

DRAINAGE SUMMARY REPORT
101 HUNTOON MEMORIAL HIGHWAY
LEICESTER, MA 01524

OWNED BY: 101 Huntoon, LLC.
101 Huntoon Memorial Highway
Leicester, MA 01524

DATE: June 5, 2018

Prepared By:

BC Engineering & Survey Inc.

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TABLE OF CONTENTS

1.0	Drainage Narrative
1.1	Introduction
1.2	Methods of Analysis
1.3	Site Description
1.4	Runoff Curve Numbers
1.5	Design Criteria
1.6	Conclusions
2.0	Hydrological Calculations
2.1	Pre-Development Conditions
2.2	Post-Development Conditions
3.0	Operation and Maintenance Procedures

Figures

Figure 1 - Assessors Map
Figure 2 - Recorded Deed and Plans
Figure 3 - Soils Information
Figure 4 - Site Ariel
Figure 5 - Pre-Development Watershed Map
Figure 6 - Post-Development Watershed Map

1.0

DRAINAGE NARRATIVE

1.0 NARRATIVE

1.1 INTRODUCTION

On behalf of our client, 101 Huntoon, LLC, BC Engineering & Survey, Inc. has prepared this Drainage Analysis and Report as part of the submittal package for approval from the Town of Leicester Planning Board and Conservation Commission. The proposed site improvements consist of installing Cultec Stormwater Management Chamber System and enlarging the existing Storm Water Basin.

For the purpose of this analysis, the U.S. Soil Conservation Service Methods were utilized in order to establish land use and run-off characteristics for the post-development peak rates of run-off. The Cultec Stormwater Management Chamber System improvements have been proposed in order to meet the requirements post-development peak rates of run-off, in accordance with the applicable sections of the Town of Leicester Zoning By-Laws and Subdivision Rules and Regulations. The purpose of this report is to compute post-development conditions relative to increase in peak rates of runoff generally associated with increases in impervious surfaces and alterations of land use which may effect potential runoff. Increases in peak rates of runoff are attributed to increases in pavement and roof areas, and alterations of land use due to land areas transformed from grass and landscape to pavement. For the purposes of this report, developed areas which are not impervious will be considered to consist of lawn, landscape, gravel storage, and undisturbed areas. There has been changes of impervious area at the site, however 101 Huntoon, LLC, is proposing to decrease the runoff from the site during the 2, 10, 25 and 100 year storm events and recharge the groundwater.

The subject parcel consists of areas of pavement, roofs, gravel storage, lawn, landscape and woods. The watershed analyzed is approximately 3.08 acres and slopes from east to west at an average slope of 3 %.

The site has been analyzed using a single Design Point as shown on the attached plans. The existing topography directs stormwater, overland, from the easterly portion of the area to be analyzed to the westerly portion of the parcel. This main "design point" has been utilized and reviewed for post-development runoff conditions. The design points are also the basis for the design of the proposed Cultec Stormwater Management Chamber System as shown on the plans submitted for approval.

1.2 METHOD OF ANALYSIS

The enclosed hydraulic calculations utilize the runoff estimating techniques developed by the USDA Soil Conservation Service (SCS). The following publications were used in the preparation of this report:

1. "Urban Hydrology for Small Watersheds"¹
2. "National Engineering Handbook, Hydrology, Section 4" (NEH-4)²
3. "Handbook of Hydraulics" 6th ed. – E.F. Brater & H. Williams³
4. "Soil Survey Report for Northeastern Worcester County" 1985 ed. – USDA NRCS⁴

Using SCS publications and other texts on surface water hydrology, in conjunction with drainage software *HydroCAD* developed by Applied Microcomputer Systems⁵, BC Engineering & Survey, Inc., has calculated peak rates of runoff relative to the subject site for post-development. The drainage software program *HydroCAD* calculates peak rates of runoff similarly to the computer program known as *Computer Programs for Project Formulations- hydrology, Technical Release Number 20* (TR-20), developed by SCS. This program and series of programs are the technical standard utilized by engineers, Planning Boards, Conservation Commission, and Municipal Agencies throughout the region and across the country for the evaluation of storm water conditions.

The analysis reviews certain parameters of sub-watersheds surrounding the subject site and how these parameters are affected by various rainfall conditions. These parameters include land cover and use, soil strata and permeability, and variations in slope. These parameters are used to develop rainfall runoff characteristics, which are used to analyze both pre and post development conditions within and surrounding the proposed construction activity. Some of these characteristics include times of concentration (T_c), peak rates of runoff, runoff volume, and the time the peak rate of runoff occurs within the particular storm event.

Times of concentration were computed by using the SCS "Upland Method" as described in the aforementioned National Engineering Handbook and were utilized for the analysis of the individual watersheds. The Upland Method computes the time of travel of storm waters over segments of the watershed depending upon land conditions, such as surface roughness, channel configuration, slope of land, and flow patterns. The addition of these travel times determines the individual watershed Time of Concentration. This method translates to more accurate T_c 's than other more general methods.

1.3 SITE DESCRIPTION

The subject area is a combination of paved parking areas, roofs and grass/landscaped areas. The watershed analyzed is approximately 3.08 acres and slopes from east to west at an average slope of 3 %.

Soils types for this analysis were based upon review of soils information contained in the SCS publication *Soil Survey of Worcester County Massachusetts*. Soils maps and descriptions were provided to this office by Natural Resource Conservation Service and are the basis for the soil type determination for this analysis. The soils are classified by number and name by SCS and, subsequently, the Hydrological Soil Group has been designated within the Urban Hydrology for Small Watersheds manual. Soils within the subject watersheds are also hydrologically classified into different soil groups as defined by the Soil Conservation Service. The following table provides the SCS Hydrological Soil Group classification for each soil type.

<u>Soil Designation</u>	<u>Names</u>	<u>Hydrological Group</u>
317B	Scituate fine sandy loam	B

1.4 RUNOFF CURVE NUMBERS

The SCS runoff curve numbers used in all watershed modeling contained in this report are based on the Hydrologic Soil Groups and land uses below:

<u>Land Use</u>	<u>Hydrologic Soil Group</u>	<u>Curve #</u>
Paved parking & roofs	B	98
Gravel storage areas	B	96
Good Grass Cover	B	69
Woods	B	60

1.5 DESIGN CRITERIA

This drainage analysis was developed utilizing a Type III, 24-hour tropical storm as developed by SCS and required for this region. The storm frequencies and the corresponding 24-hour rainfall amounts are as follows:

<u>Storm Frequency (years)</u>	<u>Rainfall (inches)</u>
100	6.7
25	5.4
10	4.5
2	3.1

The overall hydrologic impact of development was evaluated using the 100-year storm event as recommended by various engineering publications.

As with any development, changes in land use such as the transformation of grass/landscape mixture areas to impervious paved areas cause increased peak rates of runoff to the design points. The purpose of this report is to establish the peak flows at the design point and size the Cultec Stormwater Management Chamber System and existing Storm Water Basin enlargement, in order to mitigate the peak rates of runoff. The Cultec Stormwater Management Chamber System area holds back storm water flows thereby reducing the peak rate of runoff to the design points. The resulting drainage system design reduces post-development flows.

1.6 CONCLUSIONS

The proposed Cultec Stormwater Chamber System and existing Storm Water Basin enlargement, including level spreader will decrease and reduce the stormwater velocity.

Peak Flows at Design Point #1 (cfs)

<u>Storm Event</u>	<u>Pre-development</u>	<u>Post-development</u>
2 yr storm	5.32	3.39
10 yr storm	10.01	7.08
25 yr storm	12.83	10.37
100 yr storm	16.96	14.11

As outlined above, the post-development peak rates of runoff have been mitigated in order to assure that no adverse impacts to abutting properties relative to increases in peak rates of runoff will occur due to the proposed development upon the completion of construction. The storm water management as outlined herein and as shown on the accompanying plans has the following positive values relative to stormwater management:

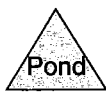
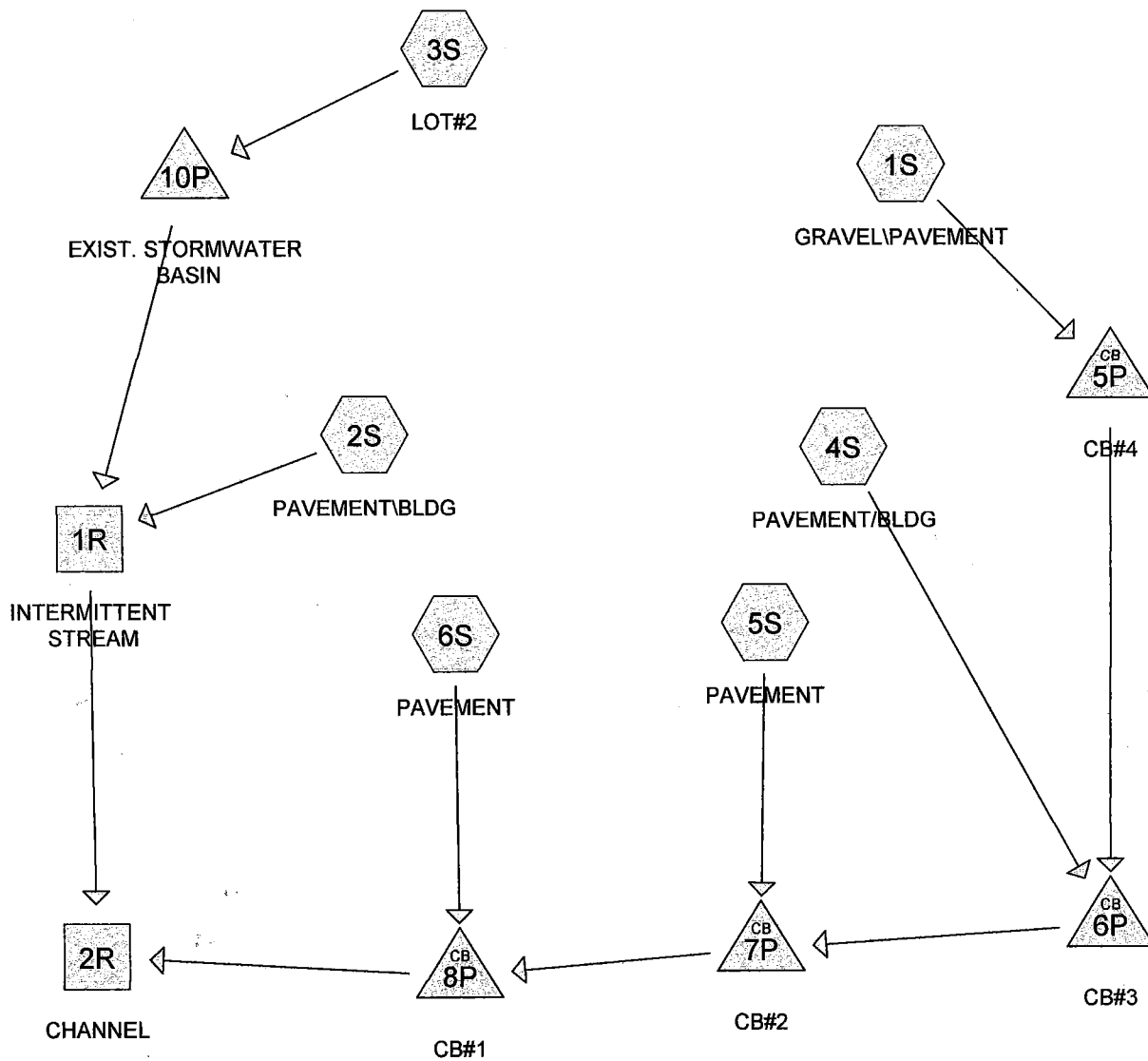
- A) The Cultec Stormwater Chamber System and existing Storm Water Basin enlargement including level spreader will reduce velocity during the 2, 10, 25 and 100 year storm events, allowing the groundwater to recharge prior to release.

2.0

Hydrological Calculations

2.1

PRE-DEVELOPMENT **CALCULATIONS**



Routing Diagram for JOHNSON-HUNTOON-PRE
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JOHNSON-HUNTOON-PRE

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Page 2

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.122	79	<50% Grass cover, Poor, HSG B (2S, 4S)
0.169	56	Brush, Fair, HSG B (1S)
1.182	96	Gravel surface, HSG B (1S, 2S, 3S)
0.076	98	Paved parking HSG B (1S)
0.219	98	Paved parking, HSG B (5S, 6S)
0.294	98	Roofs, PAVEMENT HSG B (2S)
0.262	98	Roofs, Pavement HSG B (4S)
0.760	60	Woods, Fair, HSG B (3S)
3.083	85	TOTAL AREA

JOHNSON-HUNTOON-PRE

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Page 3

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
3.083	HSG B	1S, 2S, 3S, 4S, 5S, 6S
0.000	HSG C	
0.000	HSG D	
0.000	Other	
3.083		TOTAL AREA

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101 HUNTOON PRE-DEVELOPMENT

Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 4

Summary for Subcatchment 1S: GRAVEL\PAVEMENT

Runoff = 0.72 cfs @ 12.08 hrs, Volume= 0.050 af, Depth= 1.39"

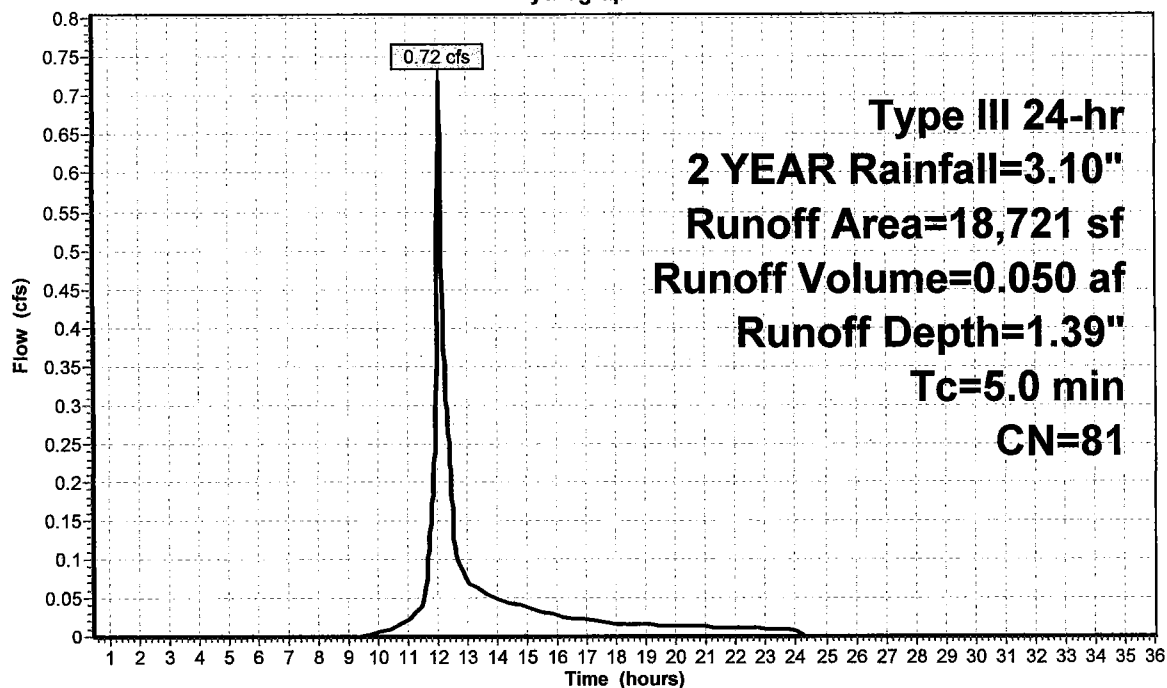
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	3,330	98	Paved parking HSG B
	7,350	56	Brush, Fair, HSG B
	8,041	96	Gravel surface, HSG B
	18,721	81	Weighted Average
	15,391		82.21% Pervious Area
	3,330		17.79% Impervious Area

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

Subcatchment 1S: GRAVEL\PAVEMENT

Hydrograph



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Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 5

Summary for Subcatchment 2S: PAVEMENT\BLDG

Runoff = 1.81 cfs @ 12.07 hrs, Volume= 0.131 af, Depth= 2.55"

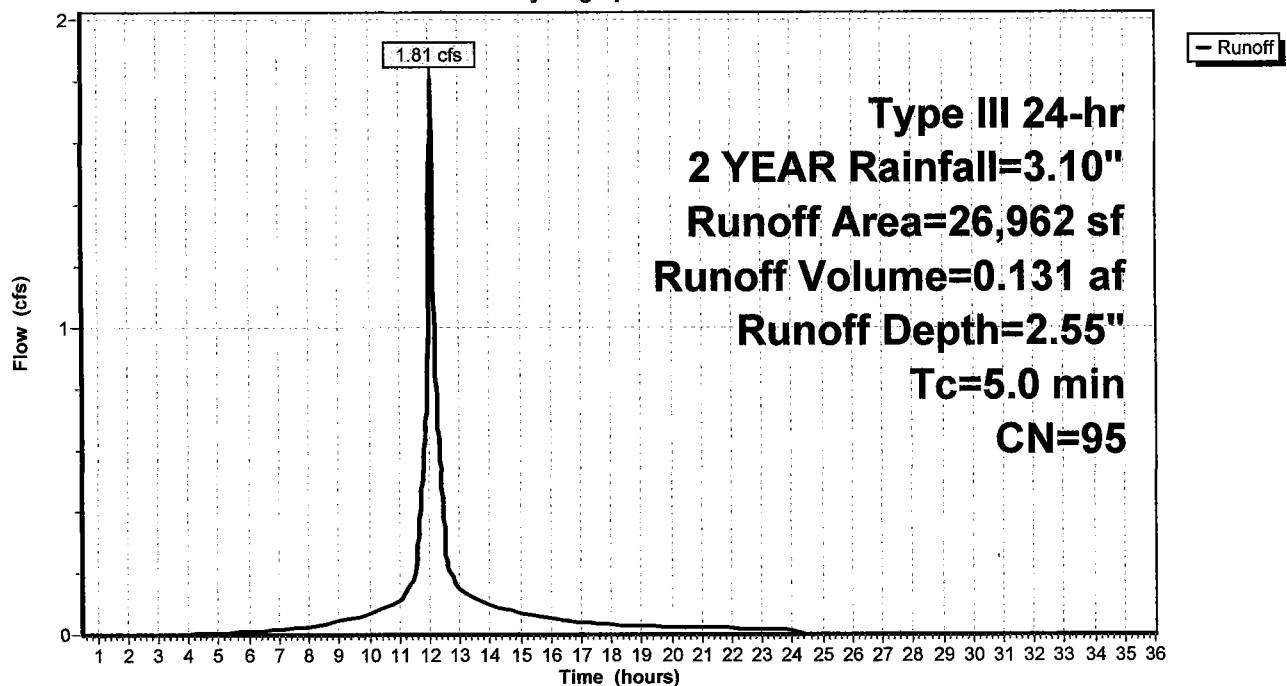
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YEAR Rainfall=3.10"

Area (sf)	CN	Description
2,775	79	<50% Grass cover, Poor, HSG B
* 12,787	98	Roofs, PAVEMENT HSG B
11,400	96	Gravel surface, HSG B
26,962	95	Weighted Average
14,175		52.57% Pervious Area
12,787		47.43% Impervious Area

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

Subcatchment 2S: PAVEMENT\BLDG

Hydrograph



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Page 6

Summary for Subcatchment 3S: LOT#2

Runoff = 2.13 cfs @ 12.08 hrs, Volume= 0.150 af, Depth= 1.20"

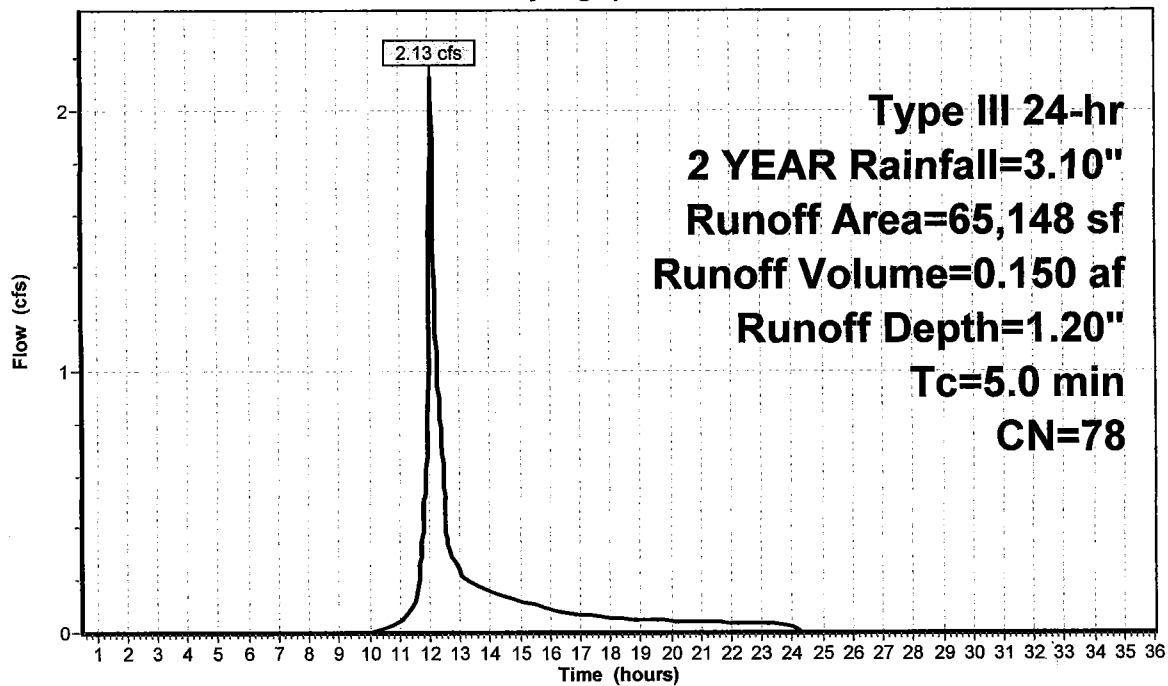
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YEAR Rainfall=3.10"

Area (sf)	CN	Description
33,118	60	Woods, Fair, HSG B
32,030	96	Gravel surface, HSG B
65,148	78	Weighted Average
65,148		100.00% Pervious Area

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

Subcatchment 3S: LOT#2

Hydrograph



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Page 7

Summary for Subcatchment 4S: PAVEMENT/BLDG

Runoff = 0.93 cfs @ 12.07 hrs, Volume= 0.068 af, Depth= 2.55"

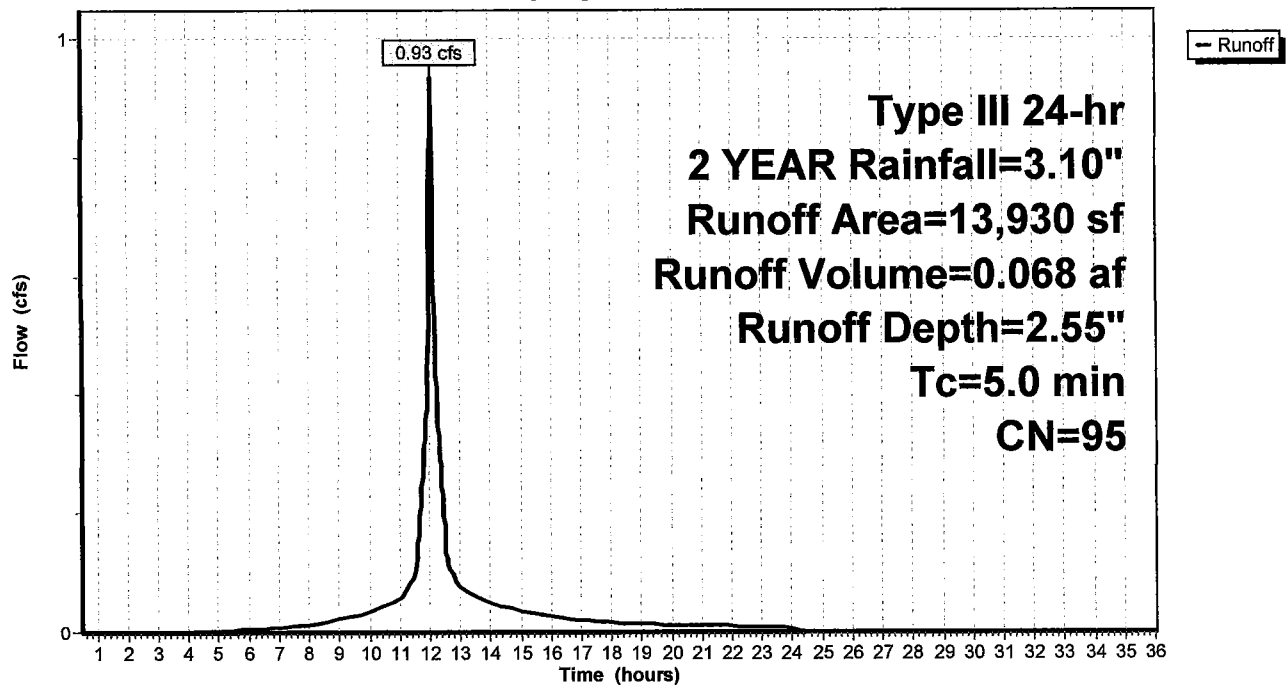
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YEAR Rainfall=3.10"

	Area (sf)	CN	Description
*	11,405	98	Roofs, Pavement HSG B
	2,525	79	<50% Grass cover, Poor, HSG B
	13,930	95	Weighted Average
	2,525		18.13% Pervious Area
	11,405		81.87% Impervious Area

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

Subcatchment 4S: PAVEMENT/BLDG

Hydrograph



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Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 8

Summary for Subcatchment 5S: PAVEMENT

Runoff = 0.14 cfs @ 12.07 hrs, Volume= 0.010 af, Depth= 2.87"

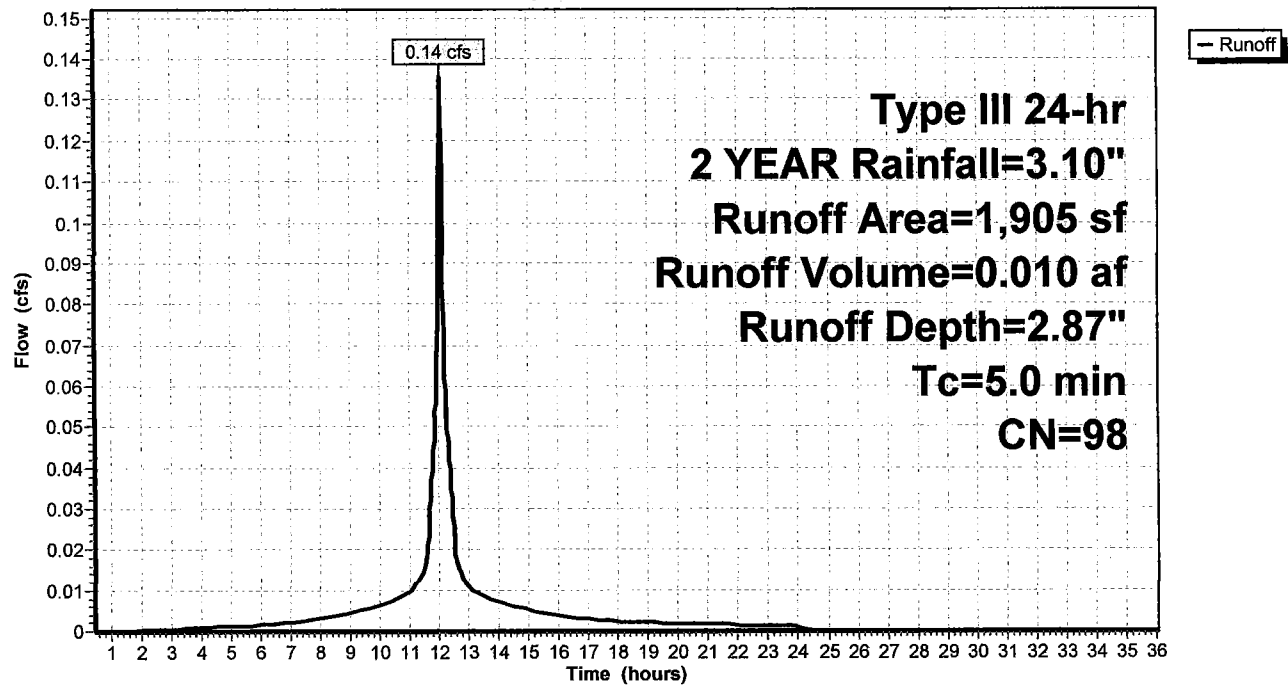
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YEAR Rainfall=3.10"

Area (sf)	CN	Description
1,905	98	Paved parking, HSG B
1,905		100.00% Impervious Area

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

Subcatchment 5S: PAVEMENT

Hydrograph



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Page 9

Summary for Subcatchment 6S: PAVEMENT

Runoff = 0.55 cfs @ 12.07 hrs, Volume= 0.042 af, Depth= 2.87"

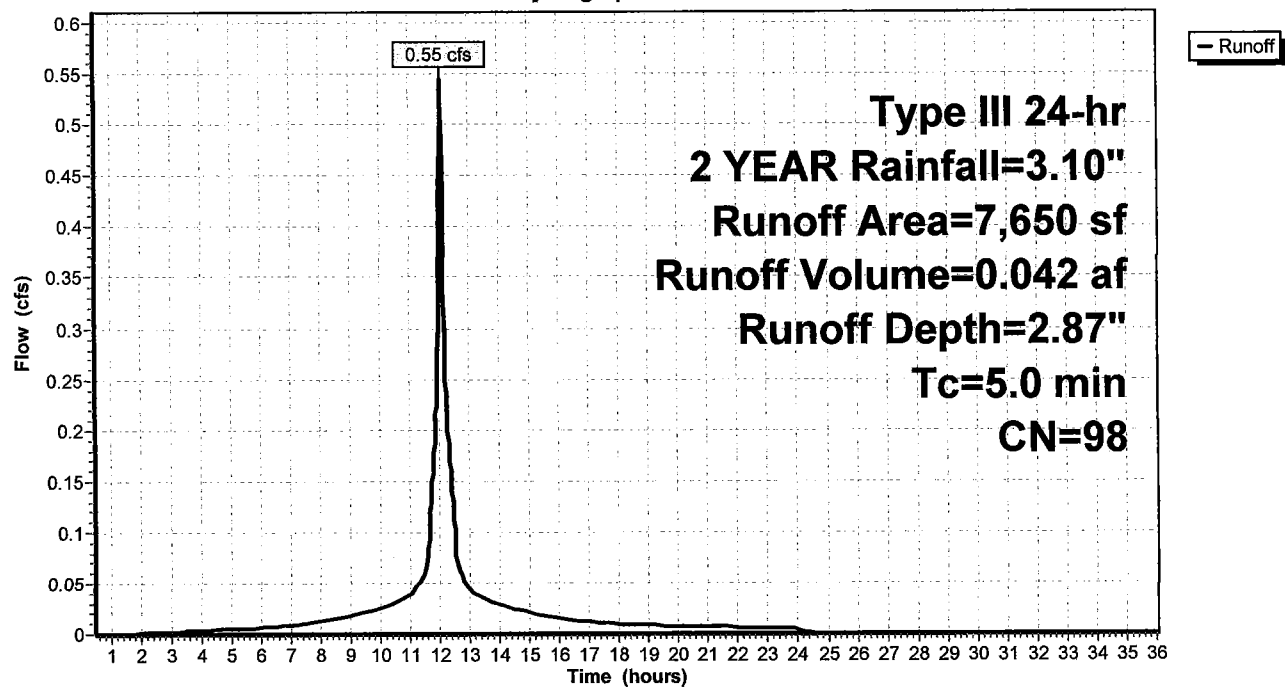
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YEAR Rainfall=3.10"

Area (sf)	CN	Description
7,650	98	Paved parking, HSG B
7,650		100.00% Impervious Area

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

Subcatchment 6S: PAVEMENT

Hydrograph



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Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 10

Summary for Reach 1R: INTERMITTENT STREAM

Inflow Area = 2.115 ac, 13.88% Impervious, Inflow Depth = 1.45" for 2 YEAR event
Inflow = 3.62 cfs @ 12.10 hrs, Volume= 0.256 af
Outflow = 3.36 cfs @ 12.13 hrs, Volume= 0.256 af, Atten= 7%, Lag= 1.7 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Max. Velocity= 2.77 fps, Min. Travel Time= 2.2 min

Avg. Velocity = 0.80 fps, Avg. Travel Time= 7.5 min

Peak Storage= 435 cf @ 12.13 hrs

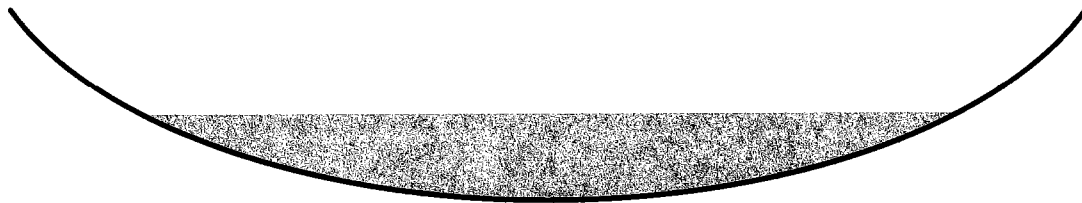
Average Depth at Peak Storage= 0.45'

Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 18.47 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds

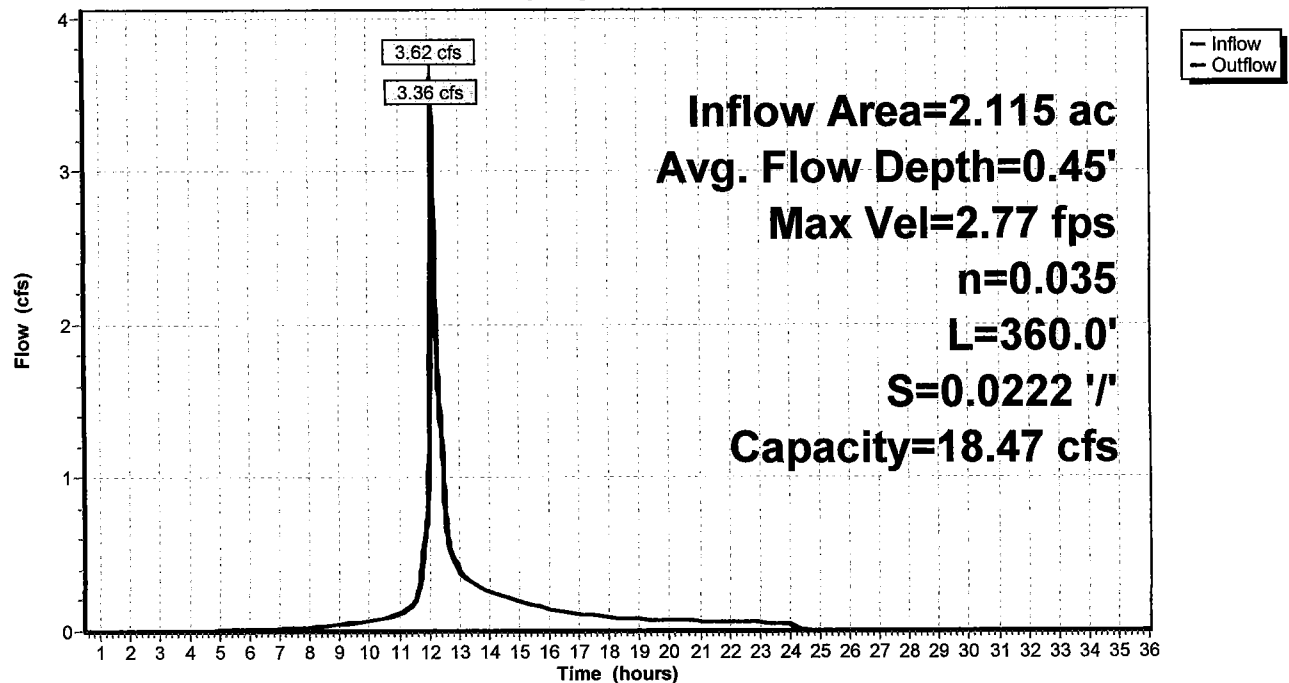
Length= 360.0' Slope= 0.0222 '/'

Inlet Invert= 502.00', Outlet Invert= 494.00'



Reach 1R: INTERMITTENT STREAM

Hydrograph



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Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 11

Summary for Reach 2R: CHANNEL

Inflow Area = 3.083 ac, 27.60% Impervious, Inflow Depth = 1.66" for 2 YEAR event
Inflow = 5.32 cfs @ 12.11 hrs, Volume= 0.426 af
Outflow = 5.32 cfs @ 12.12 hrs, Volume= 0.426 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Max. Velocity= 3.98 fps, Min. Travel Time= 0.3 min

Avg. Velocity = 1.18 fps, Avg. Travel Time= 0.9 min

Peak Storage= 87 cf @ 12.12 hrs

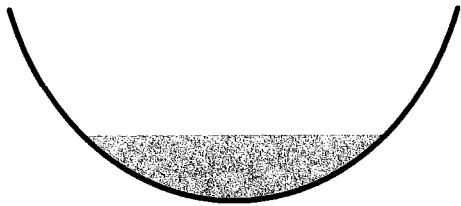
Average Depth at Peak Storage= 0.68'

Bank-Full Depth= 2.00' Flow Area= 6.7 sf, Capacity= 48.56 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040 Earth, cobble bottom, clean sides

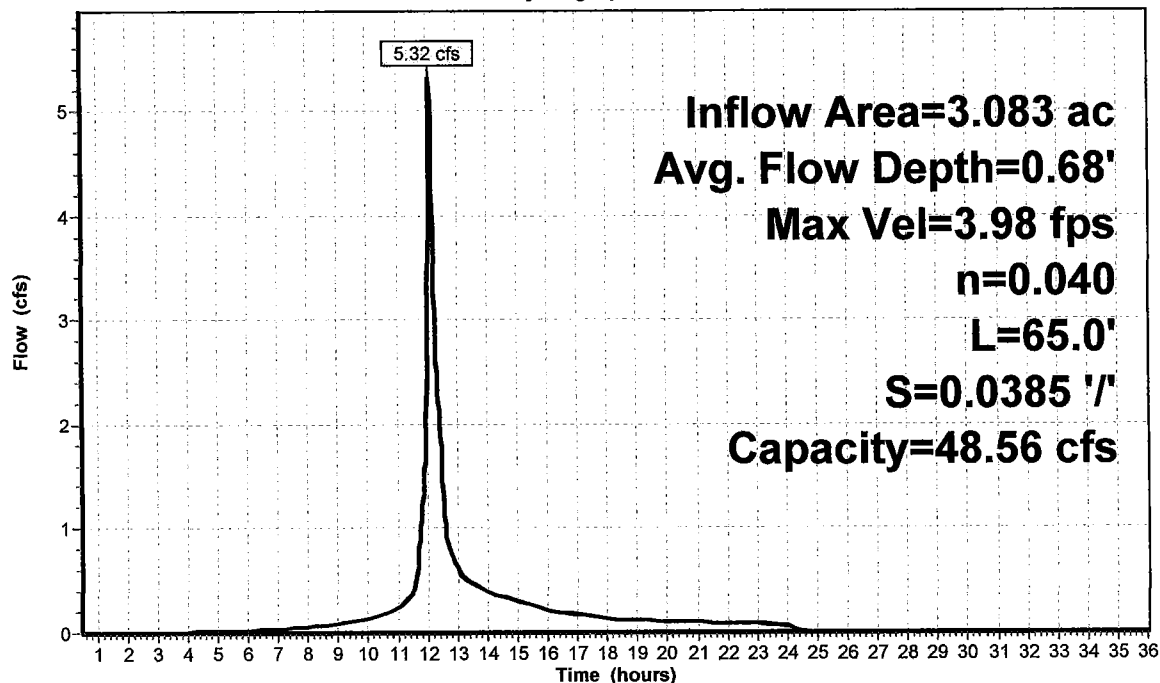
Length= 65.0' Slope= 0.0385 '/'

Inlet Invert= 494.00', Outlet Invert= 491.50'



Reach 2R: CHANNEL

Hydrograph



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Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 12

Summary for Pond 5P: CB#4

Inflow Area = 0.430 ac, 17.79% Impervious, Inflow Depth = 1.39" for 2 YEAR event
Inflow = 0.72 cfs @ 12.08 hrs, Volume= 0.050 af
Outflow = 0.72 cfs @ 12.08 hrs, Volume= 0.050 af, Atten= 0%, Lag= 0.0 min
Primary = 0.72 cfs @ 12.08 hrs, Volume= 0.050 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 498.25' @ 12.08 hrs

Flood Elev= 500.37'

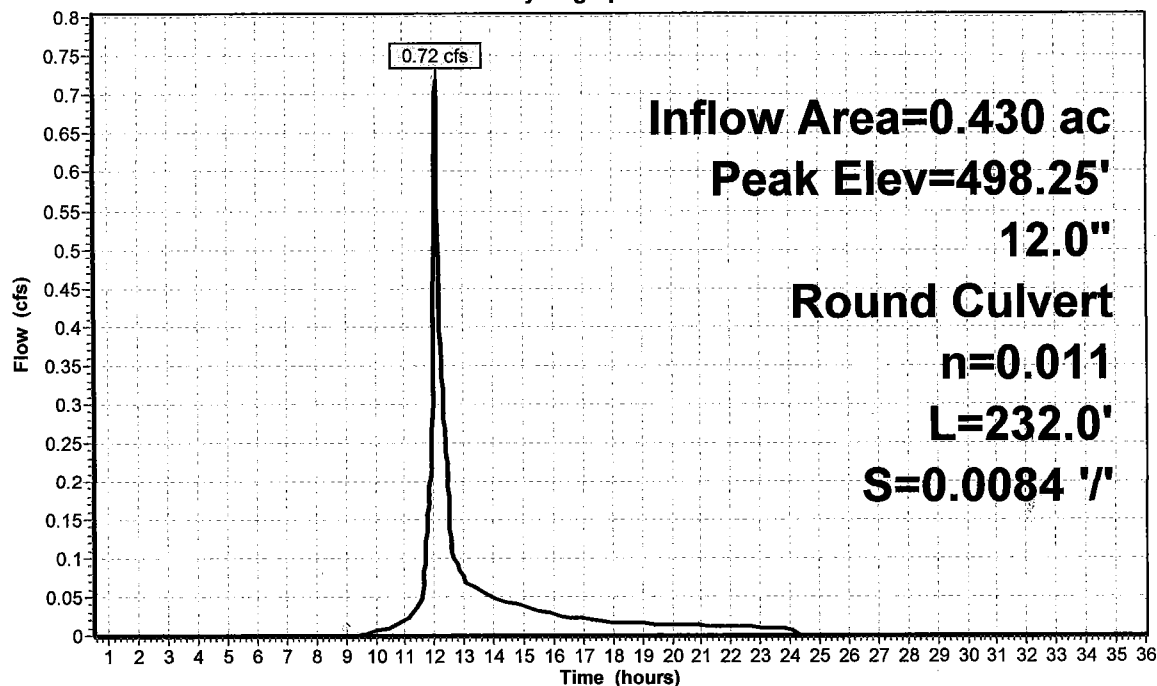
Device	Routing	Invert	Outlet Devices
#1	Primary	497.82'	12.0" Round Culvert L= 232.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 497.82' / 495.88' S= 0.0084 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.72 cfs @ 12.08 hrs HW=498.25' TW=496.73' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 0.72 cfs @ 3.23 fps)

Pond 5P: CB#4

Hydrograph



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Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 13

