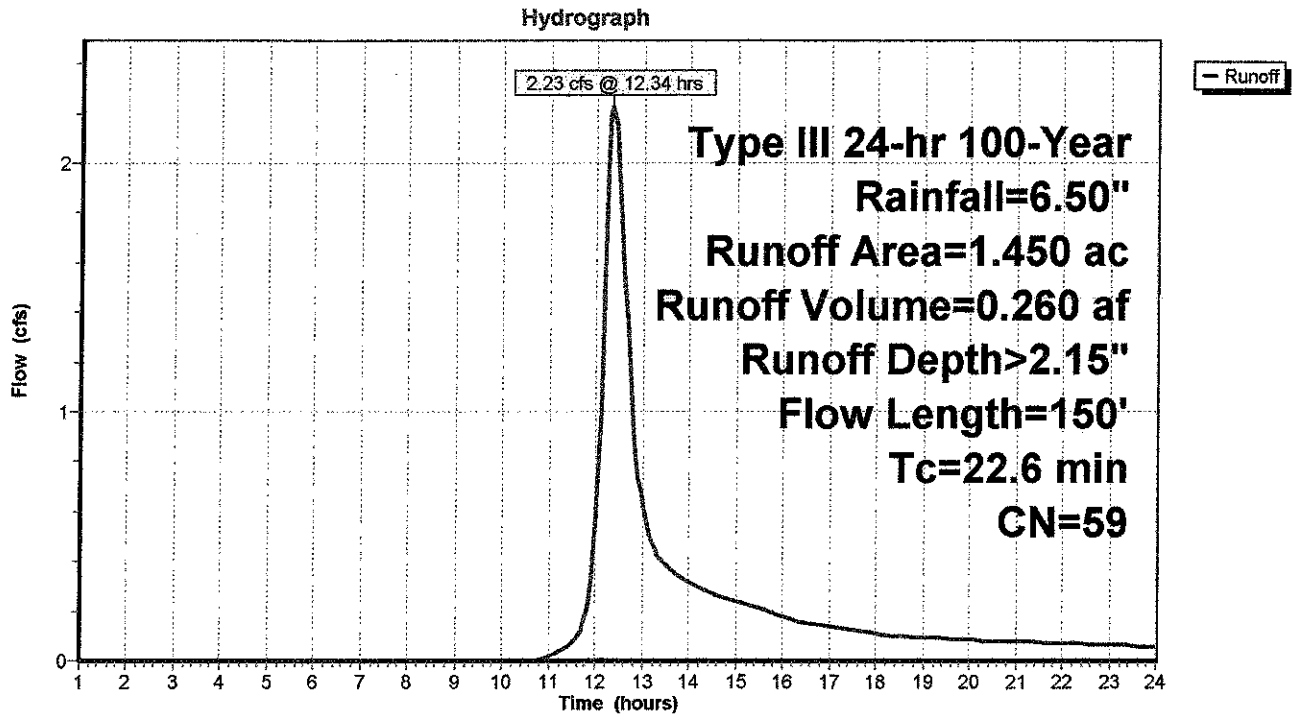
Runoff = 2.23 cfs @ 12.34 hrs, Volume= 0.260 af, Depth> 2.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

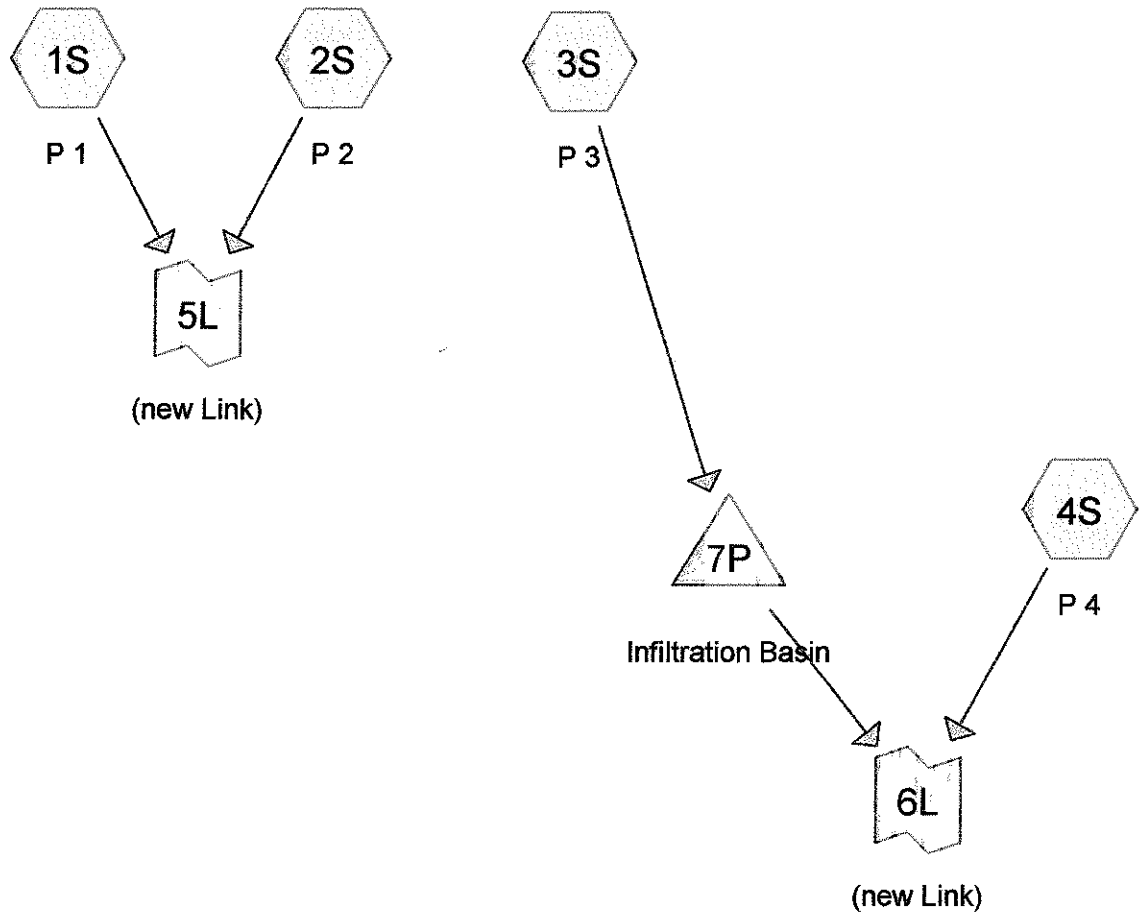
Area (ac)	CN	Description
0.400	70	Woods, Good, HSG C
1.050	55	Woods, Good, HSG B
1.450	59	Weighted Average
1.450		100.00% Pervious Area

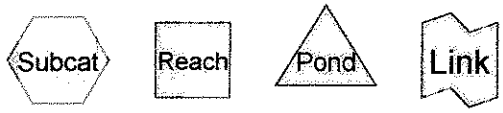
Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
21.8	100	0.0200	0.08		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
0.8	50	0.0400	1.00		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
22.6	150	Total			

Subcatchment 6S: SC B)To Rear of Property))



POSTDEVELOPMENT CALCULATIONS





Drainage Diagram for Post Office Square Postdevelopment 2 Year
Prepared by Eastern Land Survey, Printed 11/7/2012
HydroCAD® 9.10 s/n 06709 © 2010 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: P 1

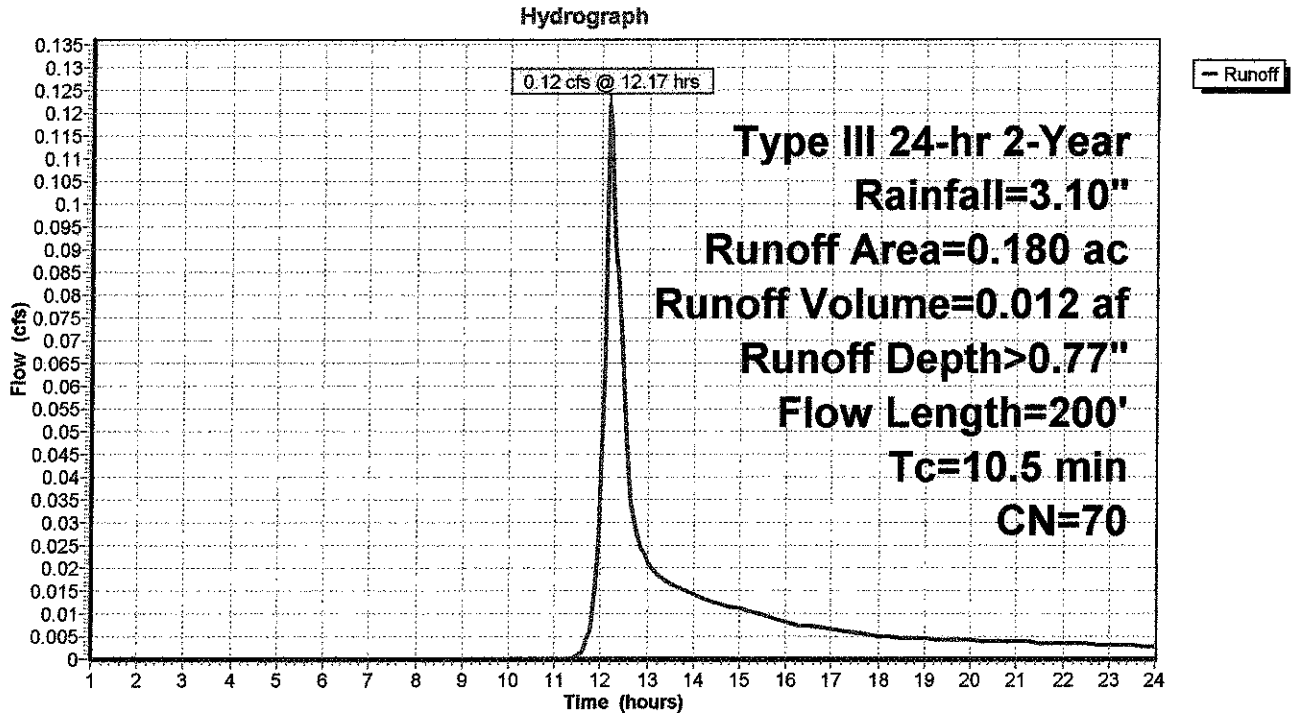
Runoff = 0.12 cfs @ 12.17 hrs, Volume= 0.012 af, Depth> 0.77"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.180	70	Woods, Good, HSG C
0.180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.1600	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	100	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.5	200	Total			

Subcatchment 1S: P 1



Summary for Subcatchment 2S: P 2

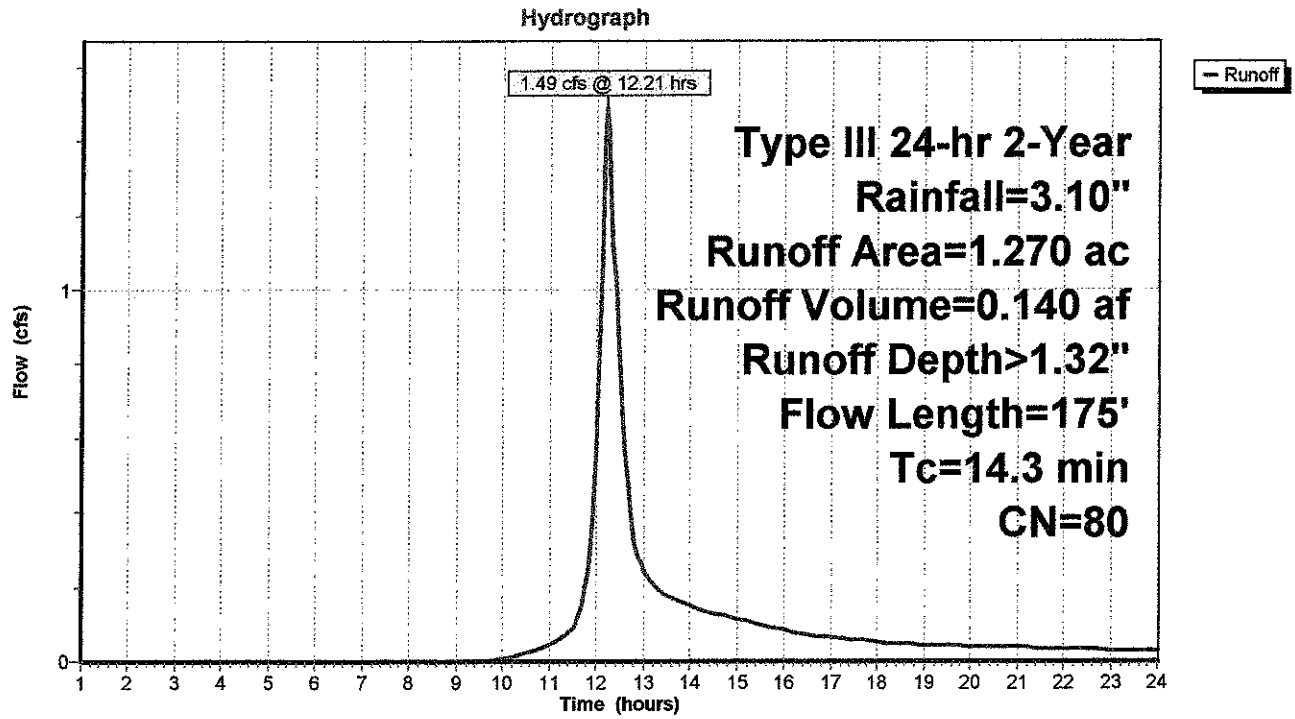
Runoff = 1.49 cfs @ 12.21 hrs, Volume= 0.140 af, Depth> 1.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.370	98	Paved parking, HSG B
0.360	61	>75% Grass cover, Good, HSG B
0.190	98	Paved parking, HSG C
0.140	74	>75% Grass cover, Good, HSG C
0.210	70	Woods, Good, HSG C
1.270	80	Weighted Average
0.710		55.91% Pervious Area
0.560		44.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	95	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.4	80	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
14.3	175	Total			

Subcatchment 2S: P 2



Summary for Subcatchment 3S: P 3

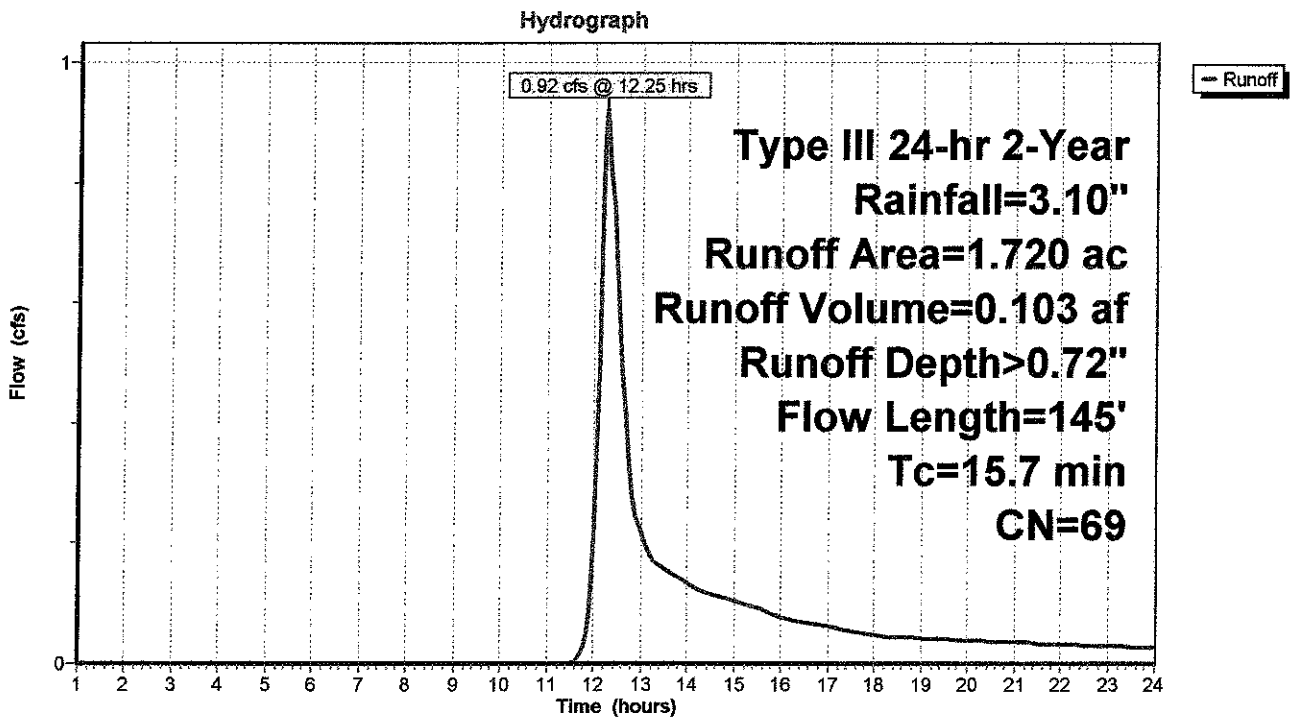
Runoff = 0.92 cfs @ 12.25 hrs, Volume= 0.103 af, Depth> 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG B
1.330	61	>75% Grass cover, Good, HSG B
1.720	69	Weighted Average
1.330		77.33% Pervious Area
0.390		22.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	90	0.0140	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.3	55	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.7	145	Total			

Subcatchment 3S: P 3



Summary for Subcatchment 4S: P 4

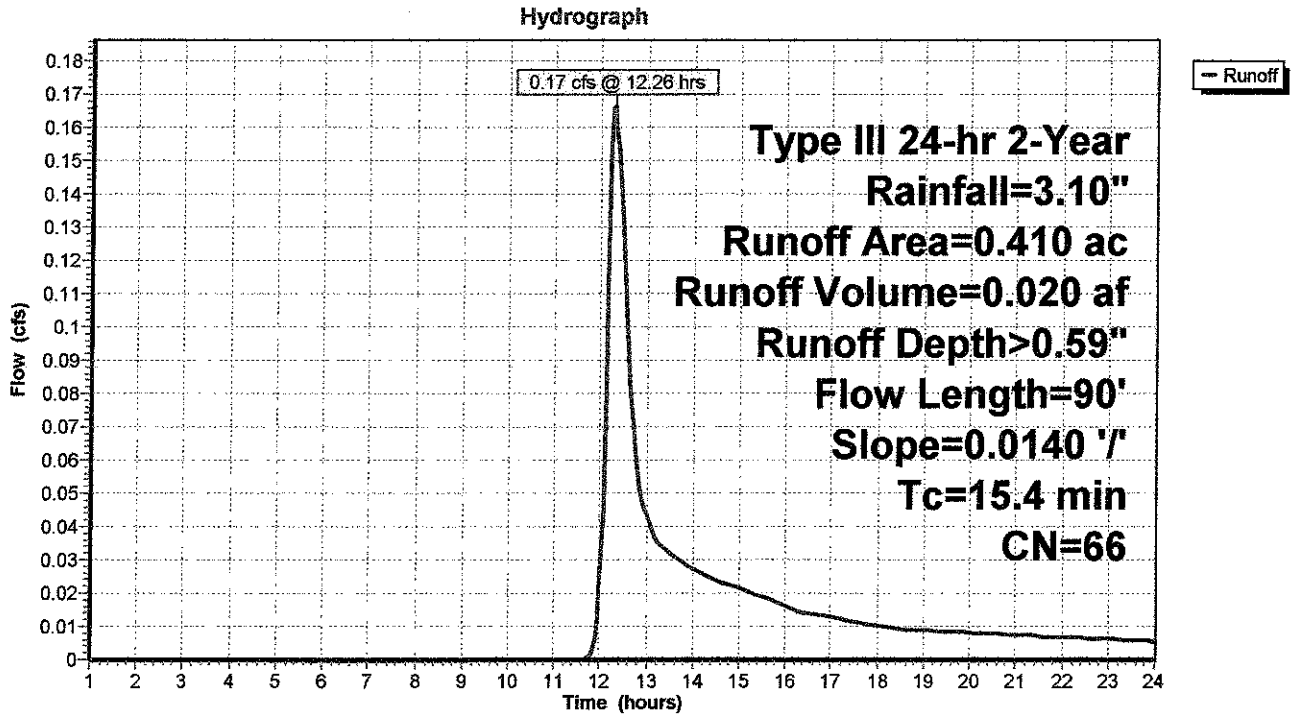
Runoff = 0.17 cfs @ 12.26 hrs, Volume= 0.020 af, Depth> 0.59"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