Summary for Pond 6P: CB#3

Inflow Area = 0.750 ac, 45.13% Impervious, Inflow Depth = 1.88" for 2 YEAR event
Inflow = 1.65 cfs @ 12.07 hrs, Volume= 0.118 af
Outflow = 1.65 cfs @ 12.07 hrs, Volume= 0.118 af, Atten= 0%, Lag= 0.0 min
Primary = 1.65 cfs @ 12.07 hrs, Volume= 0.118 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 496.73' @ 12.08 hrs

Flood Elev= 499.53'

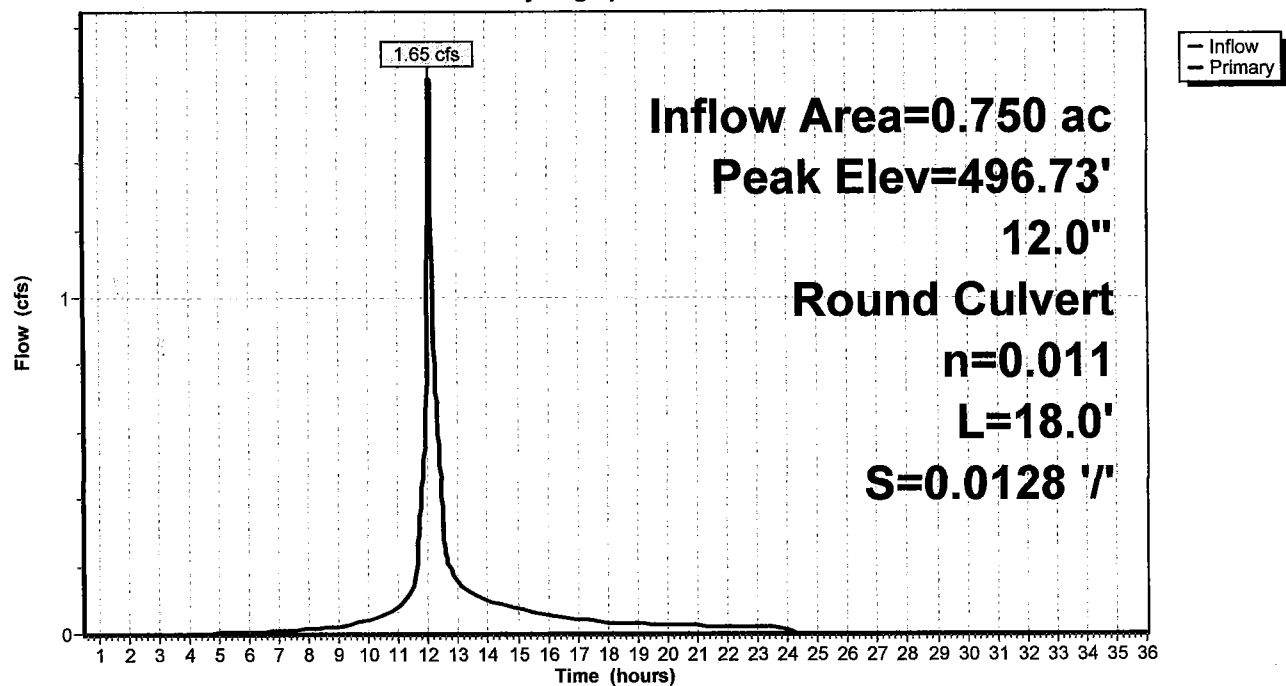
Device	Routing	Invert	Outlet Devices
#1	Primary	495.88'	12.0" Round Culvert L= 18.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.88' / 495.65' S= 0.0128 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.63 cfs @ 12.07 hrs HW=496.72' TW=496.45' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 1.63 cfs @ 3.10 fps)

Pond 6P: CB#3

Hydrograph



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101 HUNTOON PRE-DEVELOPMENT

Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 14

Summary for Pond 7P: CB#2

Inflow Area = 0.793 ac, 48.15% Impervious, Inflow Depth = 1.94" for 2 YEAR event
Inflow = 1.79 cfs @ 12.07 hrs, Volume= 0.128 af
Outflow = 1.79 cfs @ 12.07 hrs, Volume= 0.128 af, Atten= 0%, Lag= 0.0 min
Primary = 1.79 cfs @ 12.07 hrs, Volume= 0.128 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 496.45' @ 12.07 hrs

Flood Elev= 499.70'

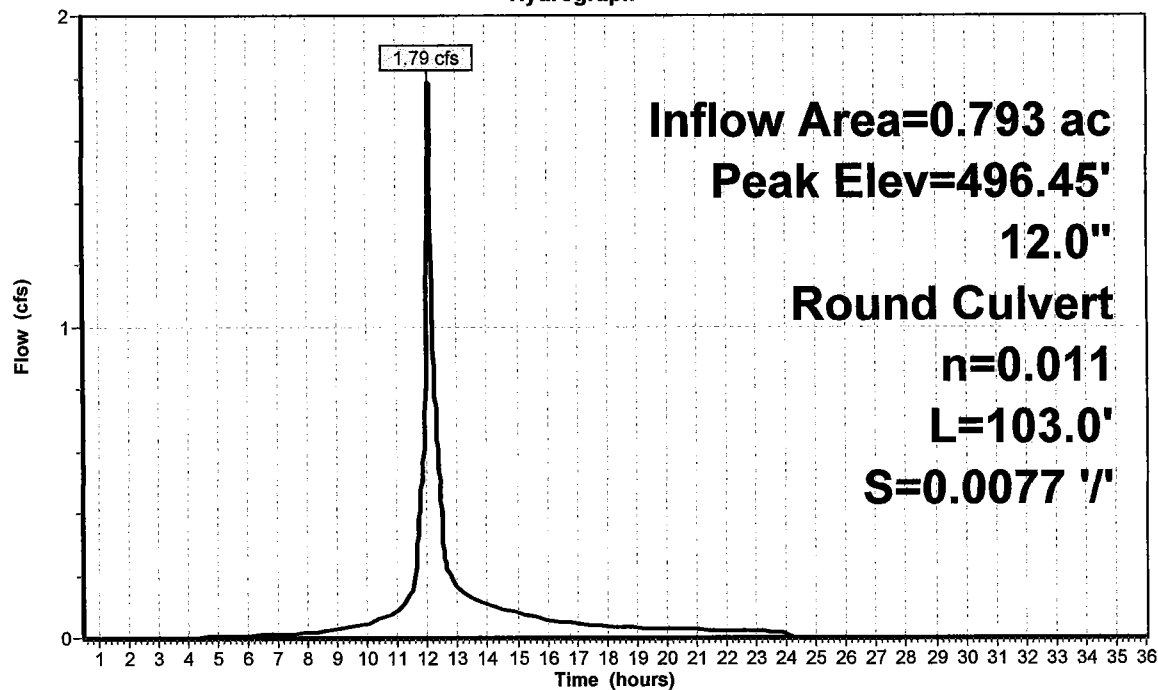
Device	Routing	Invert	Outlet Devices
#1	Primary	495.65'	12.0" Round Culvert L= 103.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.65' / 494.86' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.78 cfs @ 12.07 hrs HW=496.45' TW=495.73' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 1.78 cfs @ 3.62 fps)

Pond 7P: CB#2

Hydrograph



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101 HUNTOON PRE-DEVELOPMENT

Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 15

Summary for Pond 8P: CB#1

Inflow Area = 0.969 ac, 57.55% Impervious, Inflow Depth = 2.11" for 2 YEAR event
Inflow = 2.33 cfs @ 12.07 hrs, Volume= 0.170 af
Outflow = 2.33 cfs @ 12.07 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min
Primary = 2.33 cfs @ 12.07 hrs, Volume= 0.170 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 495.74' @ 12.07 hrs

Flood Elev= 499.70'

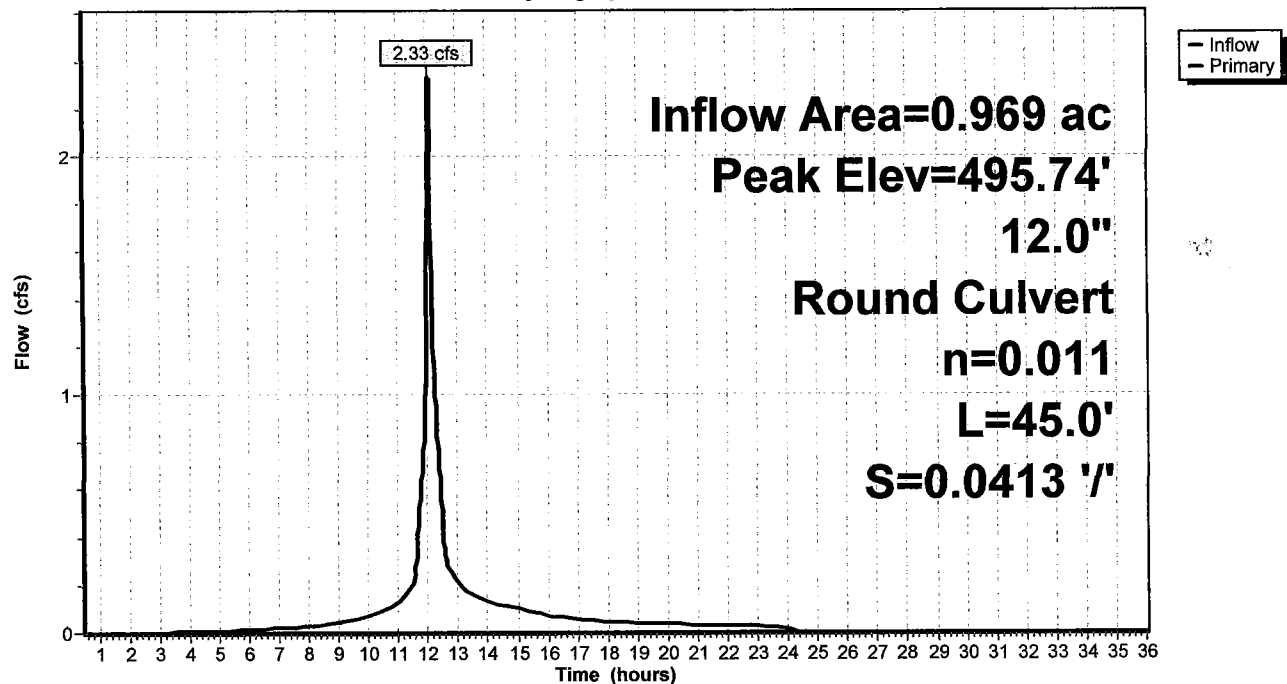
Device	Routing	Invert	Outlet Devices
#1	Primary	494.86'	12.0" Round Culvert L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 494.86' / 493.00' S= 0.0413 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.32 cfs @ 12.07 hrs HW=495.73' TW=494.63' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 2.32 cfs @ 3.18 fps)

Pond 8P: CB#1

Hydrograph



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101 HUNTOON PRE-DEVELOPMENT

Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 16

Summary for Pond 10P: EXIST. STORMWATER BASIN

Inflow Area = 1.496 ac, 0.00% Impervious, Inflow Depth = 1.20" for 2 YEAR event
 Inflow = 2.13 cfs @ 12.08 hrs, Volume= 0.150 af
 Outflow = 1.96 cfs @ 12.11 hrs, Volume= 0.124 af, Atten= 8%, Lag= 2.0 min
 Primary = 1.96 cfs @ 12.11 hrs, Volume= 0.124 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 503.22' @ 12.11 hrs Surf.Area= 1,014 sf Storage= 1,317 cf

Flood Elev= 504.00' Surf.Area= 1,300 sf Storage= 2,219 cf

Plug-Flow detention time= 105.4 min calculated for 0.124 af (83% of inflow)

Center-of-Mass det. time= 33.5 min (883.5 - 850.0)

Volume	Invert	Avail.Storage	Storage Description
#1	500.70'	2,219 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.70	30	0	0
501.00	203	35	35
502.00	500	352	386
503.00	933	717	1,103
504.00	1,300	1,117	2,219

Device	Routing	Invert	Outlet Devices
#1	Primary	503.00'	8.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=1.95 cfs @ 12.11 hrs HW=503.22' TW=502.44' (Dynamic Tailwater)

↑1=Broad-Crested Rectangular Weir (Weir Controls 1.95 cfs @ 1.11 fps)

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101 HUNTOON PRE-DEVELOPMENT

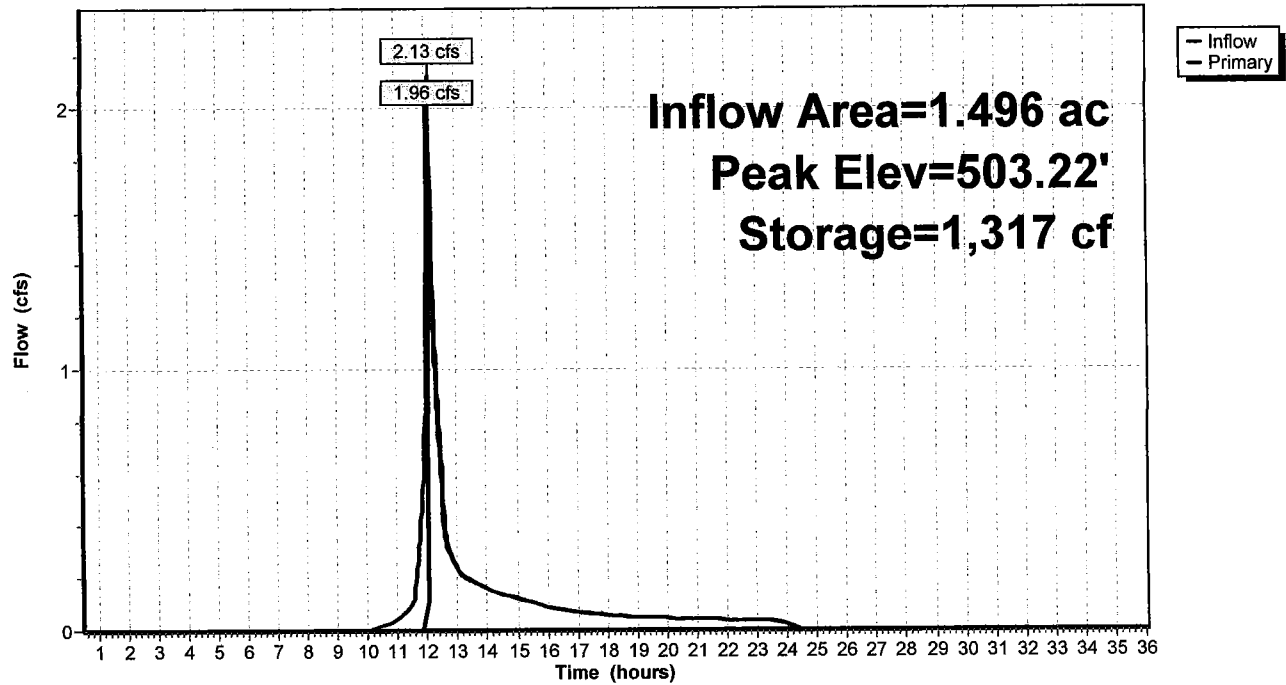
Type III 24-hr 2 YEAR Rainfall=3.10"

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Page 17

Pond 10P: EXIST. STORMWATER BASIN

Hydrograph



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101 HUNTOON PRE-DEVELOPMENT
Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 18

Summary for Subcatchment 1S: GRAVEL\PAVEMENT

Runoff = 1.33 cfs @ 12.08 hrs, Volume= 0.091 af, Depth= 2.55"

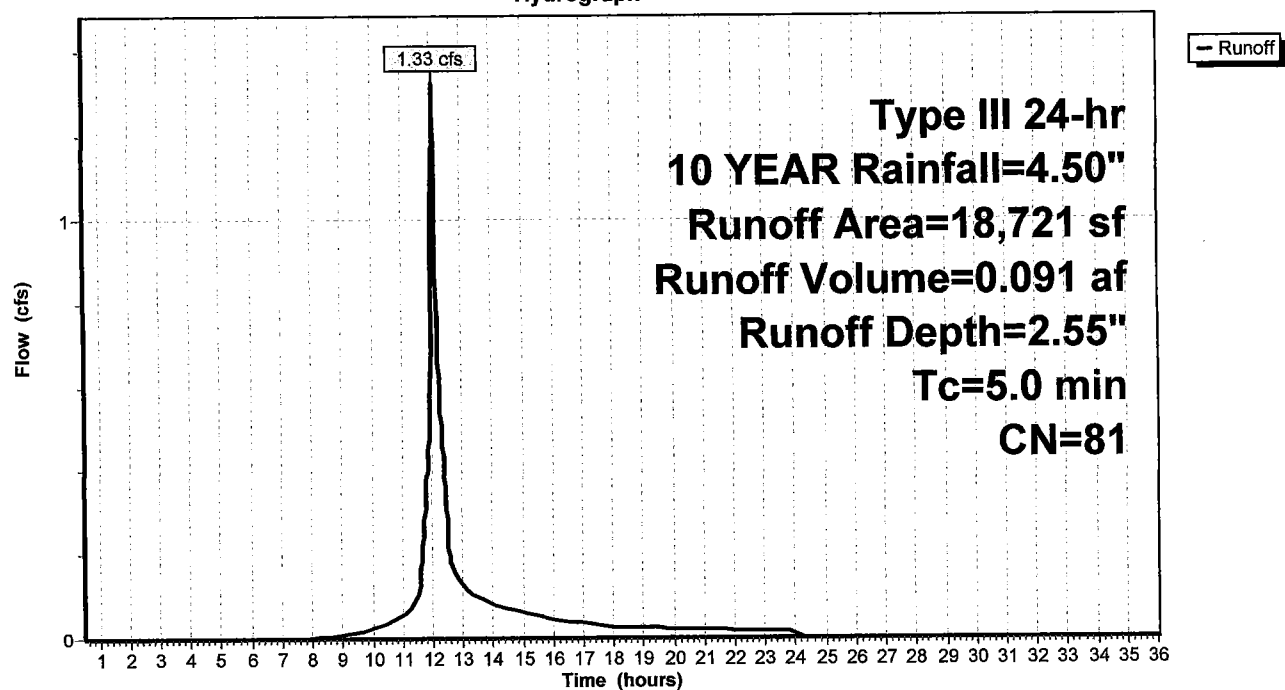
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YEAR Rainfall=4.50"

	Area (sf)	CN	Description
*	3,330	98	Paved parking HSG B
	7,350	56	Brush, Fair, HSG B
	8,041	96	Gravel surface, HSG B
	18,721	81	Weighted Average
	15,391		82.21% Pervious Area
	3,330		17.79% Impervious Area

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

Subcatchment 1S: GRAVEL\PAVEMENT

Hydrograph



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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 19

Summary for Subcatchment 2S: PAVEMENT\BLDG

Runoff = 2.72 cfs @ 12.07 hrs, Volume= 0.202 af, Depth= 3.92"

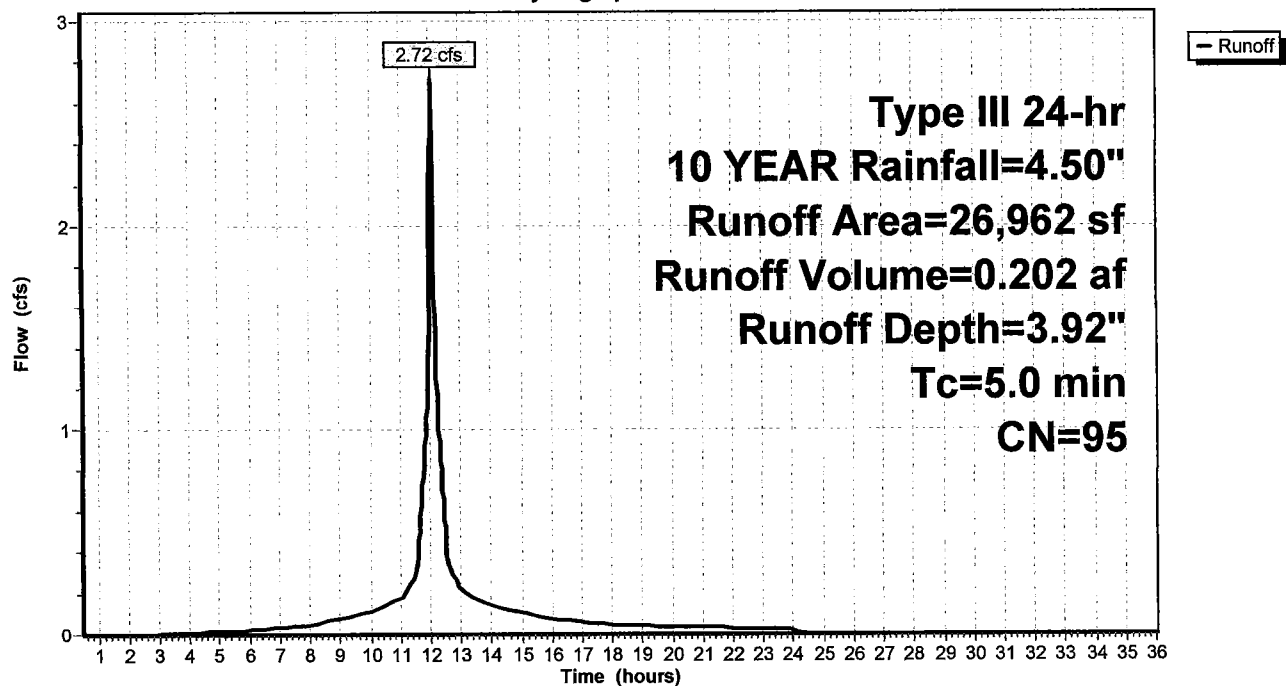
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YEAR Rainfall=4.50"

Area (sf)	CN	Description
2,775	79	<50% Grass cover, Poor, HSG B
* 12,787	98	Roofs, PAVEMENT HSG B
11,400	96	Gravel surface, HSG B
26,962	95	Weighted Average
14,175		52.57% Pervious Area
12,787		47.43% Impervious Area

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

Subcatchment 2S: PAVEMENT\BLDG

Hydrograph



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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 20

Summary for Subcatchment 3S: LOT#2

Runoff = 4.15 cfs @ 12.08 hrs, Volume= 0.286 af, Depth= 2.29"

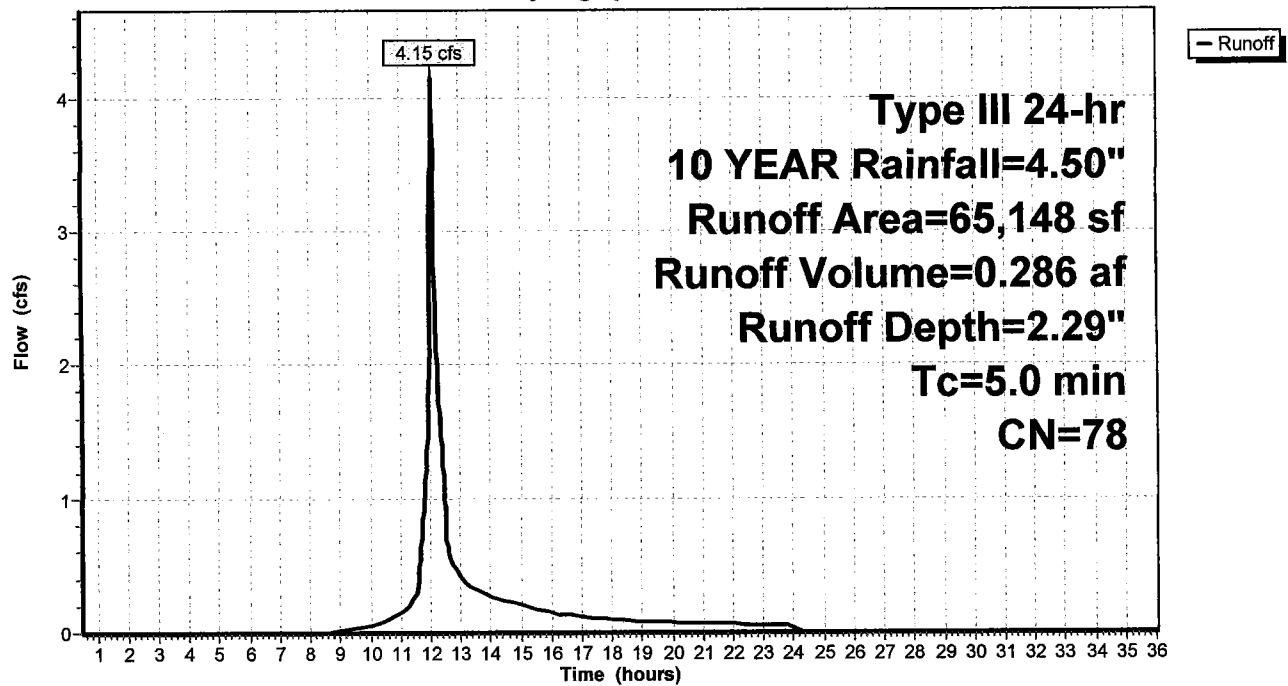
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YEAR Rainfall=4.50"

Area (sf)	CN	Description
33,118	60	Woods, Fair, HSG B
32,030	96	Gravel surface, HSG B
65,148	78	Weighted Average
65,148		100.00% Pervious Area

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

Subcatchment 3S: LOT#2

Hydrograph



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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 21

Summary for Subcatchment 4S: PAVEMENT/BLDG

Runoff = 1.40 cfs @ 12.07 hrs, Volume= 0.105 af, Depth= 3.92"

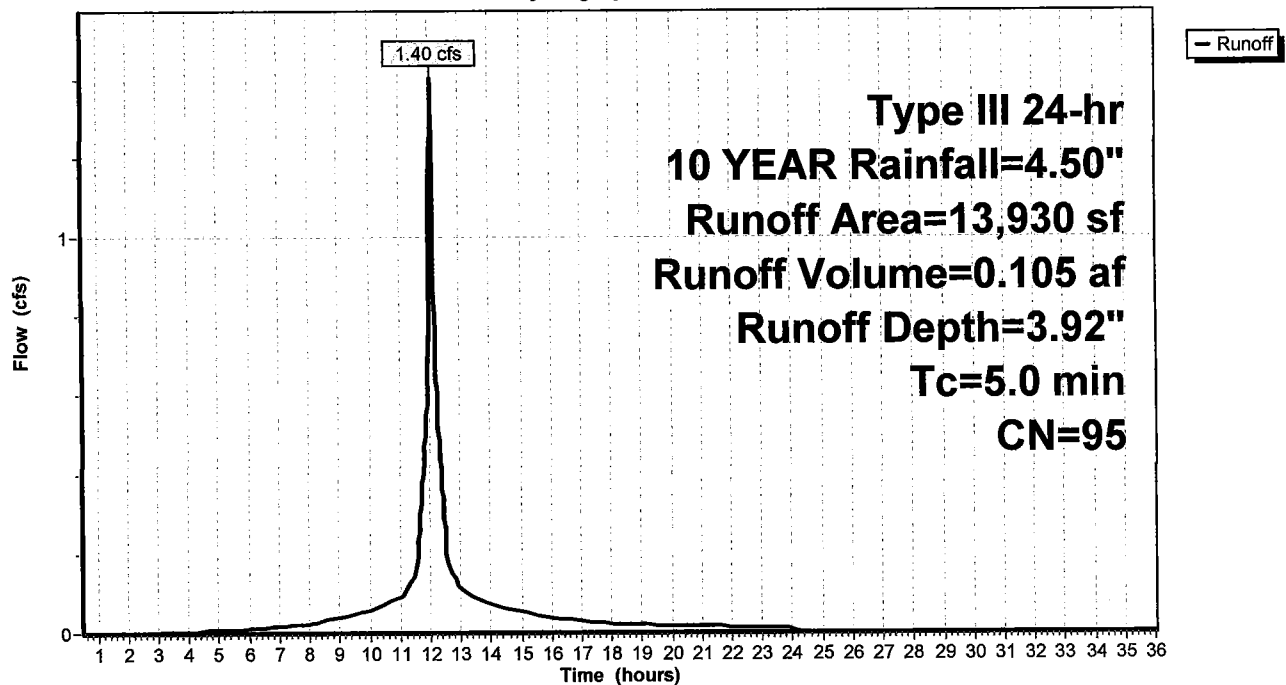
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YEAR Rainfall=4.50"

	Area (sf)	CN	Description
*	11,405	98	Roofs, Pavement HSG B
	2,525	79	<50% Grass cover, Poor, HSG B
	13,930	95	Weighted Average
	2,525		18.13% Pervious Area
	11,405		81.87% Impervious Area

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

Subcatchment 4S: PAVEMENT/BLDG

Hydrograph



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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 22

Summary for Subcatchment 5S: PAVEMENT

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 0.016 af, Depth= 4.26"

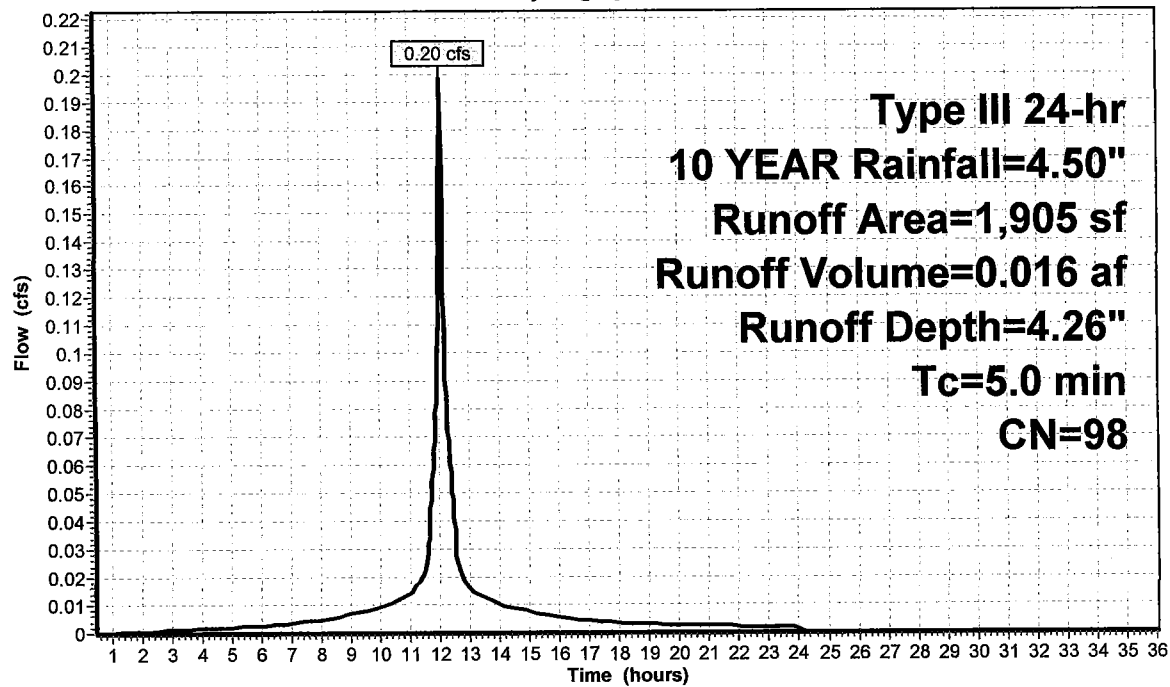
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YEAR Rainfall=4.50"

Area (sf)	CN	Description
1,905	98	Paved parking, HSG B
1,905		100.00% Impervious Area

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

Subcatchment 5S: PAVEMENT

Hydrograph



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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 23

Summary for Subcatchment 6S: PAVEMENT

Runoff = 0.80 cfs @ 12.07 hrs, Volume= 0.062 af, Depth= 4.26"

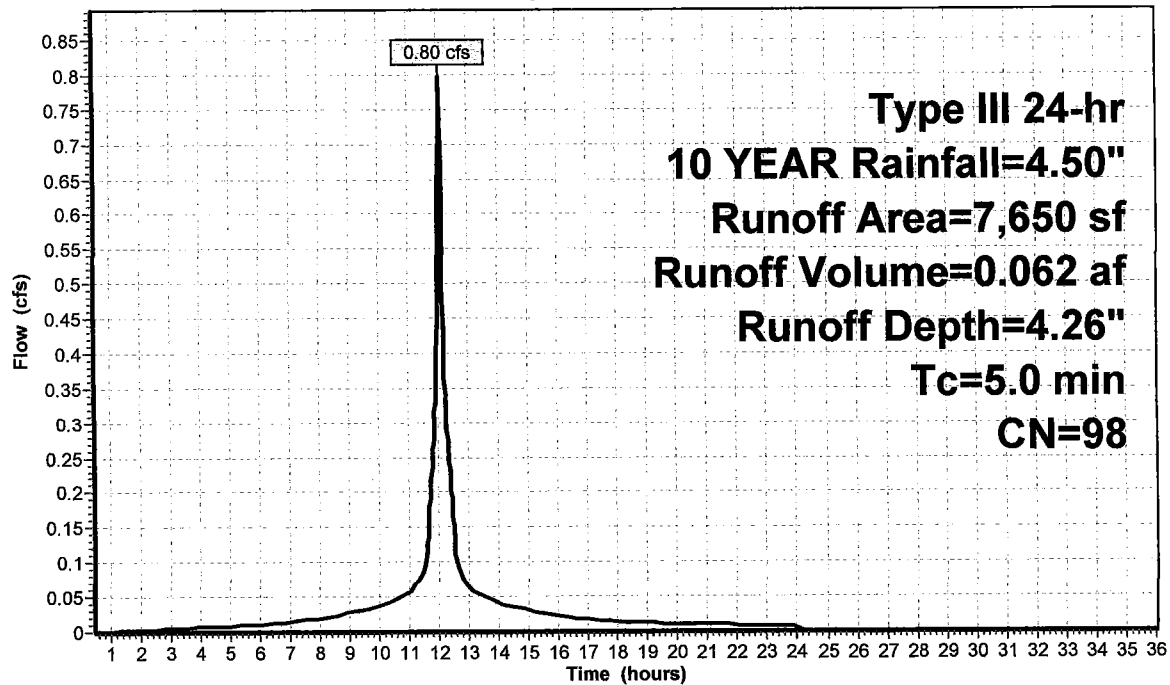
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YEAR Rainfall=4.50"

Area (sf)	CN	Description
7,650	98	Paved parking, HSG B
7,650		100.00% Impervious Area

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

Subcatchment 6S: PAVEMENT

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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 24

Summary for Reach 1R: INTERMITTENT STREAM

Inflow Area = 2.115 ac, 13.88% Impervious, Inflow Depth = 2.63" for 10 YEAR event
Inflow = 6.72 cfs @ 12.08 hrs, Volume= 0.463 af
Outflow = 6.50 cfs @ 12.11 hrs, Volume= 0.463 af, Atten= 3%, Lag= 1.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Max. Velocity= 3.38 fps, Min. Travel Time= 1.8 min

Avg. Velocity = 0.92 fps, Avg. Travel Time= 6.5 min

Peak Storage= 691 cf @ 12.11 hrs

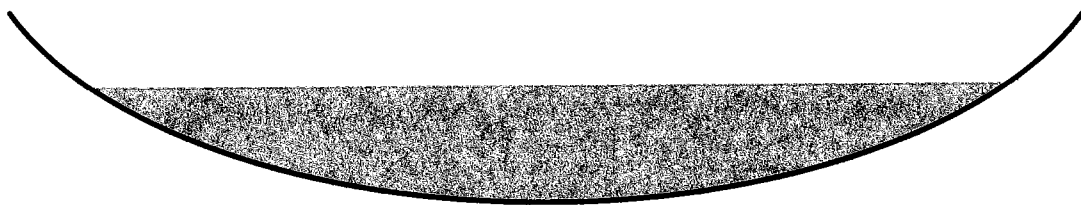
Average Depth at Peak Storage= 0.61'

Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 18.47 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds

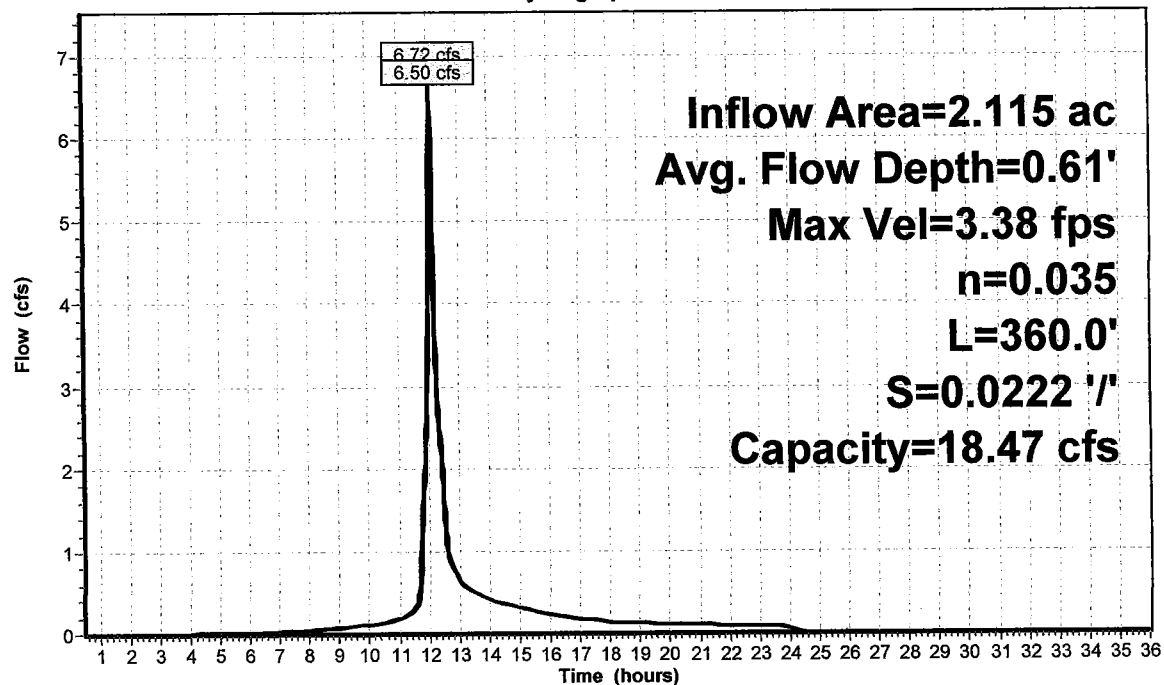
Length= 360.0' Slope= 0.0222 '/'

Inlet Invert= 502.00', Outlet Invert= 494.00'



Reach 1R: INTERMITTENT STREAM

Hydrograph



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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 25

Summary for Reach 2R: CHANNEL

Inflow Area = 3.083 ac, 27.60% Impervious, Inflow Depth = 2.87" for 10 YEAR event
Inflow = 10.02 cfs @ 12.09 hrs, Volume= 0.737 af
Outflow = 10.01 cfs @ 12.10 hrs, Volume= 0.737 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Max. Velocity= 4.76 fps, Min. Travel Time= 0.2 min

Avg. Velocity= 1.36 fps, Avg. Travel Time= 0.8 min

Peak Storage= 137 cf @ 12.10 hrs

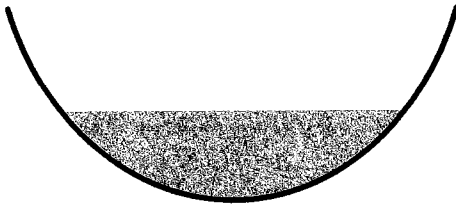
Average Depth at Peak Storage= 0.93'

Bank-Full Depth= 2.00' Flow Area= 6.7 sf, Capacity= 48.56 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040 Earth, cobble bottom, clean sides

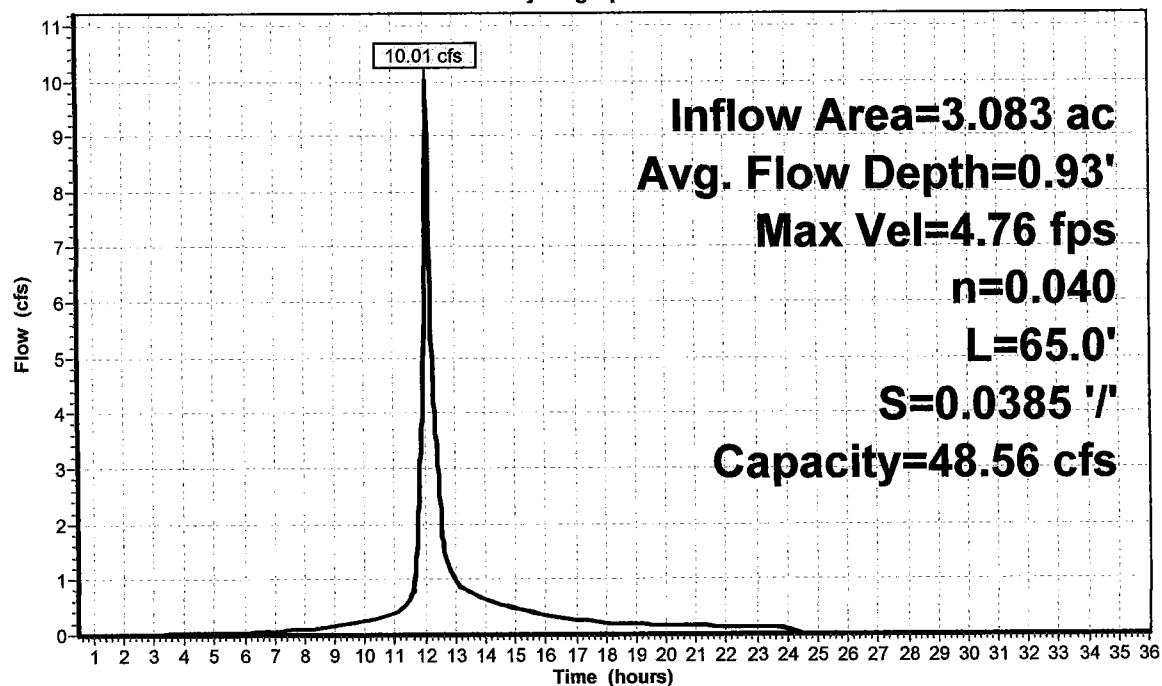
Length= 65.0' Slope= 0.0385 '/'

Inlet Invert= 494.00', Outlet Invert= 491.50'



Reach 2R: CHANNEL

Hydrograph



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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 26

Summary for Pond 5P: CB#4

Inflow Area = 0.430 ac, 17.79% Impervious, Inflow Depth = 2.55" for 10 YEAR event
Inflow = 1.33 cfs @ 12.08 hrs, Volume= 0.091 af
Outflow = 1.33 cfs @ 12.08 hrs, Volume= 0.091 af, Atten= 0%, Lag= 0.0 min
Primary = 1.33 cfs @ 12.08 hrs, Volume= 0.091 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 498.55' @ 12.08 hrs