Area (ac)	CN	Description
0.060	98	Paved parking, HSG B
0.350	61	>75% Grass cover, Good, HSG B
0.410	66	Weighted Average
0.350		85.37% Pervious Area
0.060		14.63% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	90	0.0140	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"

Subcatchment 4S: P 4



Summary for Pond 7P: Infiltration Basin

Inflow Area =	1.720 ac, 22.67% Impervious, Inflow Depth > 0.72" for 2-Year event			
Inflow =	0.92 cfs @ 12.25 hrs, Volume=	0.103 af		
Outflow =	0.58 cfs @ 12.15 hrs, Volume=	0.103 af, Atten= 37%, Lag= 0.0 min		
Discarded =	0.58 cfs @ 12.15 hrs, Volume=	0.103 af		
Primary =	0.00 cfs @ 1.00 hrs, Volume=	0.000 af		

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 0.28' @ 12.54 hrs Surf.Area= 0.069 ac Storage= 0.008 af

Plug-Flow detention time=3.1 min calculated for 0.103 af (100% of inflow)
Center-of-Mass det. time= 2.8 min (891.3 - 888.4)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.054 af	**23.58'W x 128.00'L x 3.21'H Field A** 0.222 af Overall - 0.088 af Embedded = 0.135 af x 40.0% Voids
#2A	0.50'	0.088 af	**Cultec R-280** x 90 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
		0.142 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	2.33'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.58 cfs @ 12.15 hrs HW=0.04' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.58 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=0.00' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 7P: Infiltration Basin - Chamber Wizard Field A

Chamber Model = Cultec R-280
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap

47.0" Wide + 6.0" Spacing = 53.0" C-C

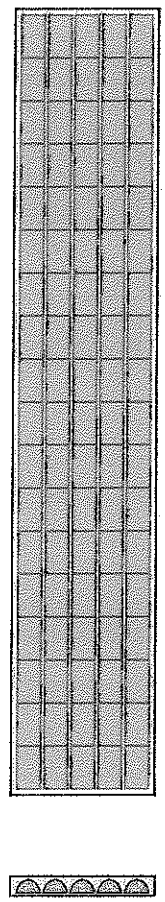
18 Chambers/Row x 7.00' Long = 126.00' + 12.0" End Stone x 2 = 128.00' Base Length
5 Rows x 47.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 23.58' Base Width
6.0" Base + 26.5" Chamber Height + 6.0" Cover = 3.21' Field Height

90 Chambers x 42.5 cf = 3,825.2 cf Chamber Storage

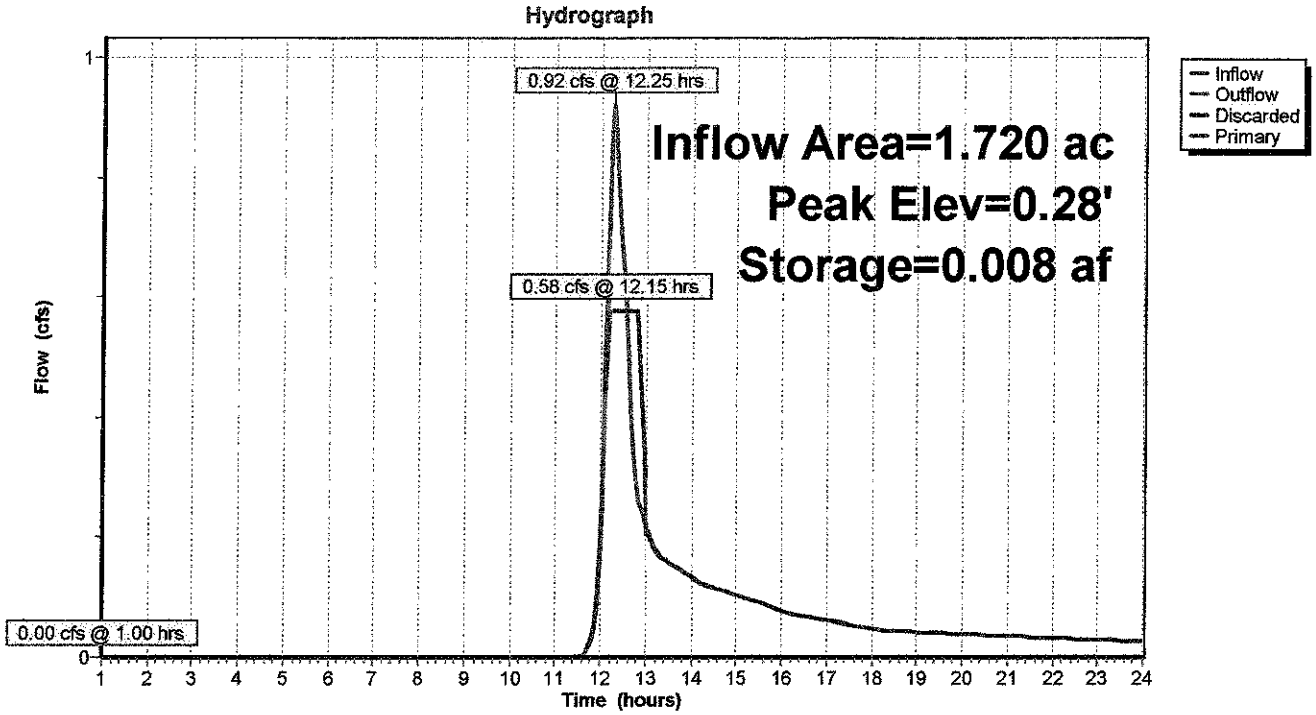
9,684.9 cf Field - 3,825.2 cf Chambers = 5,859.7 cf Stone x 40.0% Voids = 2,343.9 cf Stone Storage

Stone + Chamber Storage = 6,169.1 cf = 0.142 af

90 Chambers
358.7 cy Field
217.0 cy Stone



Pond 7P: Infiltration Basin

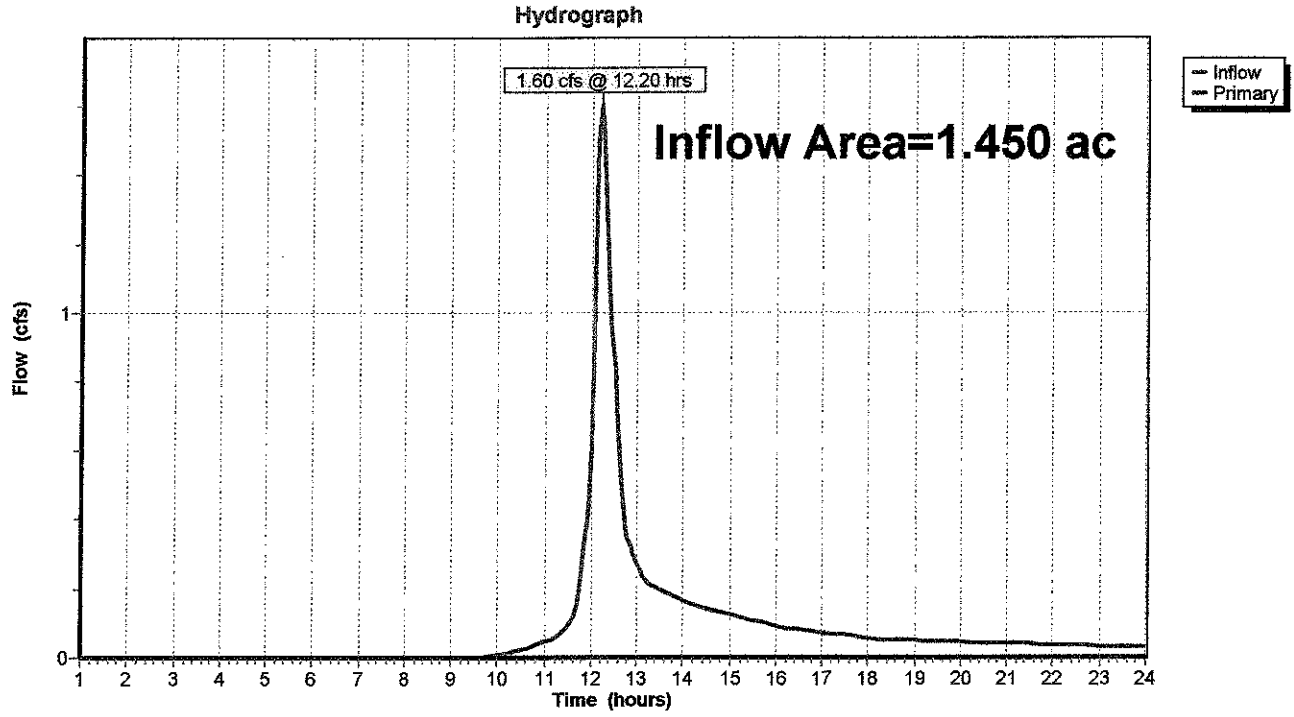


Summary for Link 5L: (new Link)

Inflow Area = 1.450 ac, 38.62% Impervious, Inflow Depth > 1.25" for 2-Year event
Inflow = 1.60 cfs @ 12.20 hrs, Volume= 0.151 af
Primary = 1.60 cfs @ 12.20 hrs, Volume= 0.151 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Link 5L: (new Link)

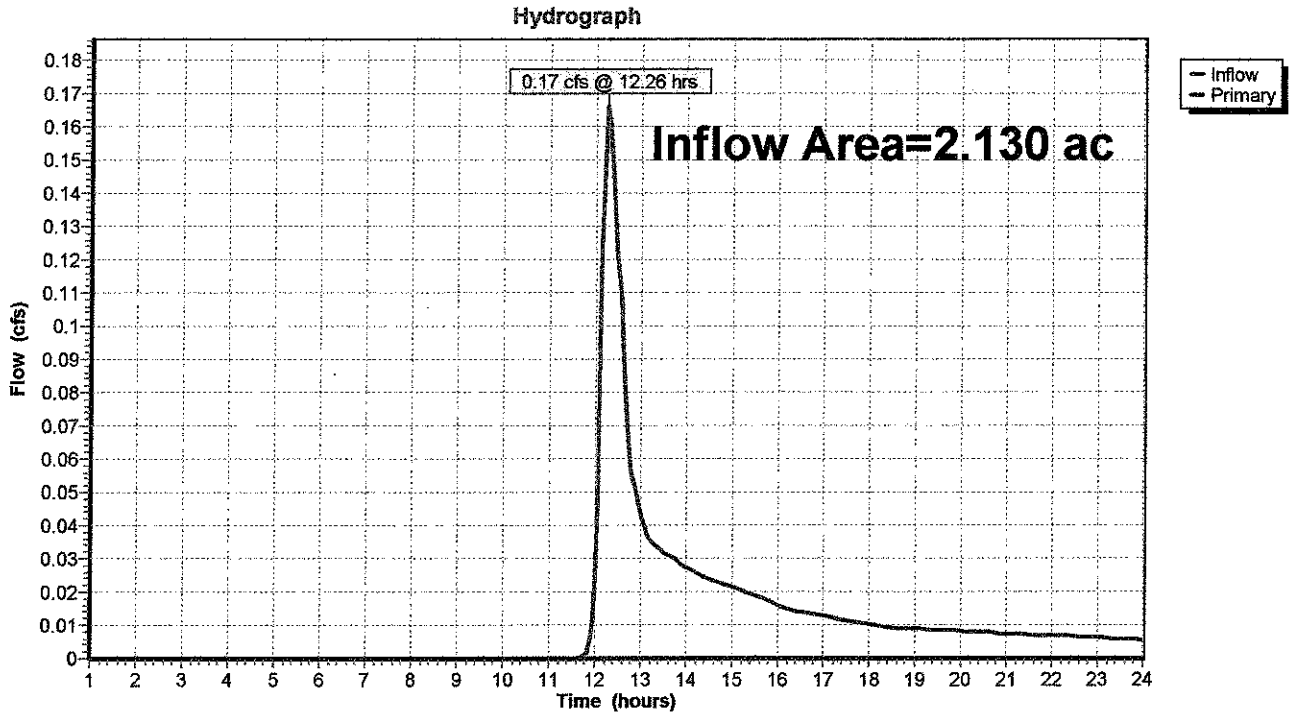


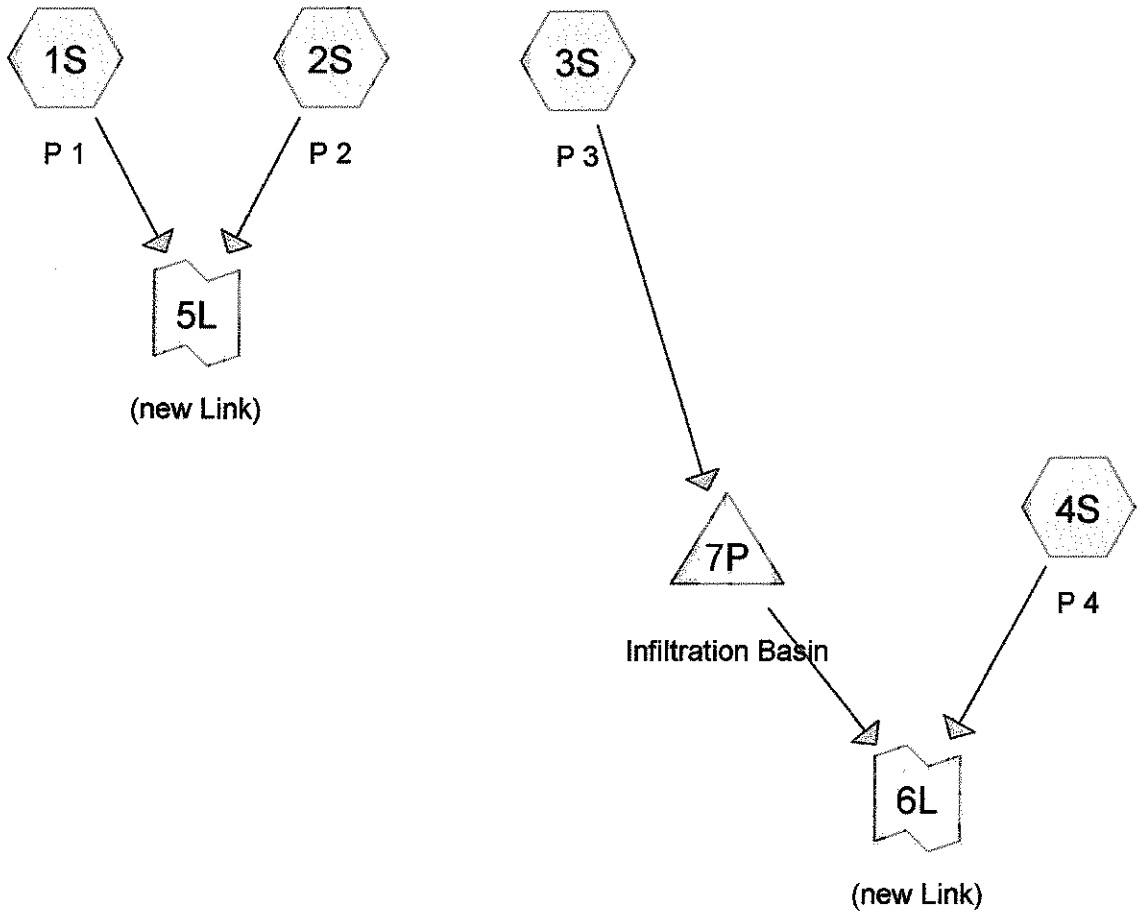
Summary for Link 6L: (new Link)

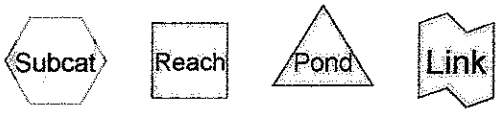
Inflow Area = 2.130 ac, 21.13% Impervious, Inflow Depth > 0.11" for 2-Year event
Inflow = 0.17 cfs @ 12.26 hrs, Volume= 0.020 af
Primary = 0.17 cfs @ 12.26 hrs, Volume= 0.020 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Link 6L: (new Link)







Drainage Diagram for Post Office Square Postdevelopment
Prepared by Eastern Land Survey, Printed 11/7/2012
HydroCAD® 9.10 s/n 06709 © 2010 HydroCAD Software Solutions LLC

Summary for Subcatchment 1S: P 1

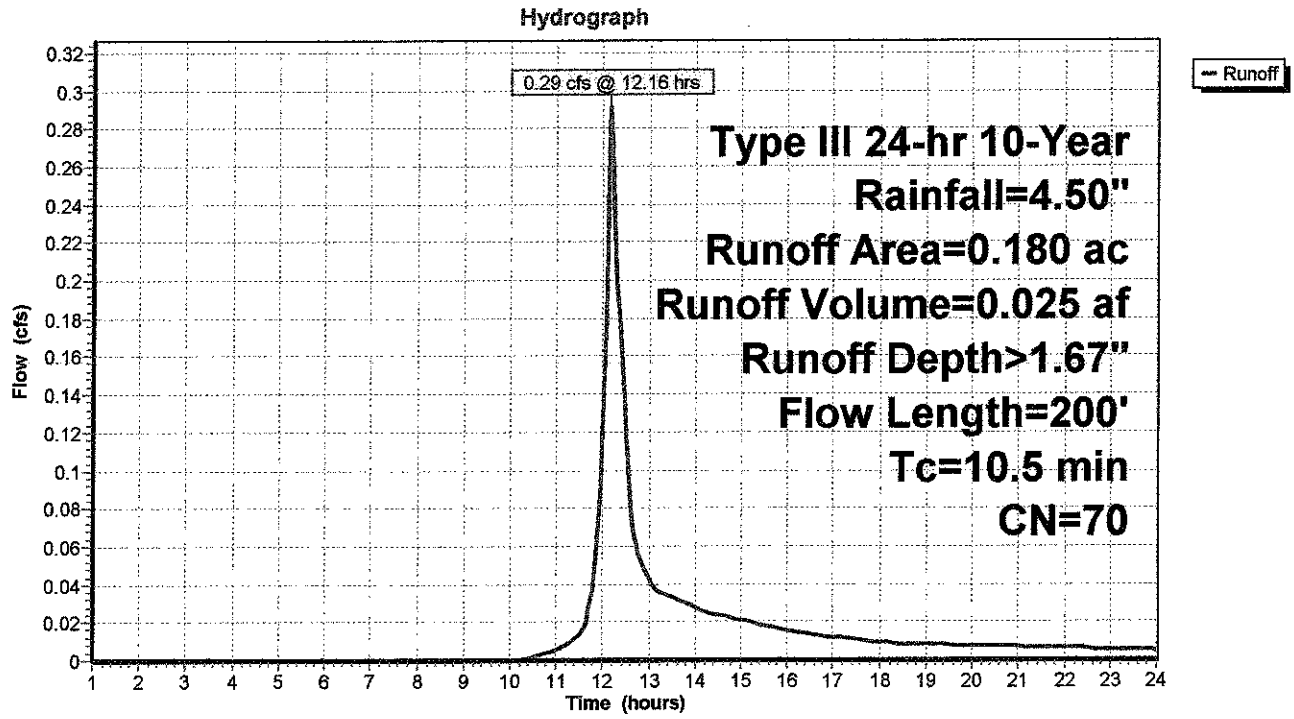
Runoff = 0.29 cfs @ 12.16 hrs, Volume= 0.025 af, Depth> 1.67"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (ac)	CN	Description
0.180	70	Woods, Good, HSG C
0.180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.1600	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	100	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.5	200	Total			