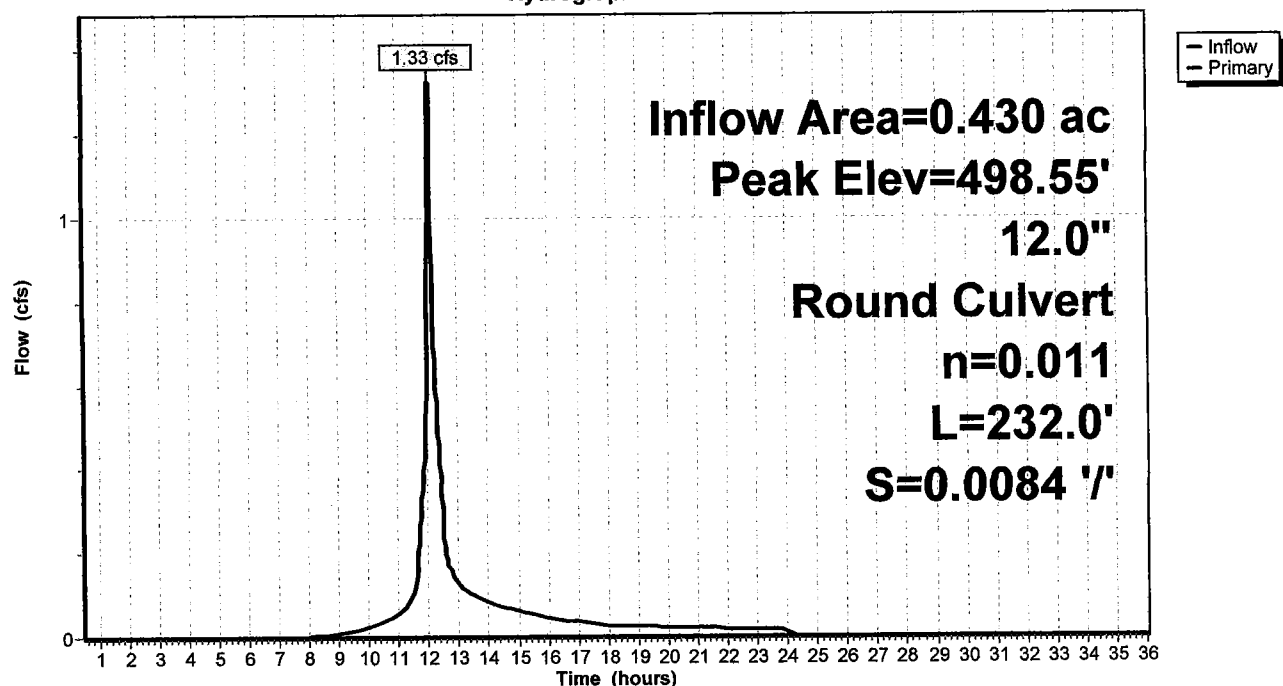
Flood Elev= 500.37'

Device	Routing	Invert	Outlet Devices
#1	Primary	497.82'	12.0" Round Culvert L= 232.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 497.82' / 495.88' S= 0.0084 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.30 cfs @ 12.08 hrs HW=498.53' TW=497.59' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 1.30 cfs @ 3.06 fps)

Pond 5P: CB#4

Hydrograph



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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 27

Summary for Pond 6P: CB#3

Inflow Area = 0.750 ac, 45.13% Impervious, Inflow Depth = 3.14" for 10 YEAR event
Inflow = 2.73 cfs @ 12.07 hrs, Volume= 0.196 af
Outflow = 2.73 cfs @ 12.07 hrs, Volume= 0.196 af, Atten= 0%, Lag= 0.0 min
Primary = 2.73 cfs @ 12.07 hrs, Volume= 0.196 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 497.65' @ 12.08 hrs

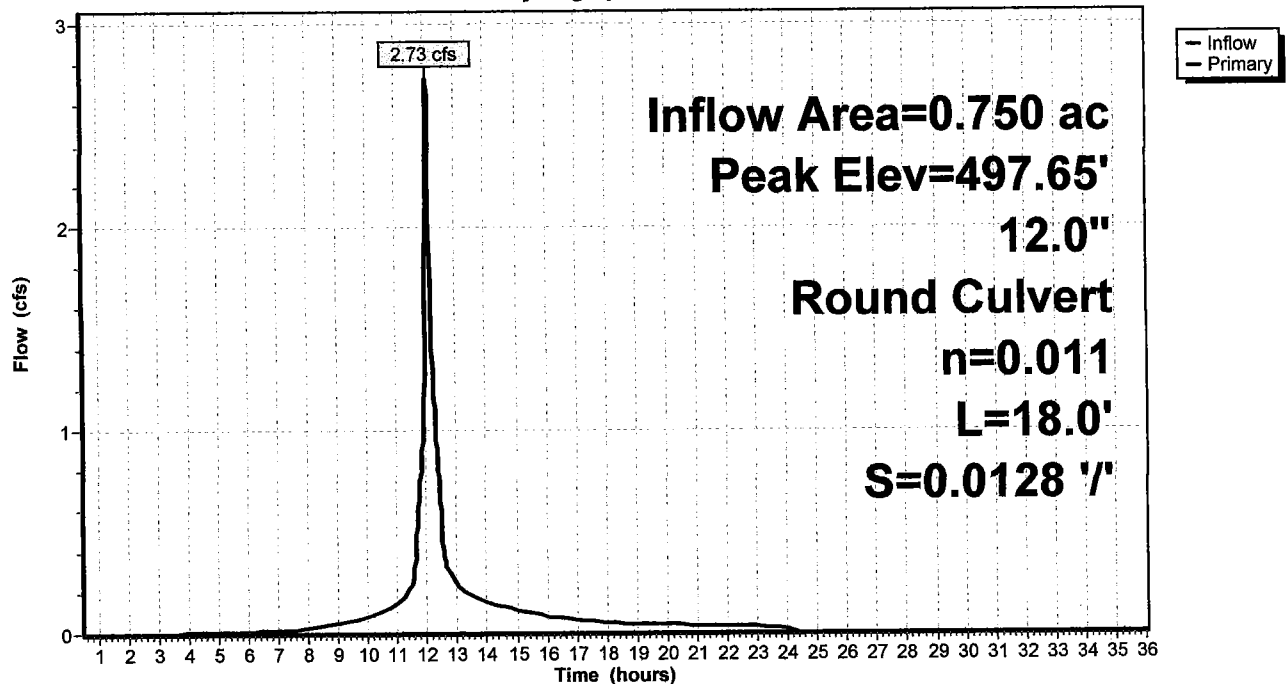
Flood Elev= 499.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.88'	12.0" Round Culvert L= 18.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.88' / 495.65' S= 0.0128 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.50 cfs @ 12.07 hrs HW=497.57' TW=497.13' (Dynamic Tailwater)
←1=Culvert (Inlet Controls 2.50 cfs @ 3.18 fps)

Pond 6P: CB#3

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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 28

Summary for Pond 7P: CB#2

Inflow Area = 0.793 ac, 48.15% Impervious, Inflow Depth = 3.20" for 10 YEAR event
Inflow = 2.93 cfs @ 12.07 hrs, Volume= 0.211 af
Outflow = 2.93 cfs @ 12.07 hrs, Volume= 0.211 af, Atten= 0%, Lag= 0.0 min
Primary = 2.93 cfs @ 12.07 hrs, Volume= 0.211 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 497.16' @ 12.07 hrs

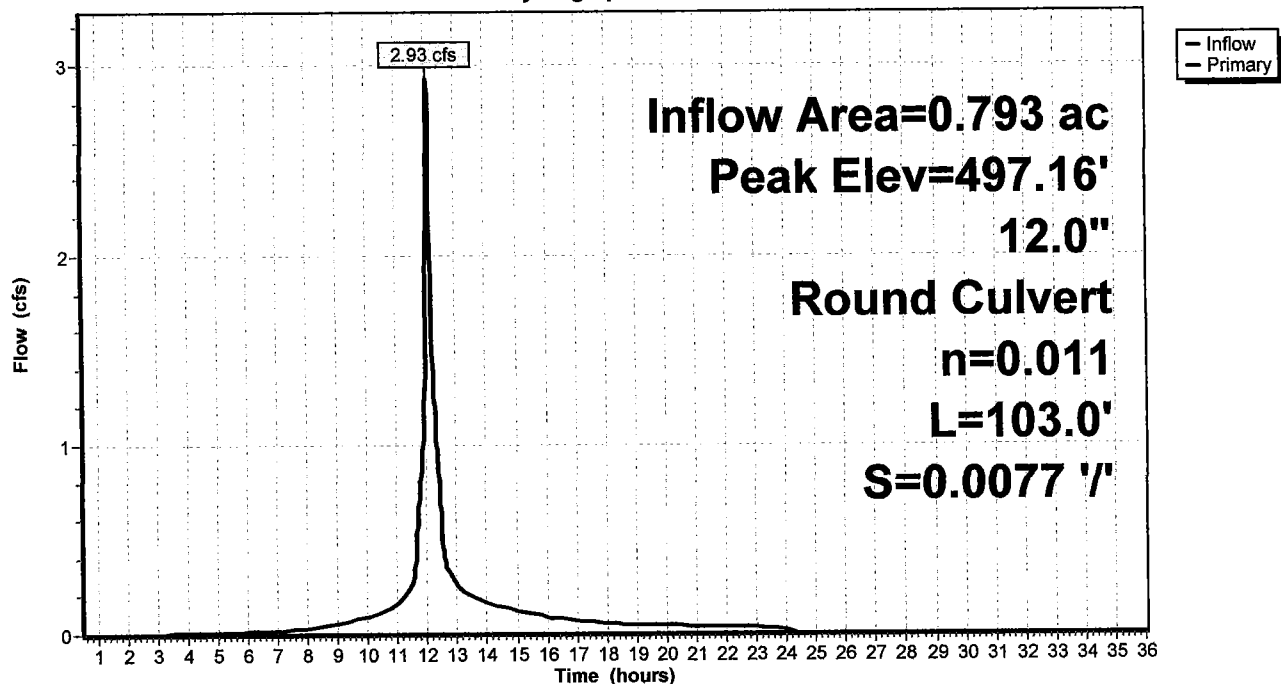
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.65'	12.0" Round Culvert L= 103.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.65' / 494.86' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.91 cfs @ 12.07 hrs HW=497.13' TW=496.32' (Dynamic Tailwater)
1=Culvert (Outlet Controls 2.91 cfs @ 3.70 fps)

Pond 7P: CB#2

Hydrograph



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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 29

Summary for Pond 8P: CB#1

Inflow Area = 0.969 ac, 57.55% Impervious, Inflow Depth = 3.39" for 10 YEAR event
Inflow = 3.73 cfs @ 12.07 hrs, Volume= 0.274 af
Outflow = 3.73 cfs @ 12.07 hrs, Volume= 0.274 af, Atten= 0%, Lag= 0.0 min
Primary = 3.73 cfs @ 12.07 hrs, Volume= 0.274 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 496.33' @ 12.07 hrs

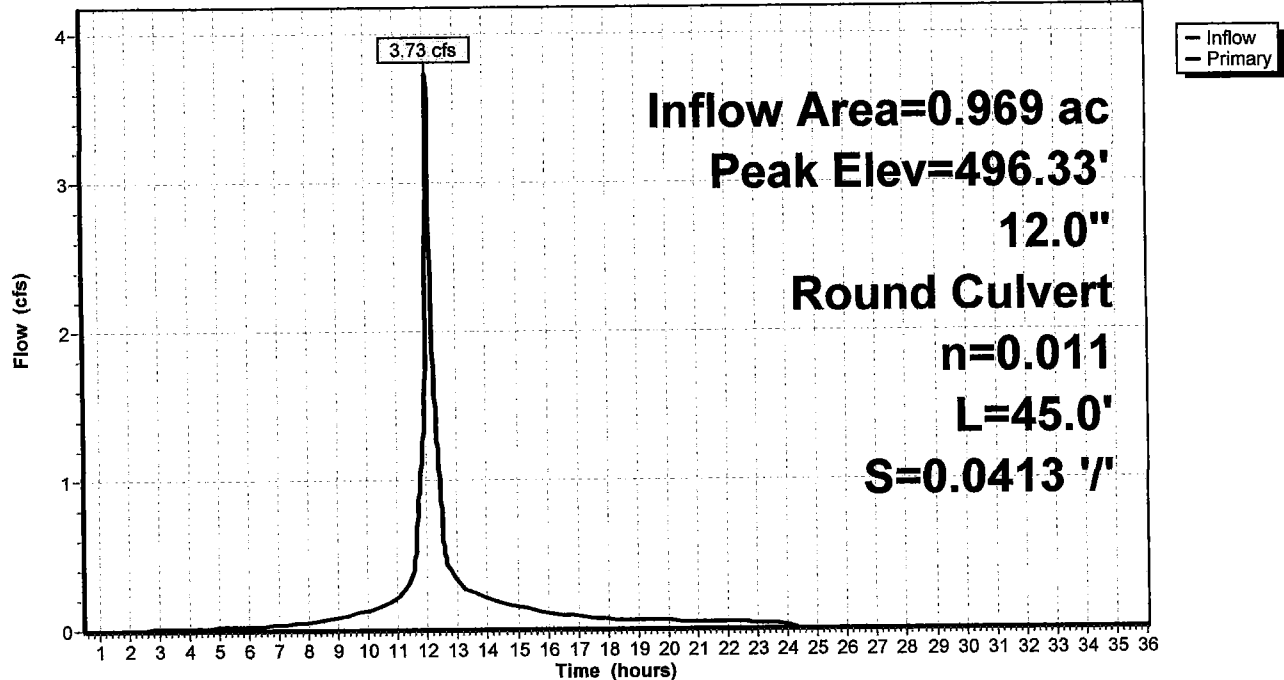
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	494.86'	12.0" Round Culvert L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 494.86' / 493.00' S= 0.0413 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.70 cfs @ 12.07 hrs HW=496.32' TW=494.91' (Dynamic Tailwater)
↑1=Culvert (Inlet Controls 3.70 cfs @ 4.71 fps)

Pond 8P: CB#1

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Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 30

Summary for Pond 10P: EXIST. STORMWATER BASIN

Inflow Area = 1.496 ac, 0.00% Impervious, Inflow Depth = 2.29" for 10 YEAR event
 Inflow = 4.15 cfs @ 12.08 hrs, Volume= 0.286 af
 Outflow = 4.06 cfs @ 12.09 hrs, Volume= 0.260 af, Atten= 2%, Lag= 1.0 min
 Primary = 4.06 cfs @ 12.09 hrs, Volume= 0.260 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 503.35' @ 12.09 hrs Surf.Area= 1,061 sf Storage= 1,450 cf

Flood Elev= 504.00' Surf.Area= 1,300 sf Storage= 2,219 cf

Plug-Flow detention time= 64.2 min calculated for 0.260 af (91% of inflow)

Center-of-Mass det. time= 19.9 min (850.9 - 831.0)

Volume	Invert	Avail.Storage	Storage Description
#1	500.70'	2,219 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.70	30	0	0
501.00	203	35	35
502.00	500	352	386
503.00	933	717	1,103
504.00	1,300	1,117	2,219

Device	Routing	Invert	Outlet Devices
#1	Primary	503.00'	8.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=4.03 cfs @ 12.09 hrs HW=503.35' TW=502.61' (Dynamic Tailwater)

1=Broad-Crested Rectangular Weir (Weir Controls 4.03 cfs @ 1.46 fps)

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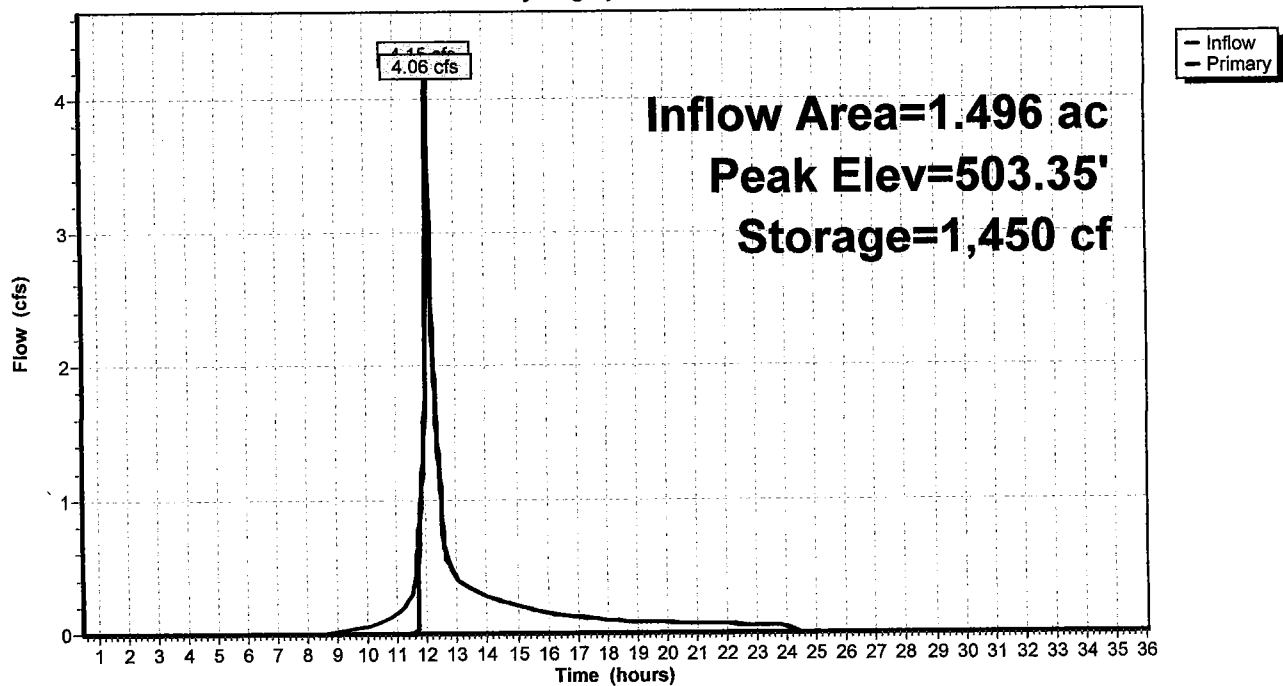
101 HUNTOON PRE-DEVELOPMENT
Type III 24-hr 10 YEAR Rainfall=4.50"

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Page 31

Pond 10P: EXIST. STORMWATER BASIN

Hydrograph



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101 HUNTOON PRE-DEVELOPMENT
Type III 24-hr 25 YEAR Rainfall=5.40"

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Page 32

Summary for Subcatchment 1S: GRAVELPAVEMENT

Runoff = 1.74 cfs @ 12.07 hrs, Volume= 0.120 af, Depth= 3.34"

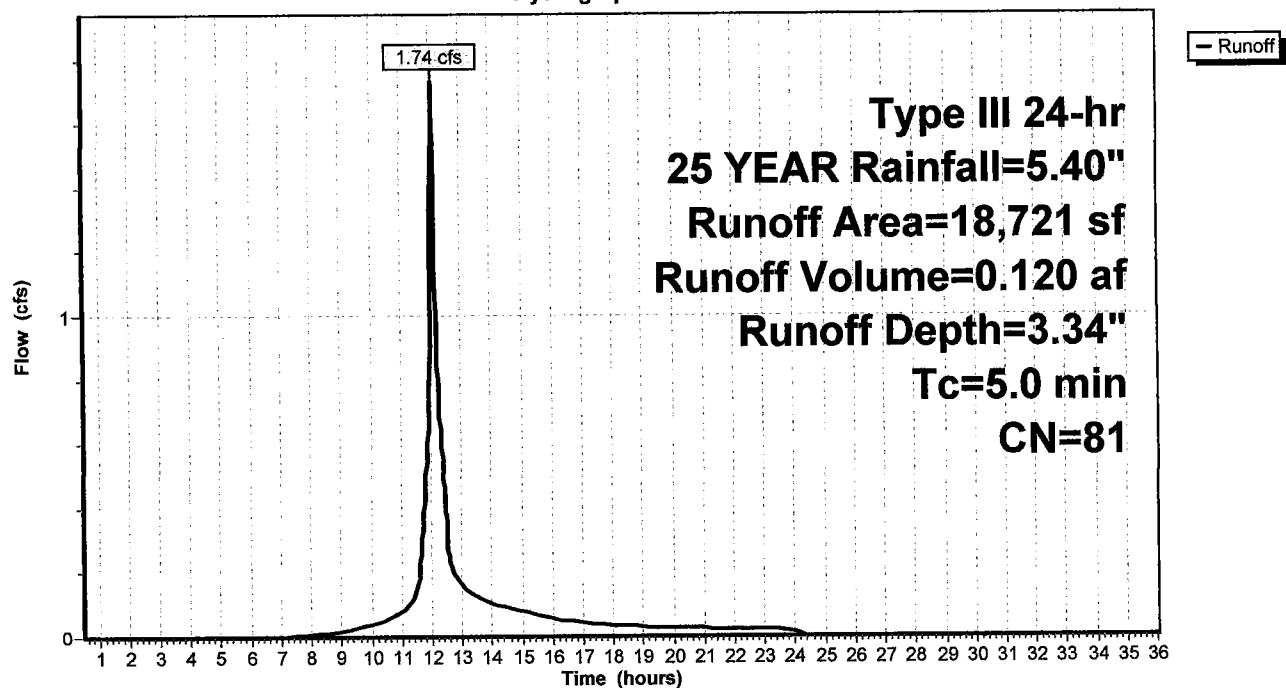
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YEAR Rainfall=5.40"

	Area (sf)	CN	Description
*	3,330	98	Paved parking HSG B
	7,350	56	Brush, Fair, HSG B
	8,041	96	Gravel surface, HSG B
	18,721	81	Weighted Average
	15,391		82.21% Pervious Area
	3,330		17.79% Impervious Area

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

Subcatchment 1S: GRAVELPAVEMENT

Hydrograph



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Page 33

Summary for Subcatchment 2S: PAVEMENT\BLDG

Runoff = 3.30 cfs @ 12.07 hrs, Volume= 0.248 af, Depth= 4.82"

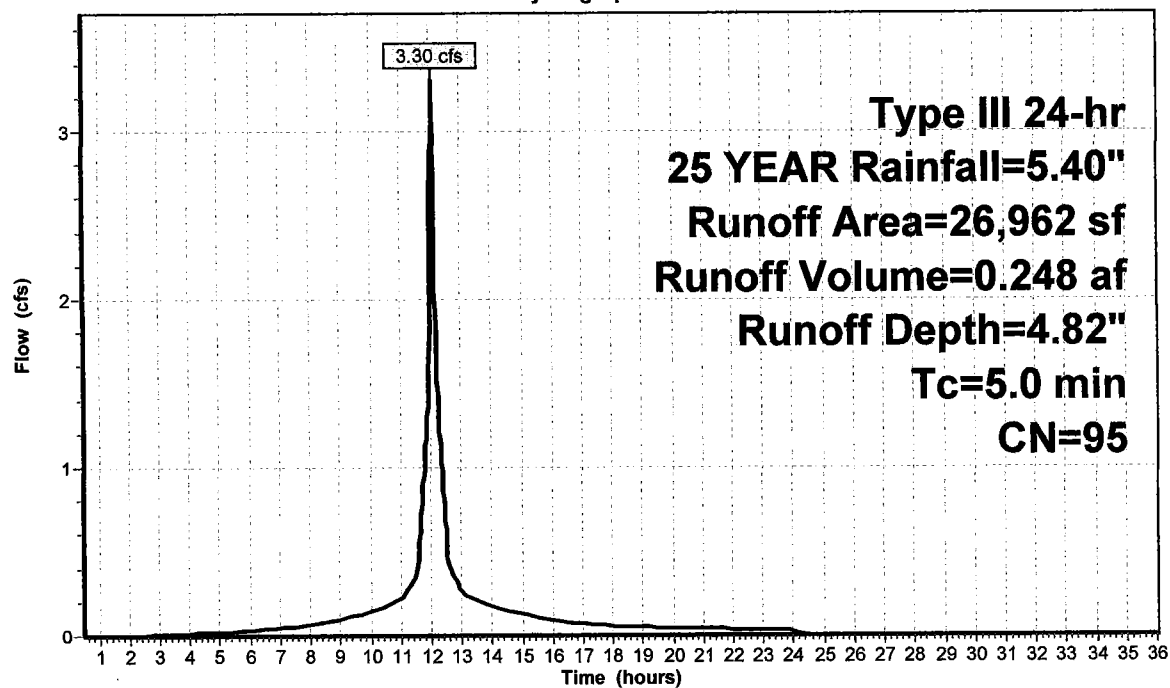
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YEAR Rainfall=5.40"

Area (sf)	CN	Description
2,775	79	<50% Grass cover, Poor, HSG B
* 12,787	98	Roofs, PAVEMENT HSG B
11,400	96	Gravel surface, HSG B
26,962	95	Weighted Average
14,175		52.57% Pervious Area
12,787		47.43% Impervious Area

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

Subcatchment 2S: PAVEMENT\BLDG

Hydrograph



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Page 34

Summary for Subcatchment 3S: LOT#2

Runoff = 5.54 cfs @ 12.08 hrs, Volume= 0.381 af, Depth= 3.05"

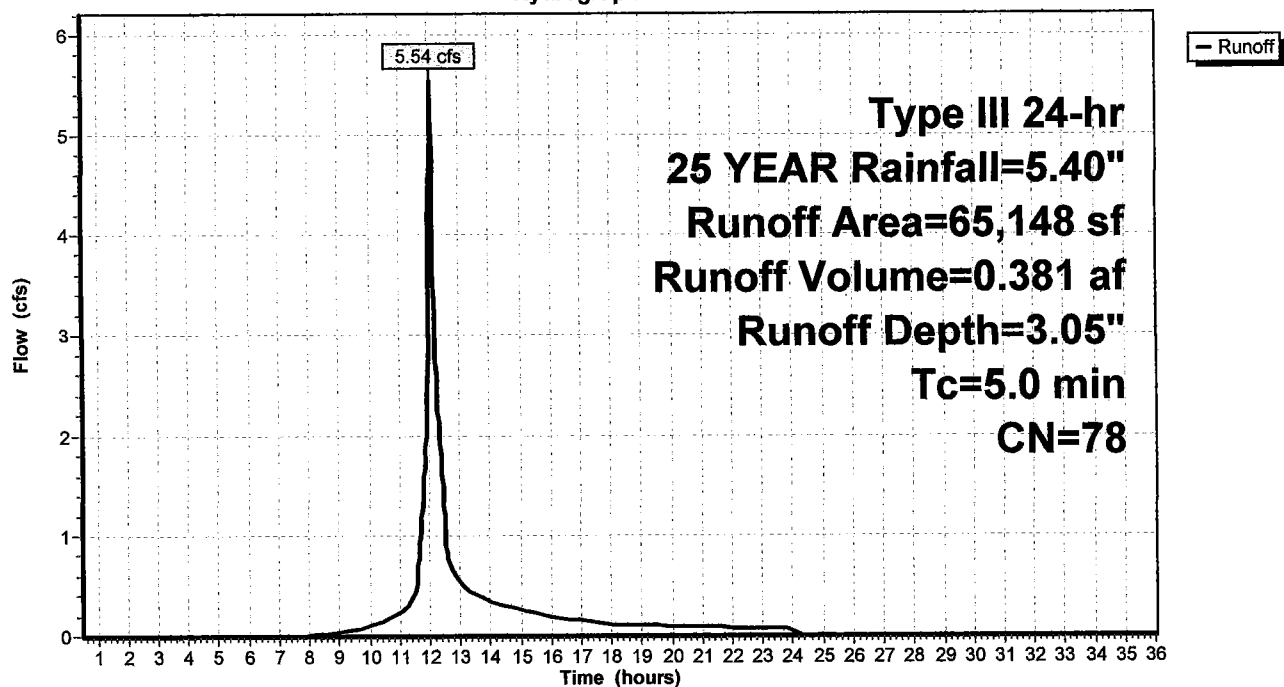
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YEAR Rainfall=5.40"

Area (sf)	CN	Description
33,118	60	Woods, Fair, HSG B
32,030	96	Gravel surface, HSG B
65,148	78	Weighted Average
65,148		100.00% Pervious Area

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

Subcatchment 3S: LOT#2

Hydrograph



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Type III 24-hr 25 YEAR Rainfall=5.40"

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Page 35

Summary for Subcatchment 4S: PAVEMENT/BLDG

Runoff = 1.70 cfs @ 12.07 hrs, Volume= 0.128 af, Depth= 4.82"

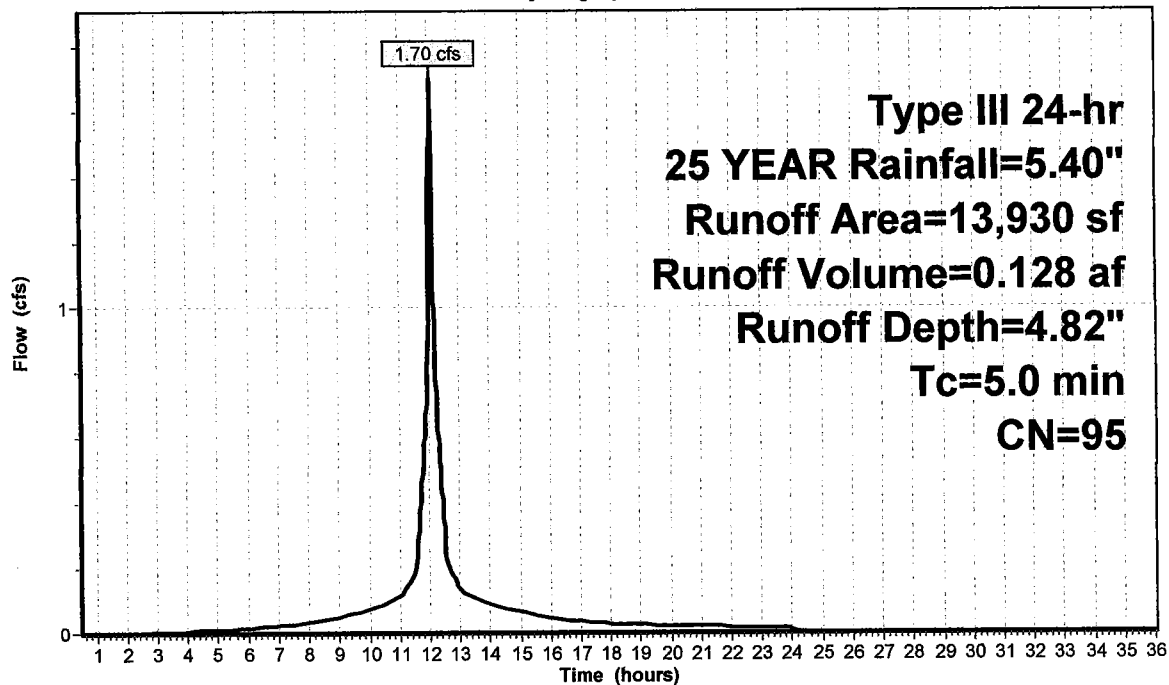
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YEAR Rainfall=5.40"

	Area (sf)	CN	Description
*	11,405	98	Roofs, Pavement HSG B
	2,525	79	<50% Grass cover, Poor, HSG B
	13,930	95	Weighted Average
	2,525		18.13% Pervious Area
	11,405		81.87% Impervious Area

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

Subcatchment 4S: PAVEMENT/BLDG

Hydrograph



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Type III 24-hr 25 YEAR Rainfall=5.40"

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Page 36

Summary for Subcatchment 5S: PAVEMENT

Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 5.16"

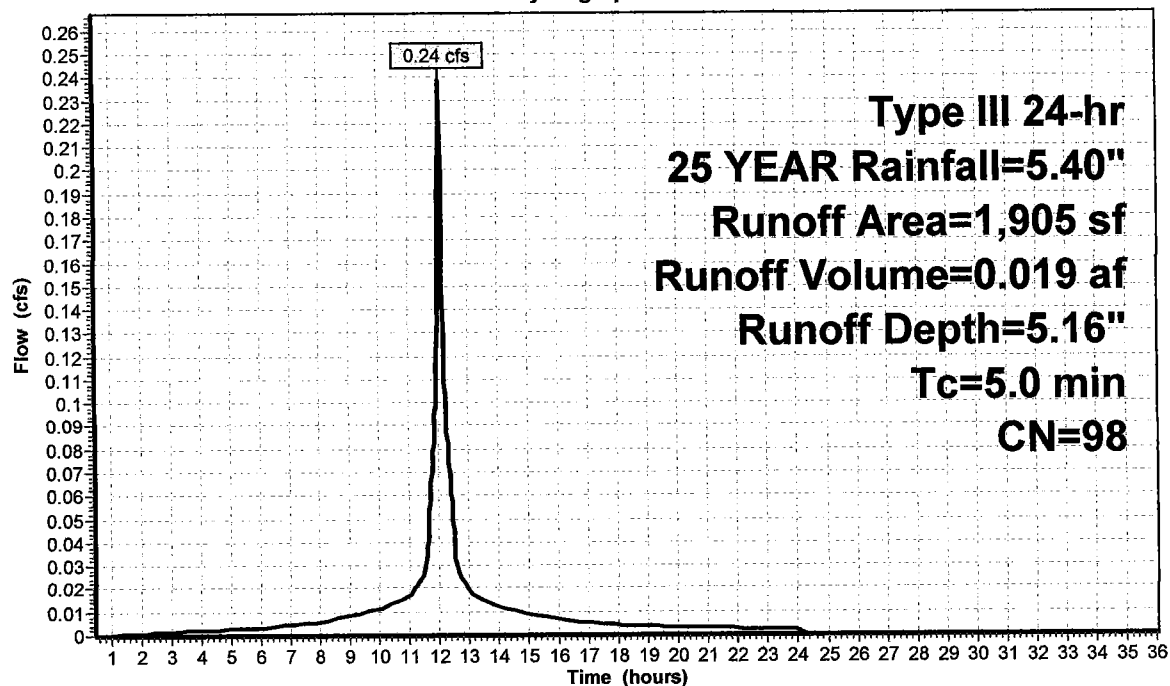
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YEAR Rainfall=5.40"

Area (sf)	CN	Description
1,905	98	Paved parking, HSG B
1,905		100.00% Impervious Area

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

Subcatchment 5S: PAVEMENT

Hydrograph



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Page 37

Summary for Subcatchment 6S: PAVEMENT

Runoff = 0.96 cfs @ 12.07 hrs, Volume= 0.076 af, Depth= 5.16"

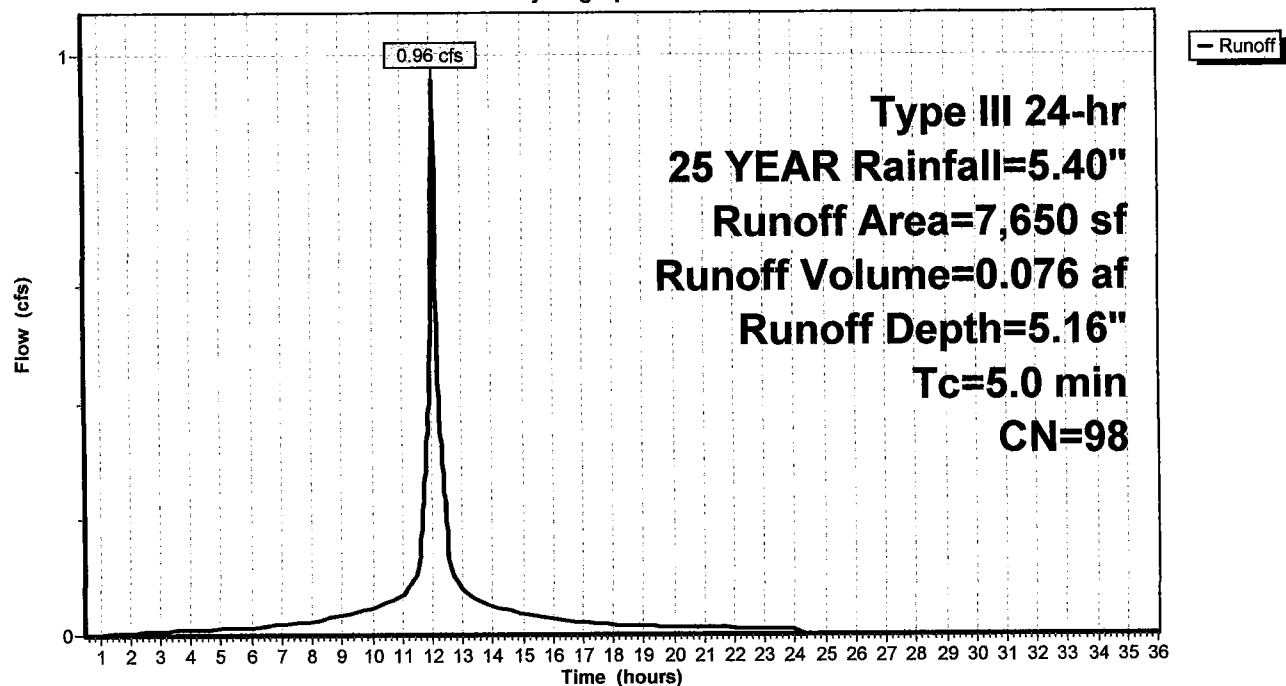
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YEAR Rainfall=5.40"

Area (sf)	CN	Description
7,650	98	Paved parking, HSG B
7,650		100.00% Impervious Area

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

Subcatchment 6S: PAVEMENT

Hydrograph



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Type III 24-hr 25 YEAR Rainfall=5.40"

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Page 38

Summary for Reach 1R: INTERMITTENT STREAM

Inflow Area = 2.115 ac, 13.88% Impervious, Inflow Depth = 3.43" for 25 YEAR event
Inflow = 8.68 cfs @ 12.08 hrs, Volume= 0.604 af
Outflow = 8.43 cfs @ 12.10 hrs, Volume= 0.604 af, Atten= 3%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Max. Velocity= 3.66 fps, Min. Travel Time= 1.6 min

Avg. Velocity = 0.99 fps, Avg. Travel Time= 6.1 min

Peak Storage= 829 cf @ 12.10 hrs

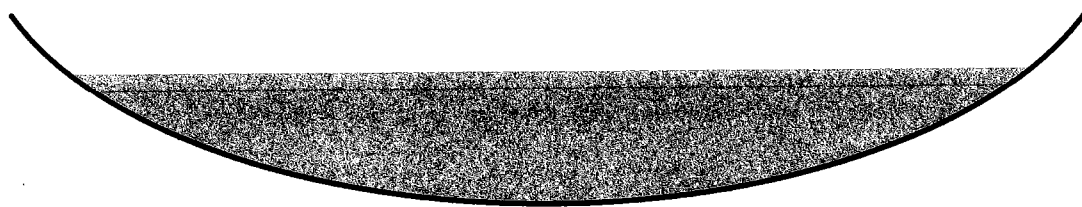
Average Depth at Peak Storage= 0.69'

Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 18.47 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds

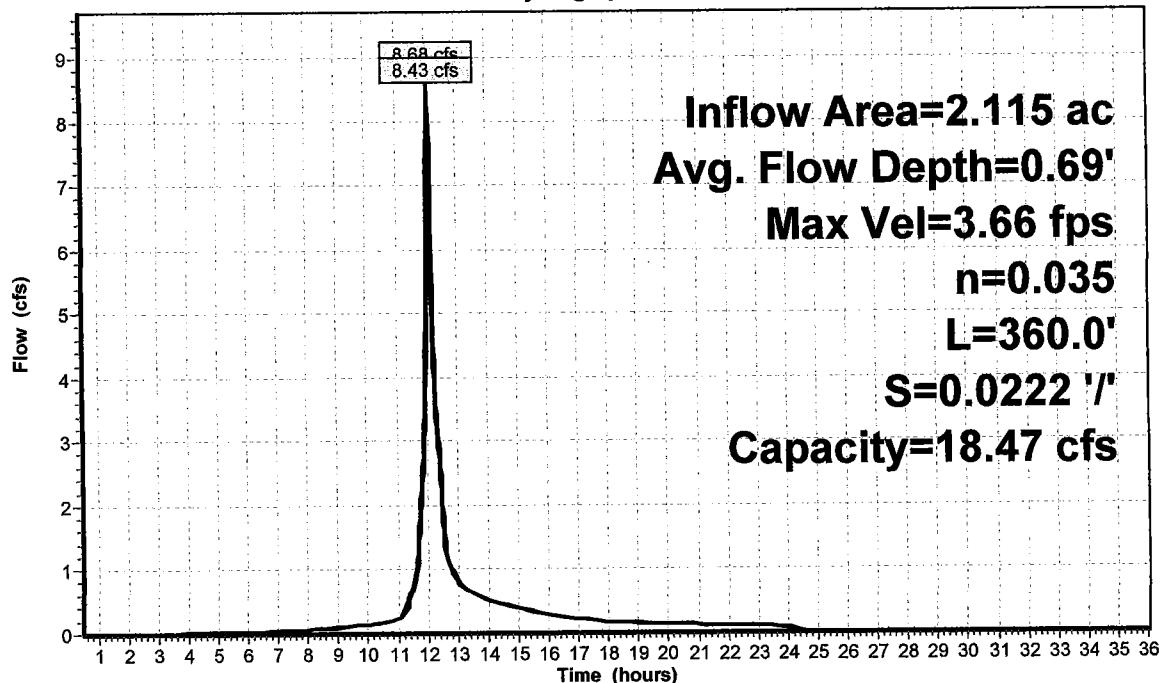
Length= 360.0' Slope= 0.0222 '/'

Inlet Invert= 502.00', Outlet Invert= 494.00'



Reach 1R: INTERMITTENT STREAM

Hydrograph



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Type III 24-hr 25 YEAR Rainfall=5.40"

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Page 39

Summary for Reach 2R: CHANNEL

Inflow Area = 3.083 ac, 27.60% Impervious, Inflow Depth = 3.68" for 25 YEAR event
Inflow = 12.83 cfs @ 12.09 hrs, Volume= 0.946 af
Outflow = 12.83 cfs @ 12.09 hrs, Volume= 0.946 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Max. Velocity= 5.09 fps, Min. Travel Time= 0.2 min

Avg. Velocity = 1.45 fps, Avg. Travel Time= 0.7 min

Peak Storage= 164 cf @ 12.09 hrs

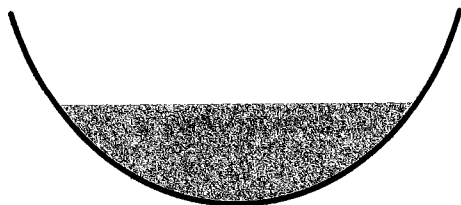
Average Depth at Peak Storage= 1.04'

Bank-Full Depth= 2.00' Flow Area= 6.7 sf, Capacity= 48.56 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040 Earth, cobble bottom, clean sides

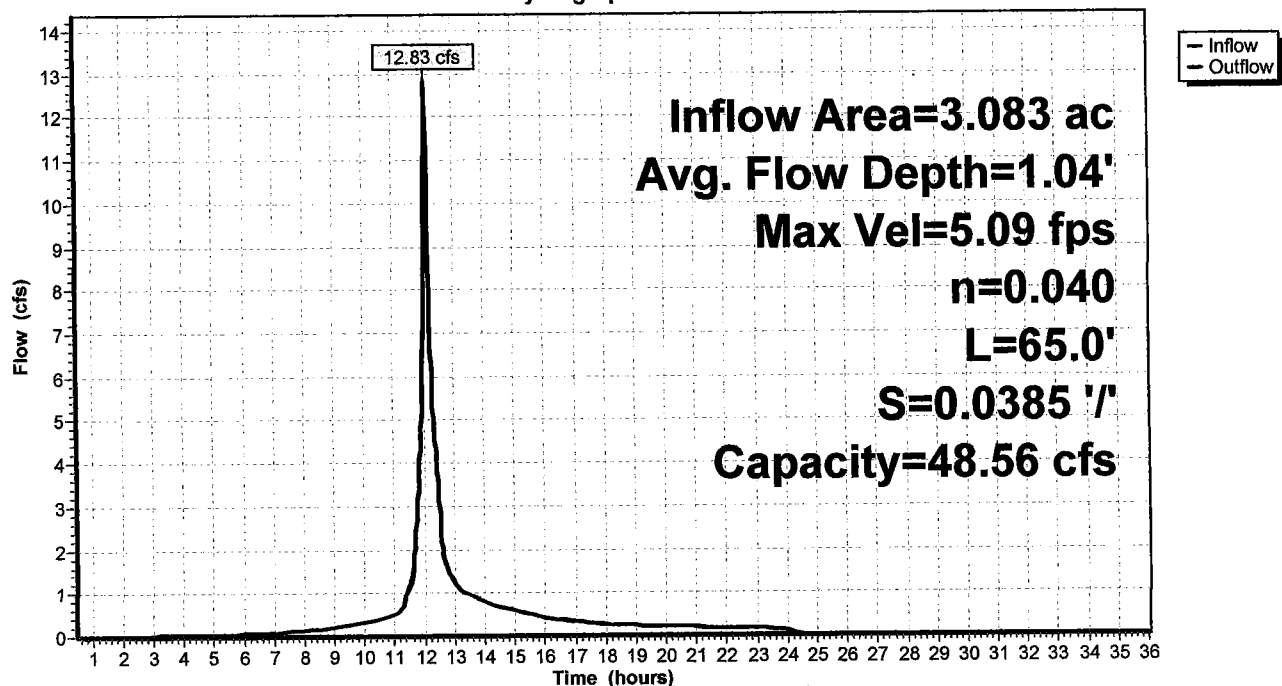
Length= 65.0' Slope= 0.0385 '/'