Subcatchment 1S: P 1



Summary for Subcatchment 2S: P 2

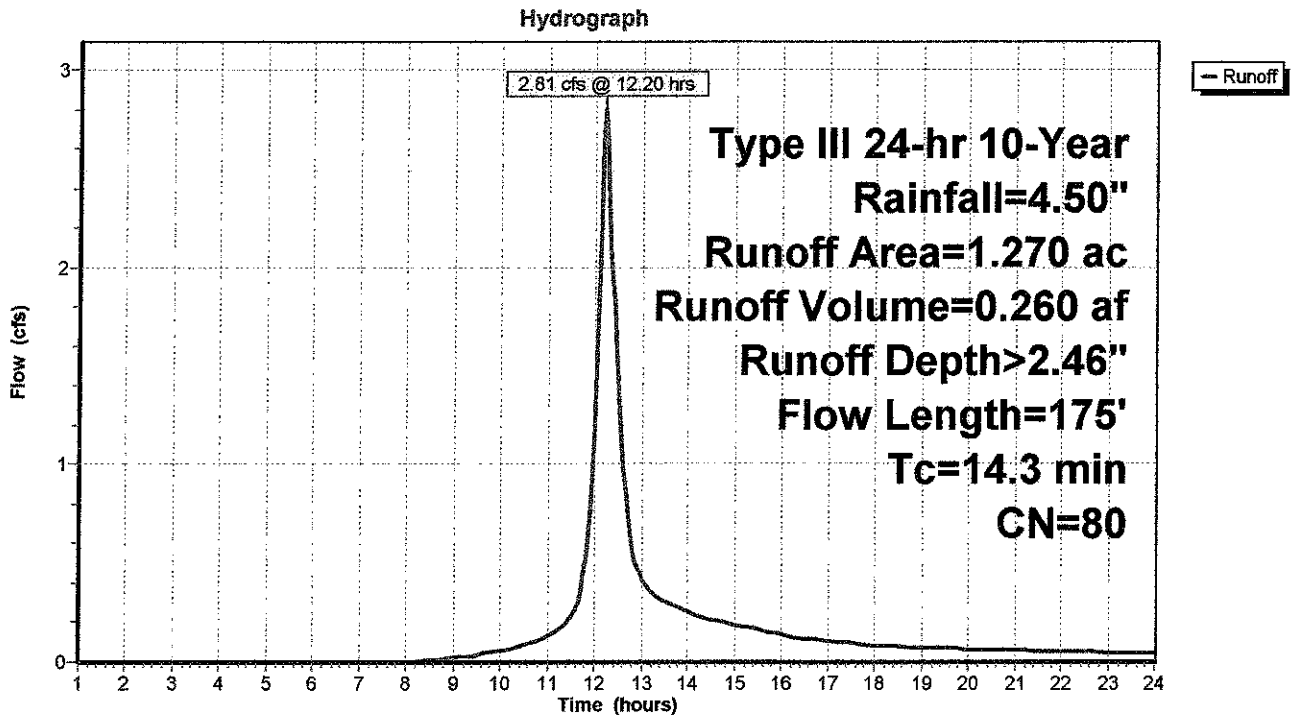
Runoff = 2.81 cfs @ 12.20 hrs, Volume= 0.260 af, Depth> 2.46"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (ac)	CN	Description
0.370	98	Paved parking, HSG B
0.360	61	>75% Grass cover, Good, HSG B
0.190	98	Paved parking, HSG C
0.140	74	>75% Grass cover, Good, HSG C
0.210	70	Woods, Good, HSG C
1.270	80	Weighted Average
0.710		55.91% Pervious Area
0.560		44.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	95	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.4	80	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
14.3	175	Total			

Subcatchment 2S: P 2



Summary for Subcatchment 3S: P 3

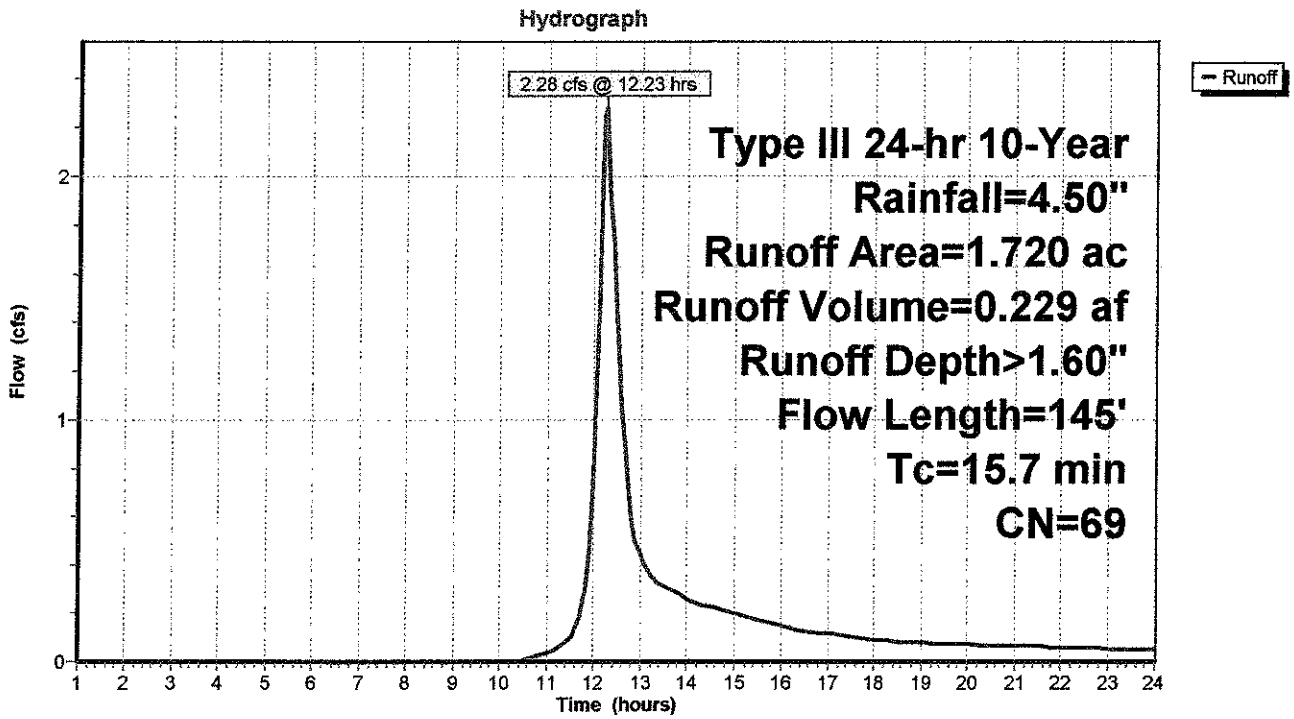
Runoff = 2.28 cfs @ 12.23 hrs, Volume= 0.229 af, Depth> 1.60"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG B
1.330	61	>75% Grass cover, Good, HSG B
1.720	69	Weighted Average
1.330		77.33% Pervious Area
0.390		22.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	90	0.0140	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.3	55	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.7	145	Total			

Subcatchment 3S: P 3



Summary for Subcatchment 4S: P 4

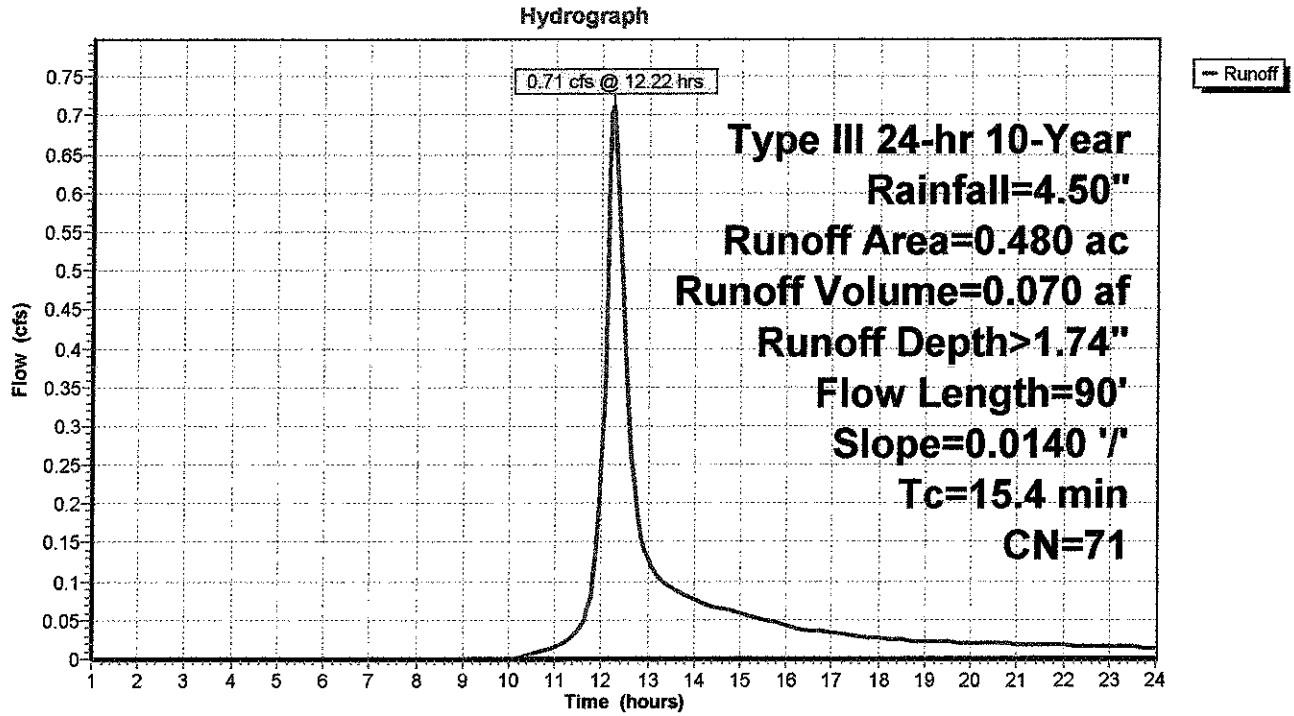
Runoff = 0.71 cfs @ 12.22 hrs, Volume= 0.070 af, Depth> 1.74"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 10-Year Rainfall=4.50"

Area (ac)	CN	Description
0.130	98	Paved parking, HSG B
0.350	61	>75% Grass cover, Good, HSG B
0.480	71	Weighted Average
0.350		72.92% Pervious Area
0.130		27.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	90	0.0140	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"

Subcatchment 4S: P 4



Summary for Pond 7P: Infiltration Basin

Inflow Area =	1.720 ac, 22.67% Impervious, Inflow Depth > 1.60" for 10-Year event			
Inflow =	2.28 cfs @	12.23 hrs, Volume=	0.229 af	
Outflow =	0.58 cfs @	12.00 hrs, Volume=	0.229 af, Atten= 75%, Lag= 0.0 min	
Discarded =	0.58 cfs @	12.00 hrs, Volume=	0.229 af	
Primary =	0.00 cfs @	1.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1.24' @ 12.81 hrs Surf.Area= 0.069 ac Storage= 0.058 af

Plug-Flow detention time=28.6 min calculated for 0.229 af (100% of inflow)
Center-of-Mass det. time= 28.5 min (891.6 - 863.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.054 af	**23.58'W x 128.00'L x 3.21'H Field A** 0.222 af Overall - 0.088 af Embedded = 0.135 af x 40.0% Voids
#2A	0.50'	0.088 af	**Cultec R-280** x 90 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
		0.142 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	2.33'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.58 cfs @ 12.00 hrs HW=0.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.58 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=0.00' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 7P: Infiltration Basin - Chamber Wizard Field A

Chamber Model = Cultec R-280
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap

47.0" Wide + 6.0" Spacing = 53.0" C-C

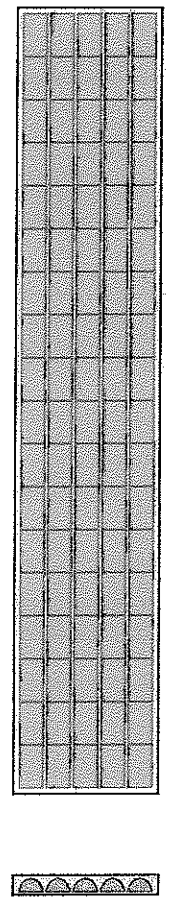
18 Chambers/Row x 7.00' Long = 126.00' + 12.0" End Stone x 2 = 128.00' Base Length
5 Rows x 47.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 23.58' Base Width
6.0" Base + 26.5" Chamber Height + 6.0" Cover = 3.21' Field Height

90 Chambers x 42.5 cf = 3,825.2 cf Chamber Storage

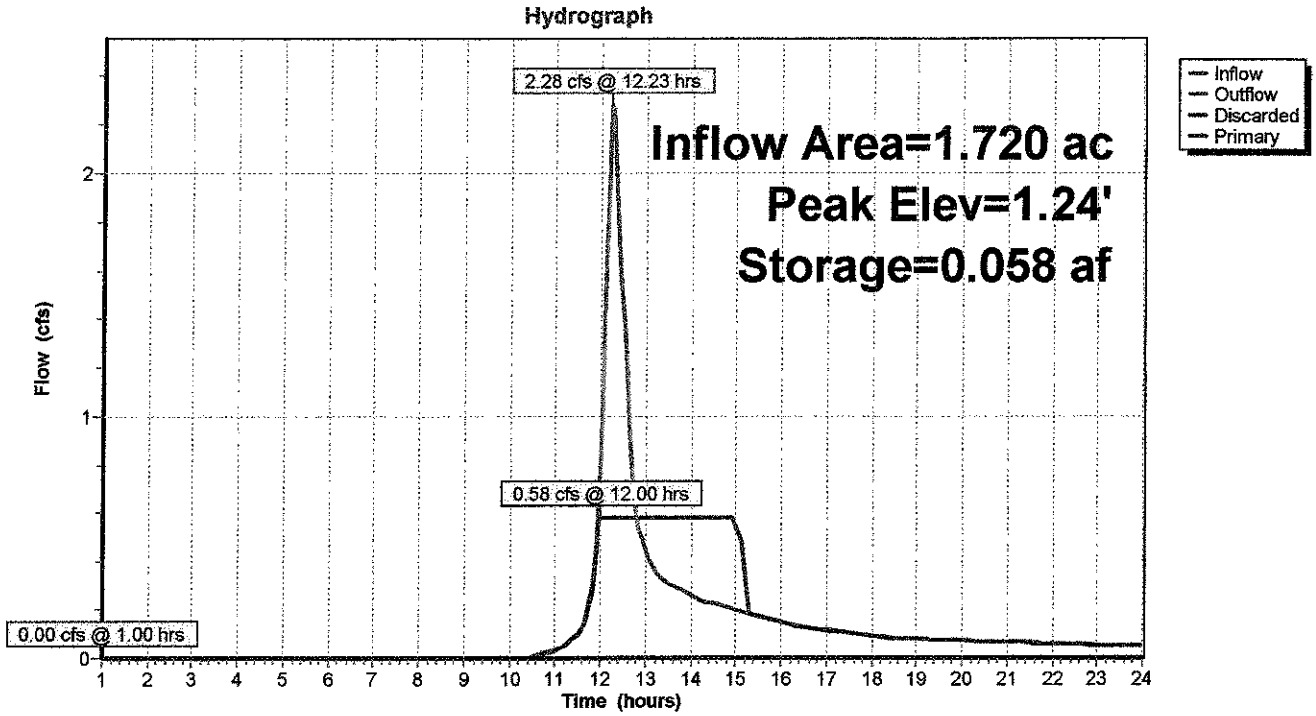
9,684.9 cf Field - 3,825.2 cf Chambers = 5,859.7 cf Stone x 40.0% Voids = 2,343.9 cf Stone Storage

Stone + Chamber Storage = 6,169.1 cf = 0.142 af

90 Chambers
358.7 cy Field
217.0 cy Stone



Pond 7P: Infiltration Basin

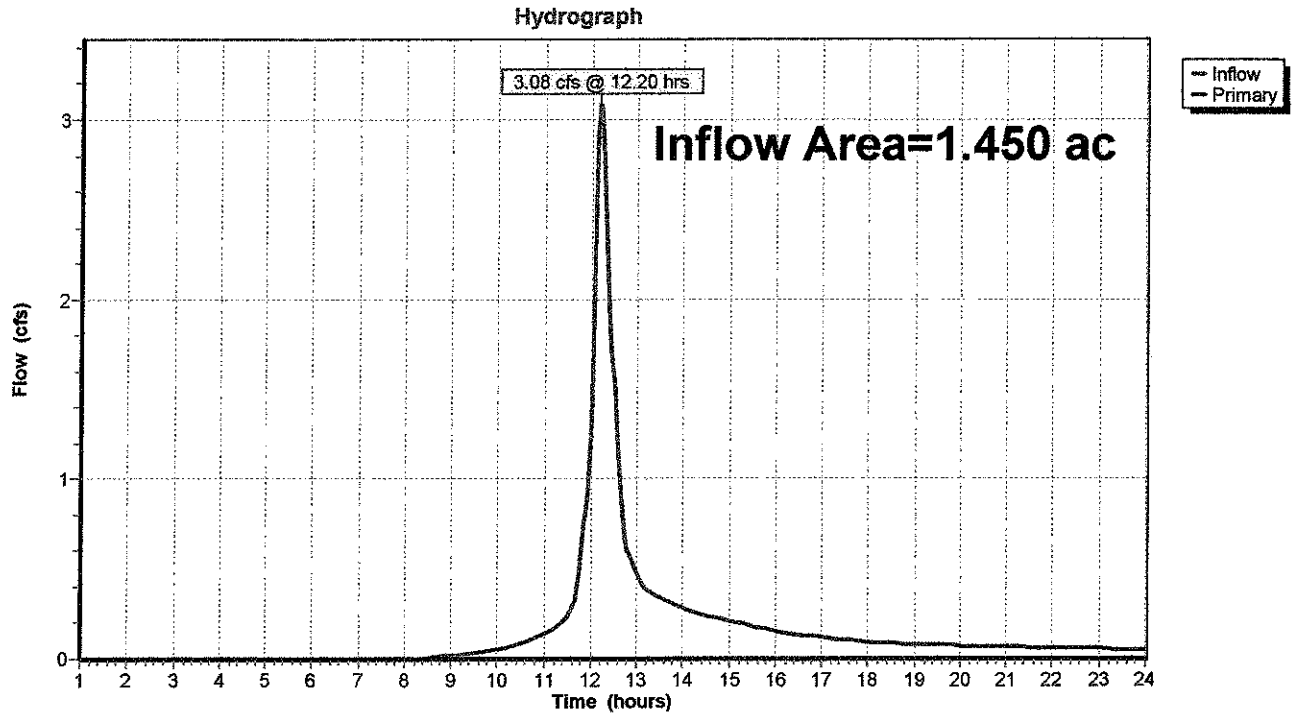


Summary for Link 5L: (new Link)