Inlet Invert= 494.00', Outlet Invert= 491.50'



Reach 2R: CHANNEL

Hydrograph



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Page 40

Summary for Pond 5P: CB#4

Inflow Area = 0.430 ac, 17.79% Impervious, Inflow Depth = 3.34" for 25 YEAR event
Inflow = 1.74 cfs @ 12.07 hrs, Volume= 0.120 af
Outflow = 1.74 cfs @ 12.07 hrs, Volume= 0.120 af, Atten= 0%, Lag= 0.0 min
Primary = 1.74 cfs @ 12.07 hrs, Volume= 0.120 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 499.45' @ 12.09 hrs

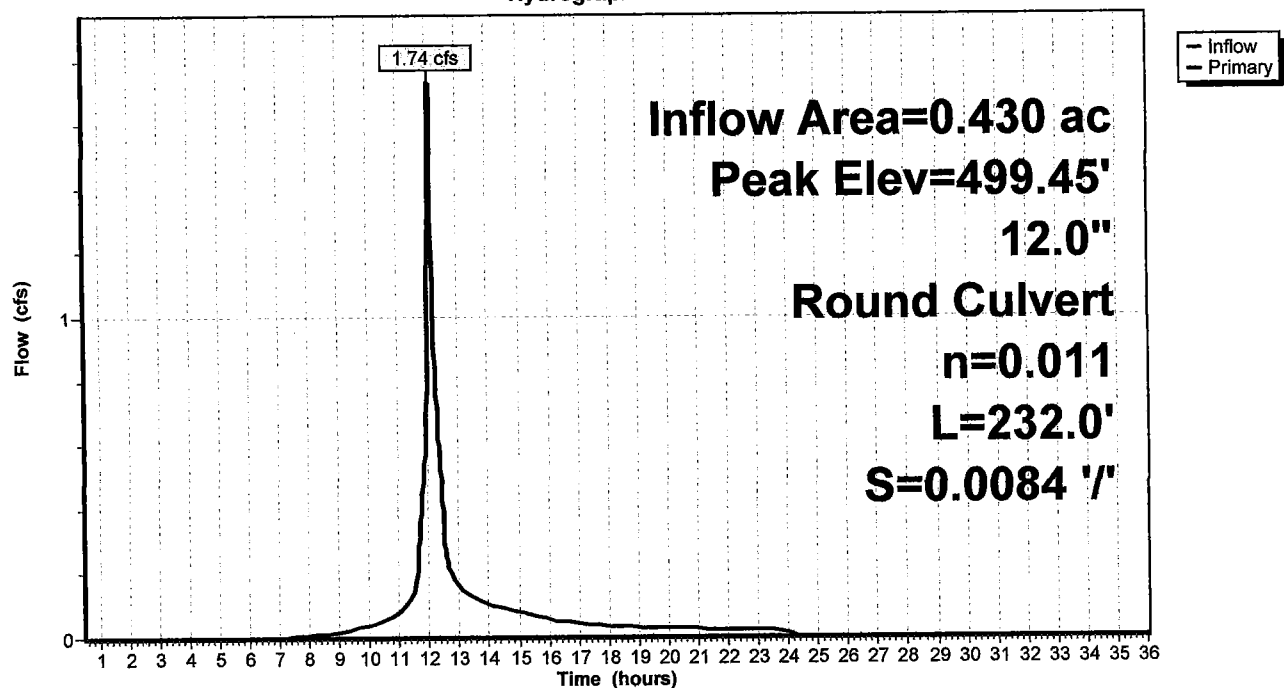
Flood Elev= 500.37'

Device	Routing	Invert	Outlet Devices
#1	Primary	497.82'	12.0" Round Culvert L= 232.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 497.82' / 495.88' S= 0.0084 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.60 cfs @ 12.07 hrs HW=499.30' TW=498.86' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 1.60 cfs @ 2.04 fps)

Pond 5P: CB#4

Hydrograph



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Type III 24-hr 25 YEAR Rainfall=5.40"

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Page 41

Summary for Pond 6P: CB#3

Inflow Area = 0.750 ac, 45.13% Impervious, Inflow Depth = 3.97" for 25 YEAR event
Inflow = 3.44 cfs @ 12.07 hrs, Volume= 0.248 af
Outflow = 3.44 cfs @ 12.07 hrs, Volume= 0.248 af, Atten= 0%, Lag= 0.0 min
Primary = 3.44 cfs @ 12.07 hrs, Volume= 0.248 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 498.93' @ 12.08 hrs

Flood Elev= 499.53'

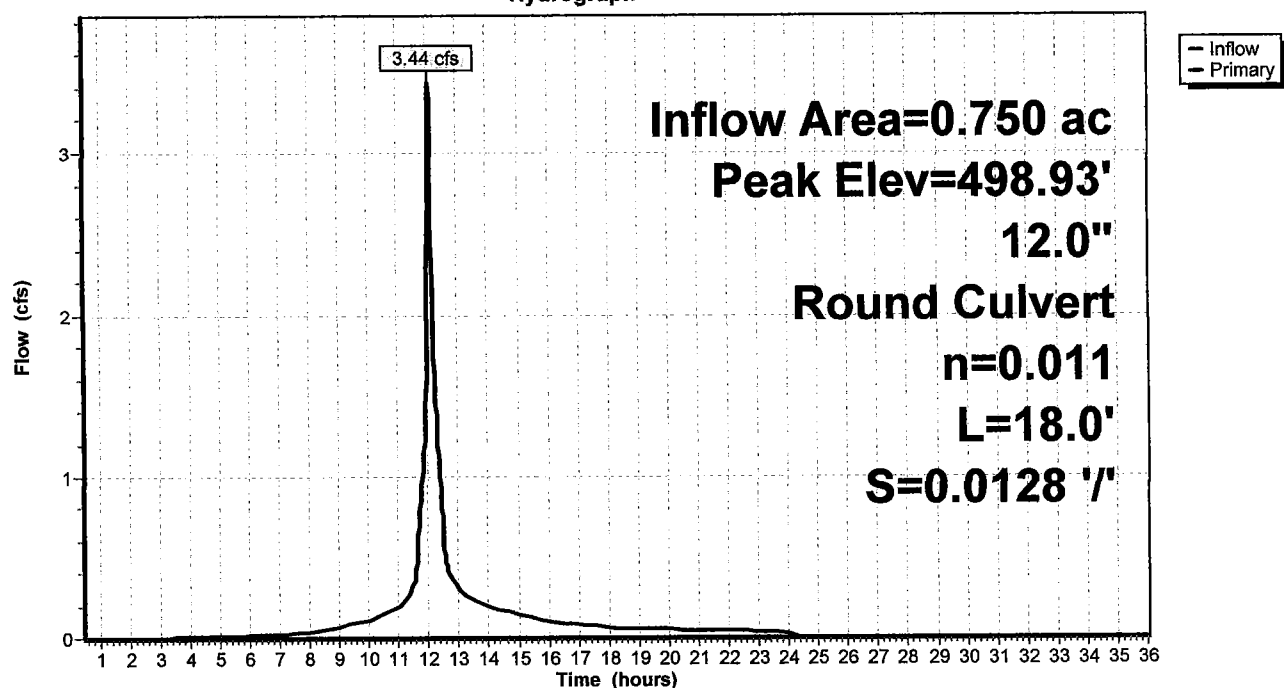
Device	Routing	Invert	Outlet Devices
#1	Primary	495.88'	12.0" Round Culvert L= 18.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.88' / 495.65' S= 0.0128 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.21 cfs @ 12.07 hrs HW=498.84' TW=498.12' (Dynamic Tailwater)

1=Culvert (Inlet Controls 3.21 cfs @ 4.09 fps)

Pond 6P: CB#3

Hydrograph



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Type III 24-hr 25 YEAR Rainfall=5.40"

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Page 42

Summary for Pond 7P: CB#2

Inflow Area = 0.793 ac, 48.15% Impervious, Inflow Depth = 4.04" for 25 YEAR event
Inflow = 3.68 cfs @ 12.07 hrs, Volume= 0.267 af
Outflow = 3.68 cfs @ 12.07 hrs, Volume= 0.267 af, Atten= 0%, Lag= 0.0 min
Primary = 3.68 cfs @ 12.07 hrs, Volume= 0.267 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 498.16' @ 12.07 hrs

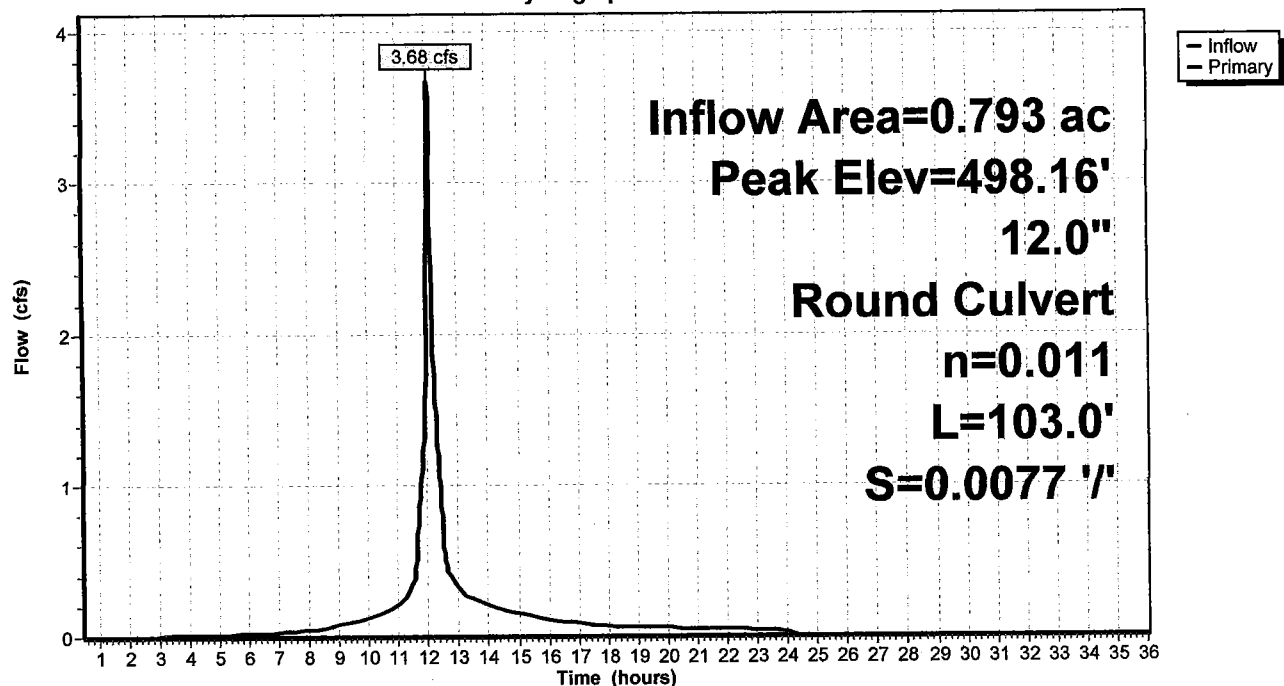
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.65'	12.0" Round Culvert L= 103.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.65' / 494.86' S= 0.0077 ' / ' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.65 cfs @ 12.07 hrs HW=498.12' TW=496.84' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 3.65 cfs @ 4.65 fps)

Pond 7P: CB#2

Hydrograph



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Page 43

Summary for Pond 8P: CB#1

Inflow Area = 0.969 ac, 57.55% Impervious, Inflow Depth = 4.24" for 25 YEAR event
Inflow = 4.63 cfs @ 12.07 hrs, Volume= 0.342 af
Outflow = 4.63 cfs @ 12.07 hrs, Volume= 0.342 af, Atten= 0%, Lag= 0.0 min
Primary = 4.63 cfs @ 12.07 hrs, Volume= 0.342 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 496.86' @ 12.07 hrs

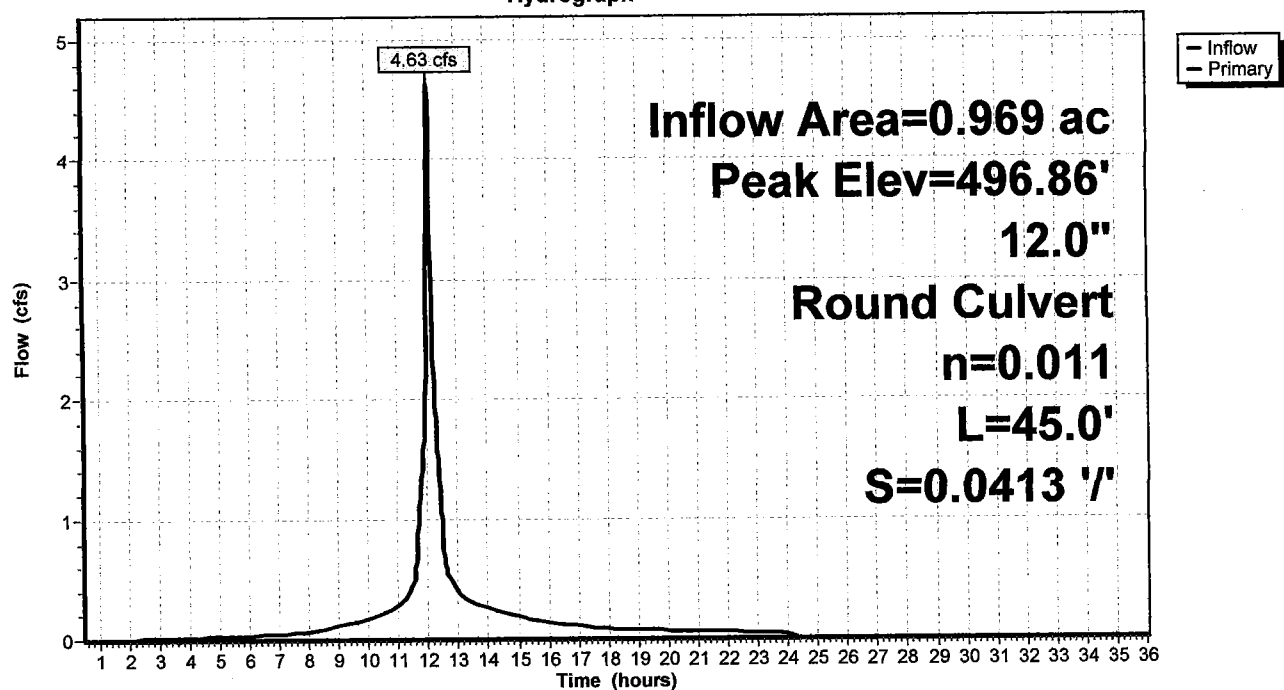
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	494.86'	12.0" Round Culvert L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 494.86' / 493.00' S= 0.0413 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=4.60 cfs @ 12.07 hrs HW=496.84' TW=495.02' (Dynamic Tailwater)
↑1=Culvert (Inlet Controls 4.60 cfs @ 5.86 fps)

Pond 8P: CB#1

Hydrograph



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Page 44

Summary for Pond 10P: EXIST. STORMWATER BASIN

Inflow Area = 1.496 ac, 0.00% Impervious, Inflow Depth = 3.05" for 25 YEAR event
 Inflow = 5.54 cfs @ 12.08 hrs, Volume= 0.381 af
 Outflow = 5.45 cfs @ 12.09 hrs, Volume= 0.355 af, Atten= 2%, Lag= 0.9 min
 Primary = 5.45 cfs @ 12.09 hrs, Volume= 0.355 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 503.42' @ 12.09 hrs Surf.Area= 1,086 sf Storage= 1,524 cf

Flood Elev= 504.00' Surf.Area= 1,300 sf Storage= 2,219 cf

Plug-Flow detention time= 52.3 min calculated for 0.355 af (93% of inflow)

Center-of-Mass det. time= 17.1 min (839.9 - 822.8)

Volume	Invert	Avail.Storage	Storage Description
#1	500.70'	2,219 cf	Custom Stage Data (Prismatic) Listed below (Recalc)
Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.70	30	0	0
501.00	203	35	35
502.00	500	352	386
503.00	933	717	1,103
504.00	1,300	1,117	2,219

Device	Routing	Invert	Outlet Devices
#1	Primary	503.00'	8.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=5.40 cfs @ 12.09 hrs HW=503.42' TW=502.69' (Dynamic Tailwater)

↑1=Broad-Crested Rectangular Weir (Weir Controls 5.40 cfs @ 1.63 fps)

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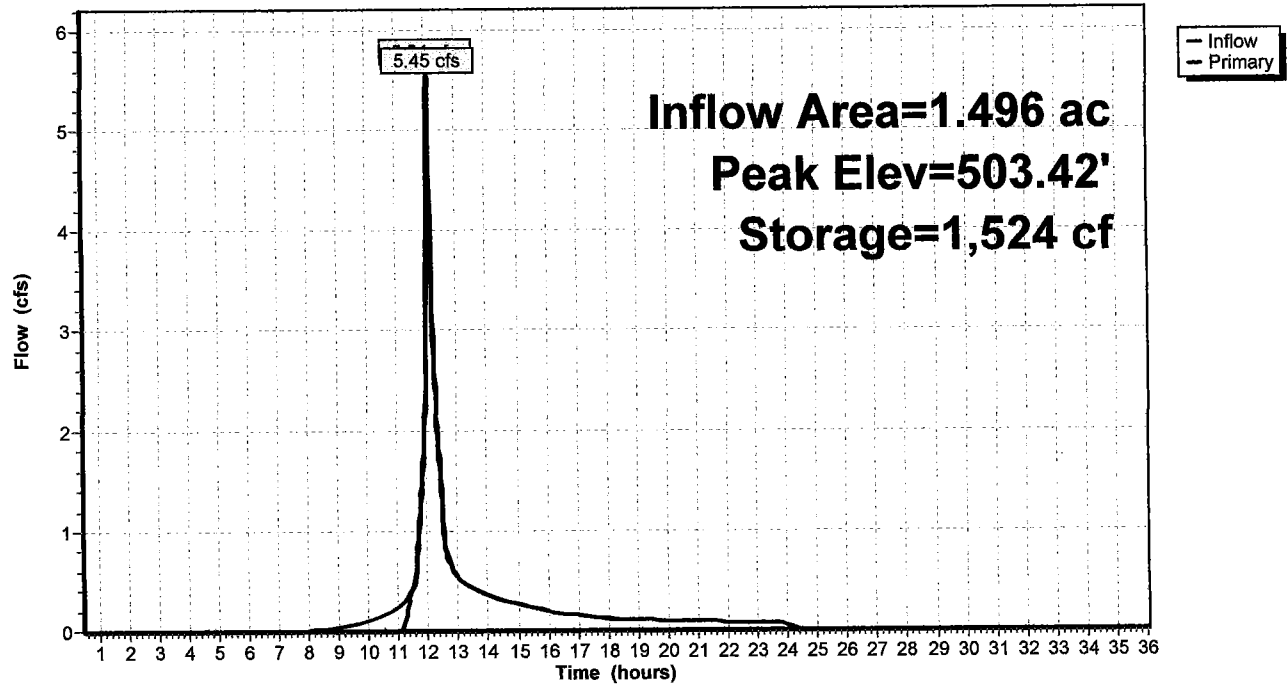
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Page 45

Pond 10P: EXIST. STORMWATER BASIN

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Page 46

Summary for Subcatchment 1S: GRAVEL PAVEMENT

Runoff = 2.33 cfs @ 12.07 hrs, Volume= 0.162 af, Depth= 4.53"

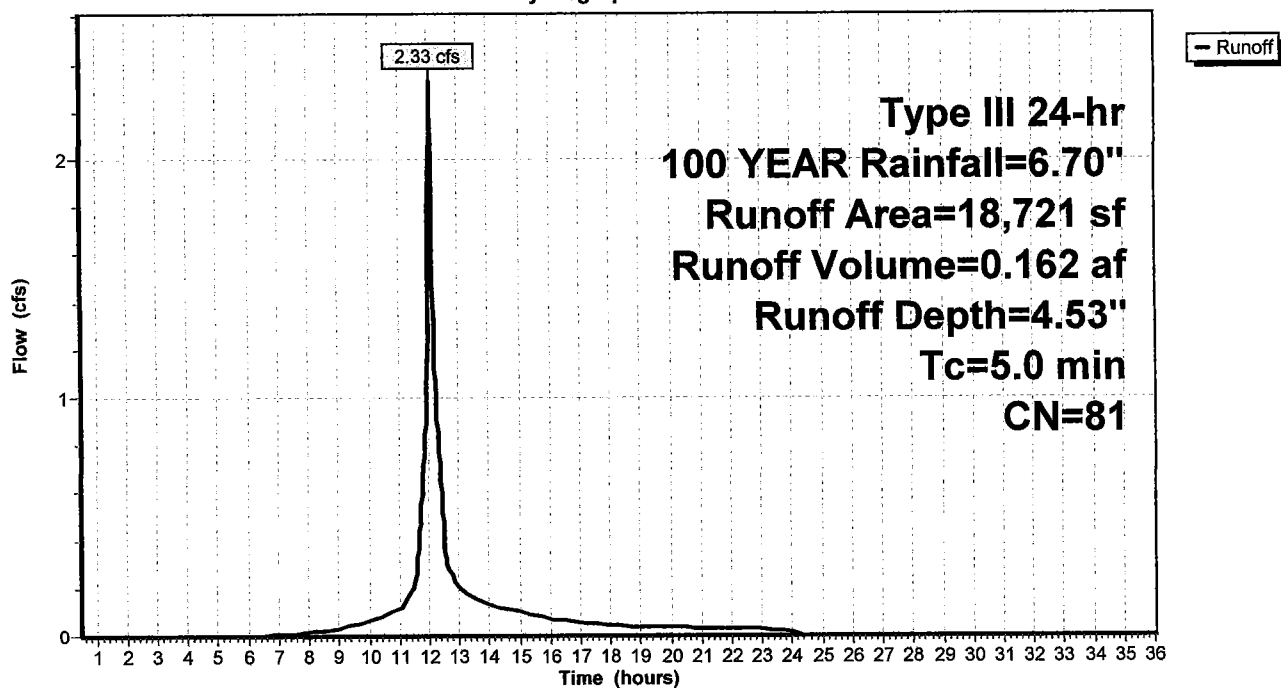
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YEAR Rainfall=6.70"

	Area (sf)	CN	Description
*	3,330	98	Paved parking HSG B
	7,350	56	Brush, Fair, HSG B
	8,041	96	Gravel surface, HSG B
	18,721	81	Weighted Average
	15,391		82.21% Pervious Area
	3,330		17.79% Impervious Area

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

Subcatchment 1S: GRAVEL PAVEMENT

Hydrograph



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Page 47

Summary for Subcatchment 2S: PAVEMENT\BLDG

Runoff = 4.13 cfs @ 12.07 hrs, Volume= 0.315 af, Depth= 6.11"

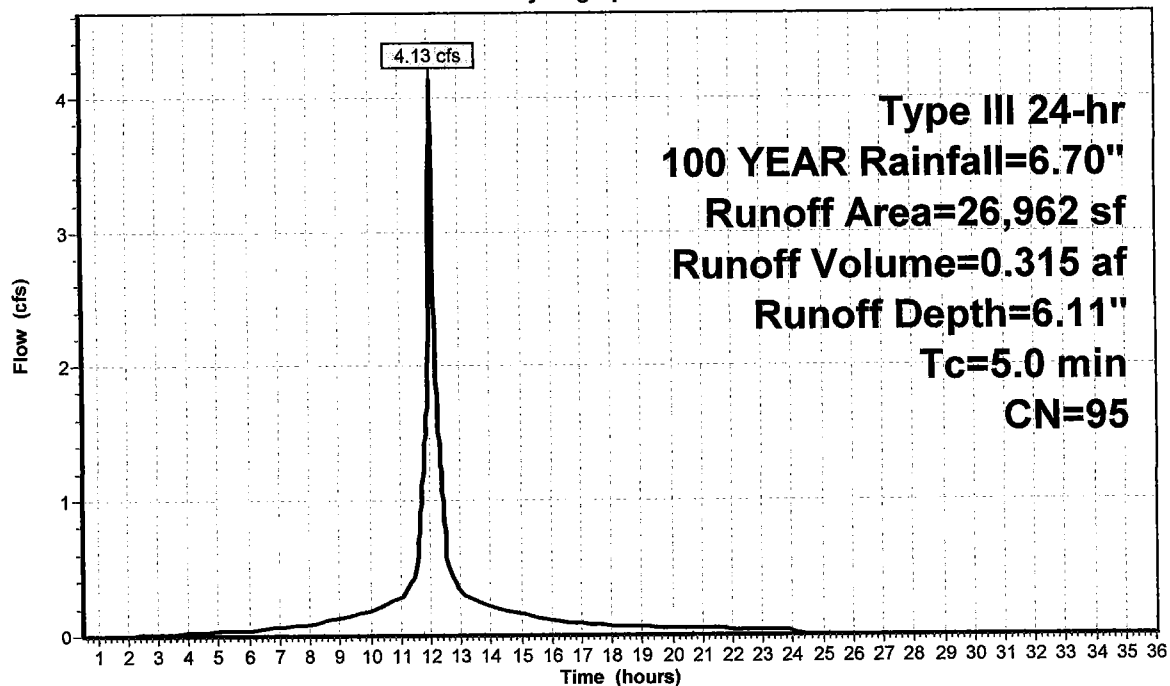
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YEAR Rainfall=6.70"

	Area (sf)	CN	Description
	2,775	79	<50% Grass cover, Poor, HSG B
*	12,787	98	Roofs, PAVEMENT HSG B
	11,400	96	Gravel surface, HSG B
	26,962	95	Weighted Average
	14,175		52.57% Pervious Area
	12,787		47.43% Impervious Area

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

Subcatchment 2S: PAVEMENT\BLDG

Hydrograph



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Type III 24-hr 100 YEAR Rainfall=6.70"

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Page 48

Summary for Subcatchment 3S: LOT#2

Runoff = 7.59 cfs @ 12.07 hrs, Volume= 0.524 af, Depth= 4.20"

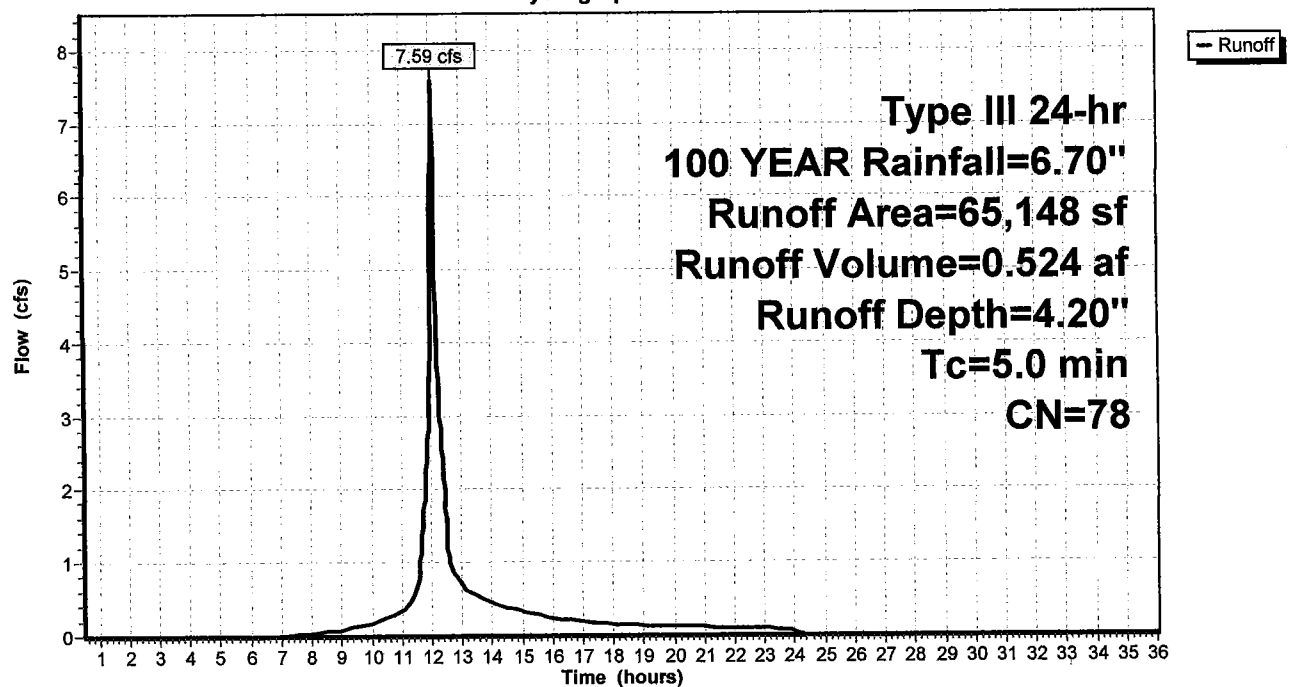
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YEAR Rainfall=6.70"

Area (sf)	CN	Description
33,118	60	Woods, Fair, HSG B
32,030	96	Gravel surface, HSG B
65,148	78	Weighted Average
65,148		100.00% Pervious Area

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

Subcatchment 3S: LOT#2

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Type III 24-hr 100 YEAR Rainfall=6.70"

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Page 49

Summary for Subcatchment 4S: PAVEMENT/BLDG

Runoff = 2.13 cfs @ 12.07 hrs, Volume= 0.163 af, Depth= 6.11"

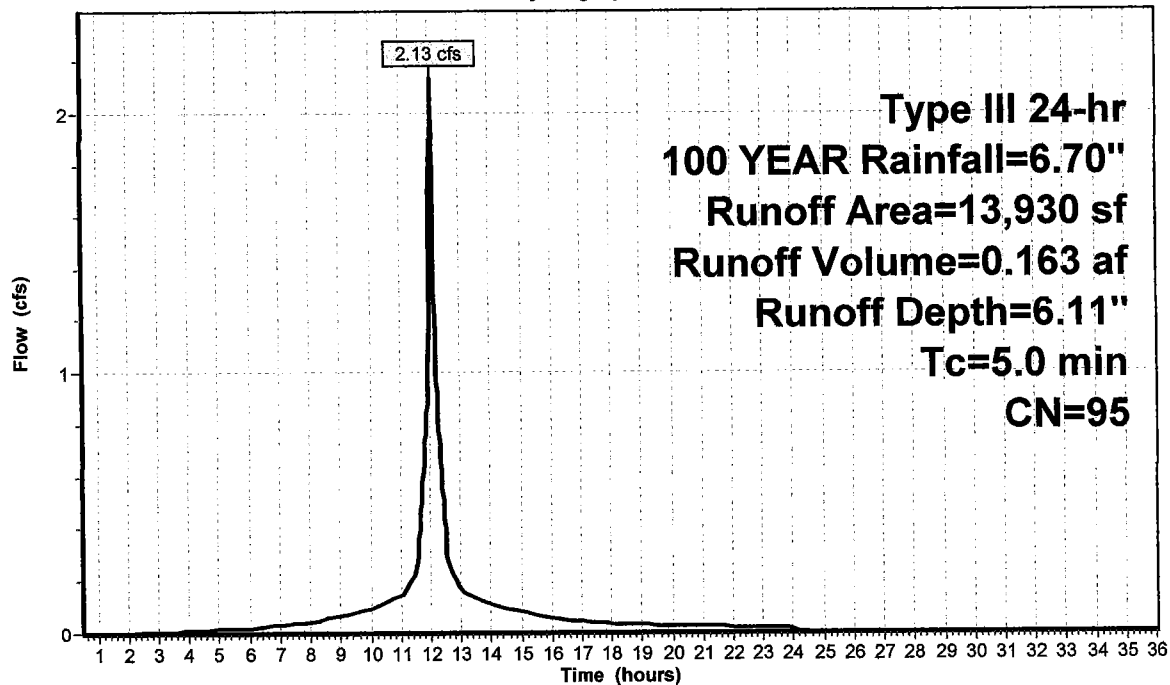
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YEAR Rainfall=6.70"

	Area (sf)	CN	Description
*	11,405	98	Roofs, Pavement HSG B
	2,525	79	<50% Grass cover, Poor, HSG B
	13,930	95	Weighted Average
	2,525		18.13% Pervious Area
	11,405		81.87% Impervious Area

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

Subcatchment 4S: PAVEMENT/BLDG

Hydrograph



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Page 50

Summary for Subcatchment 5S: PAVEMENT

Runoff = 0.30 cfs @ 12.07 hrs, Volume= 0.024 af, Depth= 6.46"

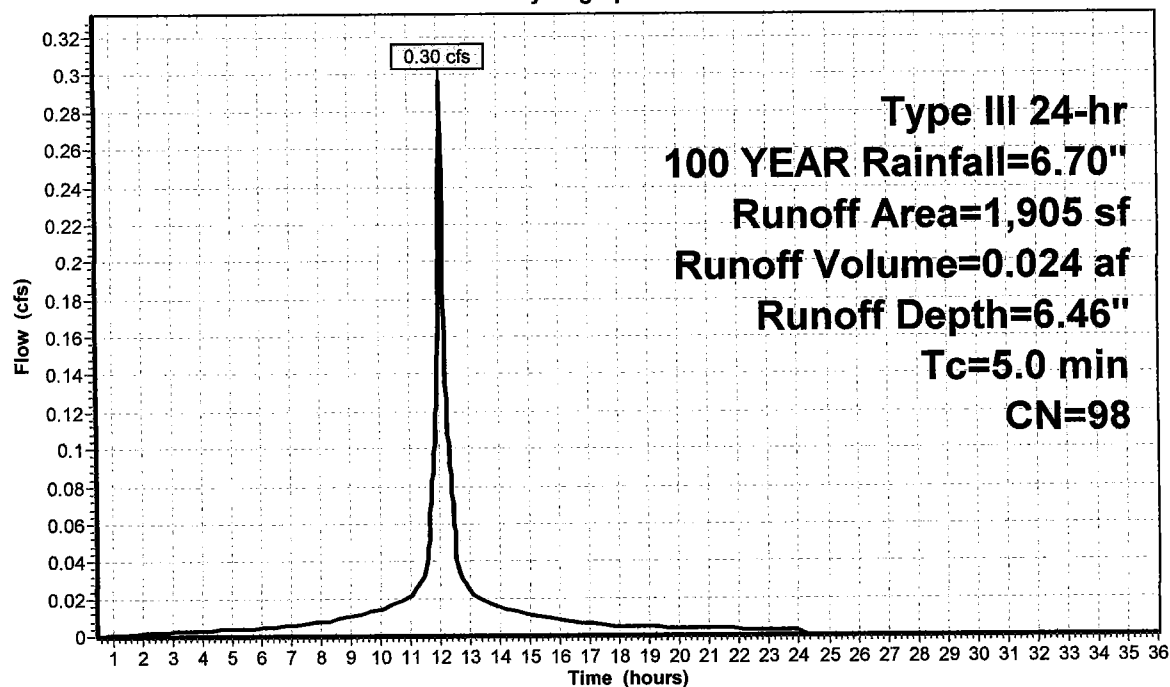
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YEAR Rainfall=6.70"

Area (sf)	CN	Description
1,905	98	Paved parking, HSG B
1,905		100.00% Impervious Area

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

Subcatchment 5S: PAVEMENT

Hydrograph



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Page 51

Summary for Subcatchment 6S: PAVEMENT

Runoff = 1.19 cfs @ 12.07 hrs, Volume= 0.095 af, Depth= 6.46"

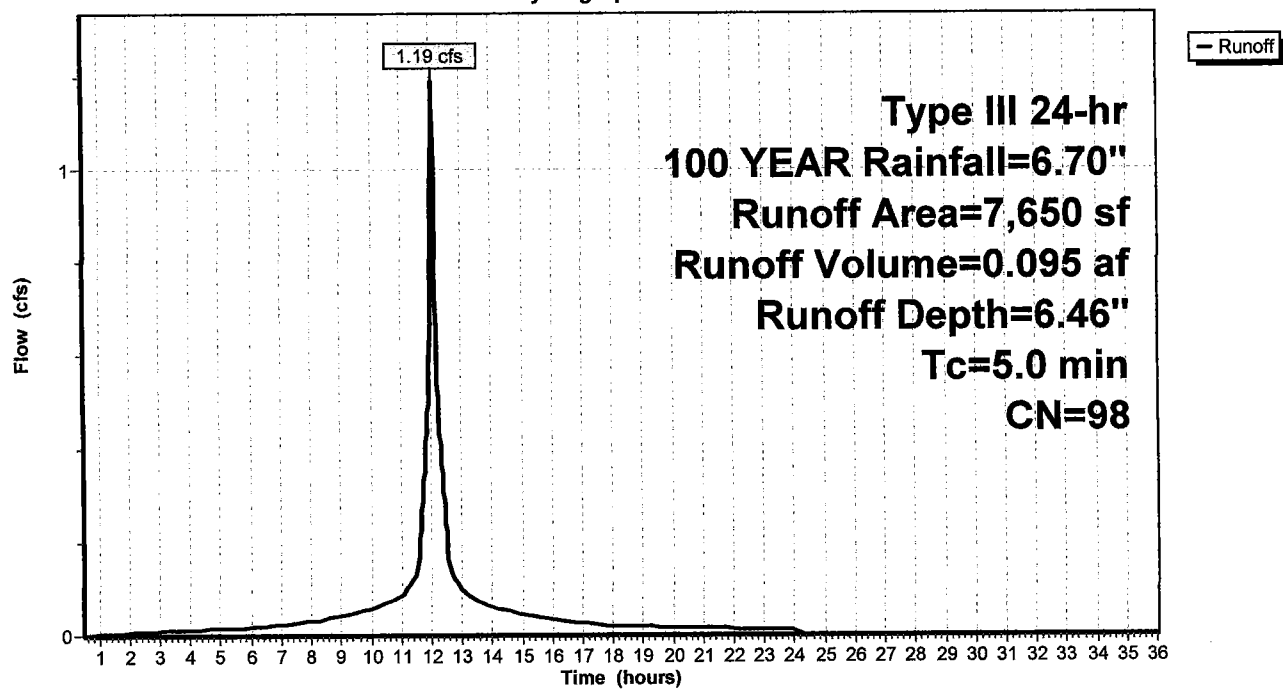
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YEAR Rainfall=6.70"

Area (sf)	CN	Description
7,650	98	Paved parking, HSG B
7,650		100.00% Impervious Area

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

Subcatchment 6S: PAVEMENT

Hydrograph



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Page 52

Summary for Reach 1R: INTERMITTENT STREAM

Inflow Area = 2.115 ac, 13.88% Impervious, Inflow Depth = 4.62" for 100 YEAR event
Inflow = 11.56 cfs @ 12.08 hrs, Volume= 0.814 af
Outflow = 11.27 cfs @ 12.10 hrs, Volume= 0.814 af, Atten= 3%, Lag= 1.1 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Max. Velocity= 3.99 fps, Min. Travel Time= 1.5 min

Avg. Velocity = 1.07 fps, Avg. Travel Time= 5.6 min

Peak Storage= 1,017 cf @ 12.10 hrs

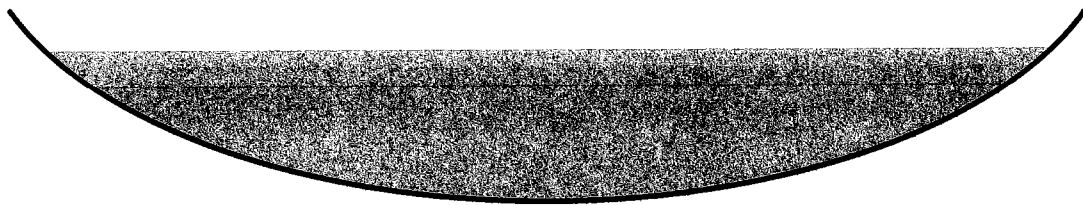
Average Depth at Peak Storage= 0.79'

Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 18.47 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds

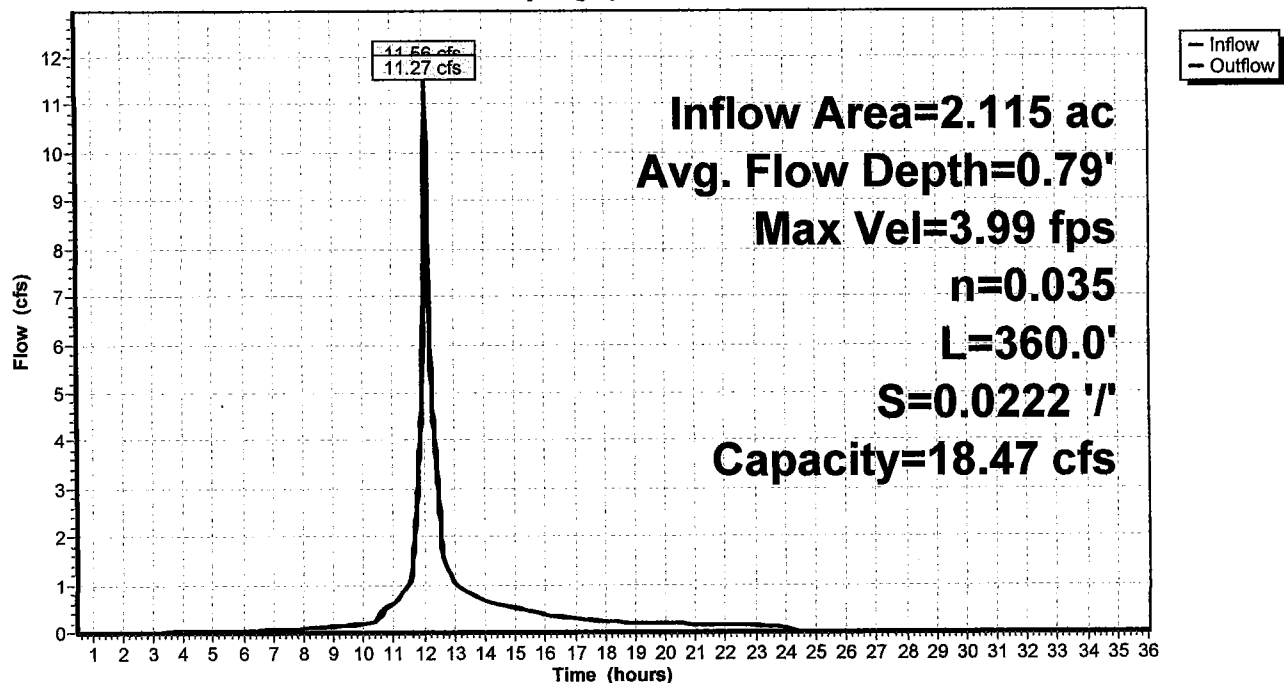
Length= 360.0' Slope= 0.0222 '/'

Inlet Invert= 502.00', Outlet Invert= 494.00'



Reach 1R: INTERMITTENT STREAM

Hydrograph



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Page 53

Summary for Reach 2R: CHANNEL

Inflow Area = 3.083 ac, 27.60% Impervious, Inflow Depth = 4.89" for 100 YEAR event
Inflow = 16.98 cfs @ 12.09 hrs, Volume= 1.257 af
Outflow = 16.96 cfs @ 12.09 hrs, Volume= 1.257 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Max. Velocity= 5.49 fps, Min. Travel Time= 0.2 min

Avg. Velocity = 1.58 fps, Avg. Travel Time= 0.7 min

Peak Storage= 200 cf @ 12.09 hrs

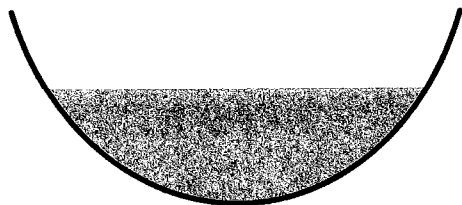
Average Depth at Peak Storage= 1.20'

Bank-Full Depth= 2.00' Flow Area= 6.7 sf, Capacity= 48.56 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040 Earth, cobble bottom, clean sides

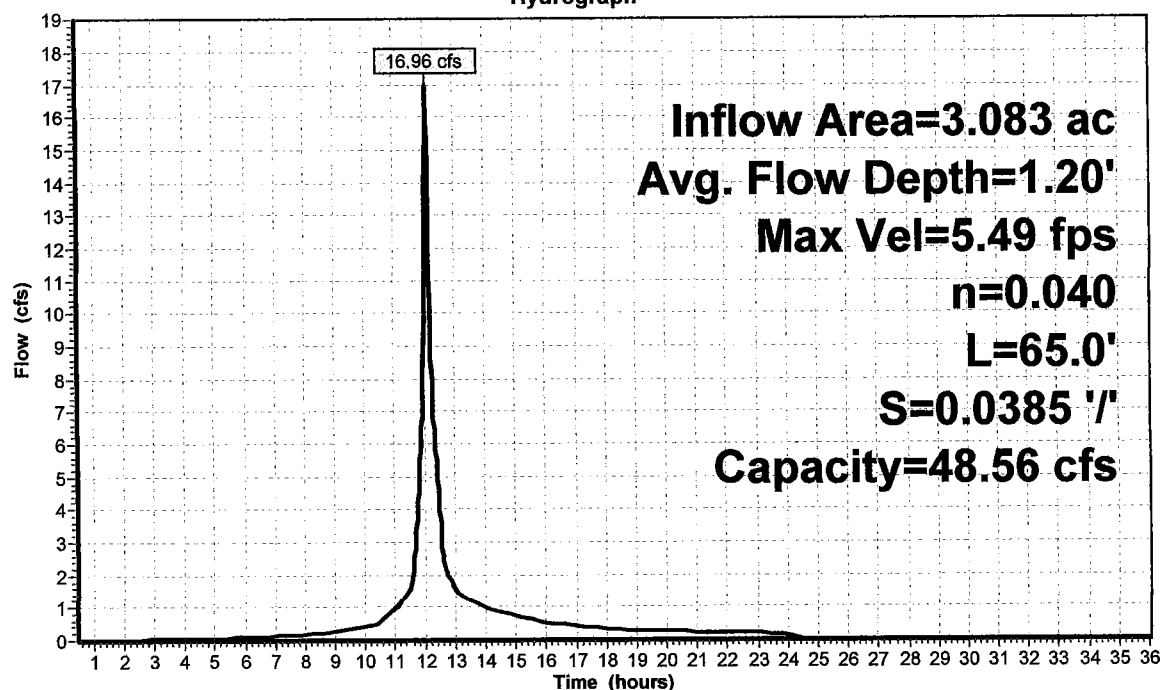
Length= 65.0' Slope= 0.0385 '/'

Inlet Invert= 494.00', Outlet Invert= 491.50'



Reach 2R: CHANNEL

Hydrograph



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Page 54

Summary for Pond 5P: CB#4

Inflow Area = 0.430 ac, 17.79% Impervious, Inflow Depth = 4.53" for 100 YEAR event
Inflow = 2.33 cfs @ 12.07 hrs, Volume= 0.162 af
Outflow = 2.33 cfs @ 12.07 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min
Primary = 2.33 cfs @ 12.07 hrs, Volume= 0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 502.24' @ 12.09 hrs

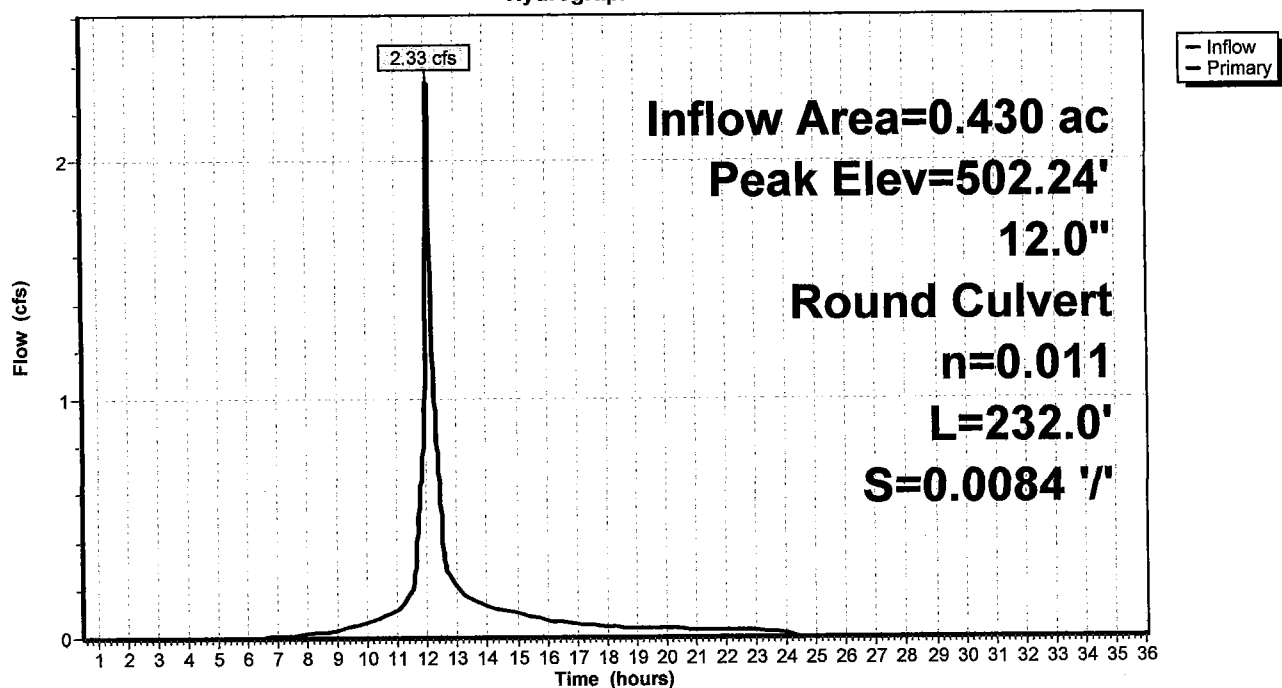
Flood Elev= 500.37'

Device	Routing	Invert	Outlet Devices
#1	Primary	497.82'	12.0" Round Culvert L= 232.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 497.82' / 495.88' S= 0.0084 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.16 cfs @ 12.07 hrs HW=501.98' TW=501.19' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 2.16 cfs @ 2.74 fps)

Pond 5P: CB#4

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Page 55

Summary for Pond 6P: CB#3

Inflow Area = 0.750 ac, 45.13% Impervious, Inflow Depth = 5.20" for 100 YEAR event
Inflow = 4.46 cfs @ 12.07 hrs, Volume= 0.325 af
Outflow = 4.46 cfs @ 12.07 hrs, Volume= 0.325 af, Atten= 0%, Lag= 0.0 min
Primary = 4.46 cfs @ 12.07 hrs, Volume= 0.325 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 501.32' @ 12.08 hrs

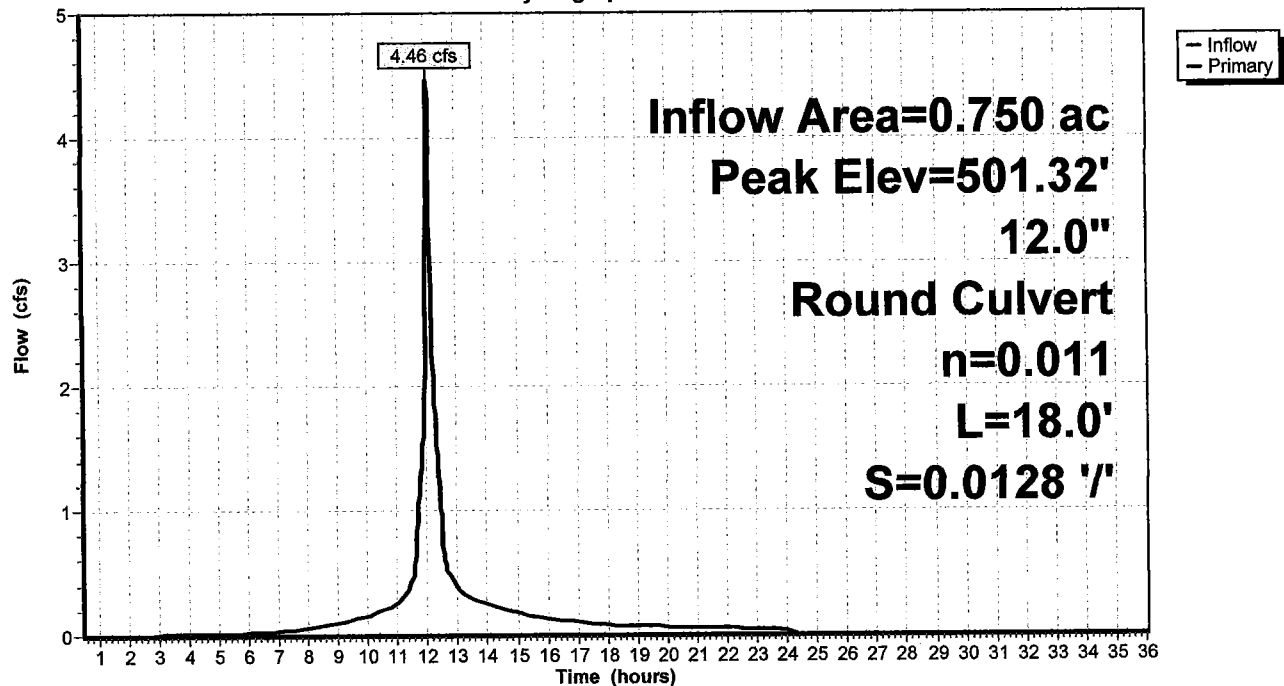
Flood Elev= 499.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.88'	12.0" Round Culvert L= 18.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.88' / 495.65' S= 0.0128 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=4.17 cfs @ 12.07 hrs HW=501.16' TW=499.95' (Dynamic Tailwater)
1=Culvert (Inlet Controls 4.17 cfs @ 5.31 fps)

Pond 6P: CB#3

Hydrograph



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Page 56

Summary for Pond 7P: CB#2

Inflow Area = 0.793 ac, 48.15% Impervious, Inflow Depth = 5.27" for 100 YEAR event
Inflow = 4.76 cfs @ 12.07 hrs, Volume= 0.348 af
Outflow = 4.76 cfs @ 12.07 hrs, Volume= 0.348 af, Atten= 0%, Lag= 0.0 min
Primary = 4.76 cfs @ 12.07 hrs, Volume= 0.348 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 500.01' @ 12.07 hrs

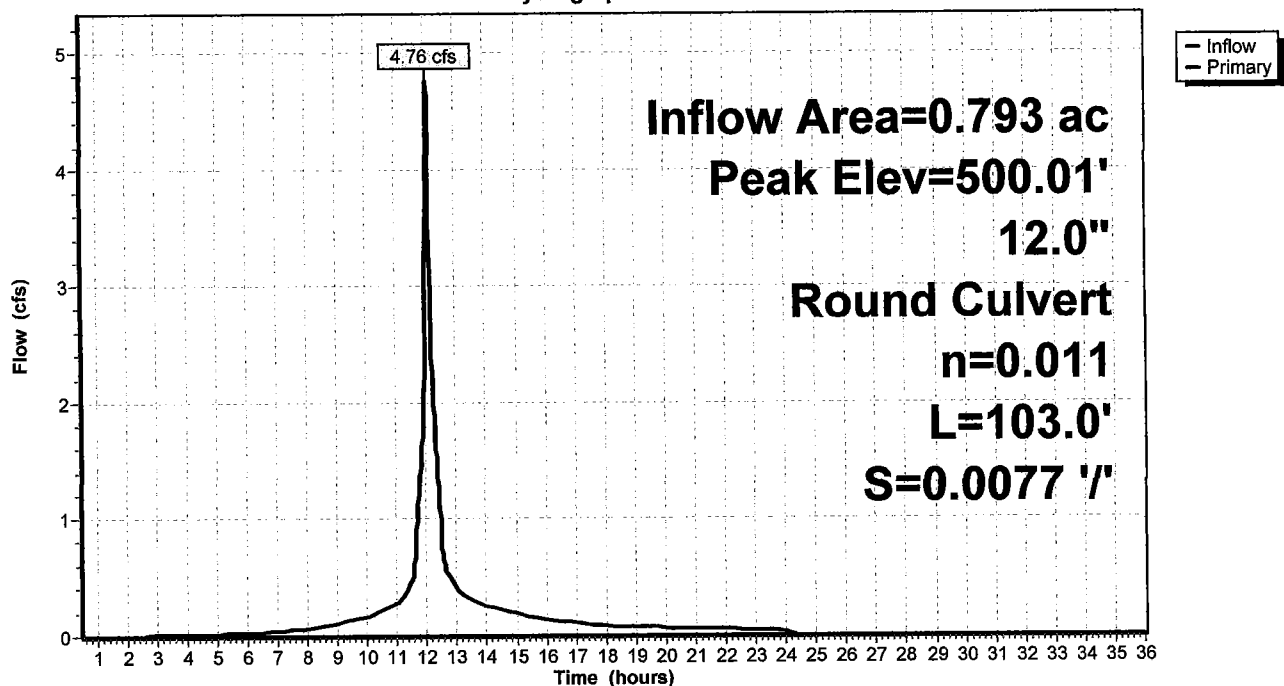
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.65'	12.0" Round Culvert L= 103.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.65' / 494.86' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=4.73 cfs @ 12.07 hrs HW=499.94' TW=497.80' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 4.73 cfs @ 6.02 fps)

Pond 7P: CB#2

Hydrograph



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Type III 24-hr 100 YEAR Rainfall=6.70"

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Page 57

Summary for Pond 8P: CB#1

Inflow Area = 0.969 ac, 57.55% Impervious, Inflow Depth = 5.49" for 100 YEAR event
Inflow = 5.95 cfs @ 12.07 hrs, Volume= 0.443 af
Outflow = 5.95 cfs @ 12.07 hrs, Volume= 0.443 af, Atten= 0%, Lag= 0.0 min
Primary = 5.95 cfs @ 12.07 hrs, Volume= 0.443 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 497.84' @ 12.07 hrs

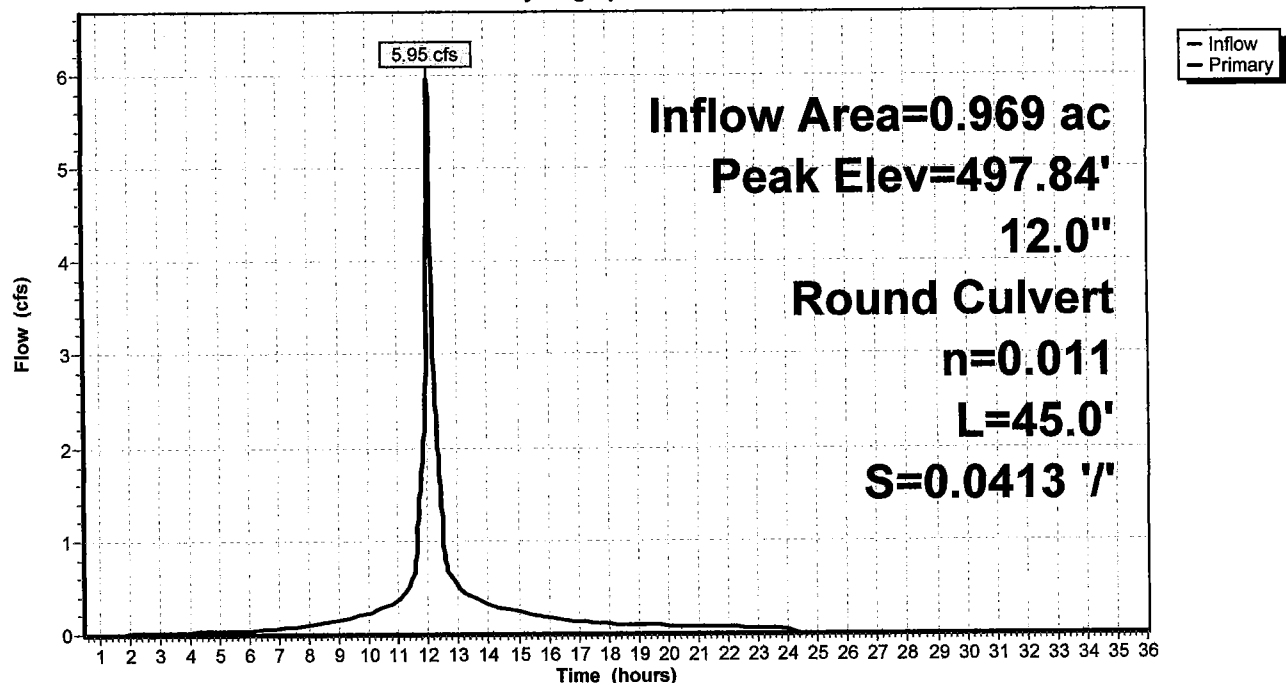
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	494.86'	12.0" Round Culvert L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 494.86' / 493.00' S= 0.0413 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=5.91 cfs @ 12.07 hrs HW=497.80' TW=495.17' (Dynamic Tailwater)
↑1=Culvert (Inlet Controls 5.91 cfs @ 7.52 fps)

Pond 8P: CB#1

Hydrograph



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Page 58

Summary for Pond 10P: EXIST. STORMWATER BASIN

Inflow Area = 1.496 ac, 0.00% Impervious, Inflow Depth = 4.20" for 100 YEAR event
 Inflow = 7.59 cfs @ 12.07 hrs, Volume= 0.524 af
 Outflow = 7.49 cfs @ 12.09 hrs, Volume= 0.499 af, Atten= 1%, Lag= 0.8 min
 Primary = 7.49 cfs @ 12.09 hrs, Volume= 0.499 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-36.00 hrs, dt= 0.02 hrs / 2

Peak Elev= 503.51' @ 12.09 hrs Surf.Area= 1,118 sf Storage= 1,621 cf

Flood Elev= 504.00' Surf.Area= 1,300 sf Storage= 2,219 cf

Plug-Flow detention time= 41.6 min calculated for 0.499 af (95% of inflow)

Center-of-Mass det. time= 14.7 min (828.4 - 813.6)

Volume	Invert	Avail.Storage	Storage Description
#1	500.70'	2,219 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.70	30	0	0
501.00	203	35	35
502.00	500	352	386
503.00	933	717	1,103
504.00	1,300	1,117	2,219

Device	Routing	Invert	Outlet Devices
#1	Primary	503.00'	8.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=7.43 cfs @ 12.09 hrs HW=503.50' TW=502.79' (Dynamic Tailwater)

↑1=Broad-Crested Rectangular Weir (Weir Controls 7.43 cfs @ 1.85 fps)

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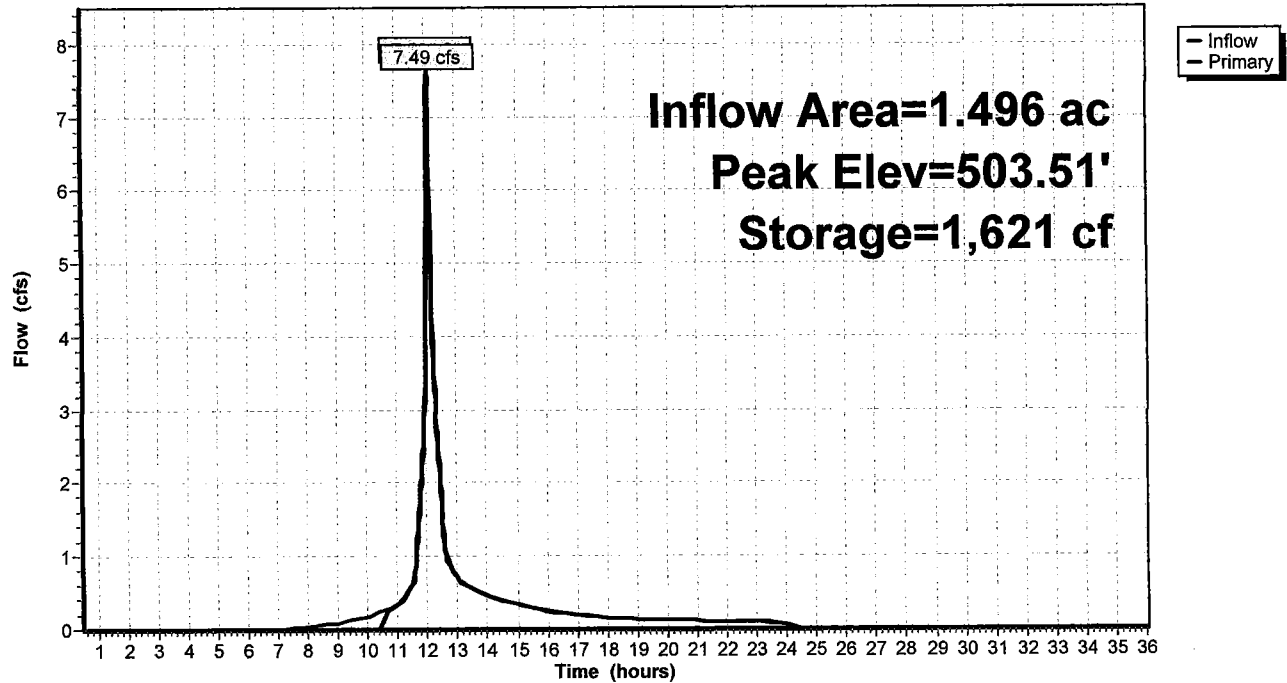
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Type III 24-hr 100 YEAR Rainfall=6.70"

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Page 59

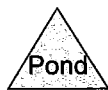
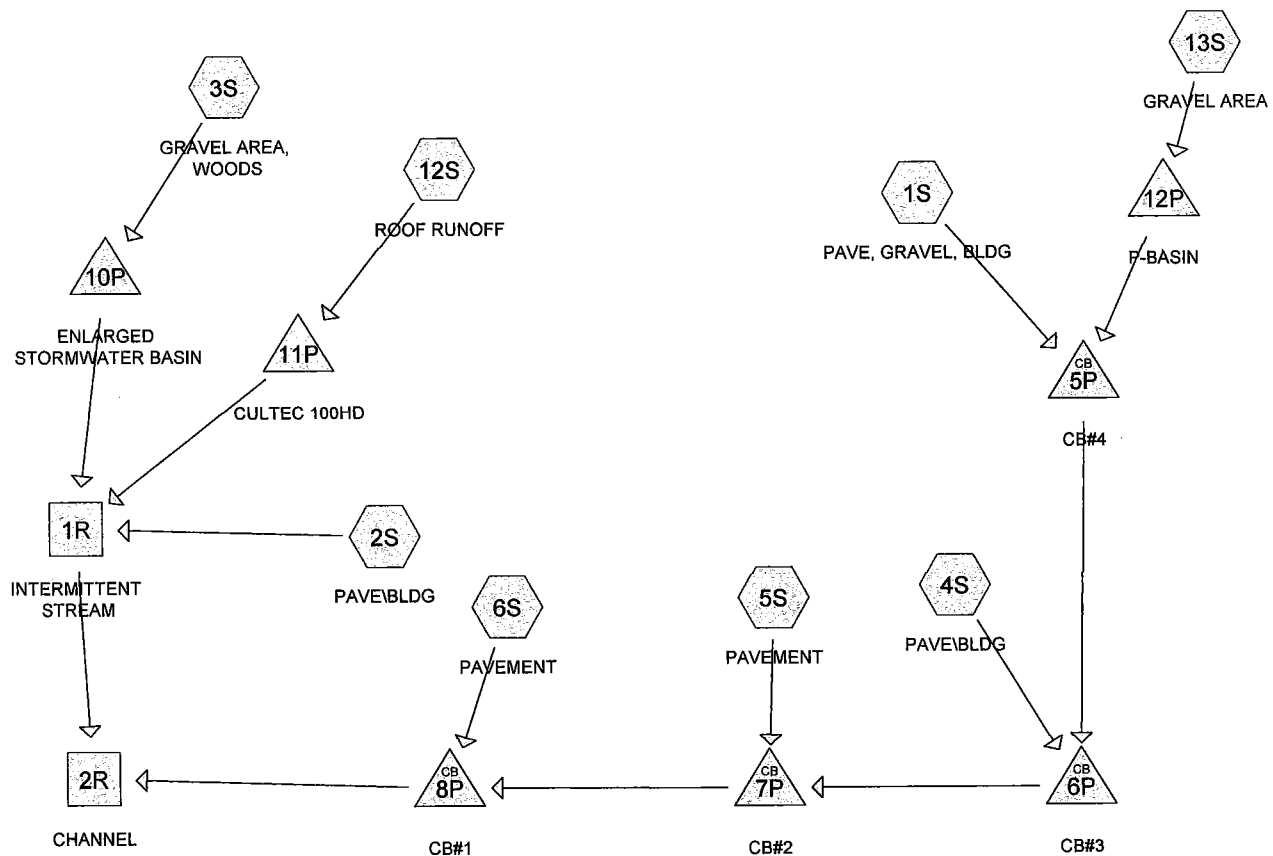
Pond 10P: EXIST. STORMWATER BASIN

Hydrograph



2.2

POST-DEVELOPMENT CALCULATIONS



Routing Diagram for POST DEV JOHNSON

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Page 62

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.122	79	<50% Grass cover, Poor, HSG B (2S, 4S)
0.169	56	Brush, Fair, HSG B (1S)
1.058	96	Gravel surface, HSG B (1S, 2S, 3S, 13S)
0.263	98	Paved parking & bldg. HSG B (2S)
0.219	98	Paved parking, HSG B (5S, 6S)
0.138	98	Paved parking, & bldg. HSG B (1S)
0.355	98	Roofs, HSG B (4S, 12S)
0.760	60	Woods, Fair, HSG B (3S)
3.083	85	TOTAL AREA

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Type III 24-hr 2 YR Rainfall=3.10"

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Page 63

Summary for Subcatchment 1S: PAVE, GRAVEL, BLDG

Runoff = 0.40 cfs @ 12.08 hrs, Volume= 0.029 af, Depth= 1.08"

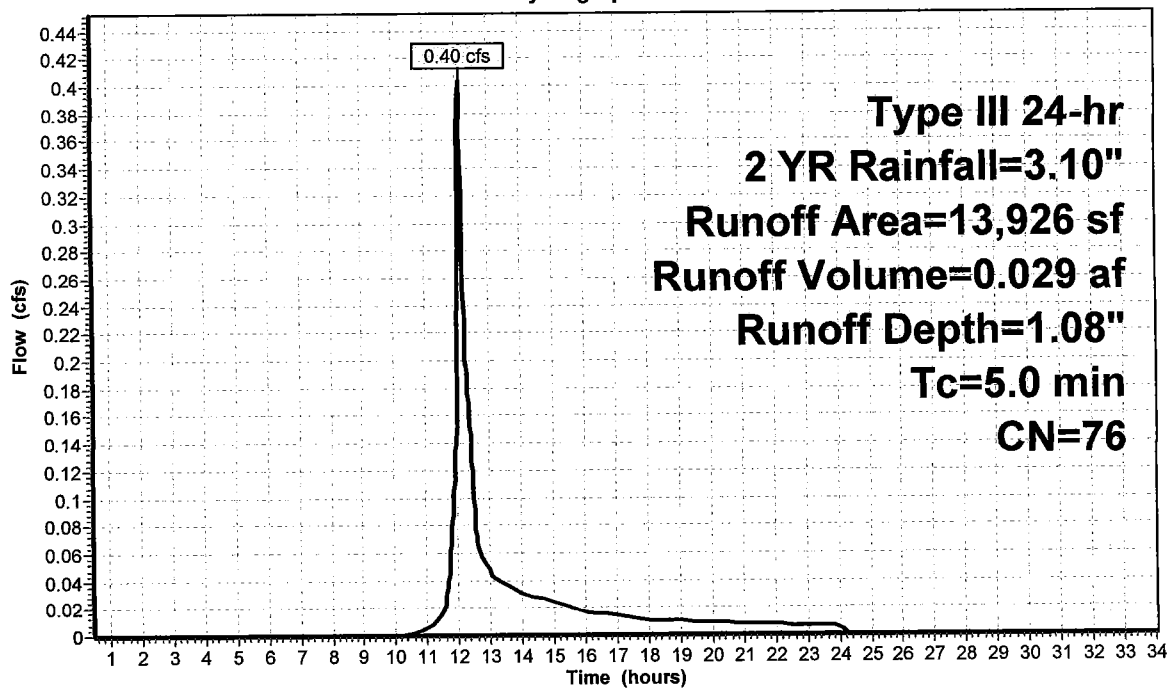
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YR Rainfall=3.10"

	Area (sf)	CN	Description
*	6,030	98	Paved parking, & bldg. HSG B
	7,350	56	Brush, Fair, HSG B
	546	96	Gravel surface, HSG B
	13,926	76	Weighted Average
	7,896		56.70% Pervious Area
	6,030		43.30% Impervious Area

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

Subcatchment 1S: PAVE, GRAVEL, BLDG

Hydrograph



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Type III 24-hr 2 YR Rainfall=3.10"

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Page 64

Summary for Subcatchment 2S: PAVE\BLDG

Runoff = 1.54 cfs @ 12.07 hrs, Volume= 0.112 af, Depth= 2.55"

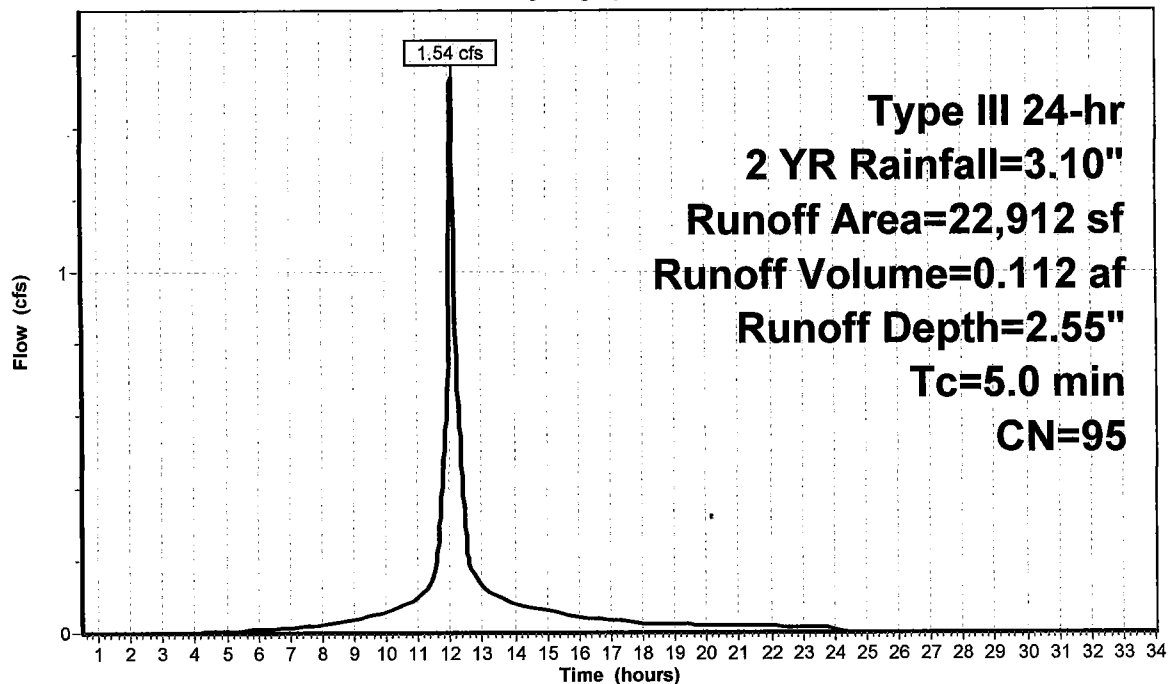
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YR Rainfall=3.10"

	Area (sf)	CN	Description
*	11,437	98	Paved parking & bldg. HSG B
	8,700	96	Gravel surface, HSG B
	2,775	79	<50% Grass cover, Poor, HSG B
	22,912	95	Weighted Average
	11,475		50.08% Pervious Area
	11,437		49.92% Impervious Area

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

Subcatchment 2S: PAVE\BLDG

Hydrograph



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Type III 24-hr 2 YR Rainfall=3.10"

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Page 65

Summary for Subcatchment 3S: GRAVEL AREA, WOODS

Runoff = 2.13 cfs @ 12.08 hrs, Volume= 0.150 af, Depth= 1.20"

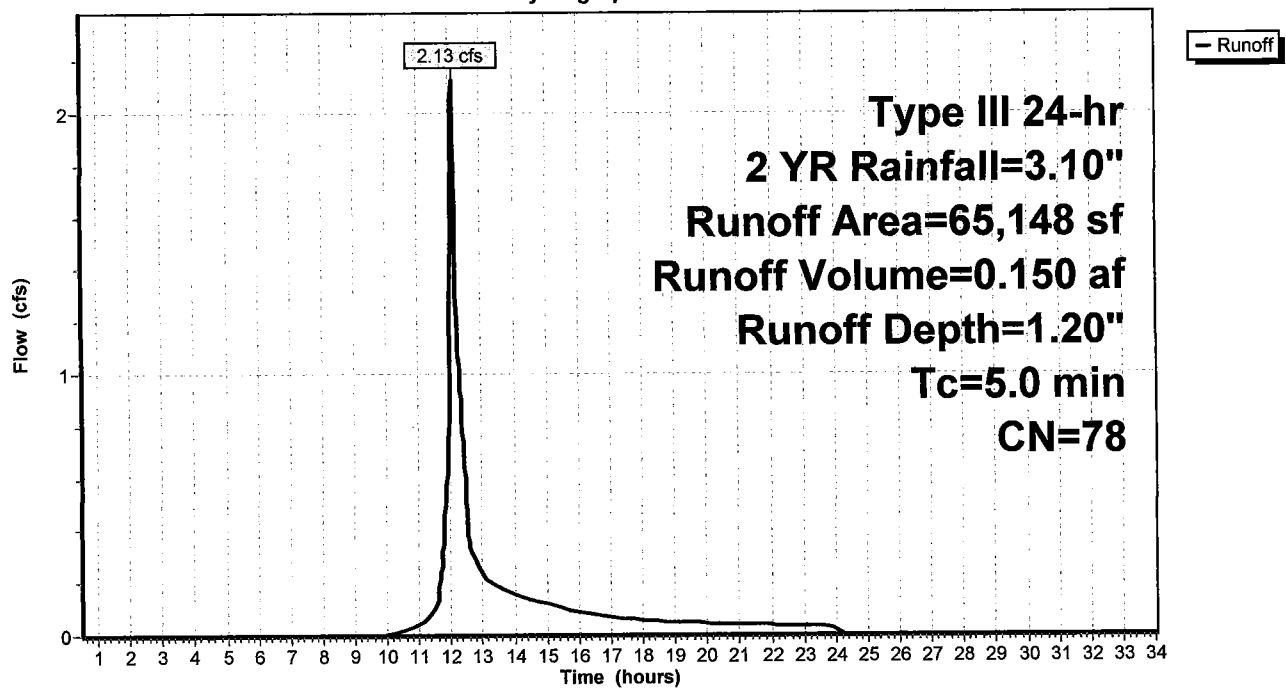
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
33,118	60	Woods, Fair, HSG B
32,030	96	Gravel surface, HSG B
65,148	78	Weighted Average
65,148		100.00% Pervious Area

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

Subcatchment 3S: GRAVEL AREA, WOODS

Hydrograph



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Type III 24-hr 2 YR Rainfall=3.10"

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Page 66

Summary for Subcatchment 4S: PAVE\BLDG

Runoff = 0.93 cfs @ 12.07 hrs, Volume= 0.068 af, Depth= 2.55"

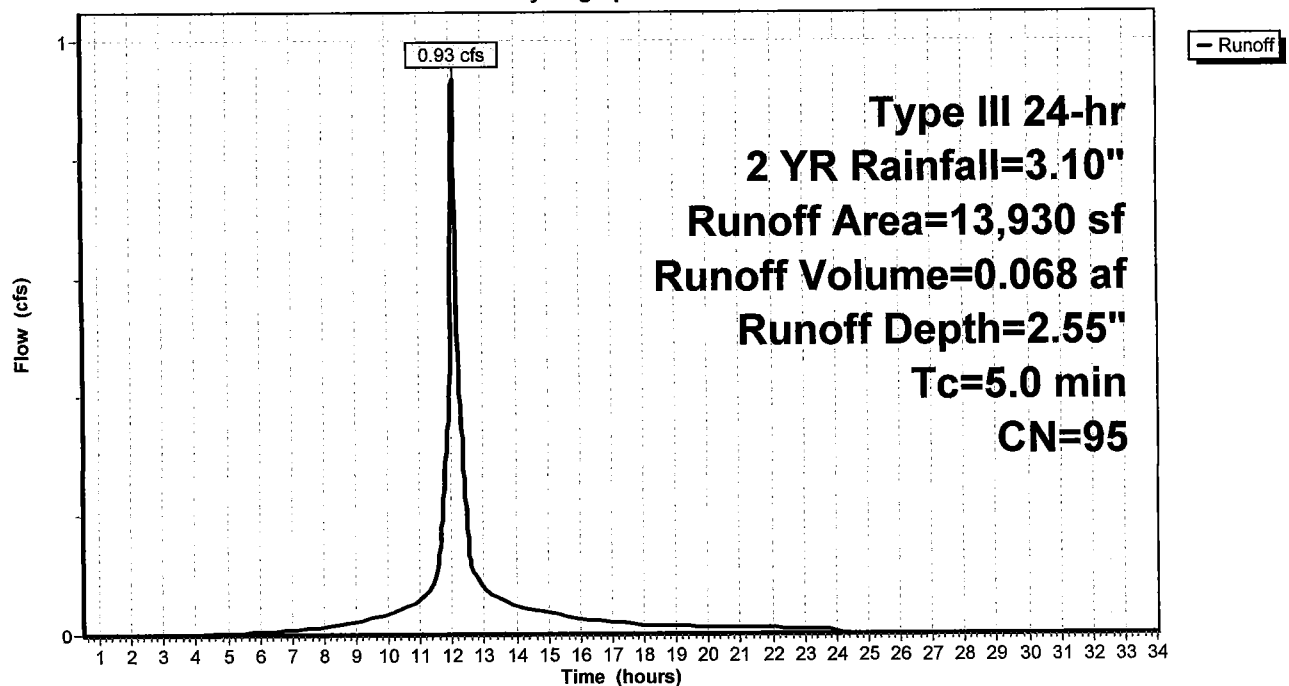
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
11,405	98	Roofs, HSG B
2,525	79	<50% Grass cover, Poor, HSG B
13,930	95	Weighted Average
2,525		18.13% Pervious Area
11,405		81.87% Impervious Area

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

Subcatchment 4S: PAVE\BLDG

Hydrograph



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Type III 24-hr 2 YR Rainfall=3.10"

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Page 67

Summary for Subcatchment 5S: PAVEMENT

Runoff = 0.14 cfs @ 12.07 hrs, Volume= 0.010 af, Depth= 2.87"

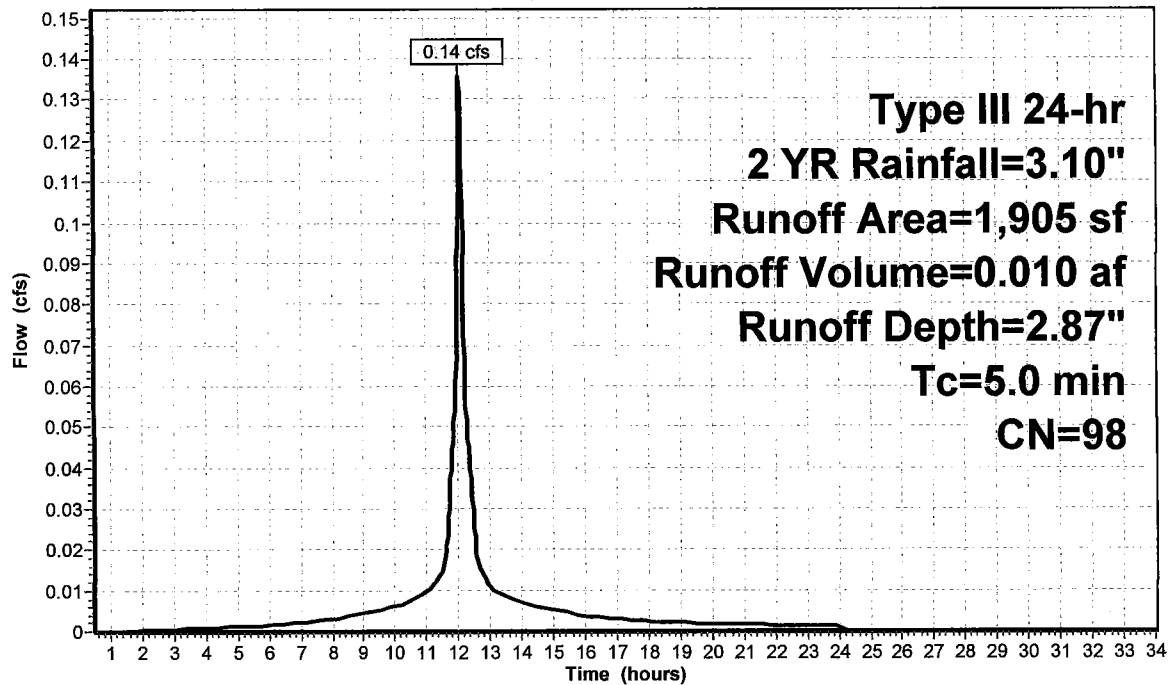
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
1,905	98	Paved parking, HSG B
1,905		100.00% Impervious Area

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

Subcatchment 5S: PAVEMENT

Hydrograph



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Type III 24-hr 2 YR Rainfall=3.10"

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Page 68

Summary for Subcatchment 6S: PAVEMENT

Runoff = 0.55 cfs @ 12.07 hrs, Volume= 0.042 af, Depth= 2.87"