Inflow Area = 1.450 ac, 38.62% Impervious, Inflow Depth > 2.36" for 10-Year event
Inflow = 3.08 cfs @ 12.20 hrs, Volume= 0.285 af
Primary = 3.08 cfs @ 12.20 hrs, Volume= 0.285 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Link 5L: (new Link)

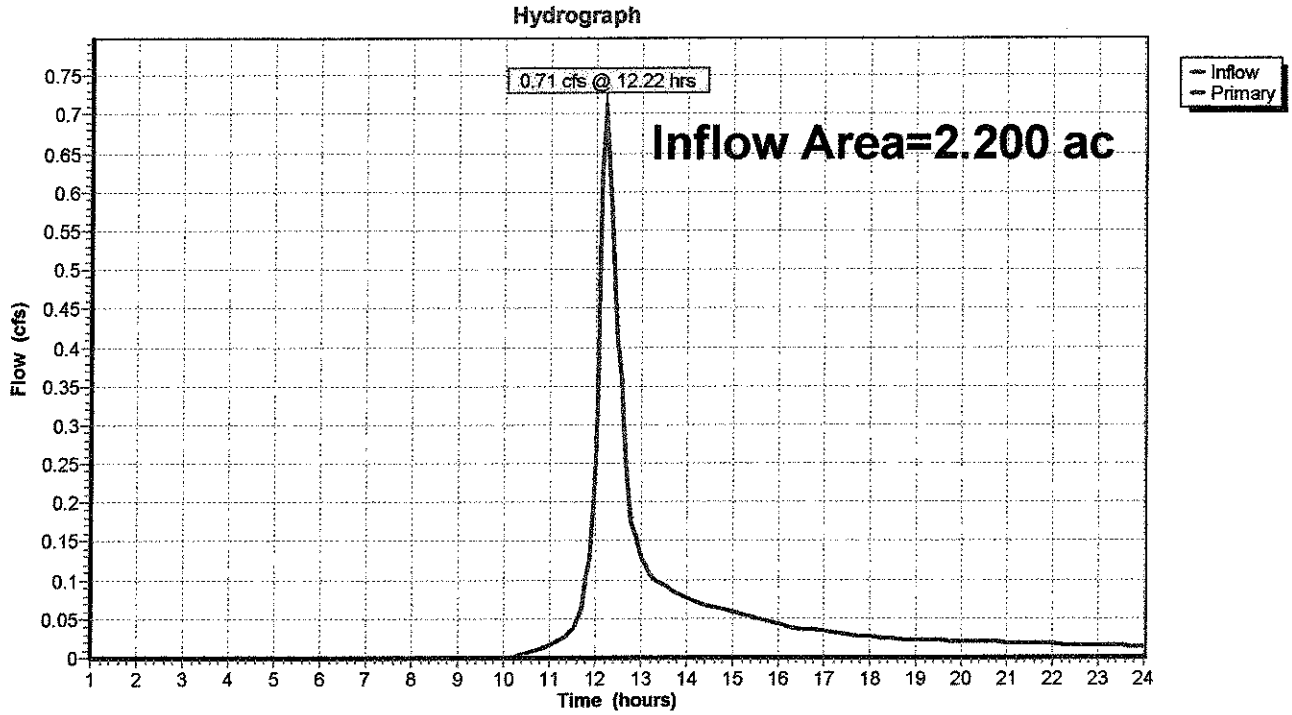


Summary for Link 6L: (new Link)

Inflow Area = 2.200 ac, 23.64% Impervious, Inflow Depth > 0.38" for 10-Year event
Inflow = 0.71 cfs @ 12.22 hrs, Volume= 0.070 af
Primary = 0.71 cfs @ 12.22 hrs, Volume= 0.070 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Link 6L: (new Link)



Summary for Subcatchment 1S: P 1

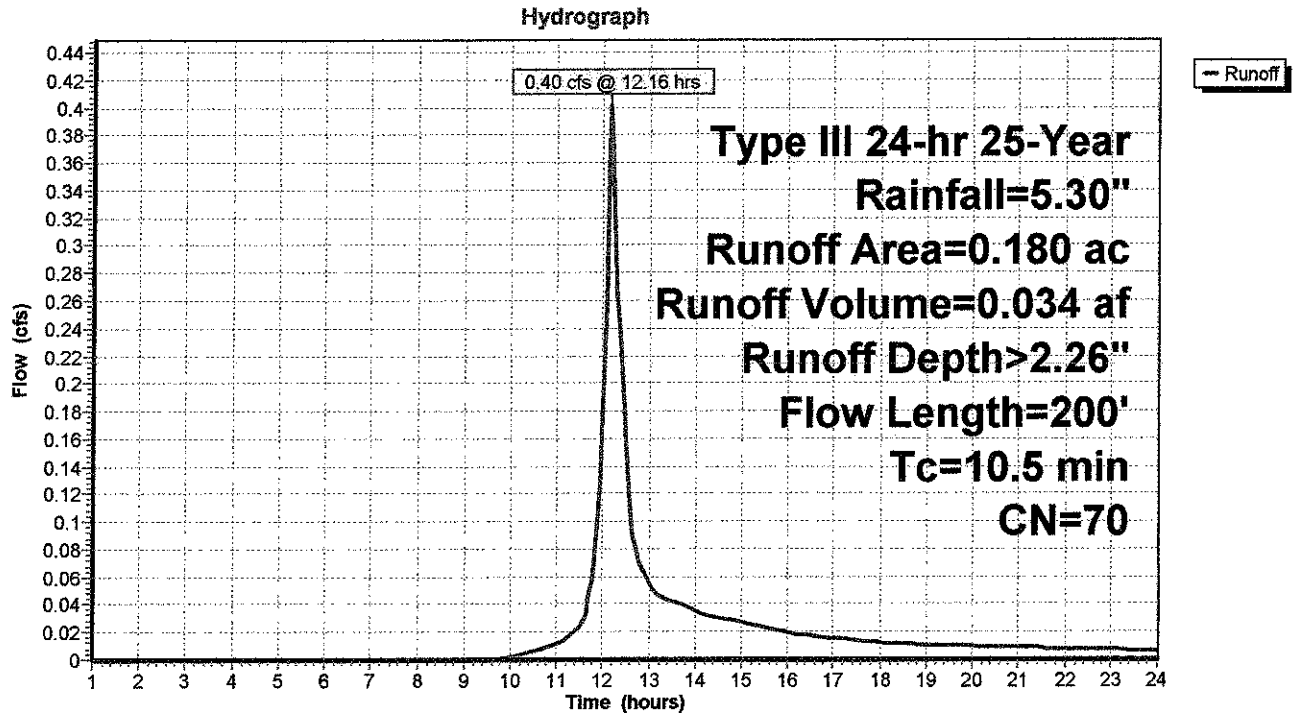
Runoff = 0.40 cfs @ 12.16 hrs, Volume= 0.034 af, Depth> 2.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (ac)	CN	Description
0.180	70	Woods, Good, HSG C
0.180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.1600	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	100	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.5	200	Total			

Subcatchment 1S: P 1



Summary for Subcatchment 2S: P 2

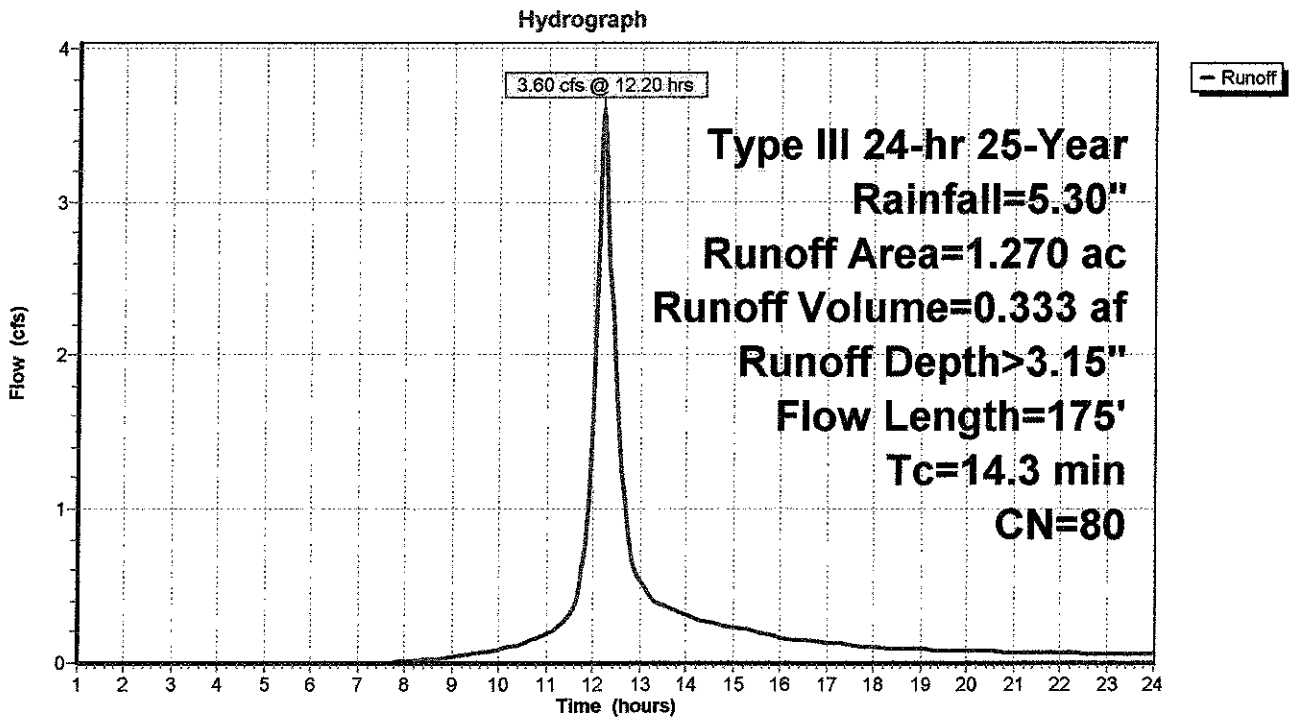
Runoff = 3.60 cfs @ 12.20 hrs, Volume= 0.333 af, Depth> 3.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (ac)	CN	Description
0.370	98	Paved parking, HSG B
0.360	61	>75% Grass cover, Good, HSG B
0.190	98	Paved parking, HSG C
0.140	74	>75% Grass cover, Good, HSG C
0.210	70	Woods, Good, HSG C
1.270	80	Weighted Average
0.710		55.91% Pervious Area
0.560		44.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	95	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.4	80	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
14.3	175	Total			

Subcatchment 2S: P 2



Summary for Subcatchment 3S: P 3

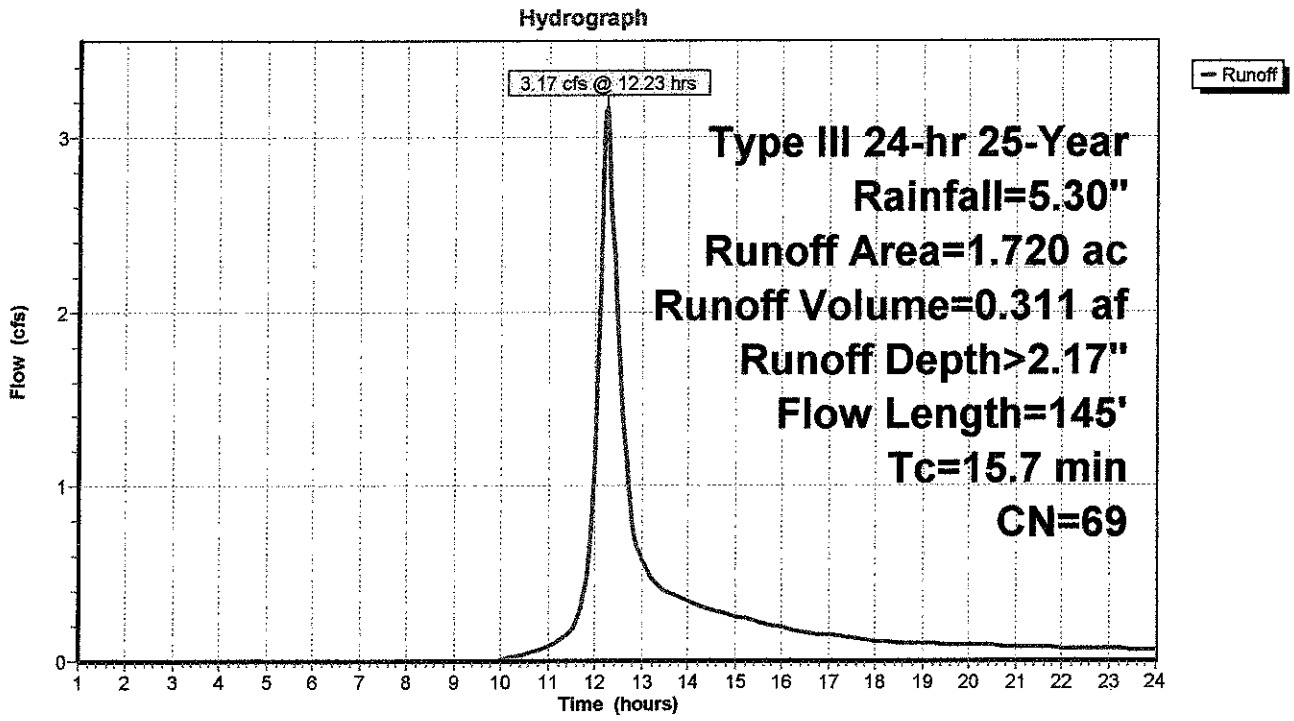
Runoff = 3.17 cfs @ 12.23 hrs, Volume= 0.311 af, Depth> 2.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG B
1.330	61	>75% Grass cover, Good, HSG B
1.720	69	Weighted Average
1.330		77.33% Pervious Area
0.390		22.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	90	0.0140	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.3	55	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.7	145	Total			

Subcatchment 3S: P 3



Summary for Subcatchment 4S: P 4

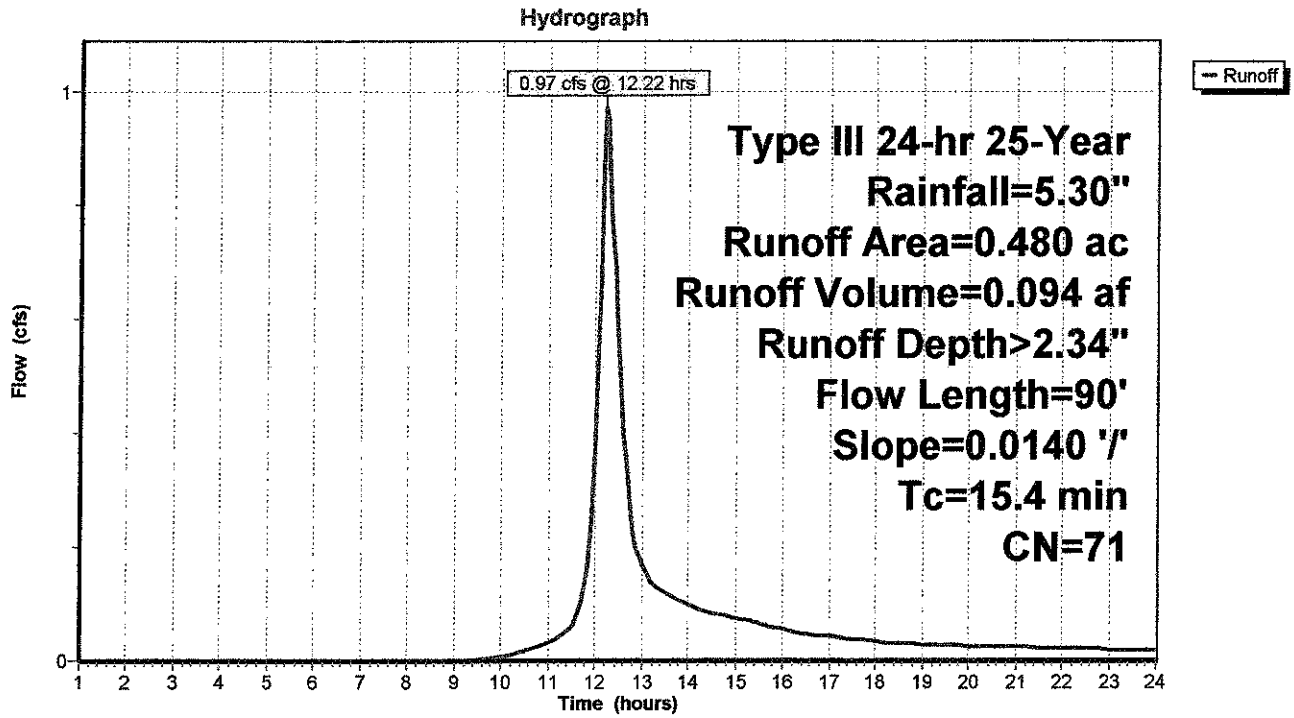
Runoff = 0.97 cfs @ 12.22 hrs, Volume= 0.094 af, Depth> 2.34"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 25-Year Rainfall=5.30"

Area (ac)	CN	Description
0.130	98	Paved parking, HSG B
0.350	61	>75% Grass cover, Good, HSG B
0.480	71	Weighted Average
0.350		72.92% Pervious Area
0.130		27.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	90	0.0140	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"

Subcatchment 4S: P 4



Summary for Pond 7P: Infiltration Basin

Inflow Area =	1.720 ac, 22.67% Impervious, Inflow Depth > 2.17" for 25-Year event			
Inflow =	3.17 cfs @	12.23 hrs, Volume=	0.311 af	
Outflow =	0.58 cfs @	11.90 hrs, Volume=	0.311 af, Atten= 82%, Lag= 0.0 min	
Discarded =	0.58 cfs @	11.90 hrs, Volume=	0.311 af	
Primary =	0.00 cfs @	1.00 hrs, Volume=	0.000 af	

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1.96' @ 12.99 hrs Surf.Area= 0.069 ac Storage= 0.097 af

Plug-Flow detention time= 56.5 min calculated for 0.311 af (100% of inflow)
Center-of-Mass det. time= 56.3 min (910.3 - 854.0)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.054 af	**23.58'W x 128.00'L x 3.21'H Field A** 0.222 af Overall - 0.088 af Embedded = 0.135 af x 40.0% Voids
#2A	0.50'	0.088 af	**Cultec R-280** x 90 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
		0.142 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	2.33'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.58 cfs @ 11.90 hrs HW=0.05' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.58 cfs)

Primary OutFlow Max=0.00 cfs @ 1.00 hrs HW=0.00' (Free Discharge)
└**2=Orifice/Grate** (Controls 0.00 cfs)

Pond 7P: Infiltration Basin - Chamber Wizard Field A

Chamber Model = Cultec R-280
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap