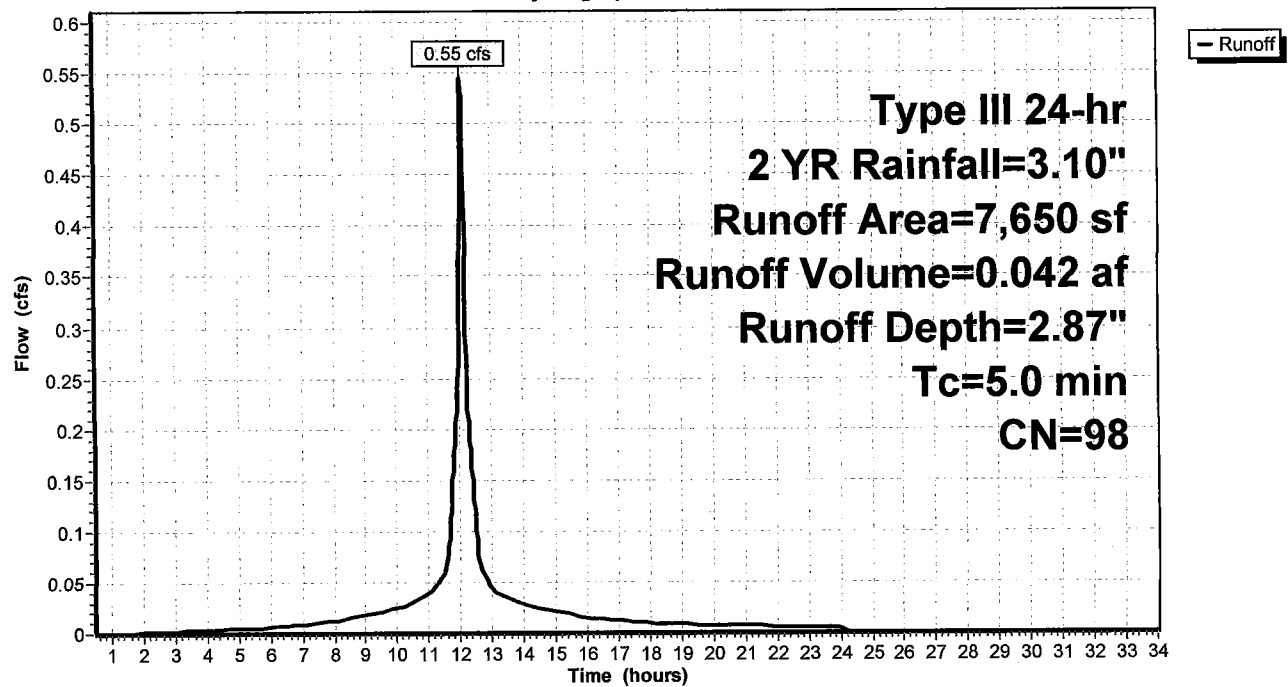
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
7,650	98	Paved parking, HSG B
7,650		100.00% Impervious Area

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

Subcatchment 6S: PAVEMENT

Hydrograph



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Type III 24-hr 2 YR Rainfall=3.10"

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Page 69

Summary for Subcatchment 12S: ROOF RUNOFF

Runoff = 0.29 cfs @ 12.07 hrs, Volume= 0.022 af, Depth= 2.87"

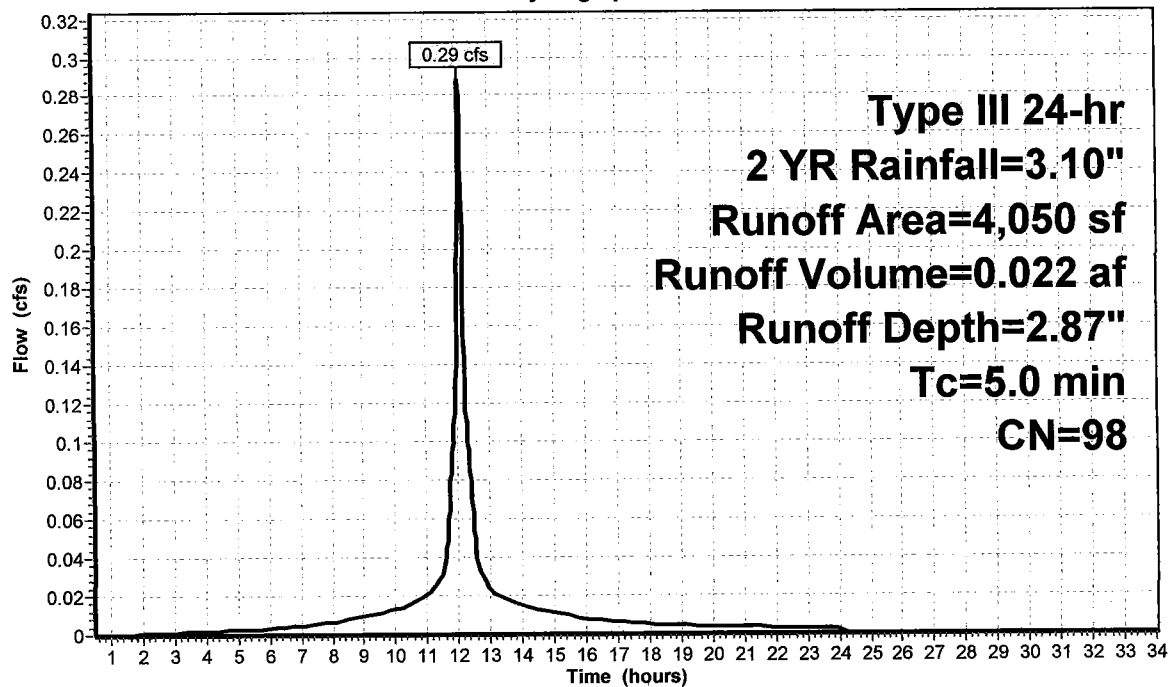
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
4,050	98	Roofs, HSG B
4,050		100.00% Impervious Area

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

Subcatchment 12S: ROOF RUNOFF

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Type III 24-hr 2 YR Rainfall=3.10"

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Page 70

Summary for Subcatchment 13S: GRAVEL AREA

Runoff = 0.33 cfs @ 12.07 hrs, Volume= 0.024 af, Depth= 2.65"

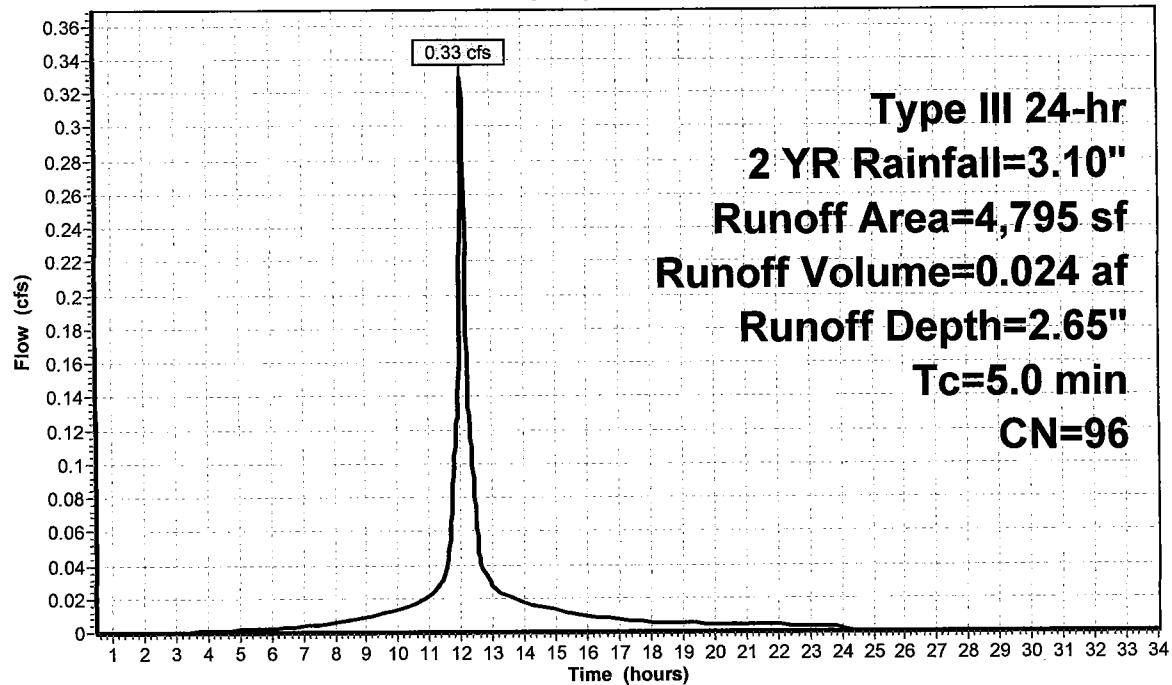
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 2 YR Rainfall=3.10"

Area (sf)	CN	Description
4,795	96	Gravel surface, HSG B
4,795		100.00% Pervious Area

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

Subcatchment 13S: GRAVEL AREA

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Type III 24-hr 2 YR Rainfall=3.10"

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Page 71

Summary for Reach 1R: INTERMITTENT STREAM

Inflow Area = 2.115 ac, 16.81% Impervious, Inflow Depth = 1.15" for 2 YR event
Inflow = 1.54 cfs @ 12.07 hrs, Volume= 0.202 af
Outflow = 1.43 cfs @ 12.10 hrs, Volume= 0.202 af, Atten= 7%, Lag= 1.8 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Max. Velocity= 2.15 fps, Min. Travel Time= 2.8 min

Avg. Velocity = 0.71 fps, Avg. Travel Time= 8.5 min

Peak Storage= 240 cf @ 12.10 hrs

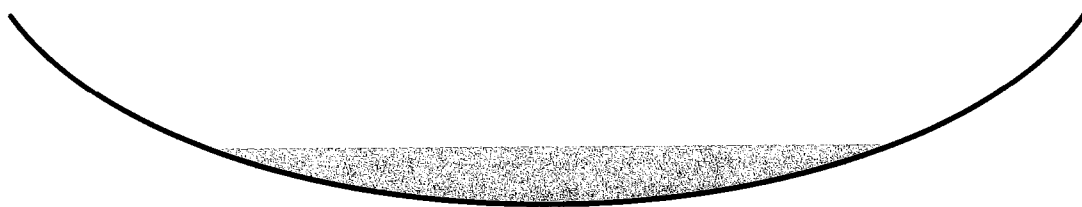
Average Depth at Peak Storage= 0.30'

Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 18.47 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds

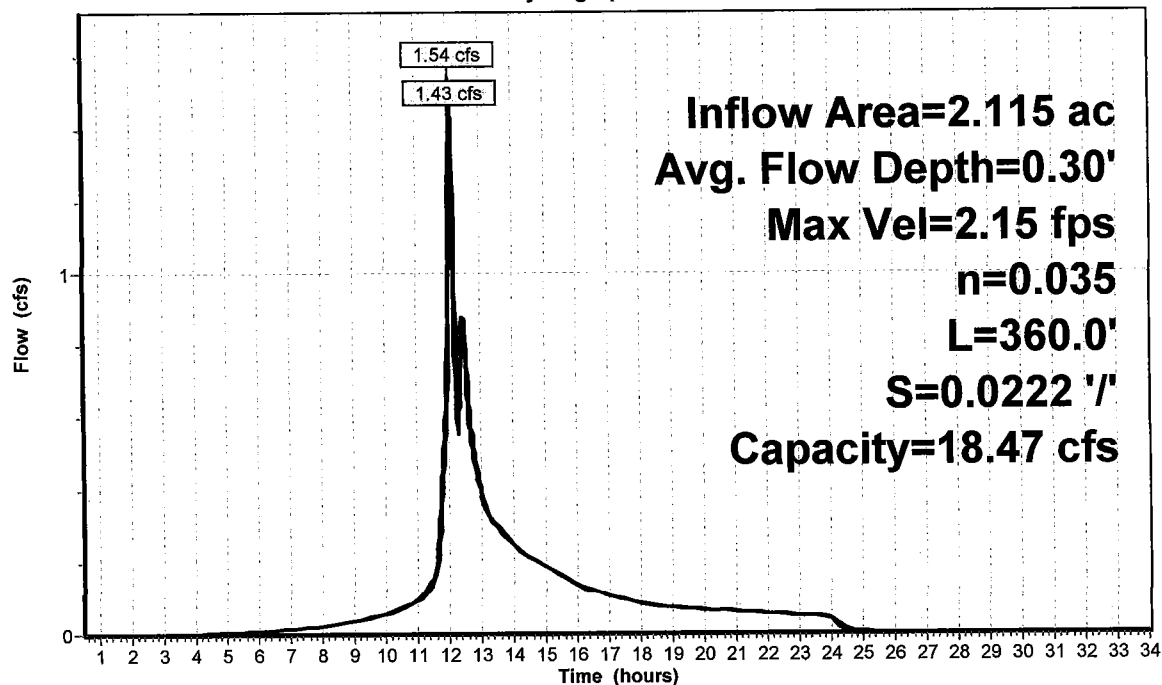
Length= 360.0' Slope= 0.0222 '/'

Inlet Invert= 502.00', Outlet Invert= 494.00'



Reach 1R: INTERMITTENT STREAM

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Type III 24-hr 2 YR Rainfall=3.10"

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Page 72

Summary for Reach 2R: CHANNEL

Inflow Area = 3.083 ac, 31.62% Impervious, Inflow Depth = 1.37" for 2 YR event
Inflow = 3.40 cfs @ 12.08 hrs, Volume= 0.351 af
Outflow = 3.39 cfs @ 12.09 hrs, Volume= 0.351 af, Atten= 0%, Lag= 0.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Max. Velocity= 2.91 fps, Min. Travel Time= 0.4 min

Avg. Velocity = 0.88 fps, Avg. Travel Time= 1.2 min

Peak Storage= 76 cf @ 12.09 hrs

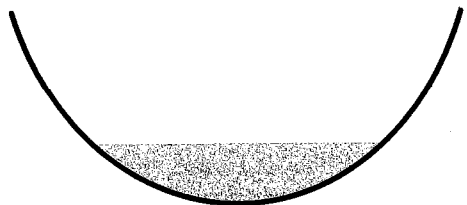
Average Depth at Peak Storage= 0.62'

Bank-Full Depth= 2.00' Flow Area= 6.7 sf, Capacity= 37.62 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040 Earth, cobble bottom, clean sides

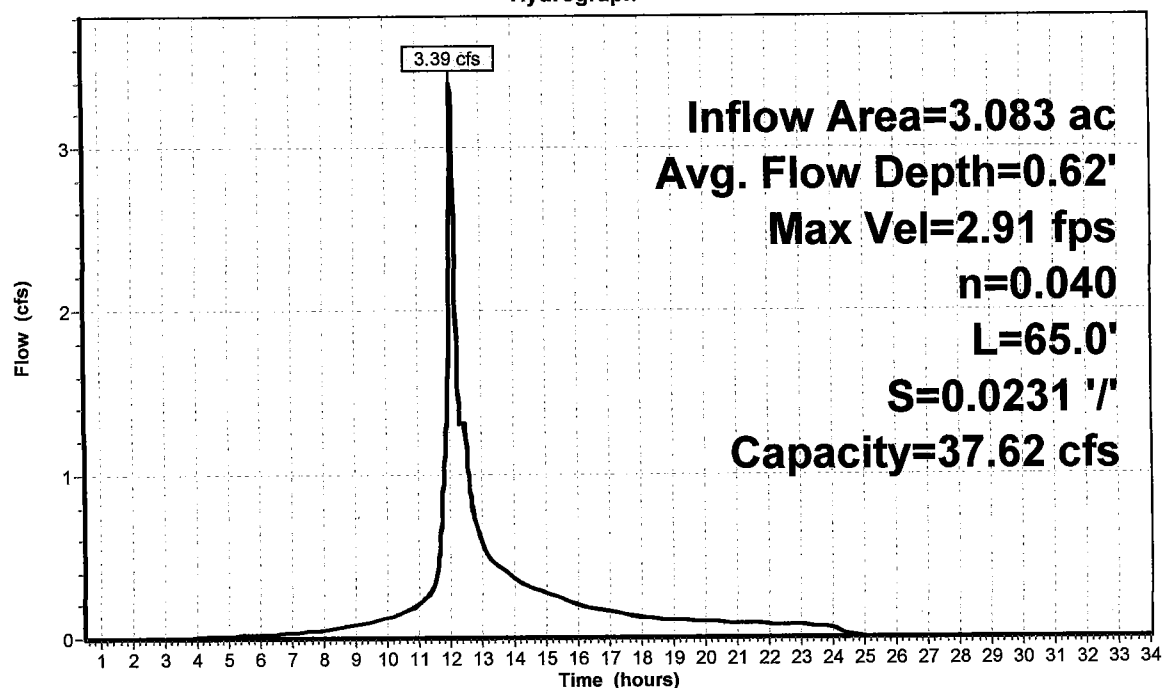
Length= 65.0' Slope= 0.0231 '/'

Inlet Invert= 493.00', Outlet Invert= 491.50'



Reach 2R: CHANNEL

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Type III 24-hr 2 YR Rainfall=3.10"

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Page 73

Summary for Pond 5P: CB#4

Inflow Area = 0.430 ac, 32.21% Impervious, Inflow Depth = 0.81" for 2 YR event
Inflow = 0.40 cfs @ 12.08 hrs, Volume= 0.029 af
Outflow = 0.40 cfs @ 12.08 hrs, Volume= 0.029 af, Atten= 0%, Lag= 0.0 min
Primary = 0.40 cfs @ 12.08 hrs, Volume= 0.029 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 500.68' @ 12.08 hrs

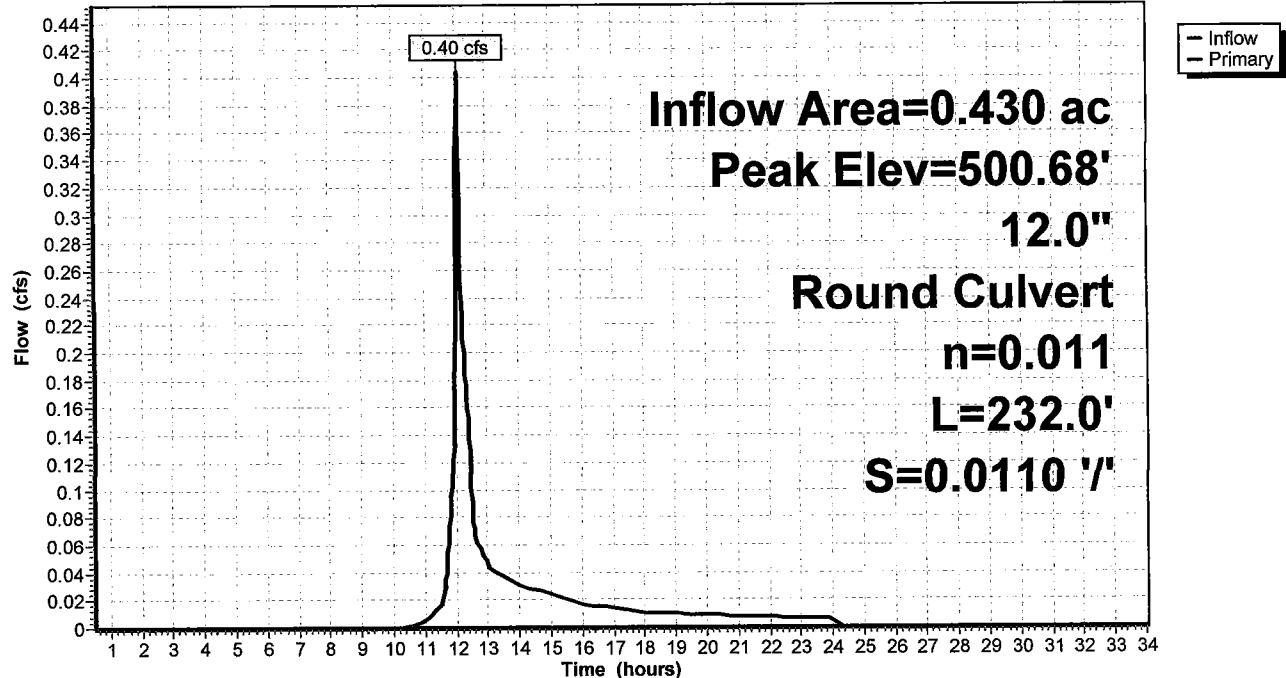
Flood Elev= 500.37'

Device	Routing	Invert	Outlet Devices
#1	Primary	500.37'	12.0" Round Culvert L= 232.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 500.37' / 497.82' S= 0.0110 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.40 cfs @ 12.08 hrs HW=500.68' TW=496.61' (Dynamic Tailwater)
↑1=Culvert (Inlet Controls 0.40 cfs @ 1.91 fps)

Pond 5P: CB#4

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Type III 24-hr 2 YR Rainfall=3.10"

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Page 74

Summary for Pond 6P: CB#3

Inflow Area = 0.750 ac, 53.40% Impervious, Inflow Depth = 1.55" for 2 YR event
Inflow = 1.34 cfs @ 12.07 hrs, Volume= 0.097 af
Outflow = 1.34 cfs @ 12.07 hrs, Volume= 0.097 af, Atten= 0%, Lag= 0.0 min
Primary = 1.34 cfs @ 12.07 hrs, Volume= 0.097 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 496.62' @ 12.07 hrs

Flood Elev= 499.53'

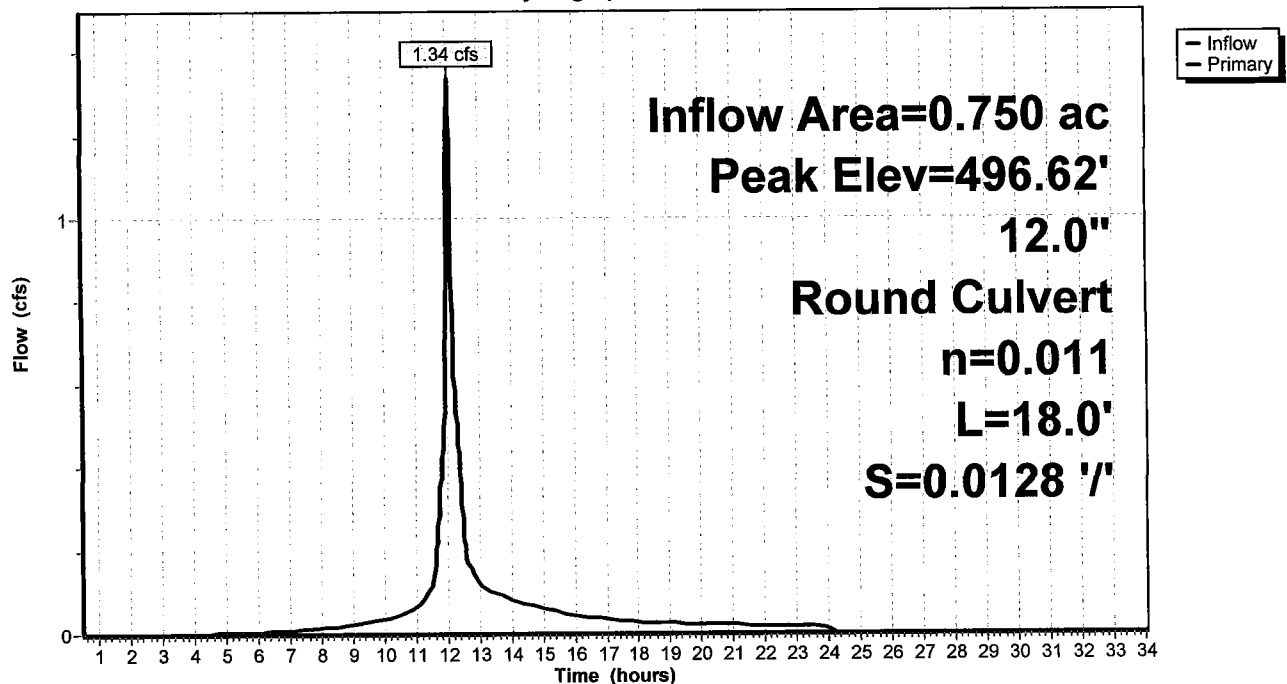
Device	Routing	Invert	Outlet Devices
#1	Primary	495.88'	12.0" Round Culvert L= 18.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.88' / 495.65' S= 0.0128 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.33 cfs @ 12.07 hrs HW=496.61' TW=496.35' (Dynamic Tailwater)

←1=Culvert (Outlet Controls 1.33 cfs @ 3.00 fps)

Pond 6P: CB#3

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Type III 24-hr 2 YR Rainfall=3.10"

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Page 75

Summary for Pond 7P: CB#2

Inflow Area = 0.793 ac, 55.97% Impervious, Inflow Depth = 1.62" for 2 YR event
Inflow = 1.47 cfs @ 12.07 hrs, Volume= 0.107 af
Outflow = 1.47 cfs @ 12.07 hrs, Volume= 0.107 af, Atten= 0%, Lag= 0.0 min
Primary = 1.47 cfs @ 12.07 hrs, Volume= 0.107 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 496.35' @ 12.07 hrs

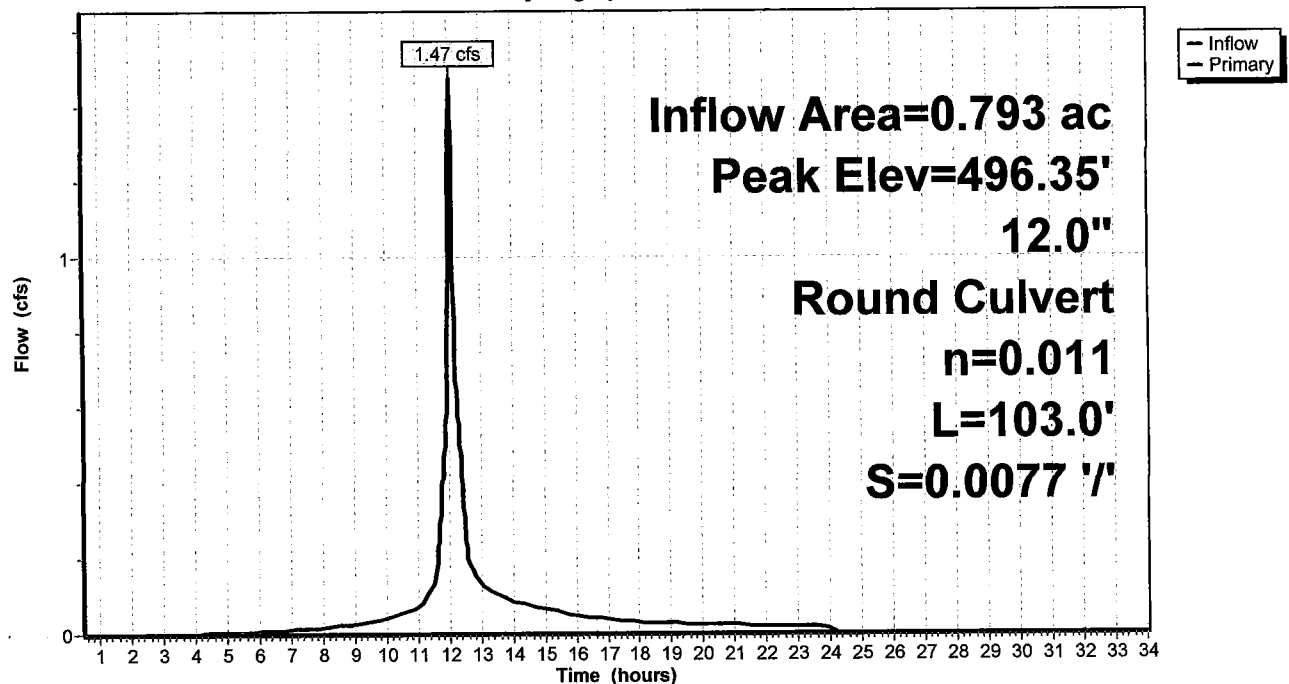
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.65'	12.0" Round Culvert L= 103.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.65' / 494.86' S= 0.0077 ' / ' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.46 cfs @ 12.07 hrs HW=496.35' TW=495.65' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 1.46 cfs @ 3.49 fps)

Pond 7P: CB#2

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Type III 24-hr 2 YR Rainfall=3.10"

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Page 76

Summary for Pond 8P: CB#1

Inflow Area = 0.969 ac, 63.95% Impervious, Inflow Depth = 1.85" for 2 YR event
Inflow = 2.02 cfs @ 12.07 hrs, Volume= 0.149 af
Outflow = 2.02 cfs @ 12.07 hrs, Volume= 0.149 af, Atten= 0%, Lag= 0.0 min
Primary = 2.02 cfs @ 12.07 hrs, Volume= 0.149 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 495.65' @ 12.07 hrs

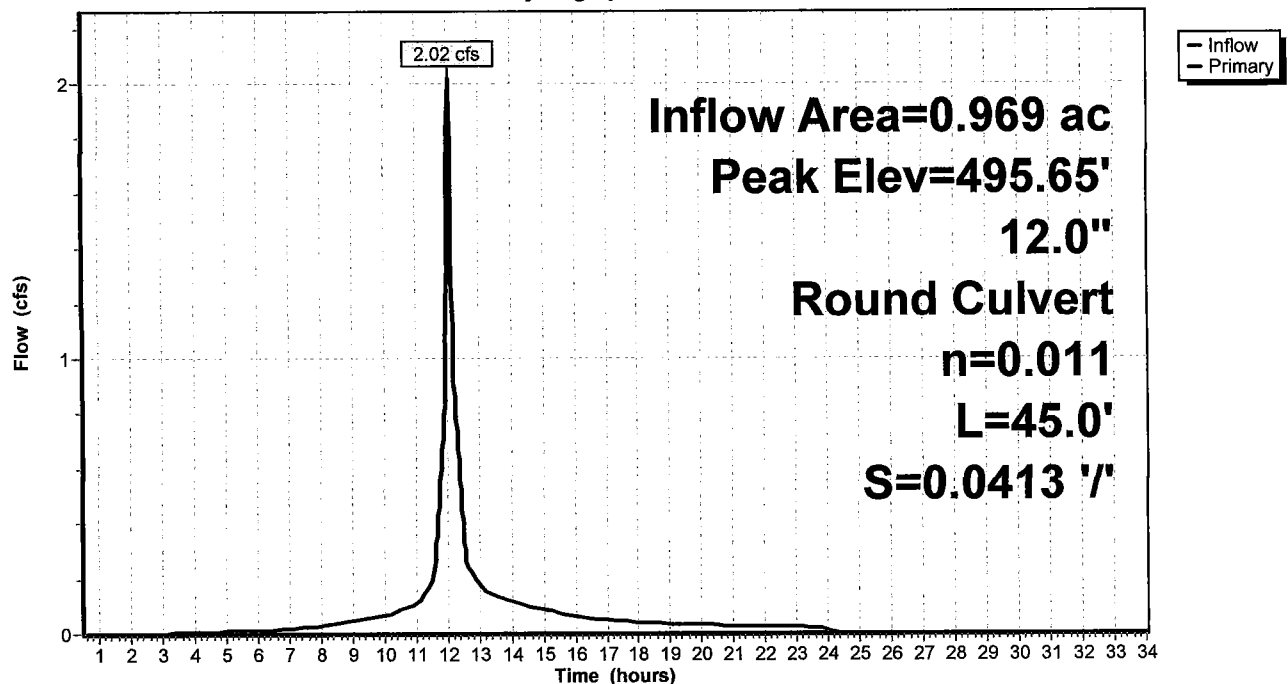
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	494.86'	12.0" Round Culvert L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 494.86' / 493.00' S= 0.0413 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.00 cfs @ 12.07 hrs HW=495.65' TW=493.62' (Dynamic Tailwater)
↑1=Culvert (Inlet Controls 2.00 cfs @ 3.02 fps)

Pond 8P: CB#1

Hydrograph



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Page 77

Summary for Pond 10P: ENLARGED STORMWATER BASIN

Inflow Area = 1.496 ac, 0.00% Impervious, Inflow Depth = 1.20" for 2 YR event
 Inflow = 2.13 cfs @ 12.08 hrs, Volume= 0.150 af
 Outflow = 0.55 cfs @ 12.49 hrs, Volume= 0.090 af, Atten= 74%, Lag= 24.3 min
 Primary = 0.55 cfs @ 12.49 hrs, Volume= 0.090 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3
 Peak Elev= 502.34' @ 12.49 hrs Surf.Area= 2,542 sf Storage= 2,815 cf

Plug-Flow detention time= 214.2 min calculated for 0.090 af (60% of inflow)
 Center-of-Mass det. time= 98.2 min (948.2 - 850.0)

Volume	Invert	Avail.Storage	Storage Description
#1	500.70'	4,796 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.70	30	0	0
501.00	1,542	236	236
502.00	2,039	1,791	2,026
503.00	3,500	2,770	4,796

Device	Routing	Invert	Outlet Devices
#1	Primary	502.25'	8.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=0.55 cfs @ 12.49 hrs HW=502.34' TW=502.24' (Dynamic Tailwater)
 ↑ **1=Broad-Crested Rectangular Weir** (Weir Controls 0.55 cfs @ 0.73 fps)

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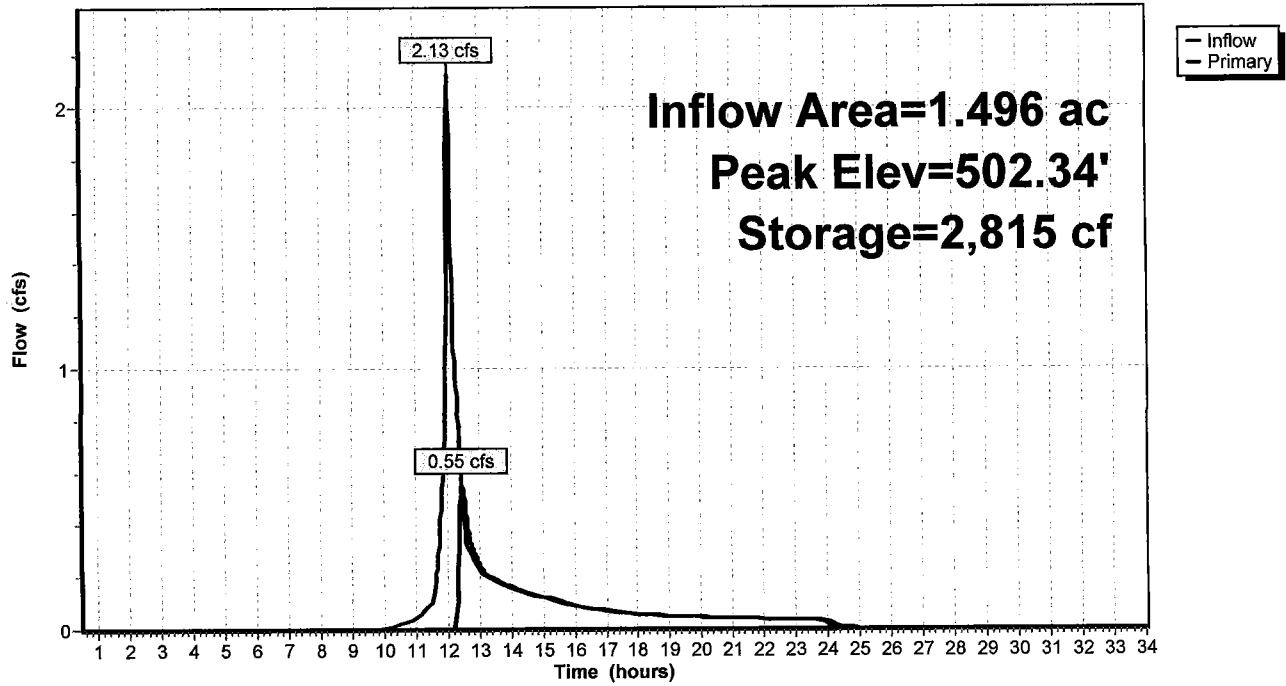
Type III 24-hr 2 YR Rainfall=3.10"

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Page 78

Pond 10P: ENLARGED STORMWATER BASIN

Hydrograph



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Type III 24-hr 2 YR Rainfall=3.10"

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Page 79

Summary for Pond 11P: CULTEC 100HD

Inflow Area = 0.093 ac, 100.00% Impervious, Inflow Depth = 2.87" for 2 YR event
 Inflow = 0.29 cfs @ 12.07 hrs, Volume= 0.022 af
 Outflow = 0.13 cfs @ 12.23 hrs, Volume= 0.017 af, Atten= 56%, Lag= 9.8 min
 Secondary = 0.13 cfs @ 12.23 hrs, Volume= 0.017 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 499.41' @ 12.23 hrs Surf.Area= 1,050 sf Storage= 445 cf

Plug-Flow detention time= 206.9 min calculated for 0.017 af (78% of inflow)

Center-of-Mass det. time= 126.4 min (882.6 - 756.1)

Volume	Invert	Avail.Storage	Storage Description
#1A	498.63'	655 cf	15.00'W x 70.00'L x 2.04'H Field A 2,144 cf Overall - 506 cf Embedded = 1,637 cf x 40.0% Voids
#2A	499.13'	506 cf	Cultec C-100HD x 36 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 4 rows
			1,161 cf Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Secondary	499.13'	4.0" Round Culvert L= 23.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 499.13' / 498.90' S= 0.0100 ' / Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	499.80'	6.0" Round Culvert L= 23.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 499.80' / 499.34' S= 0.0200 ' / Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Secondary OutFlow Max=0.13 cfs @ 12.23 hrs HW=499.41' (Free Discharge)

1=Culvert (Inlet Controls 0.13 cfs @ 1.60 fps)

2=Culvert (Controls 0.00 cfs)

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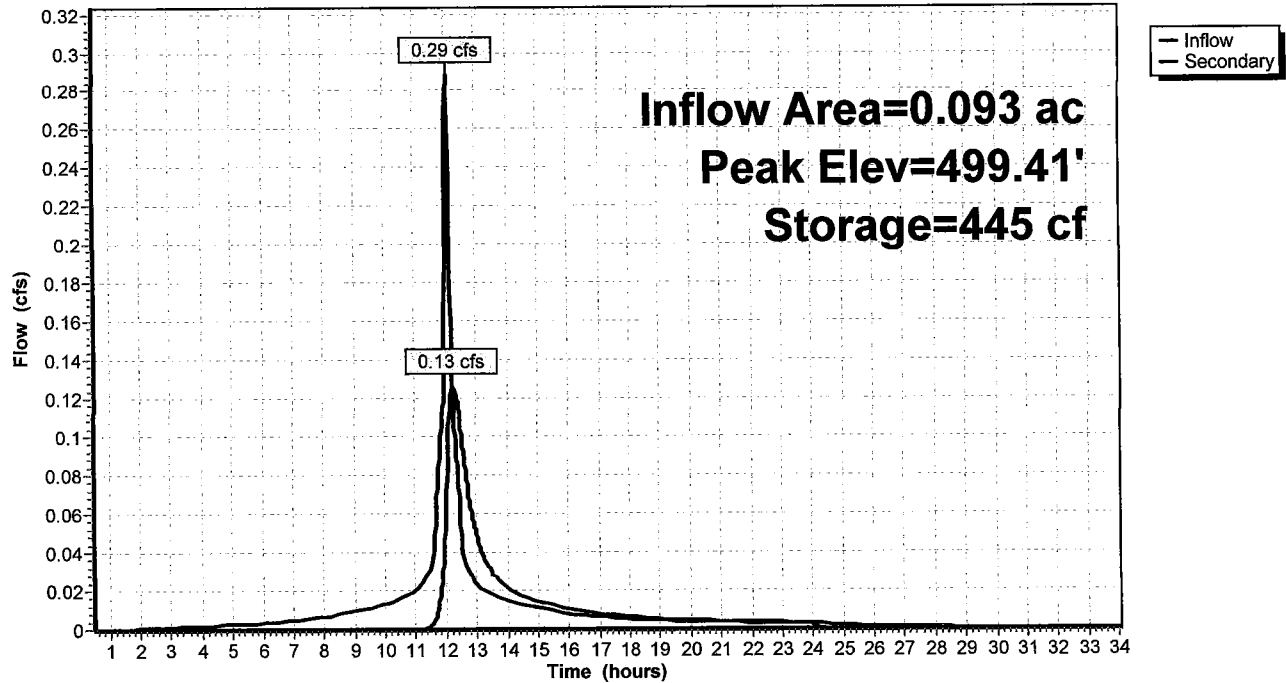
Type III 24-hr 2 YR Rainfall=3.10"

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Page 80

Pond 11P: CULTEC 100HD

Hydrograph



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Page 81

Summary for Pond 12P: P-BASIN

Inflow Area = 0.110 ac, 0.00% Impervious, Inflow Depth = 2.65" for 2 YR event
 Inflow = 0.33 cfs @ 12.07 hrs, Volume= 0.024 af
 Outflow = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min
 Primary = 0.00 cfs @ 0.50 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3
 Peak Elev= 501.24' @ 24.30 hrs Surf.Area= 2,055 sf Storage= 1,059 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
 Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	500.50'	2,779 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.50	383	0	0
501.00	1,911	574	574
502.00	2,500	2,206	2,779

Device	Routing	Invert	Outlet Devices
#1	Primary	501.50'	5.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 0.50 hrs HW=500.50' TW=500.37' (Dynamic Tailwater)
 1=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

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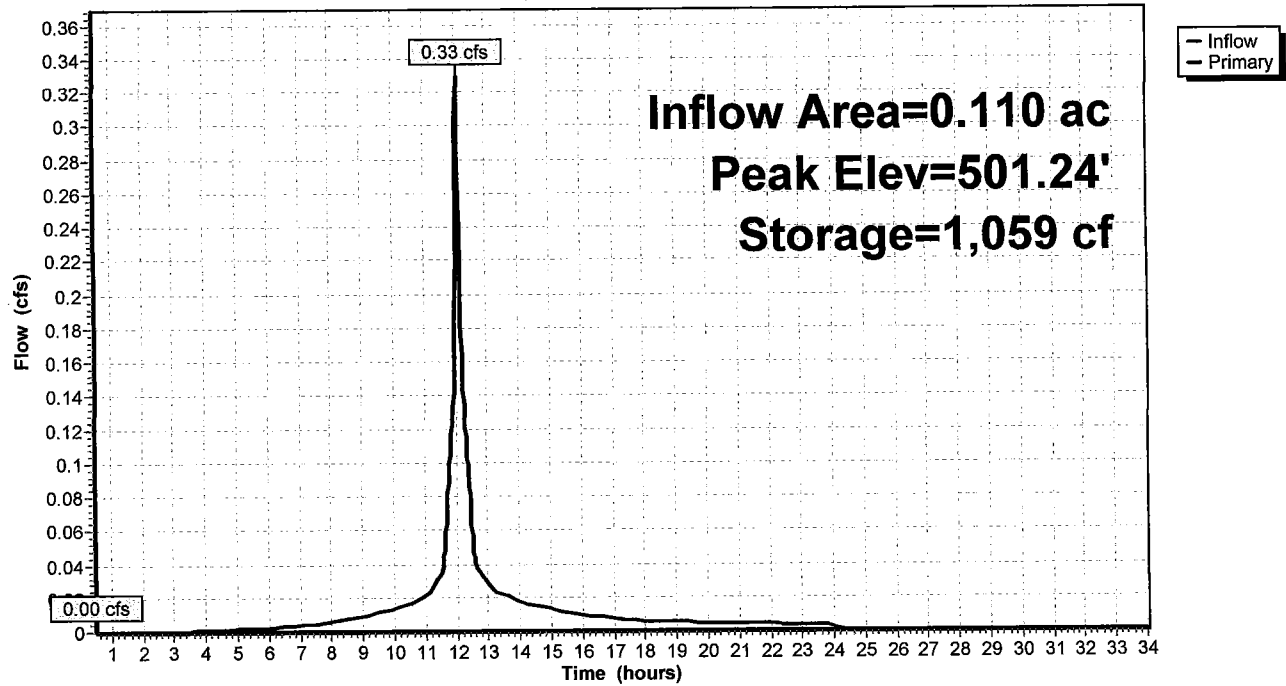
Type III 24-hr 2 YR Rainfall=3.10"