47.0" Wide + 6.0" Spacing = 53.0" C-C

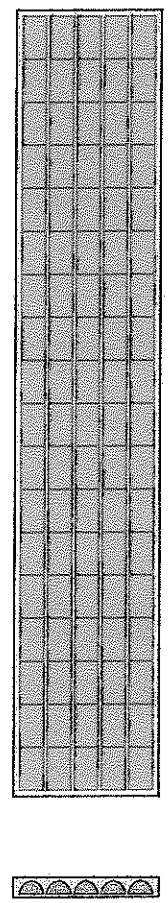
18 Chambers/Row x 7.00' Long = 126.00' + 12.0" End Stone x 2 = 128.00' Base Length
5 Rows x 47.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 23.58' Base Width
6.0" Base + 26.5" Chamber Height + 6.0" Cover = 3.21' Field Height

90 Chambers x 42.5 cf = 3,825.2 cf Chamber Storage

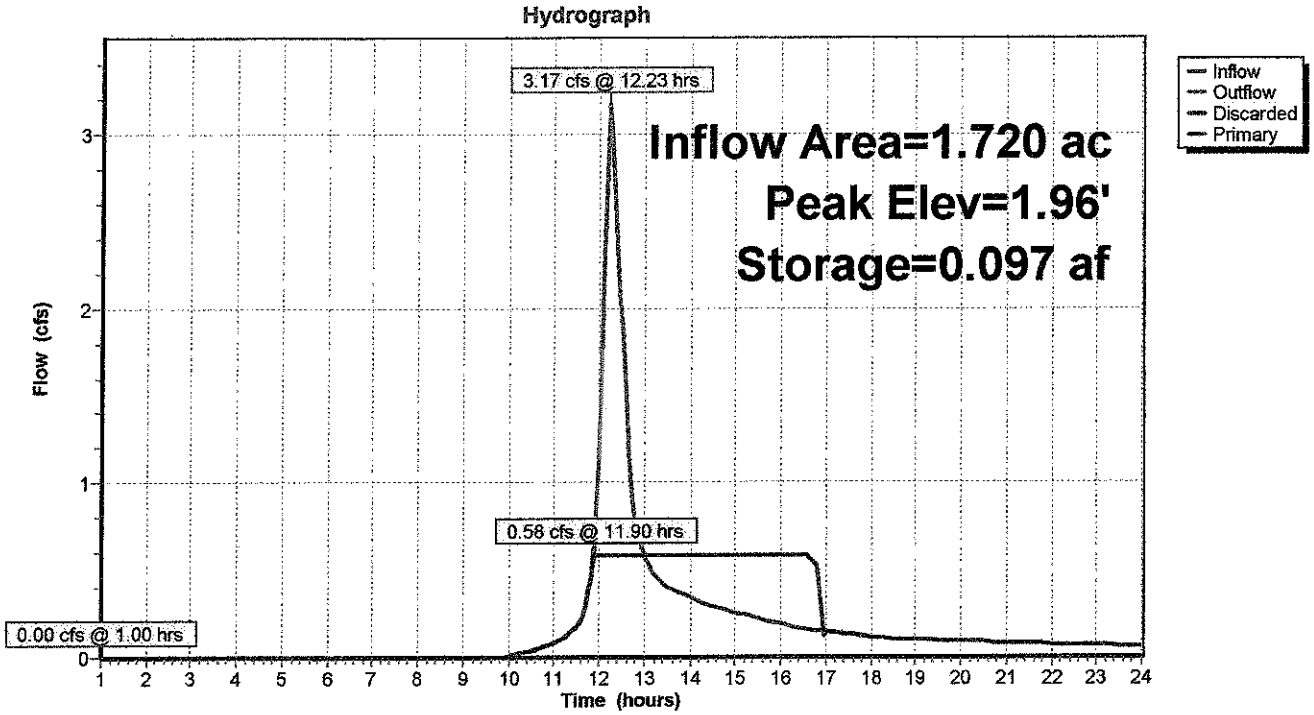
9,684.9 cf Field - 3,825.2 cf Chambers = 5,859.7 cf Stone x 40.0% Voids = 2,343.9 cf Stone Storage

Stone + Chamber Storage = 6,169.1 cf = 0.142 af

90 Chambers
358.7 cy Field
217.0 cy Stone



Pond 7P: Infiltration Basin

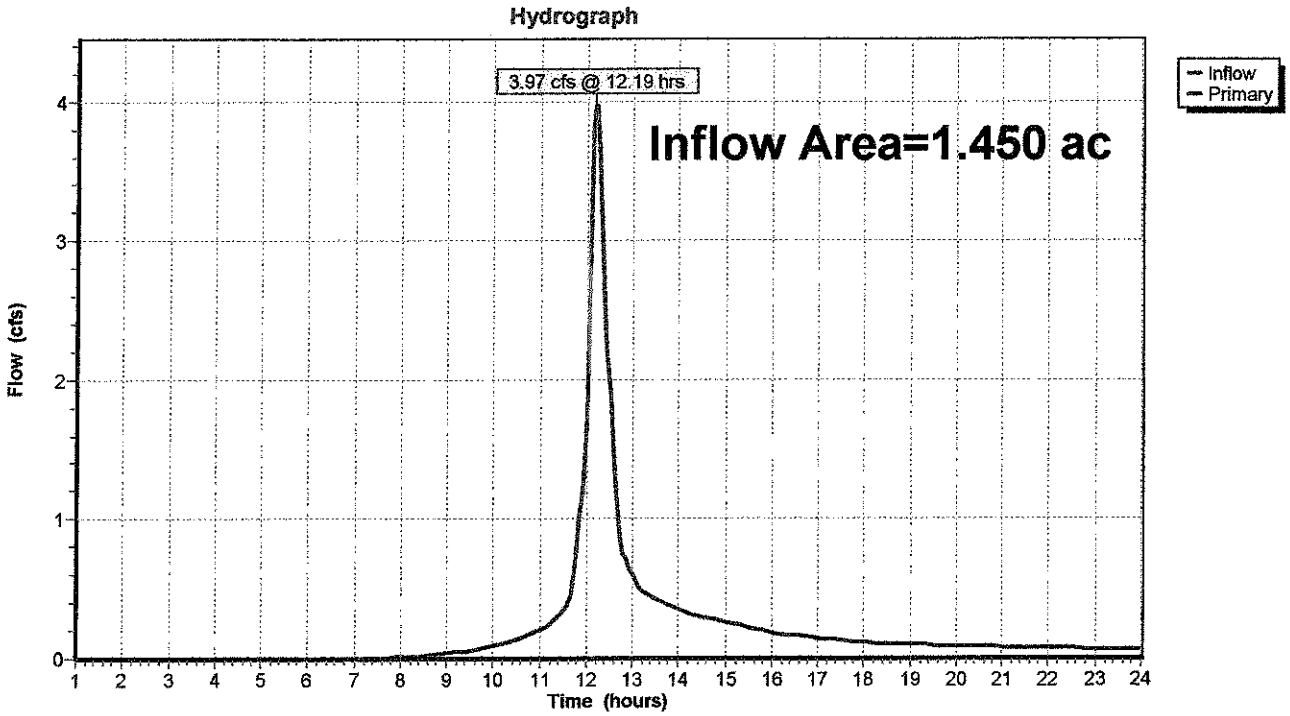


Summary for Link 5L: (new Link)

Inflow Area = 1.450 ac, 38.62% Impervious, Inflow Depth > 3.04" for 25-Year event
Inflow = 3.97 cfs @ 12.19 hrs, Volume= 0.367 af
Primary = 3.97 cfs @ 12.19 hrs, Volume= 0.367 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Link 5L: (new Link)

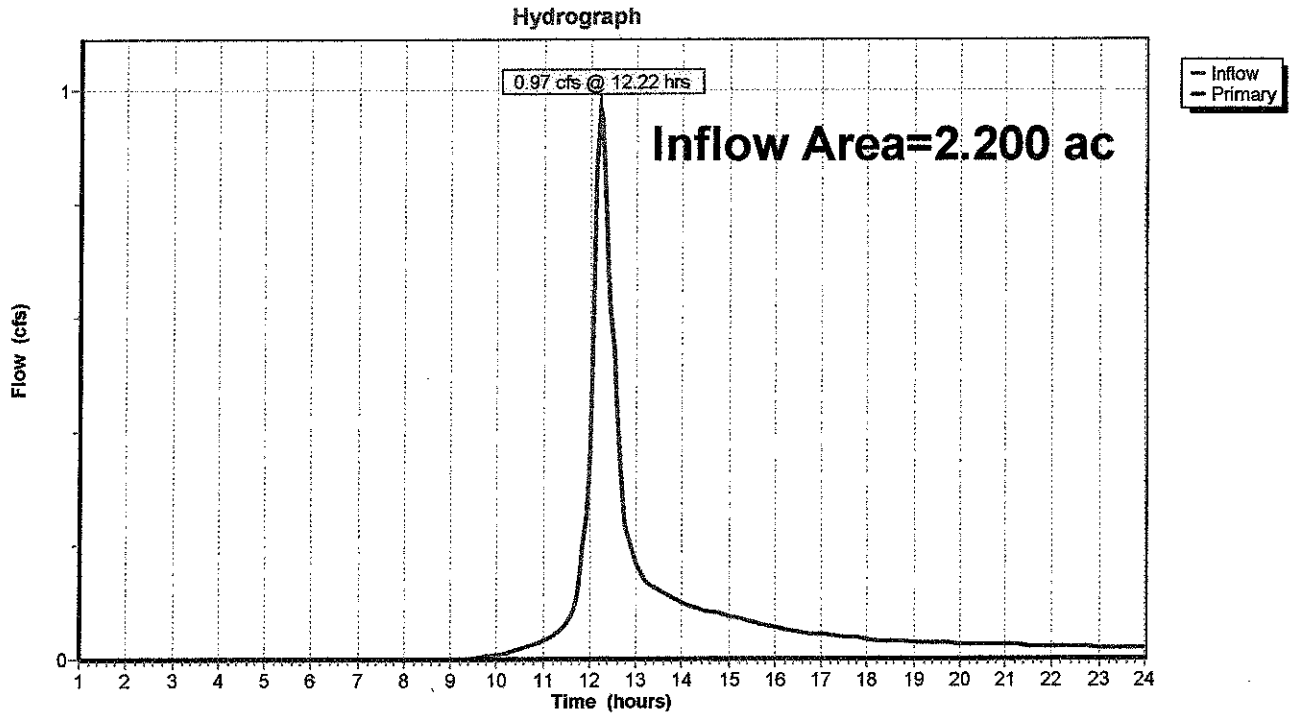


Summary for Link 6L: (new Link)

Inflow Area = 2.200 ac, 23.64% Impervious, Inflow Depth > 0.51" for 25-Year event
Inflow = 0.97 cfs @ 12.22 hrs, Volume= 0.094 af
Primary = 0.97 cfs @ 12.22 hrs, Volume= 0.094 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Link 6L: (new Link)



Summary for Subcatchment 1S: P 1

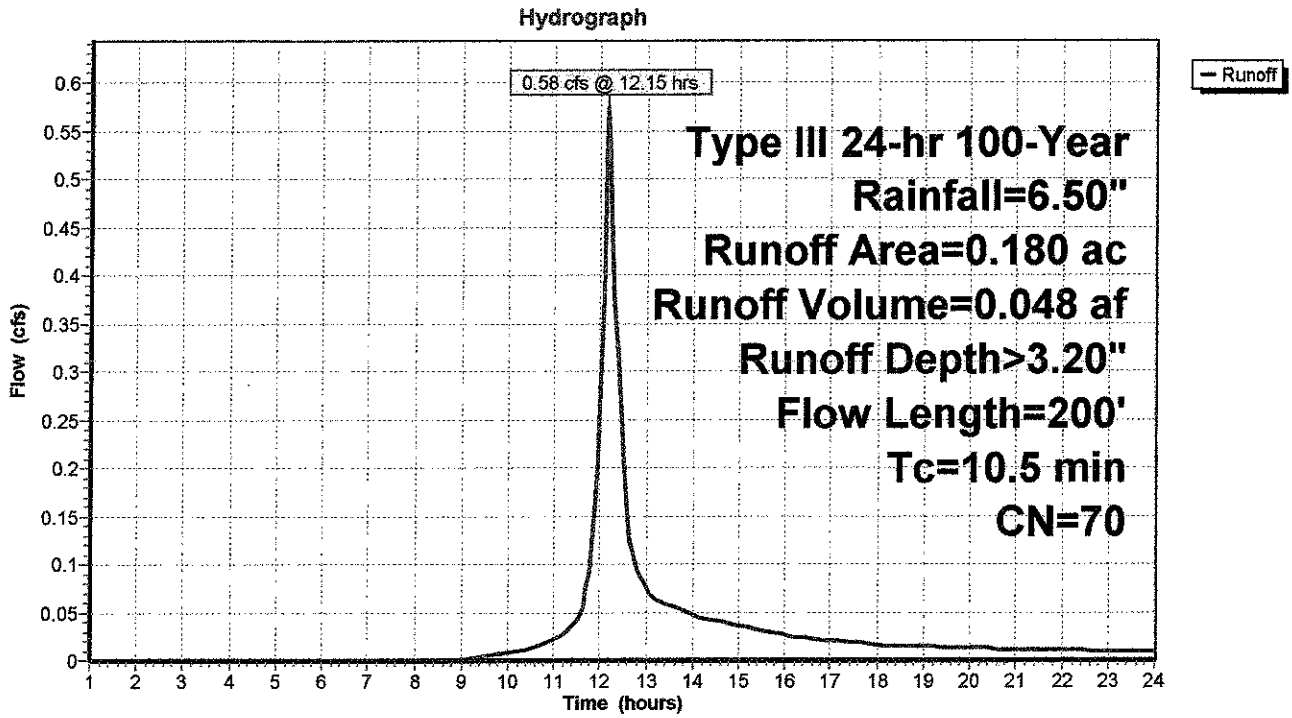
Runoff = 0.58 cfs @ 12.15 hrs, Volume= 0.048 af, Depth> 3.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (ac)	CN	Description
0.180	70	Woods, Good, HSG C
0.180		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.5	100	0.1600	0.18		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.10"
1.0	100	0.1100	1.66		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.5	200	Total			

Subcatchment 1S: P 1



Summary for Subcatchment 2S: P 2

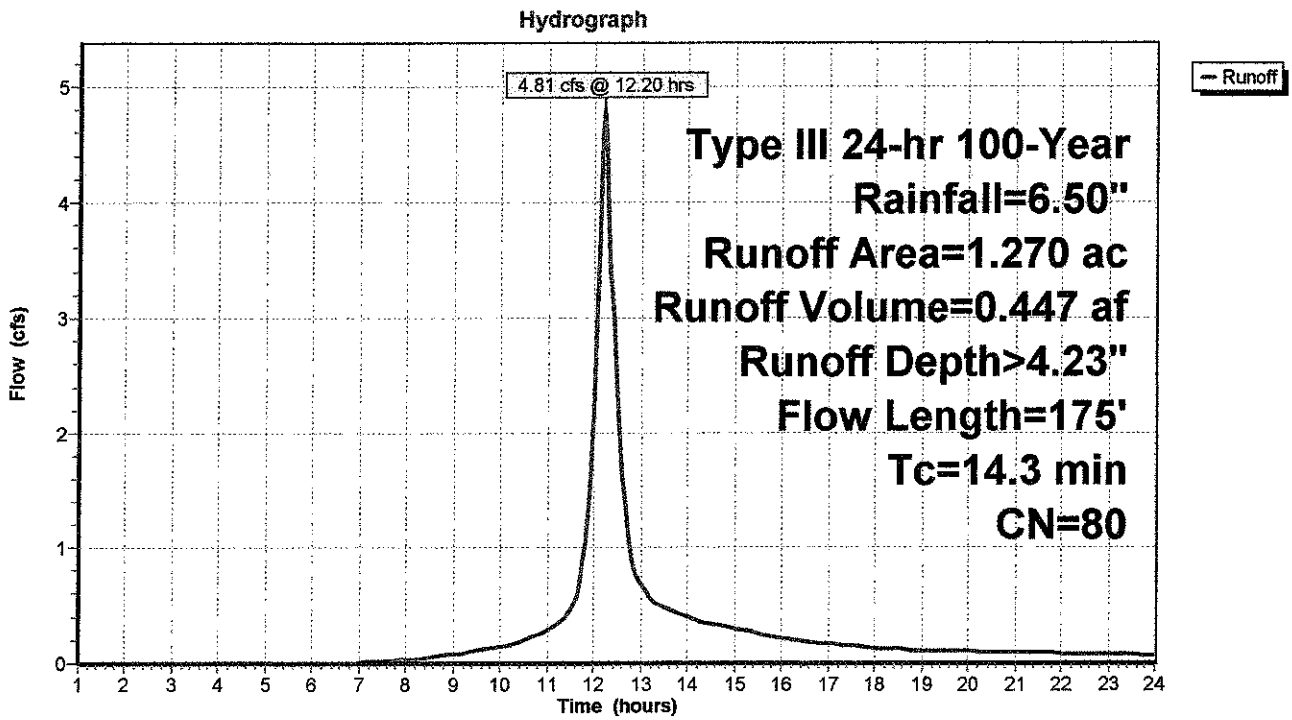
Runoff = 4.81 cfs @ 12.20 hrs, Volume= 0.447 af, Depth> 4.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (ac)	CN	Description
0.370	98	Paved parking, HSG B
0.360	61	>75% Grass cover, Good, HSG B
0.190	98	Paved parking, HSG C
0.140	74	>75% Grass cover, Good, HSG C
0.210	70	Woods, Good, HSG C
1.270	80	Weighted Average
0.710		55.91% Pervious Area
0.560		44.09% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
13.9	95	0.0200	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.4	80	0.0300	3.52		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
14.3	175	Total			