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Page 82

Pond 12P: P-BASIN

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Type III 24-hr 10 YR Rainfall=4.50"

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Page 83

Summary for Subcatchment 1S: PAVE, GRAVEL, BLDG

Runoff = 0.82 cfs @ 12.08 hrs, Volume= 0.057 af, Depth= 2.13"

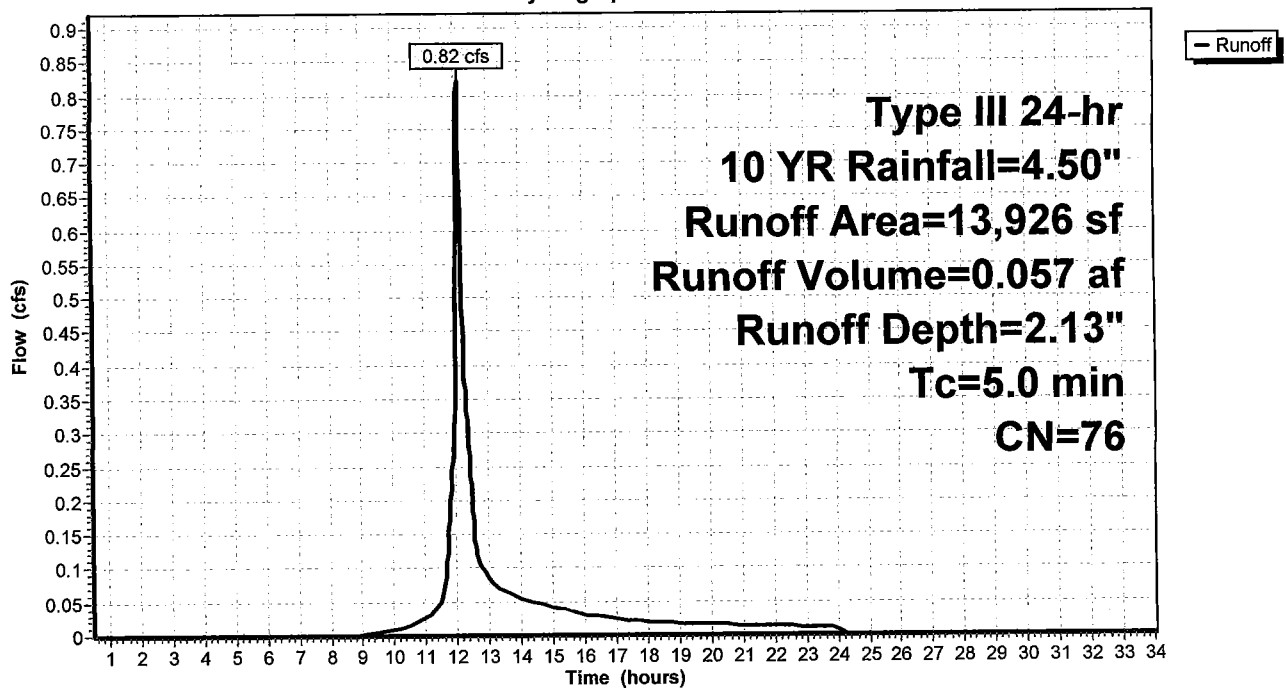
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
* 6,030	98	Paved parking, & bldg. HSG B
7,350	56	Brush, Fair, HSG B
546	96	Gravel surface, HSG B
13,926	76	Weighted Average
7,896		56.70% Pervious Area
6,030		43.30% Impervious Area

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

Subcatchment 1S: PAVE, GRAVEL, BLDG

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Type III 24-hr 10 YR Rainfall=4.50"

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Page 84

Summary for Subcatchment 2S: PAVE\BLDG

Runoff = 2.31 cfs @ 12.07 hrs, Volume= 0.172 af, Depth= 3.92"

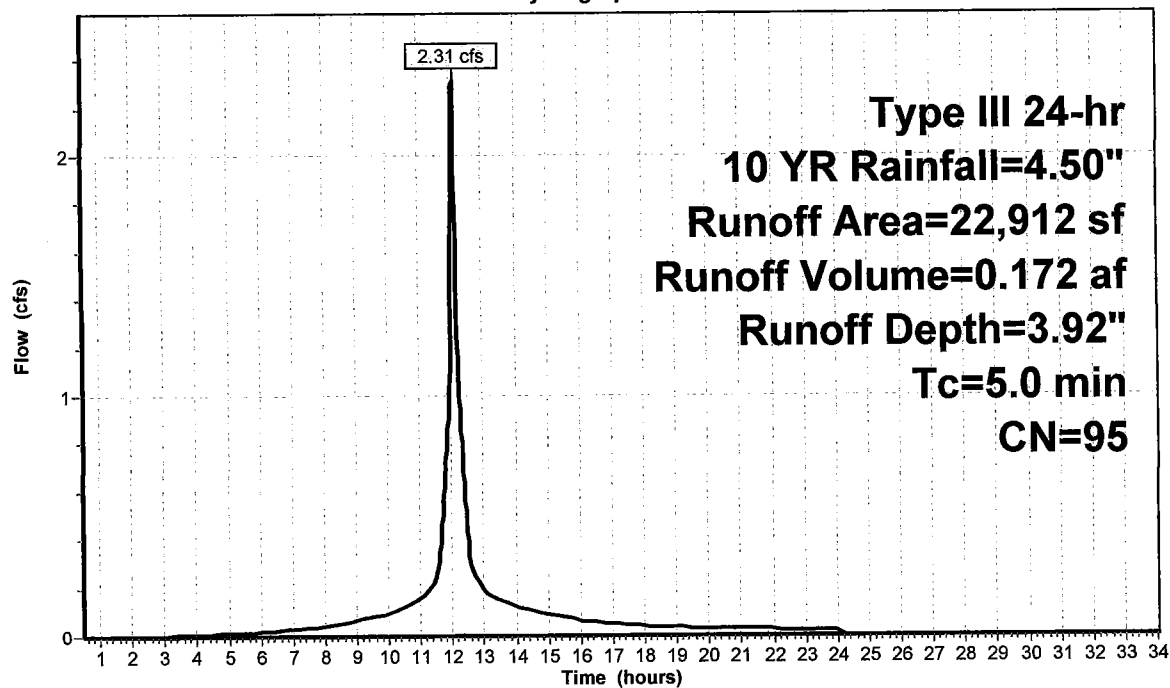
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
* 11,437	98	Paved parking & bldg. HSG B
8,700	96	Gravel surface, HSG B
2,775	79	<50% Grass cover, Poor, HSG B
22,912	95	Weighted Average
11,475		50.08% Pervious Area
11,437		49.92% Impervious Area

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

Subcatchment 2S: PAVE\BLDG

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Type III 24-hr 10 YR Rainfall=4.50"

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Page 85

Summary for Subcatchment 3S: GRAVEL AREA, WOODS

Runoff = 4.15 cfs @ 12.08 hrs, Volume= 0.286 af, Depth= 2.29"

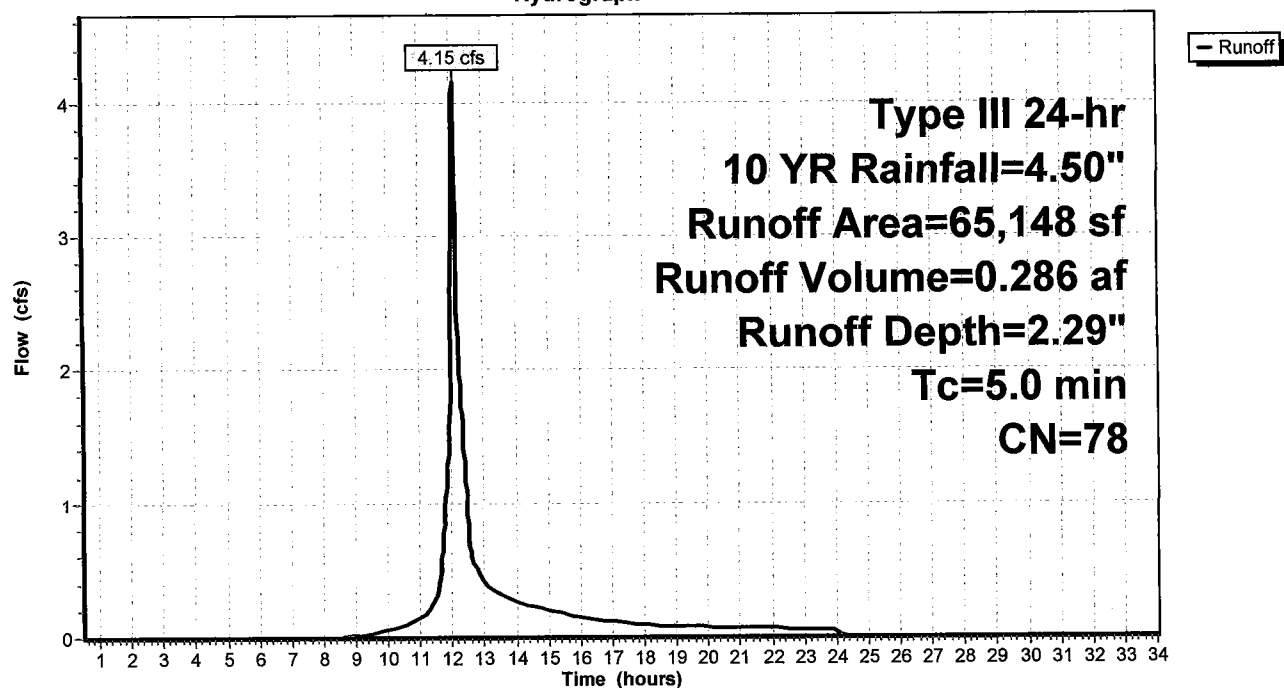
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
33,118	60	Woods, Fair, HSG B
32,030	96	Gravel surface, HSG B
65,148	78	Weighted Average
65,148		100.00% Pervious Area

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

Subcatchment 3S: GRAVEL AREA, WOODS

Hydrograph



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Type III 24-hr 10 YR Rainfall=4.50"

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Page 86

Summary for Subcatchment 4S: PAVE\BLDG

Runoff = 1.40 cfs @ 12.07 hrs, Volume= 0.105 af, Depth= 3.92"

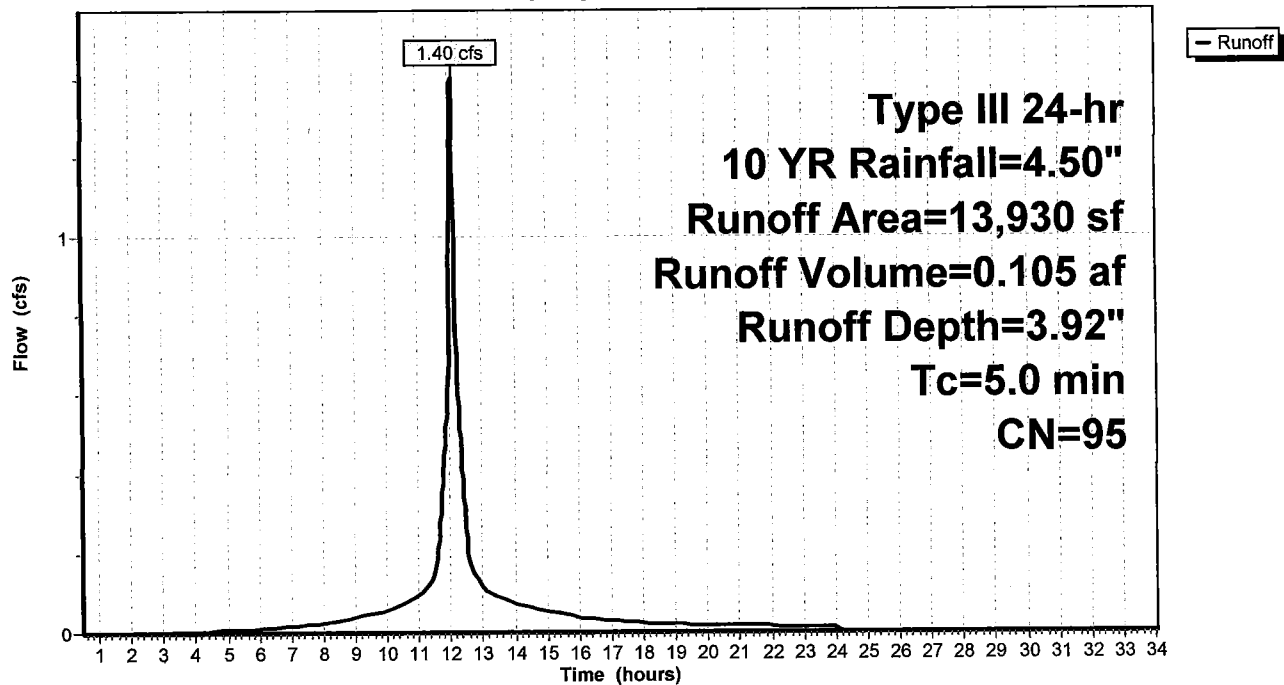
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
11,405	98	Roofs, HSG B
2,525	79	<50% Grass cover, Poor, HSG B
13,930	95	Weighted Average
2,525		18.13% Pervious Area
11,405		81.87% Impervious Area

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

Subcatchment 4S: PAVE\BLDG

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Type III 24-hr 10 YR Rainfall=4.50"

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Page 87

Summary for Subcatchment 5S: PAVEMENT

Runoff = 0.20 cfs @ 12.07 hrs, Volume= 0.016 af, Depth= 4.26"

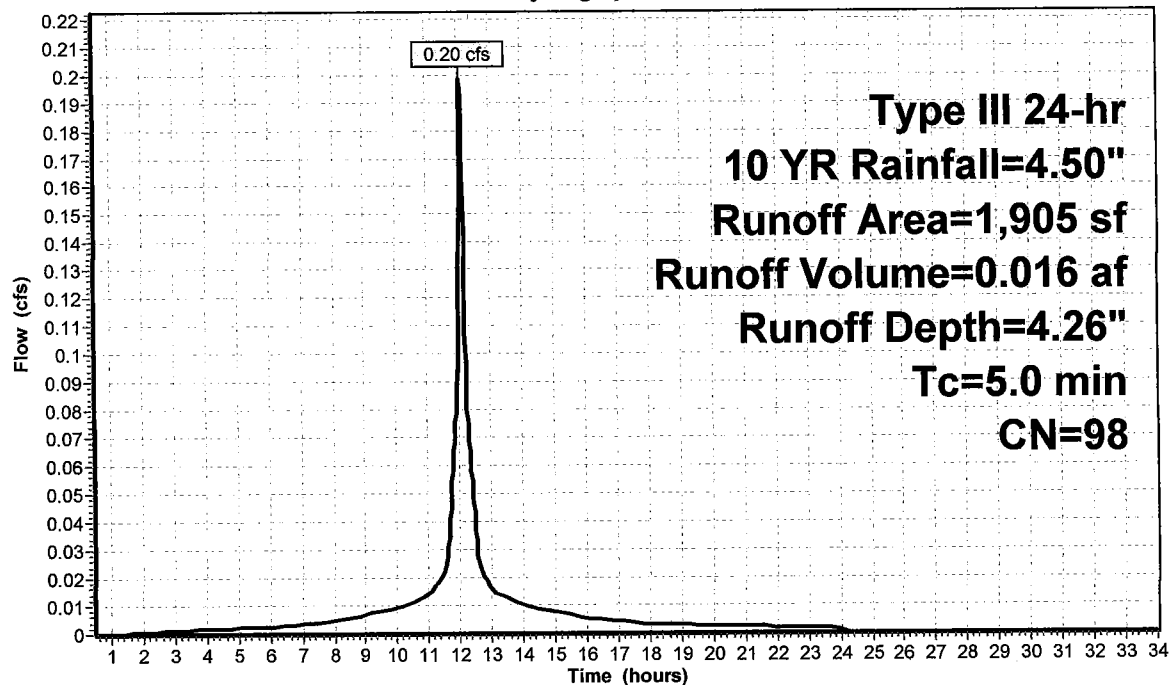
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
1,905	98	Paved parking, HSG B
1,905		100.00% Impervious Area

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

Subcatchment 5S: PAVEMENT

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Type III 24-hr 10 YR Rainfall=4.50"

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Page 88

Summary for Subcatchment 6S: PAVEMENT

Runoff = 0.80 cfs @ 12.07 hrs, Volume= 0.062 af, Depth= 4.26"

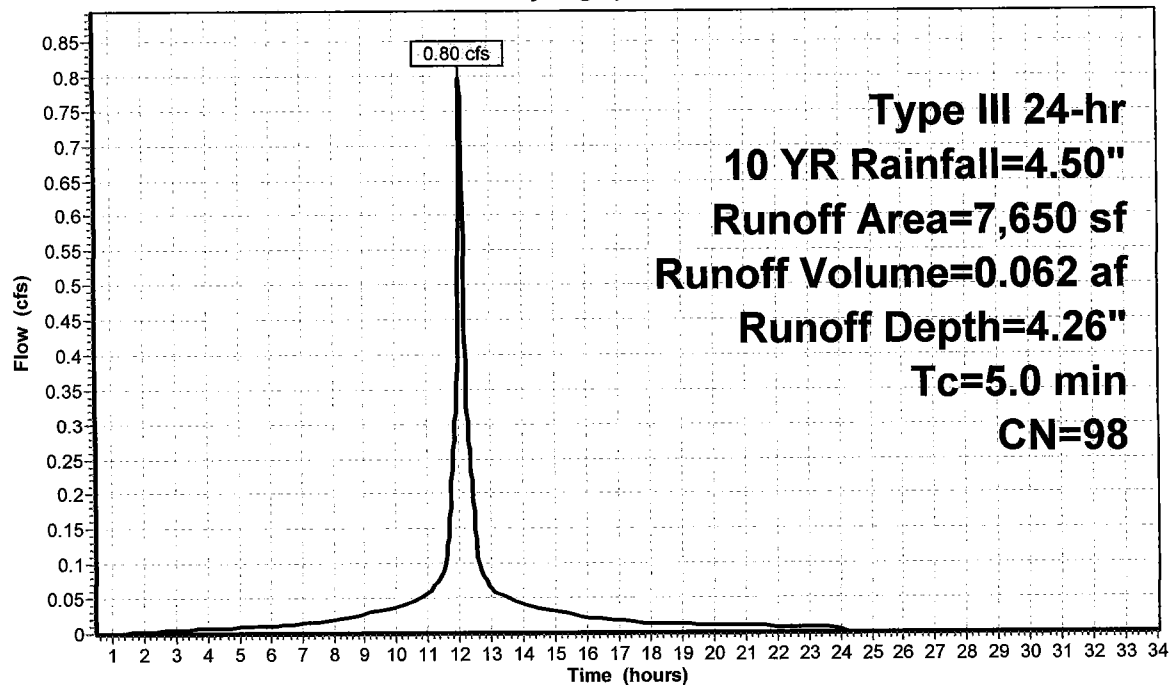
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
7,650	98	Paved parking, HSG B
7,650		100.00% Impervious Area

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

Subcatchment 6S: PAVEMENT

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Type III 24-hr 10 YR Rainfall=4.50"

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Page 89

Summary for Subcatchment 12S: ROOF RUNOFF

Runoff = 0.42 cfs @ 12.07 hrs, Volume= 0.033 af, Depth= 4.26"

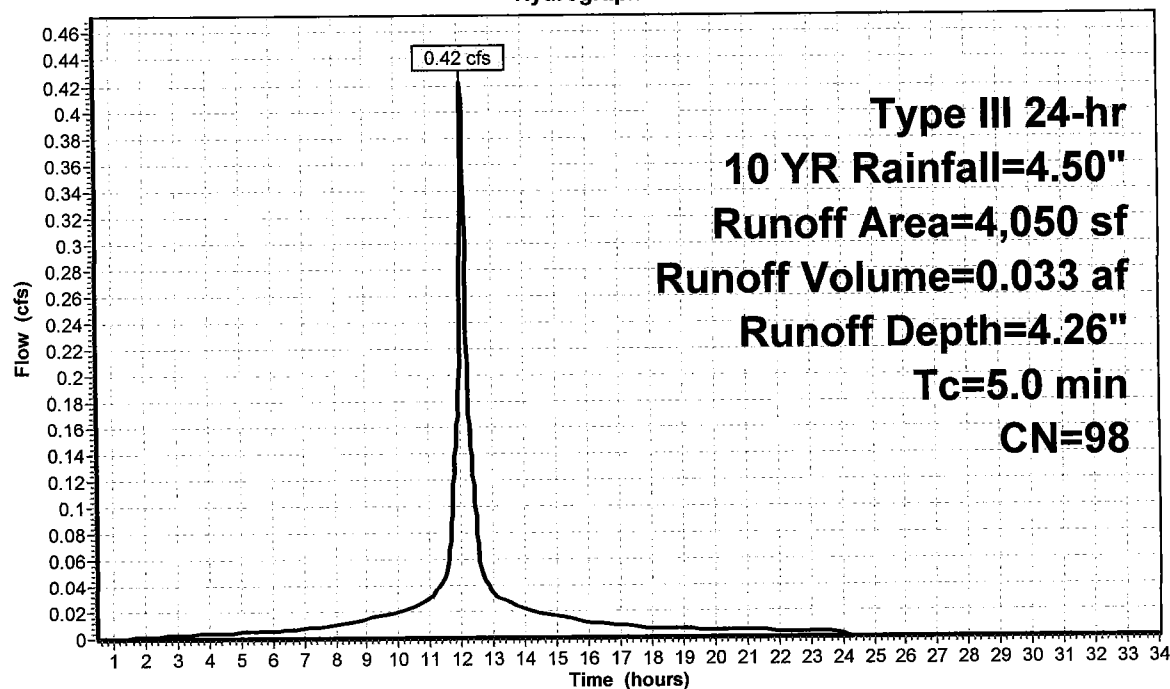
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
4,050	98	Roofs, HSG B
4,050		100.00% Impervious Area

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

Subcatchment 12S: ROOF RUNOFF

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Type III 24-hr 10 YR Rainfall=4.50"

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Page 90

Summary for Subcatchment 13S: GRAVEL AREA

Runoff = 0.49 cfs @ 12.07 hrs, Volume= 0.037 af, Depth= 4.04"

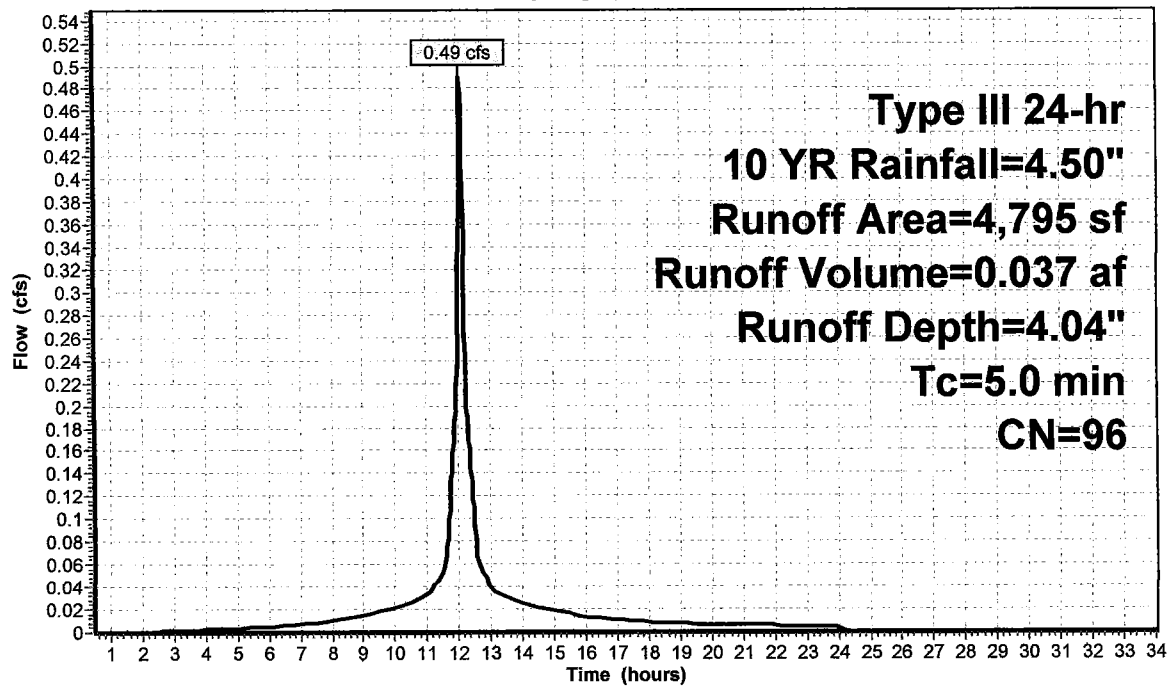
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 10 YR Rainfall=4.50"

Area (sf)	CN	Description
4,795	96	Gravel surface, HSG B
4,795		100.00% Pervious Area

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

Subcatchment 13S: GRAVEL AREA

Hydrograph



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Type III 24-hr 10 YR Rainfall=4.50"

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Page 91

Summary for Reach 1R: INTERMITTENT STREAM

Inflow Area = 2.115 ac, 16.81% Impervious, Inflow Depth = 2.26" for 10 YR event
Inflow = 4.71 cfs @ 12.12 hrs, Volume= 0.399 af
Outflow = 4.56 cfs @ 12.15 hrs, Volume= 0.399 af, Atten= 3%, Lag= 1.6 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Max. Velocity= 3.04 fps, Min. Travel Time= 2.0 min

Avg. Velocity = 0.82 fps, Avg. Travel Time= 7.4 min

Peak Storage= 539 cf @ 12.15 hrs

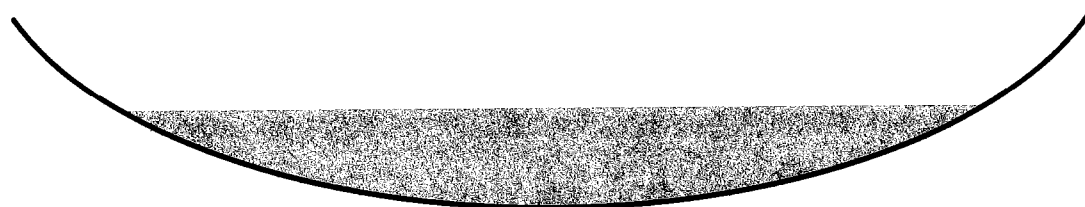
Average Depth at Peak Storage= 0.52'

Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 18.47 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds

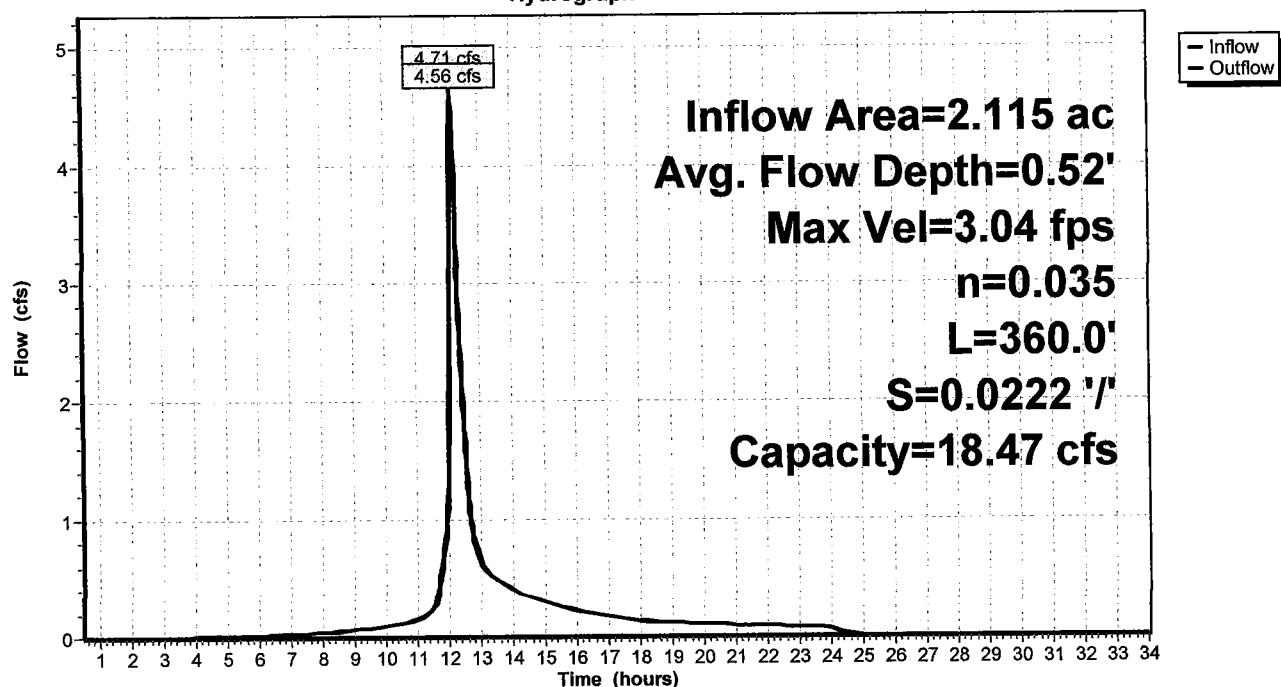
Length= 360.0' Slope= 0.0222 '/'

Inlet Invert= 502.00', Outlet Invert= 494.00'



Reach 1R: INTERMITTENT STREAM

Hydrograph



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Type III 24-hr 10 YR Rainfall=4.50"

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Page 92

Summary for Reach 2R: CHANNEL

Inflow Area = 3.083 ac, 31.62% Impervious, Inflow Depth = 2.48" for 10 YR event
Inflow = 7.08 cfs @ 12.12 hrs, Volume= 0.638 af
Outflow = 7.08 cfs @ 12.12 hrs, Volume= 0.638 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Max. Velocity= 3.59 fps, Min. Travel Time= 0.3 min

Avg. Velocity = 0.98 fps, Avg. Travel Time= 1.1 min

Peak Storage= 128 cf @ 12.12 hrs

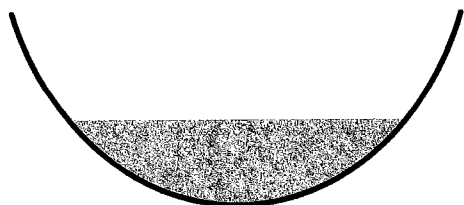
Average Depth at Peak Storage= 0.89'

Bank-Full Depth= 2.00' Flow Area= 6.7 sf, Capacity= 37.62 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040 Earth, cobble bottom, clean sides

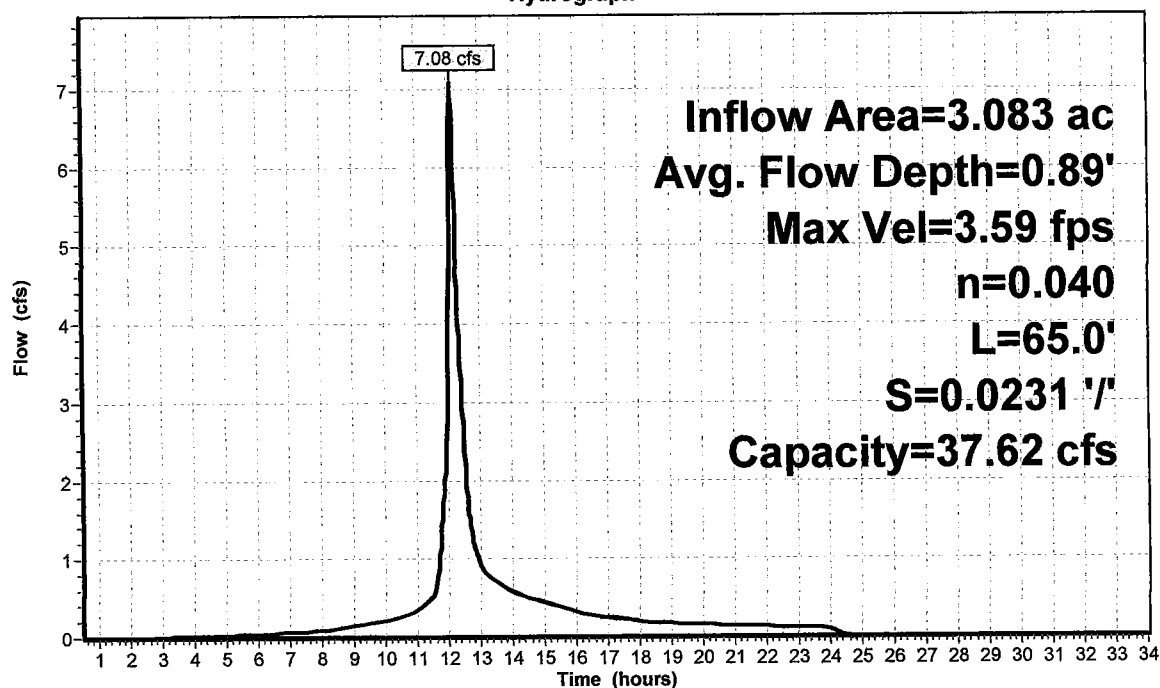
Length= 65.0' Slope= 0.0231 '/'

Inlet Invert= 493.00', Outlet Invert= 491.50'



Reach 2R: CHANNEL

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Type III 24-hr 10 YR Rainfall=4.50"

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Page 93

Summary for Pond 5P: CB#4

Inflow Area = 0.430 ac, 32.21% Impervious, Inflow Depth = 1.59" for 10 YR event
Inflow = 0.82 cfs @ 12.08 hrs, Volume= 0.057 af
Outflow = 0.82 cfs @ 12.08 hrs, Volume= 0.057 af, Atten= 0%, Lag= 0.0 min
Primary = 0.82 cfs @ 12.08 hrs, Volume= 0.057 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 500.83' @ 12.08 hrs

Flood Elev= 500.37'

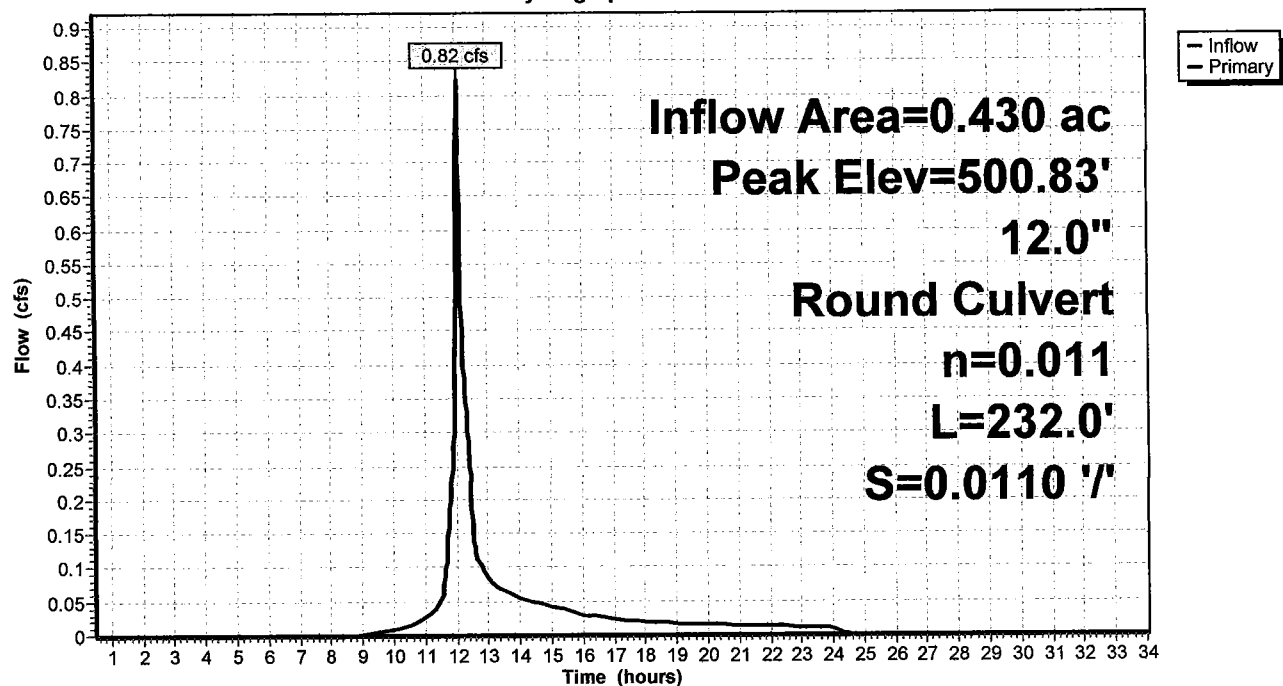
Device	Routing	Invert	Outlet Devices
#1	Primary	500.37'	12.0" Round Culvert L= 232.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 500.37' / 497.82' S= 0.0110 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=0.82 cfs @ 12.08 hrs HW=500.83' TW=497.07' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 0.82 cfs @ 2.31 fps)

Pond 5P: CB#4

Hydrograph



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Type III 24-hr 10 YR Rainfall=4.50"

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Page 94

Summary for Pond 6P: CB#3

Inflow Area = 0.750 ac, 53.40% Impervious, Inflow Depth = 2.59" for 10 YR event
Inflow = 2.22 cfs @ 12.07 hrs, Volume= 0.162 af
Outflow = 2.22 cfs @ 12.07 hrs, Volume= 0.162 af, Atten= 0%, Lag= 0.0 min
Primary = 2.22 cfs @ 12.07 hrs, Volume= 0.162 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 497.07' @ 12.07 hrs

Flood Elev= 499.53'

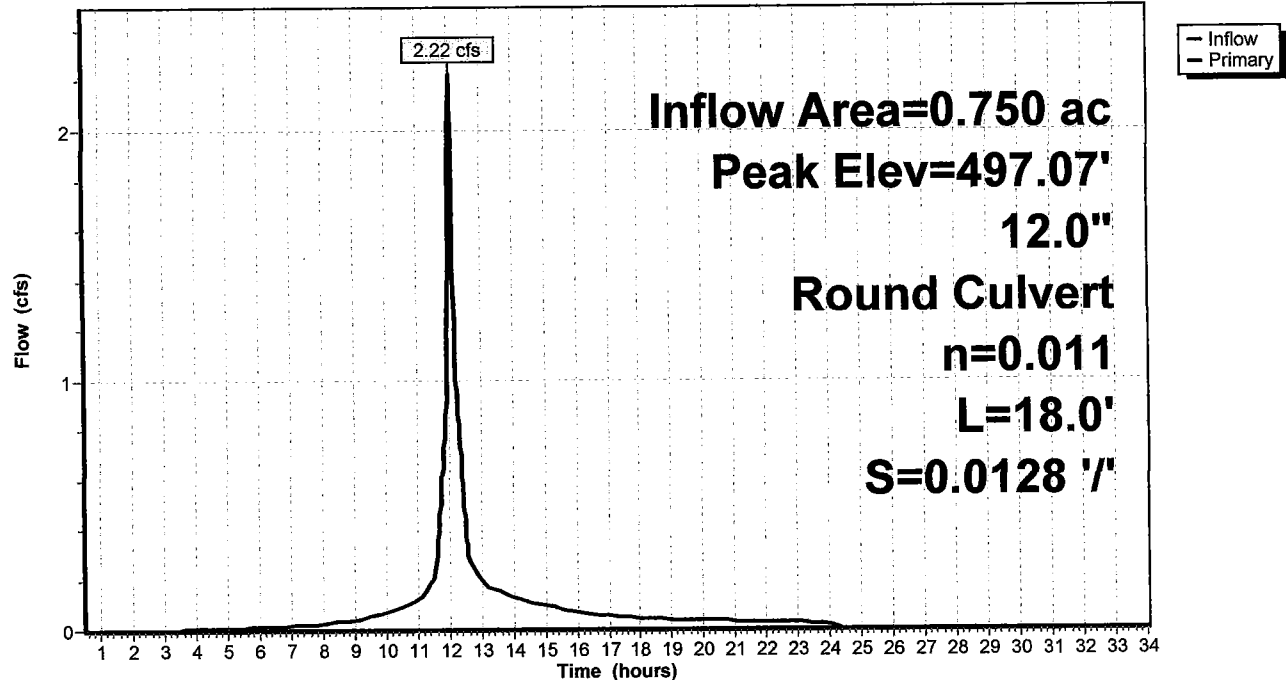
Device	Routing	Invert	Outlet Devices
#1	Primary	495.88'	12.0" Round Culvert L= 18.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.88' / 495.65' S= 0.0128 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.21 cfs @ 12.07 hrs HW=497.06' TW=496.72' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 2.21 cfs @ 2.81 fps)

Pond 6P: CB#3

Hydrograph



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Type III 24-hr 10 YR Rainfall=4.50"

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Page 95

Summary for Pond 7P: CB#2

Inflow Area = 0.793 ac, 55.97% Impervious, Inflow Depth = 2.68" for 10 YR event
Inflow = 2.42 cfs @ 12.07 hrs, Volume= 0.177 af
Outflow = 2.42 cfs @ 12.07 hrs, Volume= 0.177 af, Atten= 0%, Lag= 0.0 min
Primary = 2.42 cfs @ 12.07 hrs, Volume= 0.177 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 496.73' @ 12.07 hrs

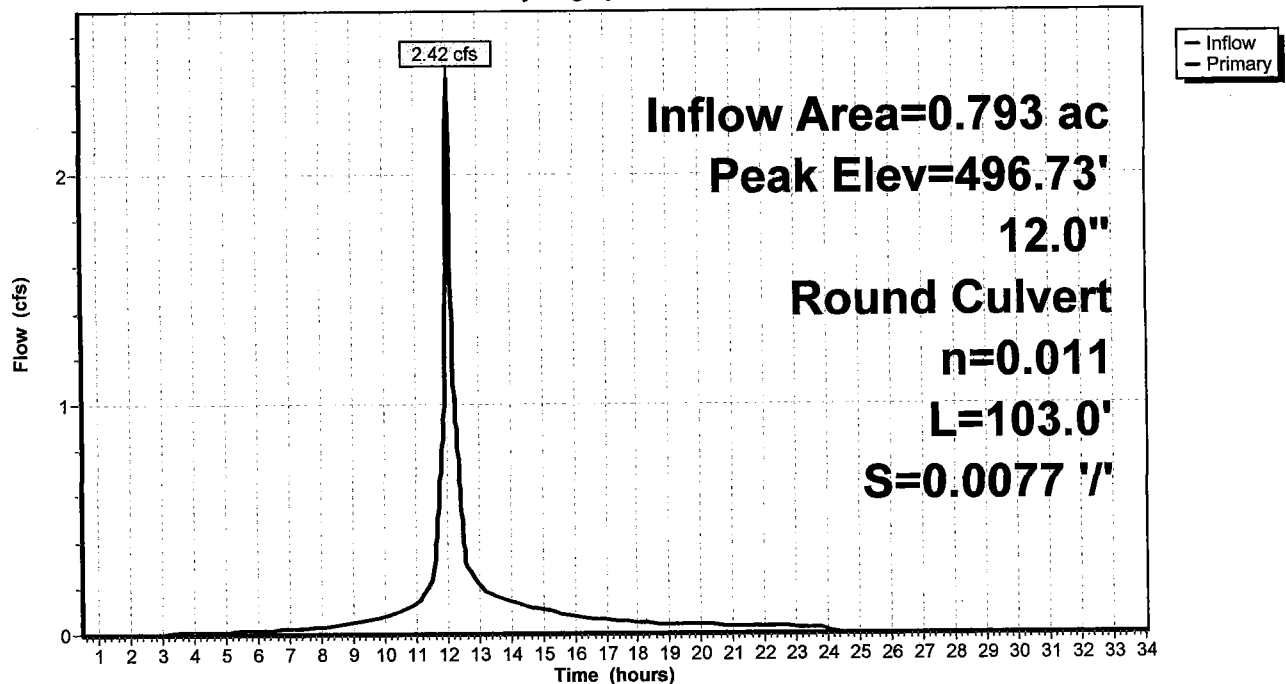
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.65'	12.0" Round Culvert L= 103.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.65' / 494.86' S= 0.0077 ' / ' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.41 cfs @ 12.07 hrs HW=496.72' TW=496.07' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 2.41 cfs @ 3.56 fps)