Subcatchment 2S: P 2



Summary for Subcatchment 3S: P 3

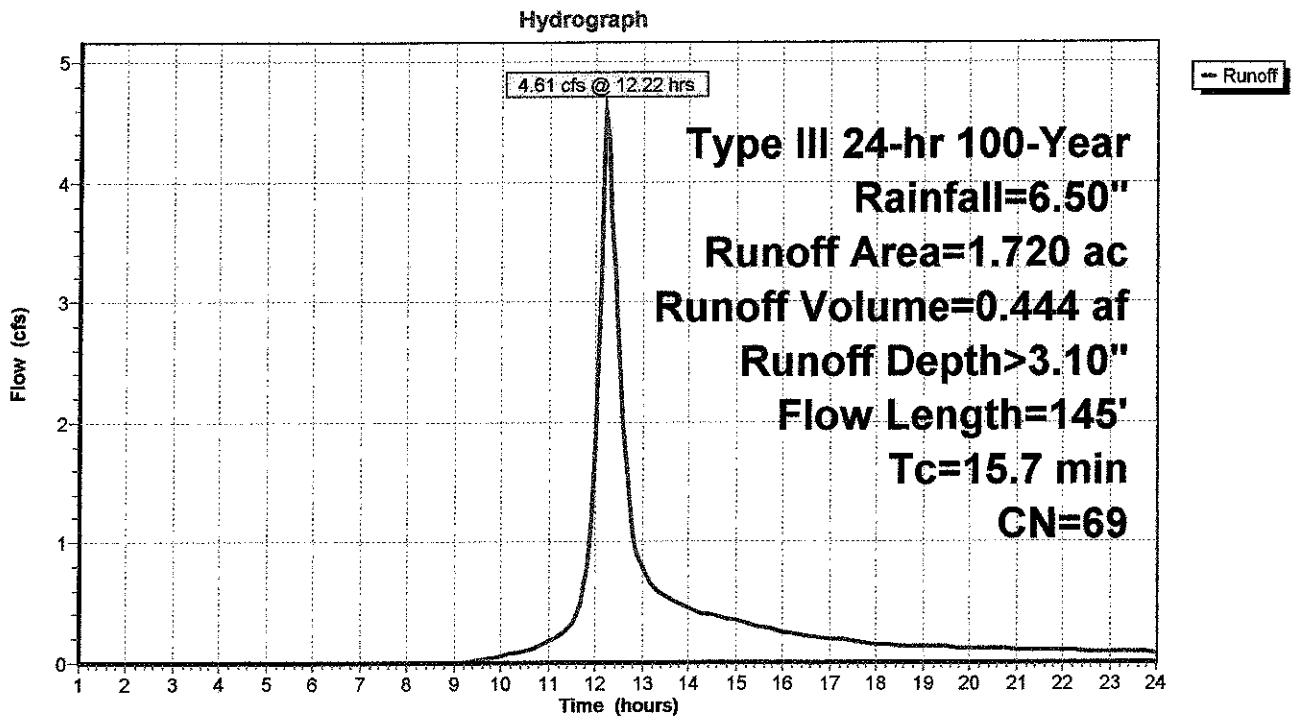
Runoff = 4.61 cfs @ 12.22 hrs, Volume= 0.444 af, Depth> 3.10"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (ac)	CN	Description
0.390	98	Paved parking, HSG B
1.330	61	>75% Grass cover, Good, HSG B
1.720	69	Weighted Average
1.330		77.33% Pervious Area
0.390		22.67% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	90	0.0140	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"
0.3	55	0.0200	2.87		**Shallow Concentrated Flow,** Paved Kv= 20.3 fps
15.7	145	Total			

Subcatchment 3S: P 3



Summary for Subcatchment 4S: P 4

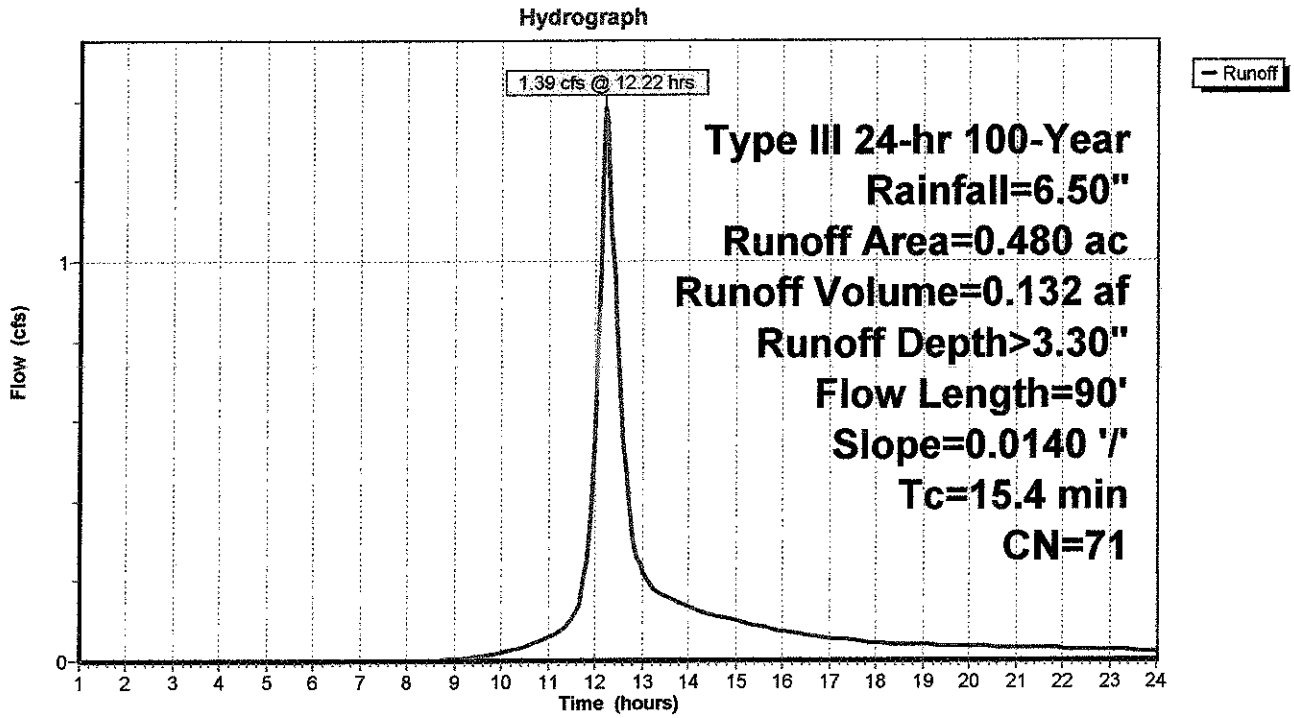
Runoff = 1.39 cfs @ 12.22 hrs, Volume= 0.132 af, Depth> 3.30"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.50"

Area (ac)	CN	Description
0.130	98	Paved parking, HSG B
0.350	61	>75% Grass cover, Good, HSG B
0.480	71	Weighted Average
0.350		72.92% Pervious Area
0.130		27.08% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.4	90	0.0140	0.10		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.10"

Subcatchment 4S: P 4



Summary for Pond 7P: Infiltration Basin

Inflow Area =	1.720 ac, 22.67% Impervious, Inflow Depth > 3.10" for 100-Year event				
Inflow =	4.61 cfs @	12.22 hrs,	Volume=	0.444 af	
Outflow =	1.54 cfs @	12.67 hrs,	Volume=	0.444 af,	Atten= 67%, Lag= 26.7 min
Discarded =	0.58 cfs @	11.75 hrs,	Volume=	0.394 af	
Primary =	0.96 cfs @	12.67 hrs,	Volume=	0.050 af	

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 3.07' @ 12.67 hrs Surf.Area= 0.069 ac Storage= 0.138 af

Plug-Flow detention time=69.7 min calculated for 0.443 af (100% of inflow)
Center-of-Mass det. time= 69.4 min (913.1 - 843.7)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.054 af	**23.58'W x 128.00'L x 3.21'H Field A** 0.222 af Overall - 0.088 af Embedded = 0.135 af x 40.0% Voids
#2A	0.50'	0.088 af	**Cultec R-280** x 90 Inside #1 Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap
		0.142 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	2.33'	**4.0" Vert. Orifice/Grate X 3.00** C= 0.600

Discarded OutFlow Max=0.58 cfs @ 11.75 hrs HW=0.03' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.58 cfs)

Primary OutFlow Max=0.95 cfs @ 12.67 hrs HW=3.07' (Free Discharge)
└**2=Orifice/Grate** (Orifice Controls 0.95 cfs @ 3.64 fps)

Pond 7P: Infiltration Basin - Chamber Wizard Field A

Chamber Model = Cultec R-280
Effective Size= 46.9"W x 26.0"H => 6.07 sf x 7.00'L = 42.5 cf
Overall Size= 47.0"W x 26.5"H x 8.00'L with 1.00' Overlap

47.0" Wide + 6.0" Spacing = 53.0" C-C

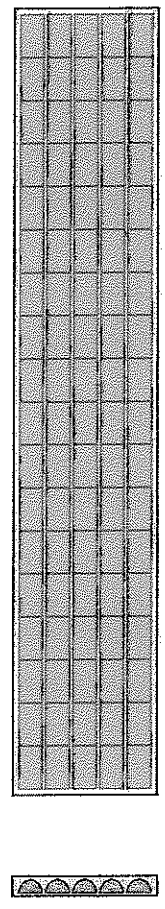
18 Chambers/Row x 7.00' Long = 126.00' + 12.0" End Stone x 2 = 128.00' Base Length
5 Rows x 47.0" Wide + 6.0" Spacing x 4 + 12.0" Side Stone x 2 = 23.58' Base Width
6.0" Base + 26.5" Chamber Height + 6.0" Cover = 3.21' Field Height

90 Chambers x 42.5 cf = 3,825.2 cf Chamber Storage

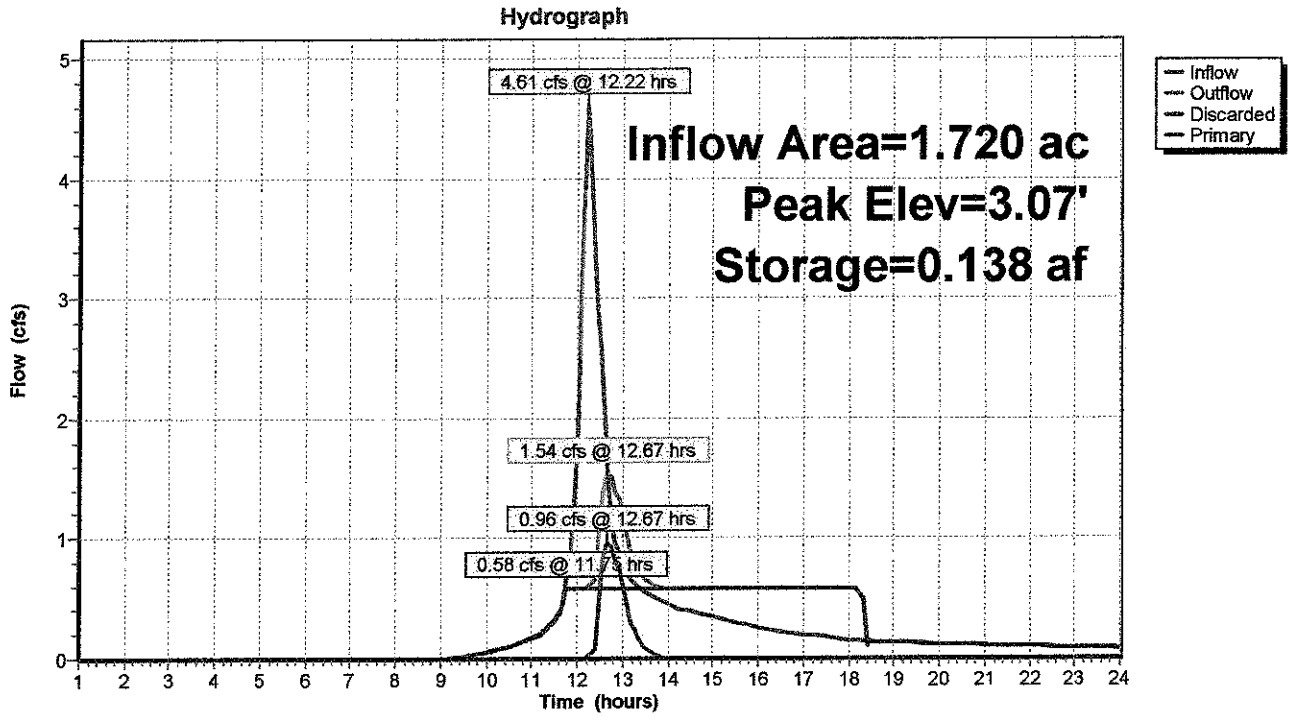
9,684.9 cf Field - 3,825.2 cf Chambers = 5,859.7 cf Stone x 40.0% Voids = 2,343.9 cf Stone Storage

Stone + Chamber Storage = 6,169.1 cf = 0.142 af

90 Chambers
358.7 cy Field
217.0 cy Stone



Pond 7P: Infiltration Basin

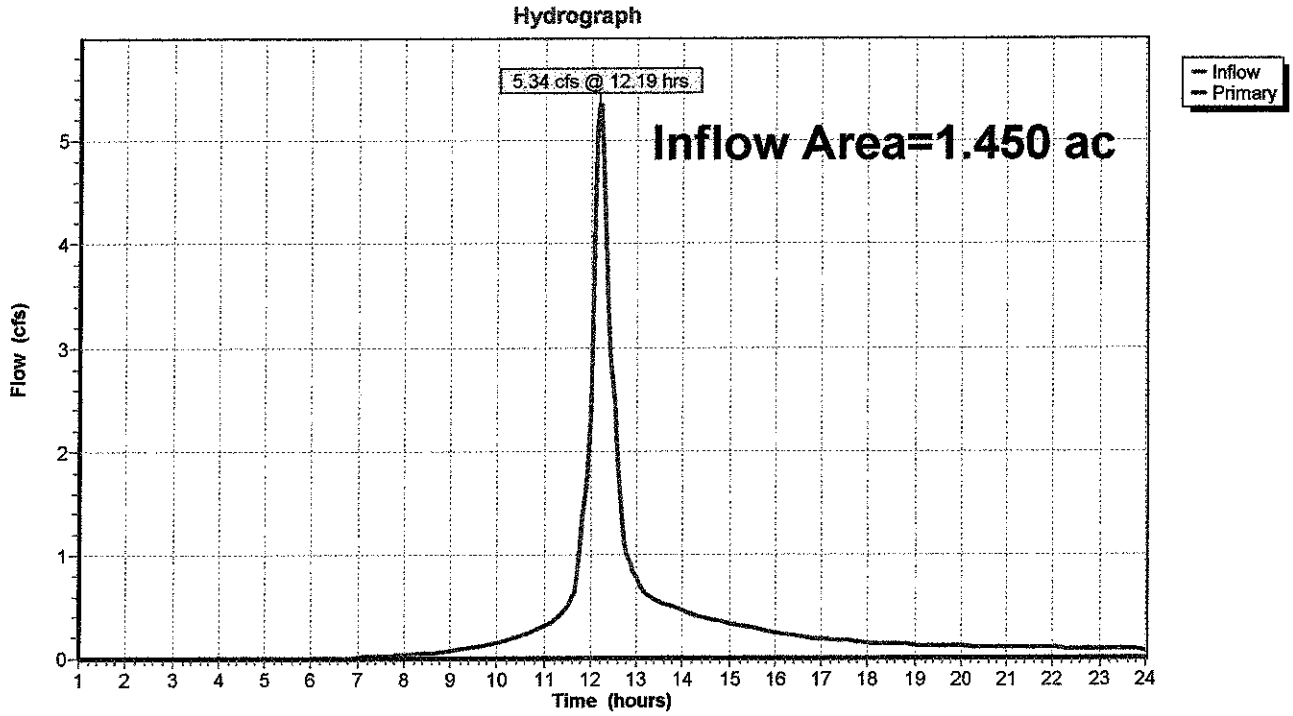


Summary for Link 5L: (new Link)

Inflow Area = 1.450 ac, 38.62% Impervious, Inflow Depth > 4.10" for 100-Year event
Inflow = 5.34 cfs @ 12.19 hrs, Volume= 0.495 af
Primary = 5.34 cfs @ 12.19 hrs, Volume= 0.495 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Link 5L: (new Link)

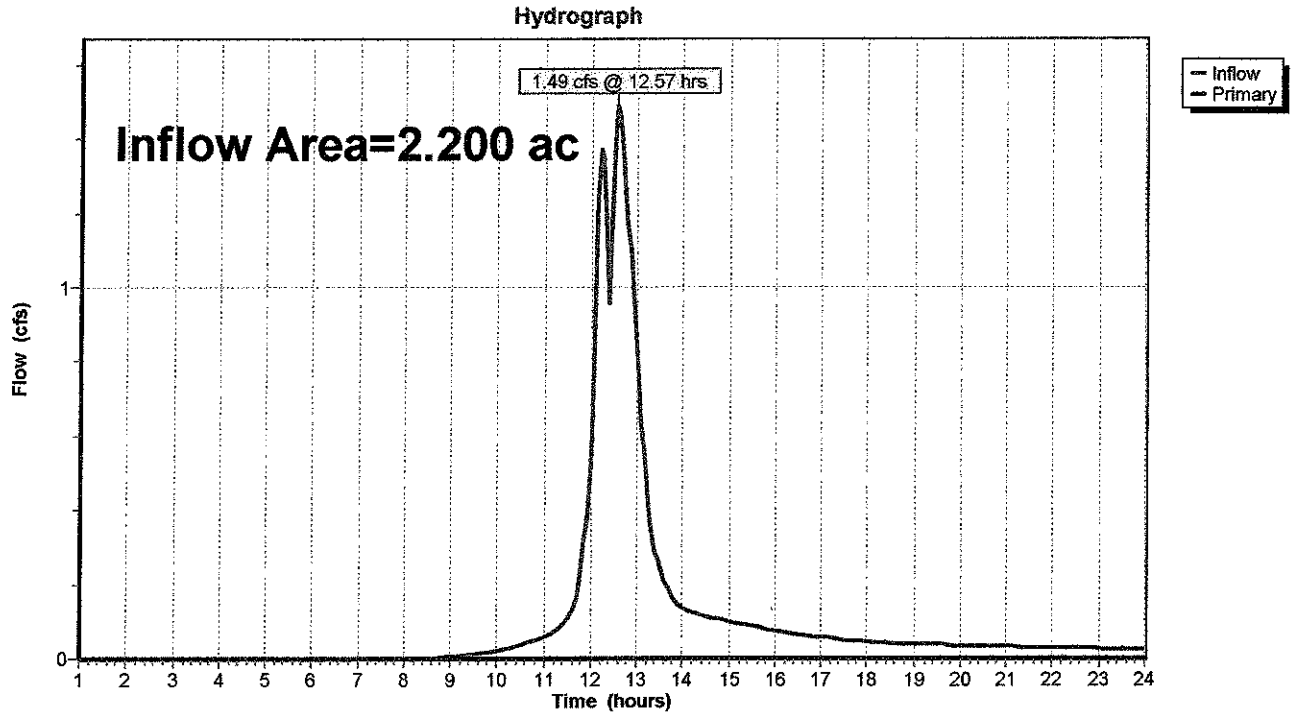


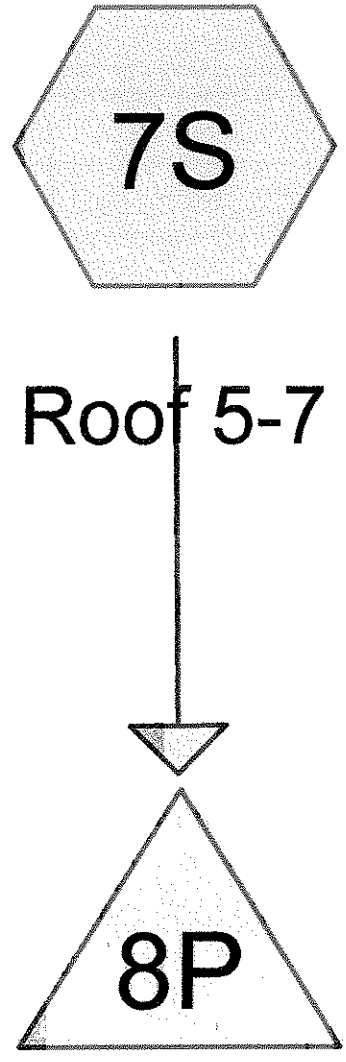
Summary for Link 6L: (new Link)

Inflow Area = 2.200 ac, 23.64% Impervious, Inflow Depth > 0.99" for 100-Year event
Inflow = 1.49 cfs @ 12.57 hrs, Volume= 0.182 af
Primary = 1.49 cfs @ 12.57 hrs, Volume= 0.182 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs

Link 6L: (new Link)





(new Pond)

LOTS 5-7

INFILTRATION

Subcat Reach Pond Link

Drainage Diagram for Post Office Square ~~Predevelopment~~
Prepared by Eastern Land Survey, Printed 11/12/2012
HydroCAD® 9.10 s/n 06709 © 2010 HydroCAD Software Solutions LLC

Time span=1.00-24.00 hrs, dt=0.05 hrs, 461 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 7S: Roof 5-7 Runoff Area=1,100 sf 100.00% Impervious Runoff Depth>2.87"
Tc=5.0 min CN=98 Runoff=0.08 cfs 0.006 af

Pond 8P: (new Pond) Peak Elev=1.70' Storage=0.002 af Inflow=0.08 cfs 0.006 af
Outflow=0.01 cfs 0.006 af

Total Runoff Area = 0.025 ac Runoff Volume = 0.006 af Average Runoff Depth = 2.87"
0.00% Pervious = 0.000 ac 100.00% Impervious = 0.025 ac

Summary for Subcatchment 7S: Roof 5-7

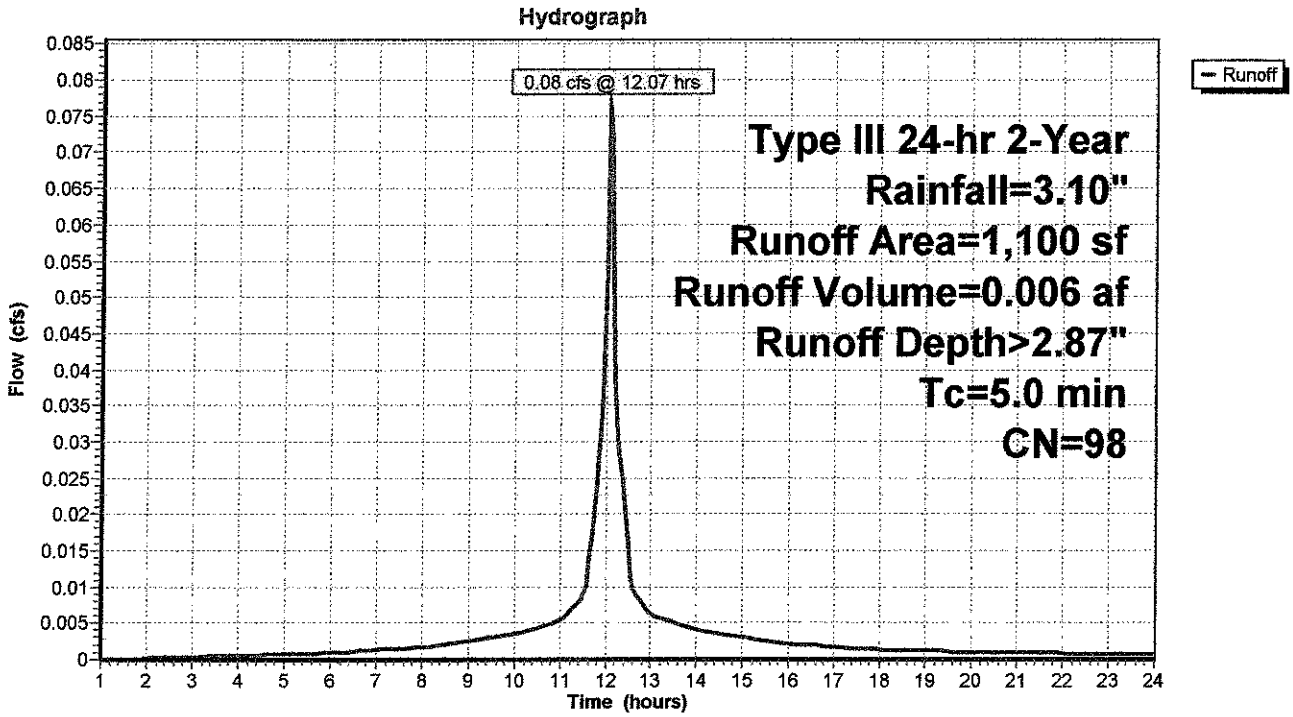
Runoff = 0.08 cfs @ 12.07 hrs, Volume= 0.006 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 2-Year Rainfall=3.10"

	Area (sf)	CN	Description
*	1,100	98	
	1,100		100.00% Impervious Area

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

Subcatchment 7S: Roof 5-7



Summary for Pond 8P: (new Pond)

Inflow Area =	0.025 ac,100.00% Impervious, Inflow Depth > 2.87" for 2-Year event			
Inflow =	0.08 cfs @ 12.07 hrs, Volume=	0.006 af		
Outflow =	0.01 cfs @ 11.00 hrs, Volume=	0.006 af, Atten= 93%, Lag= 0.0 min		
Discarded =	0.01 cfs @ 11.00 hrs, Volume=	0.006 af		

Routing by Stor-Ind method, Time Span= 1.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 1.70' @ 13.34 hrs Surf.Area= 0.003 ac Storage= 0.002 af

Plug-Flow detention time= 151.1 min calculated for 0.006 af (100% of inflow)
Center-of-Mass det. time= 150.8 min (906.6 - 755.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	0.00'	0.002 af	**4.83'W x 23.36'L x 2.33'H Field A** 0.006 af Overall - 0.001 af Embedded = 0.005 af x 40.0% Voids
#2A	0.50'	0.001 af	**StormTech SC-310** x 3 Inside #1 Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap
		0.003 af	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	0.00'	**2.000 in/hr Exfiltration over Surface area**

Discarded OutFlow Max=0.01 cfs @ 11.00 hrs HW=0.02' (Free Discharge)
↑—**1=Exfiltration** (Exfiltration Controls 0.01 cfs)

Pond 8P: (new Pond) - Chamber Wizard Field A

Chamber Model = StormTech SC-310
Effective Size= 28.9"W x 16.0"H => 2.07 sf x 7.12'L = 14.7 cf
Overall Size= 34.0"W x 16.0"H x 7.56'L with 0.44' Overlap

34.0" Wide + 6.0" Spacing = 40.0" C-C

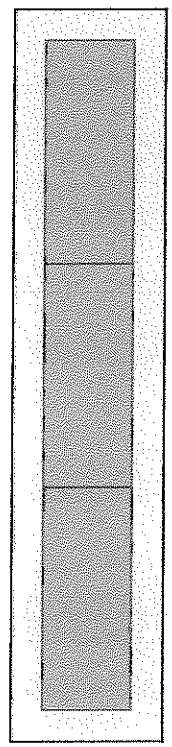
3 Chambers/Row x 7.12' Long = 21.36' + 12.0" End Stone x 2 = 23.36' Base Length
1 Rows x 34.0" Wide + 12.0" Side Stone x 2 = 4.83' Base Width
6.0" Base + 16.0" Chamber Height + 6.0" Cover = 2.33' Field Height

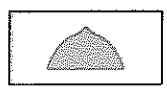
3 Chambers x 14.7 cf = 44.2 cf Chamber Storage

263.4 cf Field - 44.2 cf Chambers = 219.2 cf Stone x 40.0% Voids = 87.7 cf Stone Storage

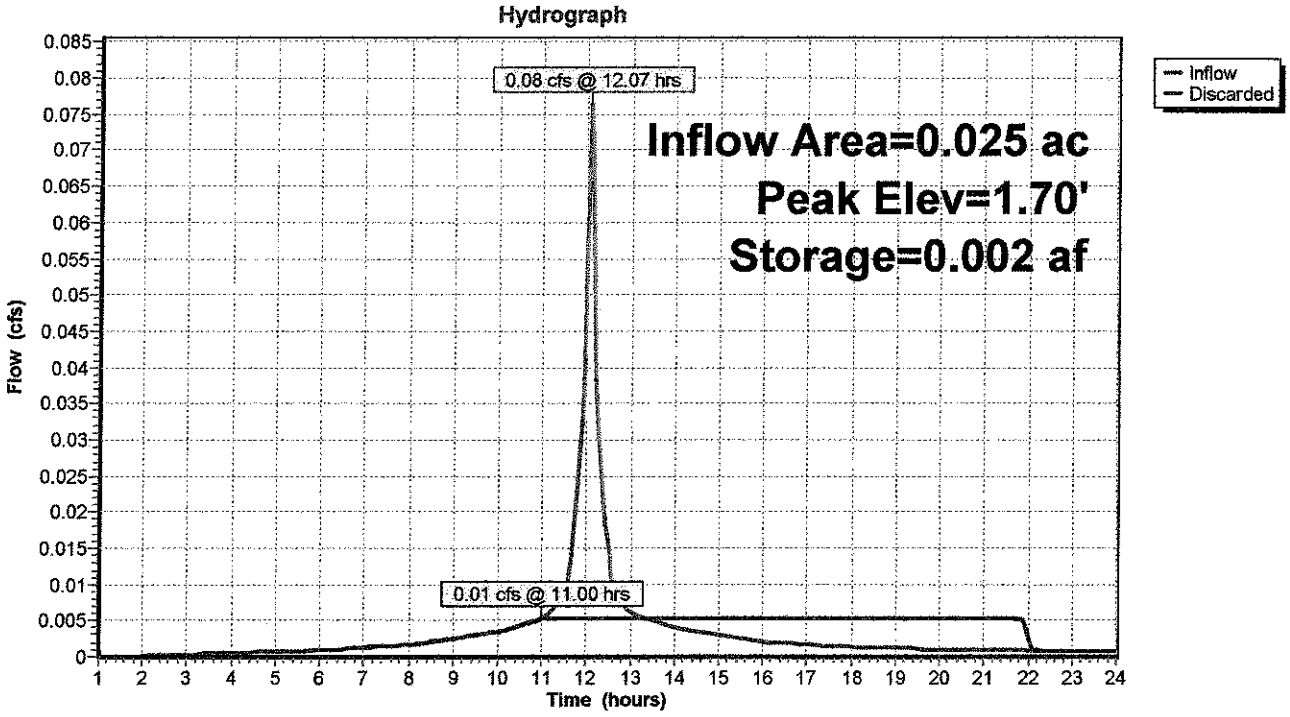
Stone + Chamber Storage = 131.9 cf = 0.003 af

3 Chambers
9.8 cy Field
8.1 cy Stone





Pond 8P: (new Pond)



TOTAL SUSPENDED SOLIDS REMOVAL

INSTRUCTIONS:

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

Location: FRONT COLLECTION SYSTEM

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
DEEP SUMP CATCH BASIN	0.25	1.00	0.25	0.75
STORMCEPTOR (SEE PGS 2-3)	0.89	0.75	.6675	.0825

Total TSS Removal = .9178 (92%)

Project: P.O. CROSSING.
Prepared By: JHM
Date: 10/2012

*Equals remaining load from which enters the BMP

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

Mass. Dept. of Environmental Protection

Stormceptor®

Stormceptor Design Summary

PCSWMM for Stormceptor

Project Information

Date	11/7/2012
Project Name	Post Office Square - Acton
Project Number	N/A
Location	Front Collection System

Designer Information

Company	Eastern Land Survey
Contact	J H MacDowell

Notes

N/A

Drainage Area

Total Area (ac)	1.45
Imperviousness (%)	39

The Stormceptor System model STC 450i achieves the water quality objective removing 82% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

Name	WORCESTER WSO AP
State	MA
ID	9923
Years of Records	1948 to 2005
Latitude	42°16'2"N
Longitude	71°52'34"W

Water Quality Objective

TSS Removal (%)	80

Upstream Storage

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

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 450i	82
STC 900	89
STC 1200	89
STC 1800	89
STC 2400	91
STC 3600	92
STC 4800	94
STC 6000	94
STC 7200	95
STC 11000	97
STC 13000	97
STC 16000	97

Rinker MATERIALS™

Stormceptor®

Particle Size Distribution

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

Fine (organics, silts and sand)

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

Stormceptor Design Notes

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

Inlet and Outlet Pipe Invert Elevations Differences

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

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

Rinker MATERIALS™

INSTRUCTIONS:

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2. The calculations must be completed using the Column Headings specified in Chart and Not the Excel Column Headings
3. To complete Chart Column D, multiple Column B value within Row x Column C value within Row
4. To complete Chart Column E value, subtract Column D value within Row from Column C within Row
5. Total TSS Removal = Sum All Values in Column D

Location: Cul De Sac Collection System

TSS Removal Calculation Worksheet

A BMP[1]	B TSS Removal Rate[1]	C Starting TSS Load*	D Amount Removed (B*C)	E Remaining Load (C-D)
Deep Sump Catch Basin	0.25	1.00	0.25	0.75
Stormceptor (See Pages 5-6)	0.91	0.75	0.68	0.07
Infiltration Basin	0.80	0.07	0.06	0.01

Total TSS Removal = 99%

Project: P.O. Crossing
Prepared By: JHM
Date: 10/2012

*Equals remaining load from which enters the BMP

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

Stormceptor®

Stormceptor Design Summary

PCSWMM for Stormceptor

Project Information

Date	11/7/2012
Project Name	Post Office Crossing Acton
Project Number	N/A
Location	Cul de Sac Collection System

Designer Information

Company	ELSAI
Contact	JMM

Notes

N/A

Drainage Area

Total Area (ac)	1.72
Imperviousness (%)	23

The Stormceptor System model STC 450i achieves the water quality objective removing 85% TSS for a Fine (organics, silts and sand) particle size distribution.

Rainfall

Name	WORCESTER WSO AP
State	MA
ID	9923
Years of Records	1948 to 2005
Latitude	42°16'2"N
Longitude	71°52'34"W

Water Quality Objective

TSS Removal (%)	80

Upstream Storage

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

Stormceptor Sizing Summary

Stormceptor Model	TSS Removal %
STC 450i	85
STC 900	91
STC 1200	91
STC 1800	91
STC 2400	93
STC 3600	94
STC 4800	95
STC 6000	95
STC 7200	96
STC 11000	97
STC 13000	97
STC 16000	98

Rinker MATERIALS™

Stormceptor®

Particle Size Distribution

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

Fine (organics, silts and sand)

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

Stormceptor Design Notes

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

Inlet and Outlet Pipe Invert Elevations Differences

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

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

Rinker MATERIALS™

PIPE DRAINAGE FACILITIES ANAYLSIS

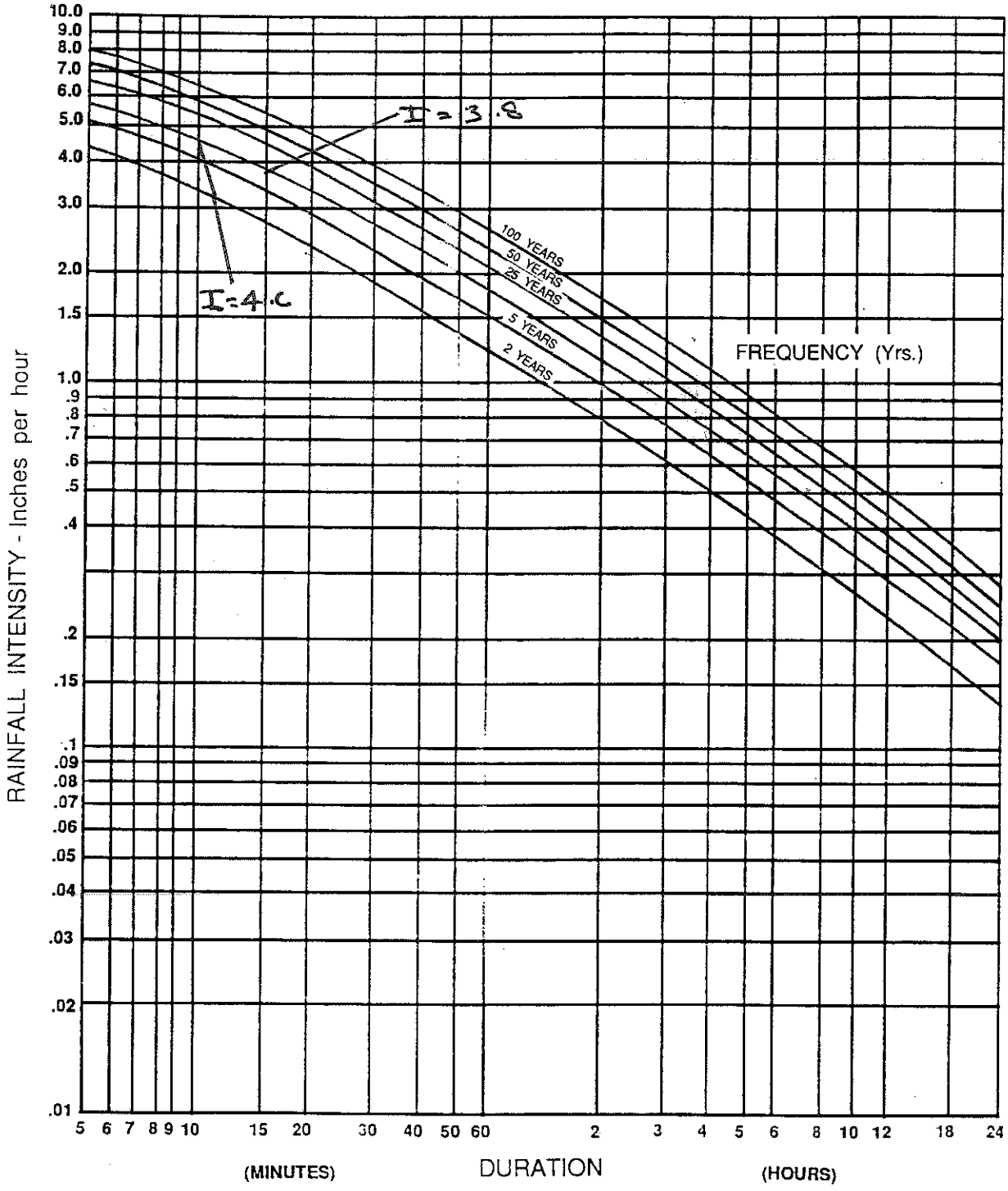

Figure 10-6. Intensity — Duration — Frequency Curve for Worcester, MA

EASTERN LAND SURVEY ASSOCIATES, INC.
Christopher R. Mello PLS
104 Lowell Street
PEABODY, MA 01960
(~~508~~) 531-8121
978

JOB: Post Office Crossing - Action
SHEET NO. 1 OF
CALCULATED BY: JHM DATE: 10/2012
CHECKED BY: DATE:
SCALE

LOCATION
DESIGN STORM: 10 year
MANNING "n": 0.012 for HDPE Drain

STORM DRAINAGE COMPUTATIONS
Based upon Rational Formula
Q = CiA

HYDRAULIC COMPUTATION	ACTUAL VELOCITY	FPS										
	FULL VELOCITY	FPS	5.77	3.47	5.10		9.11	6.44	4.99			
	CAPACITY	CFS	4.53	2.73	6.26		14.09	11.38	8.81			
	PIPE DIAMETER	In.	12	12	15		18	18	18			
	SLOPE	%	1.38	0.50	0.80		2	1	0.6			
PEAK RUNOFF COMPUTATION	RUNOFF Q	CFS	1.95	1.95	2.76		2.8	2.68	2.68			
	INTENSITY i	In./Hr.	4.6	4.6	3.8		3.8					
	INLET CONCENTRATION TIME	Minutes	10	10	15		15					
	RUNOFF COEFFICIENT		.59	.59	.54		.41					
	TOTAL AREA A	Acres	0.72	0.72	1.27		1.72					
	INCREMENTAL AREA	Acres	0.72	—	0.55		1.72					
	MANHOLE to MANHOLE		1+90 to 1+35	1+35 to 0+03	0+03 to Stormceptor		3+80 to 0+90	0+90 to 1+95	to 2+90			

PRODUCT 204-1 (Single Sheets) 205-1 (Padded) Rubbermaid Inc., Groton, Mass. 01471. To Order PHONE TOLL FREE 1-800-225-6380

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JOB Post Office Crossing - Acton
SHEET NO. ____ OF ____
CALCULATED BY ____ DATE ____
CHECKED BY ____ DATE ____
SCALE ____

Runoff Coefficient Computations

1. Assumed 'C' Values
   Impervious - .95
   Wooded - .20
   Lawns - .25

2. Area to DMH Station 1+90 (.72 Ac)
   Impervious - .35 Ac Wooded - .1 Ac Lawns - .27 Ac

$$C = \frac{.35 \times .95 + .1 \times .2 + .27 \times .25}{.72} = .583, \text{ Use } .59$$

3. Area to DMH 0+03 (1.27 Ac)

   Impervious .56 Ac Wooded .21 Ac Lawns .5 Ac

$$C = \frac{.56 \times .95 + .21 \times .2 + .57 \times .25}{1.27} = .56$$

4. Area to DMH 3+80 (1.72 Ac)

   Impervious: 0.39 Ac. Lawns 1.33 Ac.

$$C = \frac{.39 \times .95 + 1.33 \times .25}{1.72} = .41$$

rainage Pipe Capacities

Post Office Crossing - Acton, Ma.

Sewer Pipes -- English Units

Civil Tools for Windows
(11-07-2012, 09:56:38)

Flowrate (cfs)	Diameter (in)	Friction ()	Slope (%)	Velocity (fps)
4.53	12.00	0.012	1.38	5.77
2.73	12.00	0.012	0.50	3.47
6.26	15.00	0.012	0.80	5.10
16.09	18.00	0.012	2.00	9.11
11.38	18.00	0.012	1.00	6.44
8.81	18.00	0.012	0.60	4.99

SECTION 3

OPERATION AND MAINTENANCE PLAN

OPERATION AND MAINTENANCE PLAN
PROPOSED STORMWATER MANAGEMENT FACILITIES

POST OFFICE CROSSING
ACTON, MASSACHUSETTS

OCTOBER, 2012

The following Operations and Maintenance Plan ("O&M") has been prepared to ensure that proposed systems function as designed. The O & M plan includes a maintenance schedule to ensure that structural and non-structural components are implemented properly and identifies the responsible parties.

A brief summary of the specific BMP's to be implemented at the site are as follows:

Non-Structural Methods

Source Control

A comprehensive source control program will be implemented at the site which includes regular pavement sweeping, catch basin cleaning, Stormceptor cleaning and maintenance of infiltration facilities.

Spill Prevention

A spill prevention plan that includes an emergency notification plan and cleanup program will be developed as part of the National Pollution Discharge Elimination System (NPDES) Construction General Permit. At a minimum the following good housekeeping practices will be followed on-site during construction:

1. An effort will be made to store only enough product required to do the job.

2. All materials stored on-site will be kept in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.

Structural Methods

A. Deep Sump Catch Basins

1. During Construction

a. Protect catch basins grates with hay bale check dams or silt sacks until base paving course is installed and landscaped areas are stabilized and/or vegetated.

b. Inspect basins weekly or following rainstorms of greater than one-half inch in 24 hours and clean when sediment levels are greater than twelve inches.

2. Long Term

a. Inspect basins monthly and clean as necessary, but at least twice annually.

B. Stormceptor Unit

1. Maintain in accordance with Manufacturer's recommendations (copy follows). The Stormceptor Unit shall be inspected at least four times annually and after any spill event. The unit shall be maintained annually and immediately following any spill event.

C. Snow Removal

Snow removal and/or storage shall be conducted in accordance with the Massachusetts DEP, Resource Protection Snow Disposal Guidance, effective March 1, 2001. Snow shall not be stockpiled on top of catch basins and shall not be dumped or pushed into resource areas or no disturbance areas.

D. Erosion Control Procedures

1. Staked hay bales, silt fence, temporary diversion swales and sediment basins shall be installed in accordance with this plan or as otherwise directed by the project engineer prior to commencement of construction activities. 20 additional hay bales and 100 ft. of silt fence shall be kept on site for repairs or other erosion control needs. The contractor shall inspect erosion control facilities weekly and after every rainfall event to confirm that same are properly functioning. Any deficiencies in the erosion control facilities shall be corrected immediately.

2. All soil stockpiles shall be protected against erosion utilizing erosion control barriers and/or crushed stone filter dikes.

3. Catch basins shall be protected with filters, as shown on the plan, until no sediment transport is visible during rainfall events. Filters shall be inspected weekly and maintained as necessary.

4. Temporary erosion control measures to be taken during construction shall conform with the "Massachusetts Erosion and Sediment Control Guidelines, Urban and Suburban Areas" dated March 1997, and may include some or all of the following measures:
   - Temporary seeding
   - Temporary mulching (straw)
   - Permanent seeding
   - Hydroseeding
   - Sodding
   - Placement of hay or jute netting during winter months
   - Temporary stabilization shall be accomplished in any disturbed area where activity is to cease for more than 14 days

5. Debris and/or litter shall be removed from the site on a weekly basis.

6. If dust is generated during construction, it shall be controlled by use of water trucks, sprinkling or temporary stabilization methods.

7. At the completion of the project, all disturbed areas shall be permanently stabilized with loam and seed or other ground cover. All stormwater BMP's shall be inspected and cleaned as necessary. Paved areas shall be swept.

E. Infiltration Basin

1. During Construction

   a. Before the development site is graded, the area of the infiltration basin should be roped off to prevent heavy equipment from compacting the underlying soils.

   b. The infiltration basin shall not be used as a temporary sediment trap during construction.

   c. The infiltration basin shall not be constructed until the entire contributing drainage area has been stabilized or silt fence constructed between the basin and upstream areas.

d. During and after excavation, all excavated materials should be placed away from the infiltration basin to prevent redeposition during runoff events. All excavated materials should be properly handled and disposed, during and after construction.

e. Light earth-moving equipment should be used to excavate the infiltration basins. The floor should be deeply tilled with a rotary tiller or a disc harrow to restore infiltration rates after final grading.

2. Long Term

a. The infiltration basin should be inspected after every major storm for the first few months after construction to ensure proper stabilization and function. Thereafter, the basin should be inspected at least four times annually.

b. If water is observed in the basin for longer than 24 hours following a storm event, it is likely that the basin will need to be replaced.

F. Long Term Pollution Prevention Plan

1. Good Housekeeping

a. Inspect the site weekly, pickup and properly dispose of any trash, debris or branches;

b. Compost all landscape waste in an appropriate container or remove from the site to an approved waste area;

c. Inspect paved areas for any signs of oil drippings and apply an absorbent agent to such immediately;

d. Vacuum sweep paved areas of site at least two times annually

e. In any dewatering or drawdown activities during the project, water shall not be directly released into any resource area or storm drainage system tributary to a resource area. Water from dewatering activities shall make use of Dirt Bag® or similar device to remove sediment before the water is released.

2. Storage of Waste Materials
   Store any waste materials or recyclables in covered containers or a covered dumpster and remove such materials from the site on a regular basis, but in no case less often than weekly.

3. Vehicle Washing
   No vehicle washing is to be done on site other than hand washing of vehicles owned by occupants of the residences.

4. Inspect and maintain stormwater best management practices in accordance with Sections A, B and E of this Operation and Maintenance Plan.

5. Spill Prevention and Response:
   A spill prevention and response plan will be included in the NPDES SWPPP.

6. Maintenance of landscaped areas shall be done utilizing off-site personnel: Use of herbicides and pesticides shall be minimized. Low nitrogen fertilizers will be used. Landscape maintenance supplies are not to be stored on site, except during actual landscape construction.

7. Any observed pet waste will be cleaned up immediately and disposed of with regular site trash.

8. Snow management shall be in accordance with Section C of the Operation and Maintenance Plan.

G. Notification of Future Property Owners as to Requirements for Maintenance of Stormwater System

A deed restriction will be placed on any conveyance of all homes within the subject property referencing the requirements of this plan.

H. Plan

The proposed storm drainage BMP's are shown on Sheets 5, 6 and 8 of the Site Development Permit Plan. An as-built plan will be provided upon completion of site and utility work.

I. Operation and Maintenance Budget

An operation and maintenance budget will be provided prior to the time of the first home conveyance.

J. Illicit Discharges

The following measures are proposed to prevent illicit discharges from the proposed dwellings.

1. Storm Drain (catch basin) stenciling indicating that flow is tributary to public water supply.

The site plan is as referenced to in Section I of this document.
There are no known illicit discharges from the site in its existing condition.

The party responsible for Operation and Maintenance of the Stormwater Management Facilities is:

Philip Singleton
c/o Attorney John R. Keilty
40 Lowell Street
Peabody, MA 01960
978-531-7900

Or its heirs and assigns

GROUNDWATER RECHARGE ANALYSIS

EASTERN LAND SURVEY ASSOCIATES, INC.
Christopher R. Mello PLS
104 Lowell Street
PEABODY, MA 01960
(978) 531-8121

JOB Post Office Crossing - Acton
SHEET NO. 1 OF
CALCULATED BY HM DATE 11/12/2012
CHECKED BY DATE
SCALE

GROUNDWATER RECHARGE CALCULATIONS.

METHODOLOGY FOLLOW DEP STORMWATER MANAGEMENT GUIDELINES

1. REQUIRED RECHARGE VOLUMES: FOR NEW IMPERVIOUS COVERAGES.

HYDROLOGIC SOIL GROUP C $\frac{.25''}{12''/FT} \times .19\ ac \times 43{,}560\ SF/ac.$

= 172 CF.

HYDROLOGIC SOIL GROUP B $\frac{.35''}{12''/FT} \times .89\ ac \times 43{,}560\ SF/ac$

= 1130 CF

TOTAL REQUIRED RECHARGE VOLUME = 1302 CF

2. ADJUSTED VOLUME

OF THE 1.08 ACRES OF IMPERVIOUS COVERAGE ON SITE, 0.52 ACRES DRAINS TOWARD THE RECHARGE BED.

ADJUSTMENT FACTOR = 1.08 / 0.52 = 2.08.

REQ'D RECHARGE VOLUME = 1302 X 2.08 = 2704 CF

3. PROVIDED VOLUME IN RECHARGE BASIN

= 6565 CF OK.

COMMONWEALTH OF MASSACHUSETTS

ACTON, MASSACHUSETTS

SOIL SUITABILITY ASSESSMENT FOR ON-SITE SUBSURFACE SEWAGE DISPOSAL& DRAINAGE

SITE INFORMATION

Street Address: 6 Post Office Square

City/Town: Acton

State: Massachusetts Zip Code: 01718

Land Use: Commercial

PUBLISHED SOIL DATA

Soil map unit: 422B: Canton fine sandy loam, 3-8% slopes & 653: Udorthents, sandy

NRCS/USDA web soil survey: Middlesex County, Massachusetts. Map Scale: 1: 313'

Soil hydric or upland: Upland Average depth to water table: >80" Depth to restrictive feature: > depth of test holes

Frequency of flooding: None Frequency of ponding: None Available water capacity: Low (~5.2")

Drainage Class: Well drained Hydrologic Soil Group: B Ksat: High (2.00 – 6.00 in/hr)

Soil limitations: Loose unstable matrix, very stony, deep seasonal high groundwater table, moderate permeability.

WETLAND AREA & USGS WELL MEASUREMENTS

National Wetland Inventory Map: NA Wetlands Conservancy Program: NA Bordering vegetative wetland: >50 feet

Current Water Resource Condition (USGS): Well Site # 423401071109380 1, MA-XMW 78 Wilmington, MA

Well depth: 12.00 feet Hole depth: 12.00 feet Land surface altitude: 95.00 feet above NGVD29

Most recent data value: 7.55' BLS on 03/11/12 Range: Below normal

NATIONAL FLOOD INSURANCE RATE MAP

Above 500 year flood boundary: Yes
Within 500 year flood boundary: No
Within 100 year flood boundary: No

SURFICIAL & BEDROCK GEOLOGY

Surficial geology map: Qgm; Glacial ground moraine Map scale: 1:24,000 feet

Geologic parent material: Glacial lodgment till

Geomorphic landform: Rolling to undulating ground moraine controlled by bedrock structure.

Landform position (2D): Summit Landform position (3D): Head slope

Slope gradient: ~3-5 % Down-slope shape: Convex Across-slope shape: Convex Slope complexity: Simple

Bedrock outcropping in vicinity: None Glacial erratics in vicinity: Many small boulders scattered on surface adjacent to TP12-1.

TP12-2 DEEP OBSERVATION HOLE

#6 Post Office Square, Acton, Massachusetts

Test hole for stormwater drainage control

Date: March 21, 2012

Time: 10:45

Weather: Clear, 70s, East breeze, dry

Position on landscape: Side slope Slope aspect: Easterly Vegetation: Stripped surface

Property line: 20+ feet Drainage way: 50+ feet Drinking water well: 100+ feet

Wetlands: 100+ feet Open water body: 200+ feet

S O I L P R O F I L E

Depth below land surface (inches)	Soil Layer / Horizon	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 - 04"	C^	Loamy Sand	10YR3/2 very dark gray brown	NONE OBSERVED	Stripped surface, very friable, structure less, loose sandy matrix, clear smooth boundary.
04 - 66"	C_1	Sand	2.5Y5/4 lite olive brown	NONE OBSERVED	Loose, structure less unstable matrix, medium to coarse grained sand, damp, well stratified topset – foreset & bottomset beds, variegated colors within stratification, clean & silt free, 15% well rounded gravel, damp, clear smooth boundary.
66 - 79"	C_2	Sand	2.5Y5/4 lite olive brown	NONE OBSERVED	Loose, structure less unstable matrix, medium to coarse grained sand, damp, well stratified, variegated colors within stratification, clean & silt free, 10% well rounded gravel, no bedrock refusal.

Depth to bedrock: >79 Hydric/ Upland Soil: Upland Hydrologic Soil Group: A

Drainage Class: Excessively well drained Soil map unit: 653: Udorthents, sandy

DEPTH TO GROUNDWATER

Estimated Seasonal High Groundwater Table (redoximorphic features) None observed (below land surface)

Apparent water seeping from pit face: None (below land surface) Depth to stabilized apparent water: None (below land surface)

Soil moisture state: Damp Range of capillary fringe for substratum texture: ~05"

TP12-2 DEEP OBSERVATION HOLE

#6 Post Office Square, Acton, Massachusetts

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE

Depth observed: None observed prior to bottom of test hole.

Type: Masses on grain surfaces Abundance: Common Size: Medium Contrast: Distinct

Shape: Irregular/ stringy Moisture state: damp Location: C_1 matrix Hardness: Soft

Boundary: Diffuse Concentration color: 7.5R 5/8 (dark red) Reduction color: 10Y7/1 (light gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: _____ inches below grade

Groundwater adjustment: ____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 6.25 feet

Depth of naturally occurring pervious material in TP12-2 Upper boundary: 04"
Lower boundary: 79"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

_____ 03/21/12

Signature of Soil Evaluator Date of testing

Alexander F. Parker *License #1848* June 1998

Printed name of evaluator & license number Date of Soil Evaluator exam

Town of Acton Board of Health.

Witness

TP12-3 DEEP OBSERVATION HOLE

#6 Post Office Square, Acton, Massachusetts

Test hole for stormwater drainage control

Date: March 21, 2012

Time: 10:49

Weather: Clear, 70s, East breeze, dry

Position on landscape: Side slope Slope aspect: Easterly Vegetation: Stripped surface

Property line: 20+ feet Drainage way: 50+ feet Drinking water well: 100+ feet

Wetlands: 100+ feet Open water body: 200+ feet

S O I L P R O F I L E

Depth below land surface (inches)	Soil Layer / Horizon	Soil Texture (USDA/ NRCS)	Soil Color (EarthColors)	Redoxomorphic Features	Consistence, grade, size, structure, grain size, soil moisture state, roots, horizon boundary, clasts, stratification, artifacts, restrictive features, etc.
00 - 04"	C^	Loamy Sand	10YR3/2 very dark gray brown	NONE OBSERVED	Stripped surface, very friable, structure less, loose sandy matrix, clear smooth boundary.
04 - 80"	C	Sand	2.5Y5/4 lite olive brown	NONE OBSERVED	Loose, structure less unstable matrix, medium to coarse grained sand, damp, well stratified topset – foreset & bottomset beds, variegated colors within stratification, clean & silt free, 15% well rounded gravel, damp, clear smooth boundary.

Depth to bedrock: >80 Hydric/ Upland Soil: Upland Hydrologic Soil Group: A

Drainage Class: Excessively well drained Soil map unit: 653: Udorthents, sandy

DEPTH TO GROUNDWATER

Estimated Seasonal High Groundwater Table (redoximorphic features) None observed (below land surface)

Apparent water seeping from pit face: None (below land surface) Depth to stabilized apparent water: None (below land surface)

Soil moisture state: Damp Range of capillary fringe for substratum texture: ~05"

TP12-3 DEEP OBSERVATION HOLE

#6 Post Office Square, Acton, Massachusetts

ESTIMATED SEASONAL HIGH GROUNDWATER TABLE

Depth observed: None observed prior to bottom of test hole.

Type: Masses on grain surfaces Abundance: Common Size: Medium Contrast: Distinct

Shape: Irregular/ stringy Moisture state: damp Location: C_1 matrix Hardness: Soft

Boundary: Diffuse Concentration color: 7.5R 5/8 (dark red) Reduction color: 10Y7/1 (light gray)

DETERMINATION OF HIGH GROUNDWATER ELEVATION

Observed depth to stabilized phreatic water: _____ inches below grade

Observed water weeping from side of deep hole: _____ inches below grade

Observed depth to redoximorphic features: _____ inches below grade

Groundwater adjustment: ____

DEPTH OF NATURALLY OCCURRING PERVIOUS MATERIAL: ► 6.33 feet

Depth of naturally occurring pervious material in TP12-3 Upper boundary: 04"
Lower boundary: 80"

Certification

I certify that I am currently approved by the Department of Environmental Protection pursuant to 310 CMR 15.017 to conduct evaluations and that the above analysis has been performed by me consistent with the required training, expertise and experience described in 310 CMR 15.017. I further certify that the results of my soil evaluation, as indicated in the attached Soil Evaluation Form, are accurate and in accordance with 310 CMR 15.017.

_____ 03/21/12

Signature of Soil Evaluator Date of testing

Alexander F. Parker *License #1848* June 1998

Printed name of evaluator & license number Date of Soil Evaluator exam

Town of Acton Board of Health.

Witness

COMMONWEALTH OF MASSACHUSETTS

ACTON, MASSACHUSETTS

SOIL SUITABILITY ASSESSMENT FOR 0N-SITE DRAINAGE PERCOLATION TEST

Percolation Test	Percolation Test-1 TP12-3	Percolation Test-2
Depth of test:	30"	
Start presoak:	11:35	
End presoak:	Could not maintain presoak.	
Time at 12":	24 gallons absorbed within 15 min.	
Time at 9":		
Time at 6":		
Total time 9" to 6":		
Rate minutes per inch	< 2 MPI	

Alexander F. Parker *License #1848*
Printed name of evaluator & license number

03/21/12
Date of percolation testing.

Town of Acton Board of Health.
Witness