Pond 7P: CB#2

Hydrograph



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Type III 24-hr 10 YR Rainfall=4.50"

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Page 96

Summary for Pond 8P: CB#1

Inflow Area = 0.969 ac, 63.95% Impervious, Inflow Depth = 2.97" for 10 YR event
Inflow = 3.22 cfs @ 12.07 hrs, Volume= 0.240 af
Outflow = 3.22 cfs @ 12.07 hrs, Volume= 0.240 af, Atten= 0%, Lag= 0.0 min
Primary = 3.22 cfs @ 12.07 hrs, Volume= 0.240 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 496.08' @ 12.07 hrs

Flood Elev= 499.70'

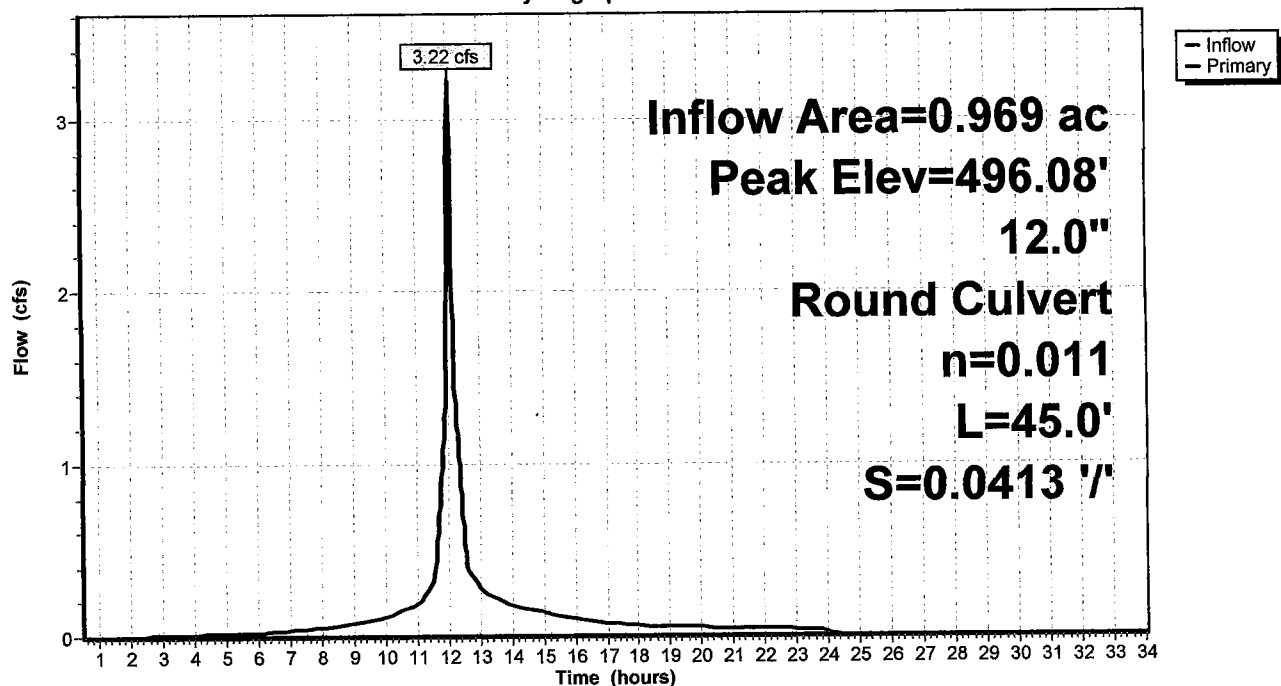
Device	Routing	Invert	Outlet Devices
#1	Primary	494.86'	12.0" Round Culvert L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 494.86' / 493.00' S= 0.0413 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.20 cfs @ 12.07 hrs HW=496.07' TW=493.82' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 3.20 cfs @ 4.07 fps)

Pond 8P: CB#1

Hydrograph



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Type III 24-hr 10 YR Rainfall=4.50"

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Page 97

Summary for Pond 10P: ENLARGED STORMWATER BASIN

Inflow Area = 1.496 ac, 0.00% Impervious, Inflow Depth = 2.29" for 10 YR event
 Inflow = 4.15 cfs @ 12.08 hrs, Volume= 0.286 af
 Outflow = 2.96 cfs @ 12.15 hrs, Volume= 0.226 af, Atten= 29%, Lag= 4.6 min
 Primary = 2.96 cfs @ 12.15 hrs, Volume= 0.226 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 502.61' @ 12.15 hrs Surf.Area= 2,936 sf Storage= 3,553 cf

Plug-Flow detention time= 126.0 min calculated for 0.226 af (79% of inflow)

Center-of-Mass det. time= 45.8 min (876.8 - 831.0)

Volume	Invert	Avail.Storage	Storage Description
#1	500.70'	4,796 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.70	30	0	0
501.00	1,542	236	236
502.00	2,039	1,791	2,026
503.00	3,500	2,770	4,796

Device	Routing	Invert	Outlet Devices
#1	Primary	502.25'	8.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=2.95 cfs @ 12.15 hrs HW=502.61' TW=502.52' (Dynamic Tailwater)

1=Broad-Crested Rectangular Weir (Weir Controls 2.95 cfs @ 1.02 fps)

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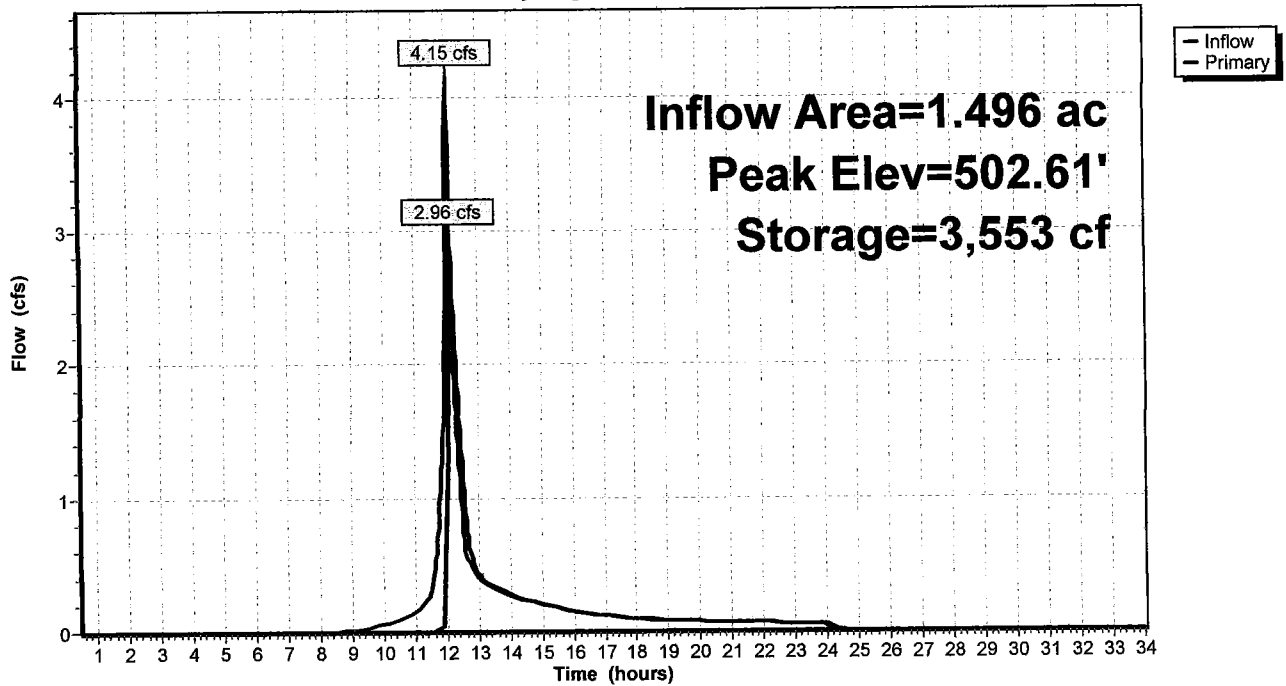
Type III 24-hr 10 YR Rainfall=4.50"

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Page 98

Pond 10P: ENLARGED STORMWATER BASIN

Hydrograph



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Type III 24-hr 10 YR Rainfall=4.50"

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Page 99

Summary for Pond 11P: CULTEC 100HD

Inflow Area = 0.093 ac, 100.00% Impervious, Inflow Depth = 4.26" for 10 YR event
 Inflow = 0.42 cfs @ 12.07 hrs, Volume= 0.033 af
 Outflow = 0.19 cfs @ 12.23 hrs, Volume= 0.028 af, Atten= 56%, Lag= 9.6 min
 Secondary = 0.19 cfs @ 12.23 hrs, Volume= 0.028 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 499.55' @ 12.23 hrs Surf.Area= 1,050 sf Storage= 553 cf

Plug-Flow detention time= 171.1 min calculated for 0.028 af (85% of inflow)

Center-of-Mass det. time= 106.5 min (855.4 - 748.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	498.63'	655 cf	15.00'W x 70.00'L x 2.04'H Field A 2,144 cf Overall - 506 cf Embedded = 1,637 cf x 40.0% Voids
#2A	499.13'	506 cf	Cultec C-100HD x 36 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 4 rows
		1,161 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Secondary	499.13'	4.0" Round Culvert L= 23.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 499.13' / 498.90' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	499.80'	6.0" Round Culvert L= 23.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 499.80' / 499.34' S= 0.0200 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Secondary OutFlow Max=0.19 cfs @ 12.23 hrs HW=499.55' (Free Discharge)

1=Culvert (Inlet Controls 0.19 cfs @ 2.13 fps)

2=Culvert (Controls 0.00 cfs)

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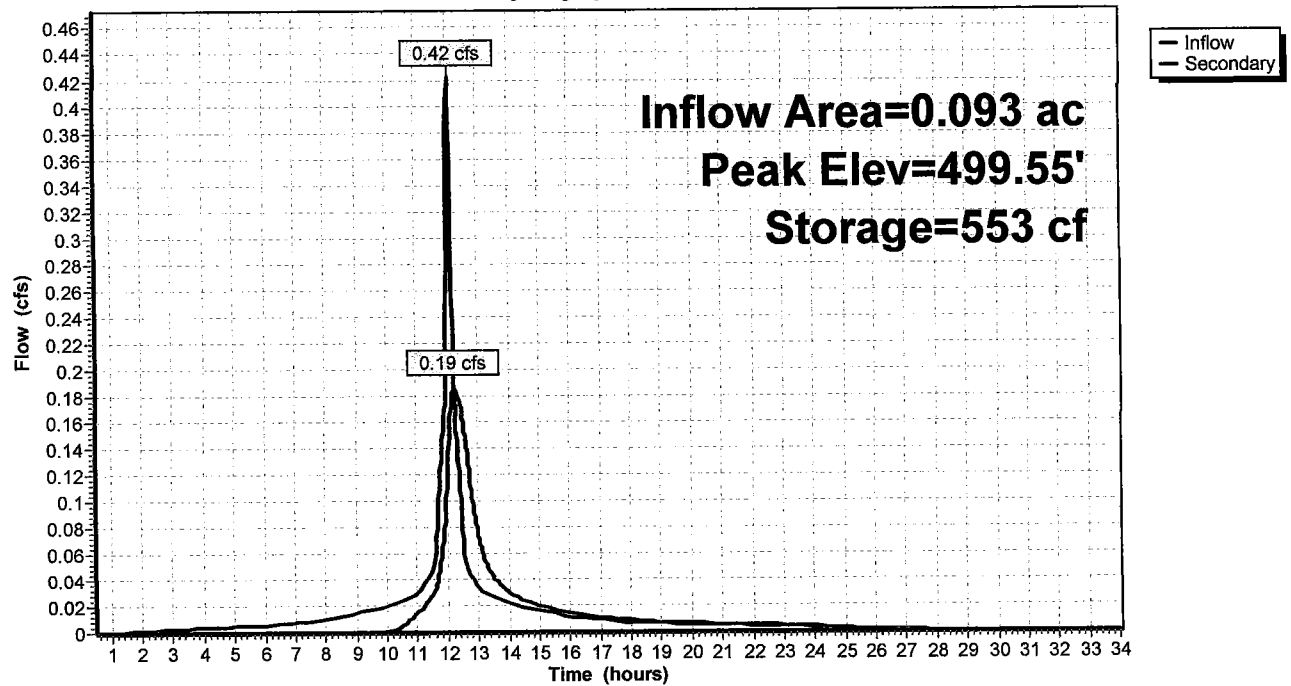
Type III 24-hr 10 YR Rainfall=4.50"

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Page 100

Pond 11P: CULTEC 100HD

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Type III 24-hr 10 YR Rainfall=4.50"

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Page 101

Summary for Pond 12P: P-BASIN

Inflow Area = 0.110 ac, 0.00% Impervious, Inflow Depth = 4.04" for 10 YR event
 Inflow = 0.49 cfs @ 12.07 hrs, Volume= 0.037 af
 Outflow = 0.00 cfs @ 24.07 hrs, Volume= 0.000 af, Atten= 100%, Lag= 719.9 min
 Primary = 0.00 cfs @ 24.07 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 501.50' @ 24.07 hrs Surf.Area= 2,207 sf Storage= 1,610 cf

Plug-Flow detention time= 1,294.6 min calculated for 0.000 af (1% of inflow)

Center-of-Mass det. time= 736.3 min (1,500.3 - 764.0)

Volume	Invert	Avail.Storage	Storage Description
#1	500.50'	2,779 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.50	383	0	0
501.00	1,911	574	574
502.00	2,500	2,206	2,779

Device	Routing	Invert	Outlet Devices
#1	Primary	501.50'	5.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.00 cfs @ 24.07 hrs HW=501.50' TW=500.41' (Dynamic Tailwater)

1=Broad-Crested Rectangular Weir (Weir Controls 0.00 cfs @ 0.13 fps)

POST DEV JOHNSON

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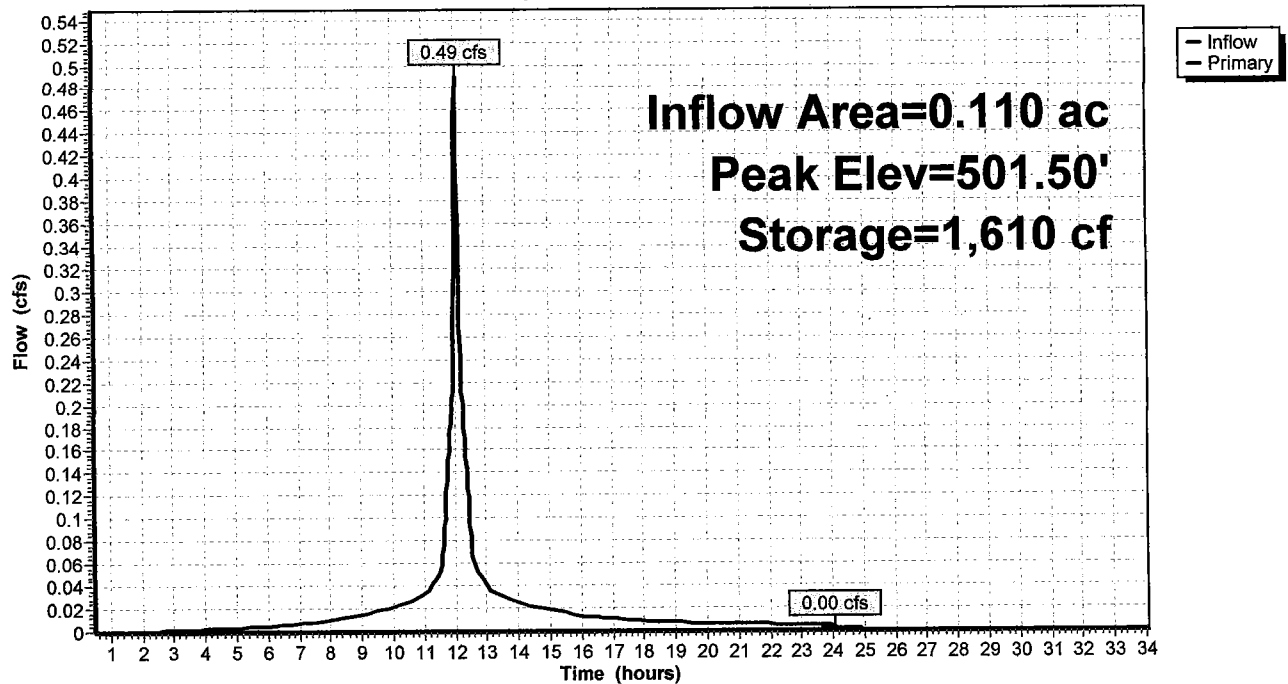
Type III 24-hr 10 YR Rainfall=4.50"

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Page 102

Pond 12P: P-BASIN

Hydrograph



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Type III 24-hr 25 YR Rainfall=5.40"

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Page 103

Summary for Subcatchment 1S: PAVE, GRAVEL, BLDG

Runoff = 1.11 cfs @ 12.08 hrs, Volume= 0.076 af, Depth= 2.87"

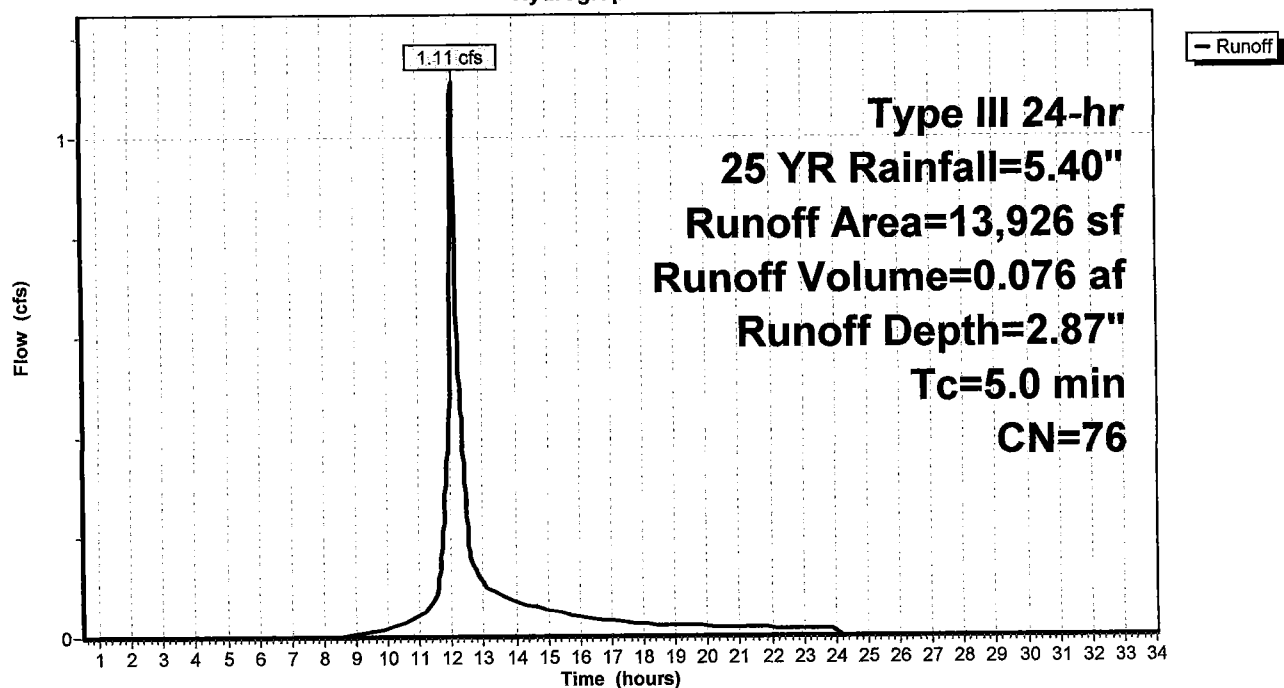
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YR Rainfall=5.40"

Area (sf)	CN	Description
* 6,030	98	Paved parking, & bldg. HSG B
7,350	56	Brush, Fair, HSG B
546	96	Gravel surface, HSG B
13,926	76	Weighted Average
7,896		56.70% Pervious Area
6,030		43.30% Impervious Area

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

Subcatchment 1S: PAVE, GRAVEL, BLDG

Hydrograph



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Type III 24-hr 25 YR Rainfall=5.40"

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Page 104

Summary for Subcatchment 2S: PAVE\BLDG

Runoff = 2.80 cfs @ 12.07 hrs, Volume= 0.211 af, Depth= 4.82"

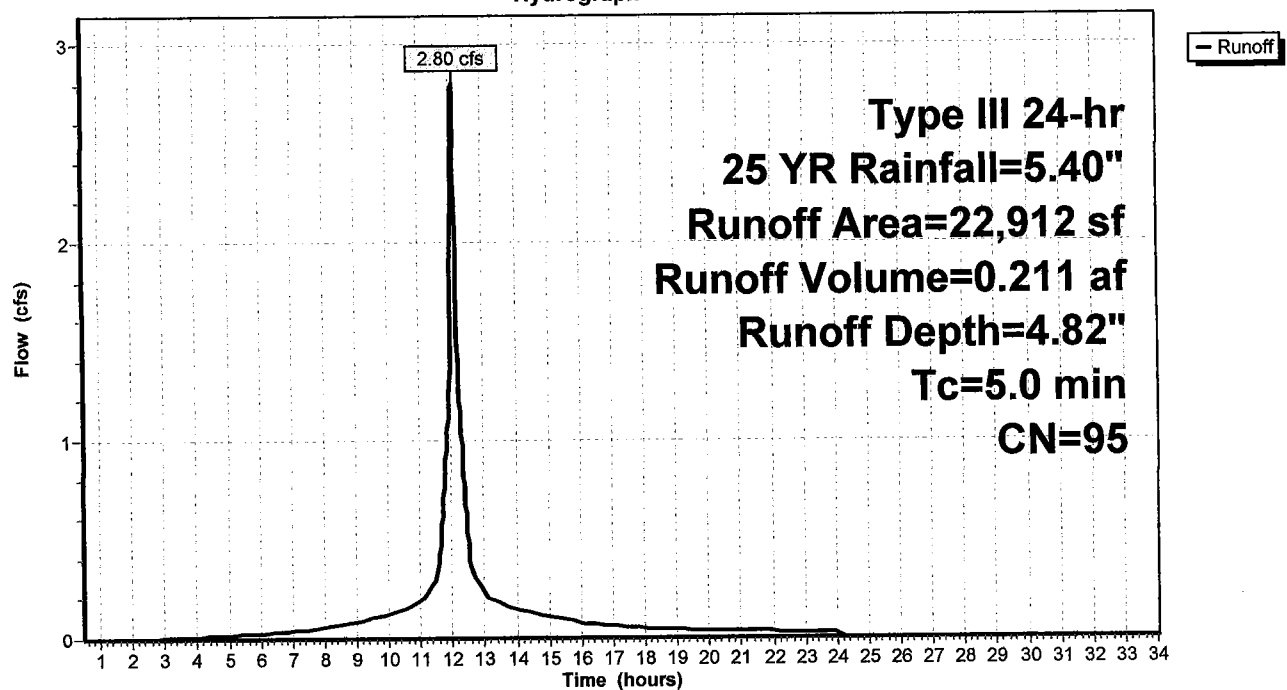
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YR Rainfall=5.40"

	Area (sf)	CN	Description
*	11,437	98	Paved parking & bldg. HSG B
	8,700	96	Gravel surface, HSG B
	2,775	79	<50% Grass cover, Poor, HSG B
	22,912	95	Weighted Average
	11,475		50.08% Pervious Area
	11,437		49.92% Impervious Area

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

Subcatchment 2S: PAVE\BLDG

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 105

Summary for Subcatchment 3S: GRAVEL AREA, WOODS

Runoff = 5.54 cfs @ 12.08 hrs, Volume= 0.381 af, Depth= 3.05"

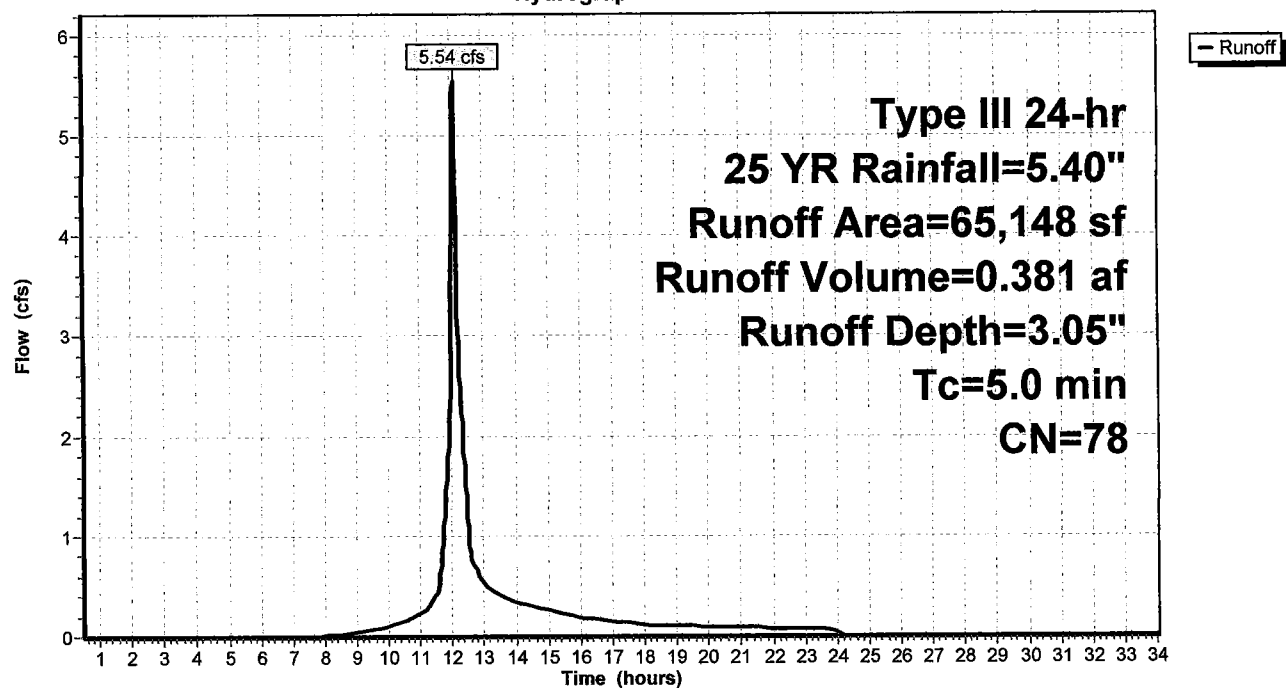
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YR Rainfall=5.40"

Area (sf)	CN	Description
33,118	60	Woods, Fair, HSG B
32,030	96	Gravel surface, HSG B
65,148	78	Weighted Average
65,148		100.00% Pervious Area

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

Subcatchment 3S: GRAVEL AREA, WOODS

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 106

Summary for Subcatchment 4S: PAVE\BLDG

Runoff = 1.70 cfs @ 12.07 hrs, Volume= 0.128 af, Depth= 4.82"

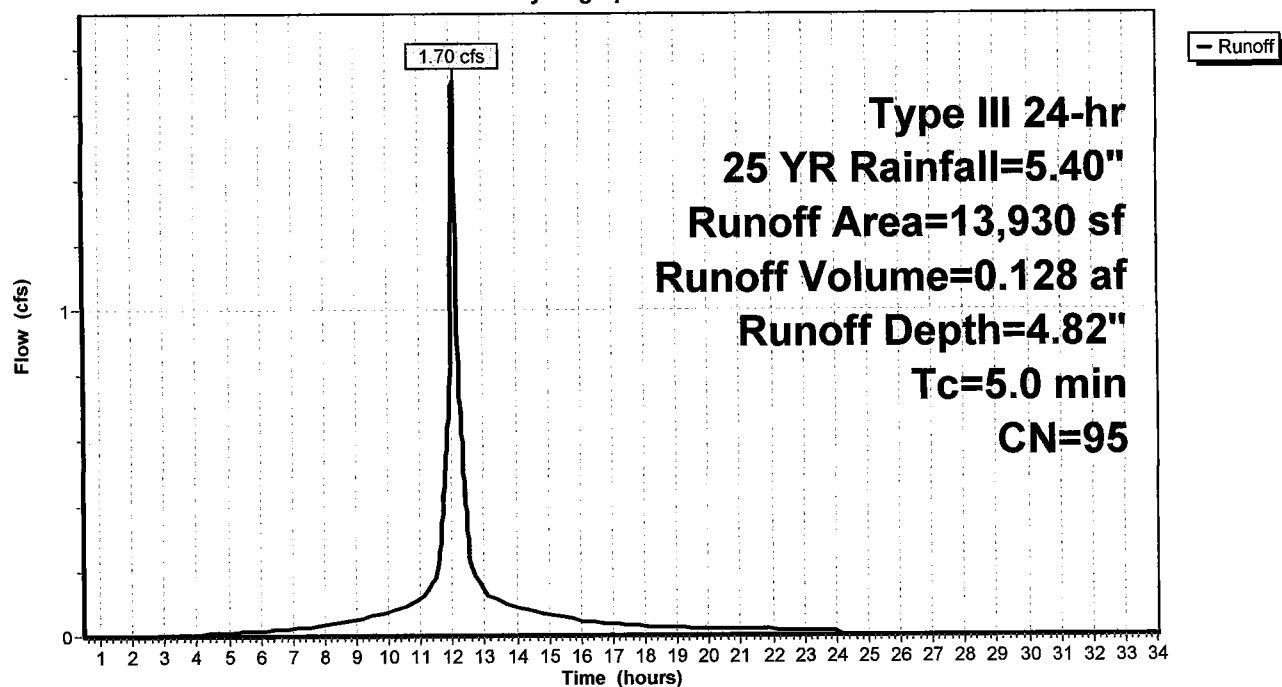
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YR Rainfall=5.40"

Area (sf)	CN	Description
11,405	98	Roofs, HSG B
2,525	79	<50% Grass cover, Poor, HSG B
13,930	95	Weighted Average
2,525		18.13% Pervious Area
11,405		81.87% Impervious Area

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

Subcatchment 4S: PAVE\BLDG

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 107

Summary for Subcatchment 5S: PAVEMENT

Runoff = 0.24 cfs @ 12.07 hrs, Volume= 0.019 af, Depth= 5.16"

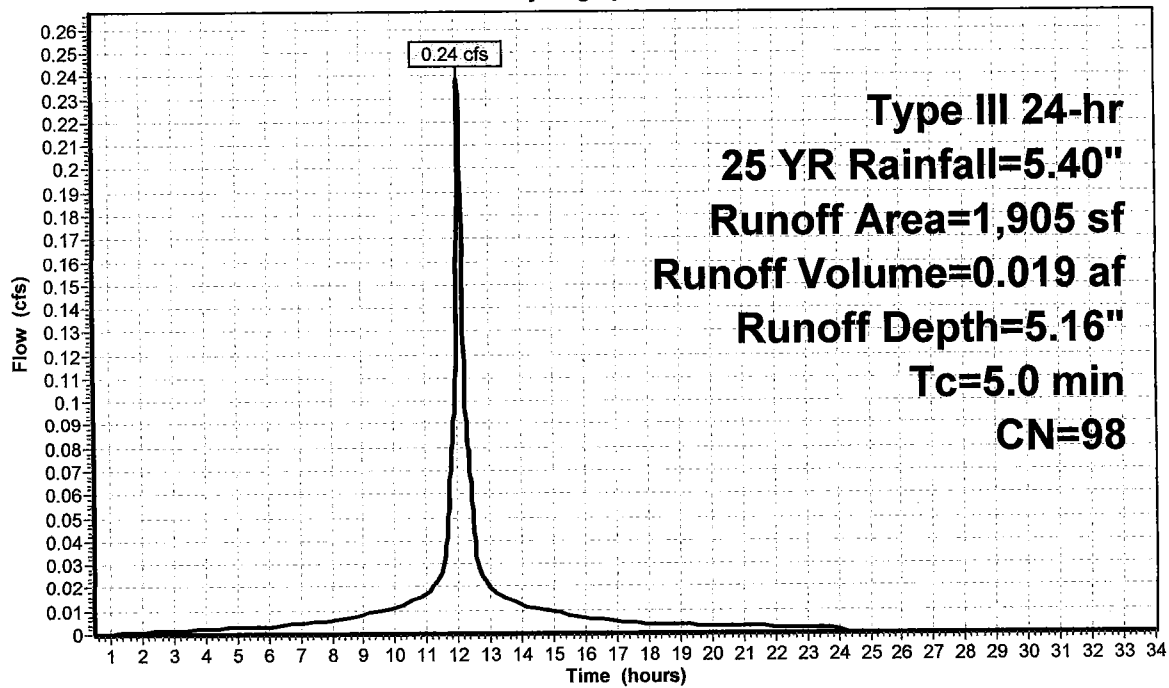
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YR Rainfall=5.40"

Area (sf)	CN	Description
1,905	98	Paved parking, HSG B
1,905		100.00% Impervious Area

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

Subcatchment 5S: PAVEMENT

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 108

Summary for Subcatchment 6S: PAVEMENT

Runoff = 0.96 cfs @ 12.07 hrs, Volume= 0.076 af, Depth= 5.16"

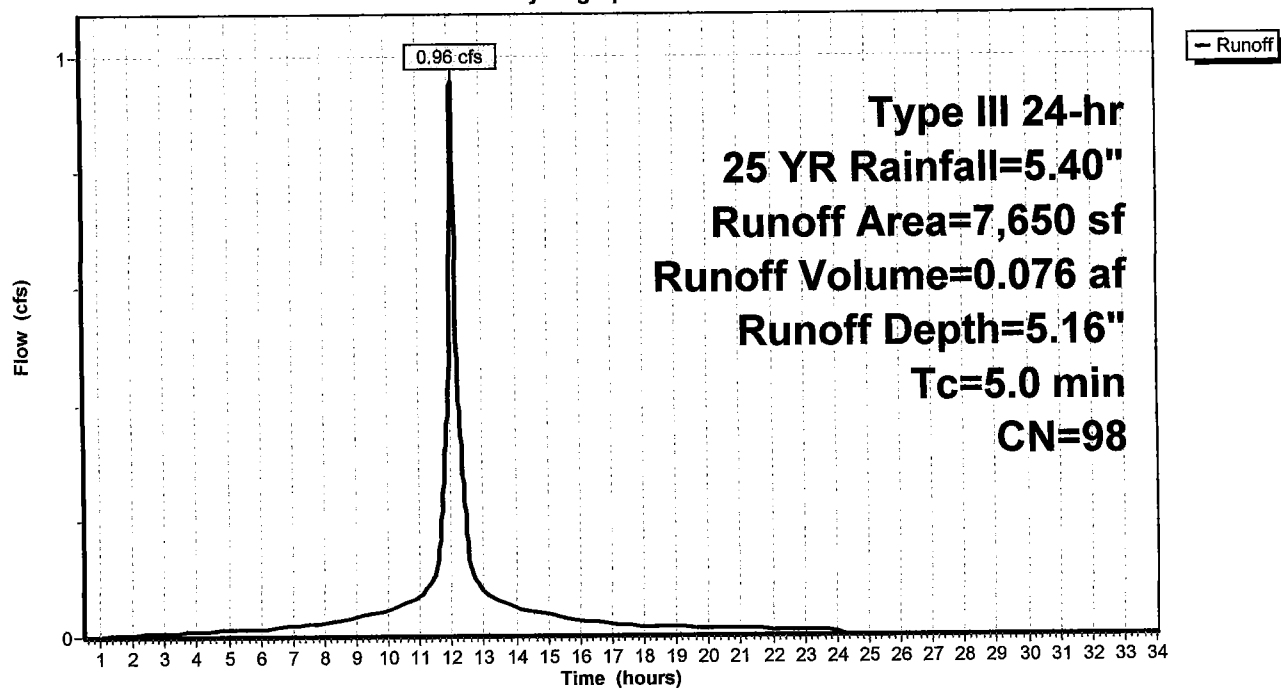
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YR Rainfall=5.40"

Area (sf)	CN	Description
7,650	98	Paved parking, HSG B
7,650		100.00% Impervious Area

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

Subcatchment 6S: PAVEMENT

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 109

Summary for Subcatchment 12S: ROOF RUNOFF

Runoff = 0.51 cfs @ 12.07 hrs, Volume= 0.040 af, Depth= 5.16"

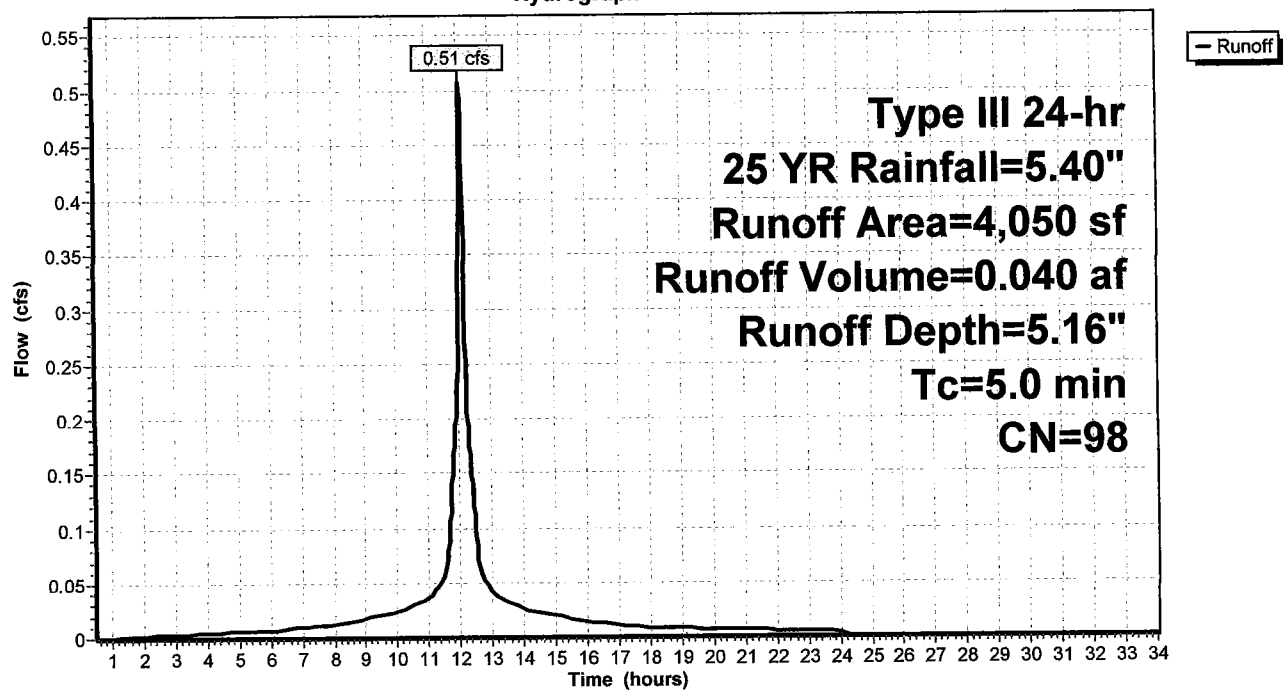
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YR Rainfall=5.40"

Area (sf)	CN	Description
4,050	98	Roofs, HSG B
4,050		100.00% Impervious Area

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

Subcatchment 12S: ROOF RUNOFF

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 110

Summary for Subcatchment 13S: GRAVEL AREA

Runoff = 0.59 cfs @ 12.07 hrs, Volume= 0.045 af, Depth= 4.93"

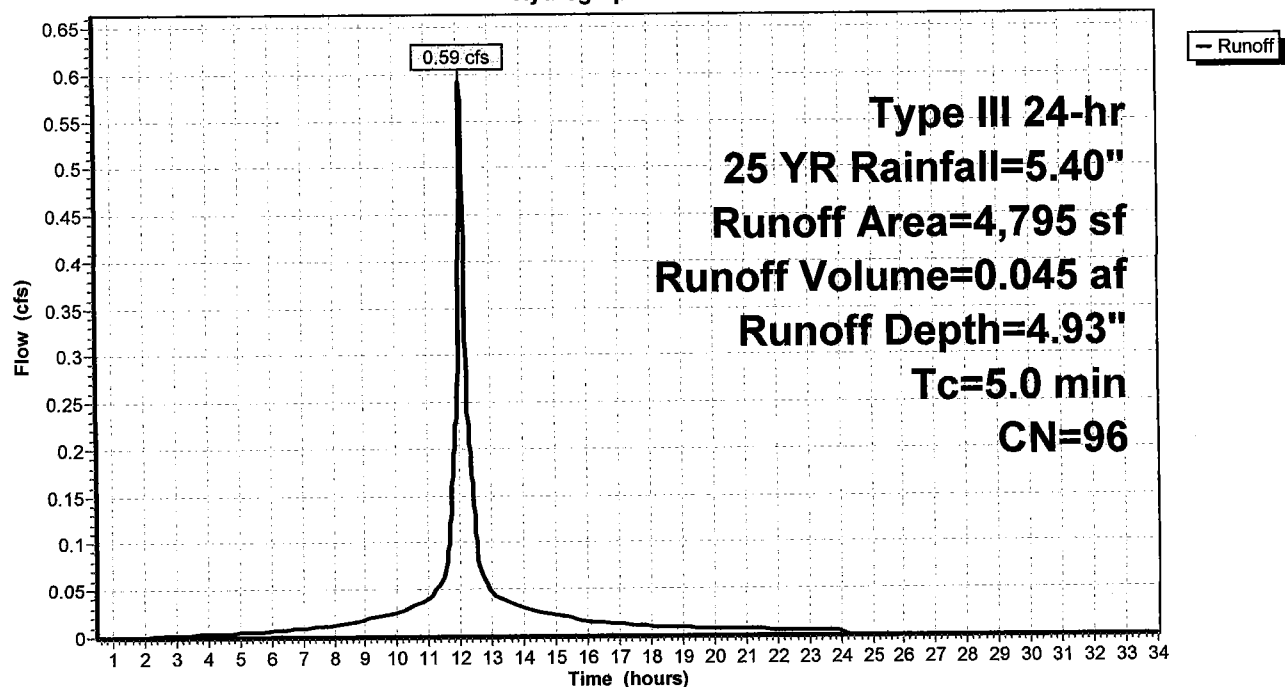
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 25 YR Rainfall=5.40"

Area (sf)	CN	Description
4,795	96	Gravel surface, HSG B
4,795		100.00% Pervious Area

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

Subcatchment 13S: GRAVEL AREA

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 111

Summary for Reach 1R: INTERMITTENT STREAM

Inflow Area = 2.115 ac, 16.81% Impervious, Inflow Depth = 3.02" for 25 YR event
Inflow = 7.01 cfs @ 12.10 hrs, Volume= 0.533 af
Outflow = 6.85 cfs @ 12.13 hrs, Volume= 0.533 af, Atten= 2%, Lag= 1.3 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Max. Velocity= 3.44 fps, Min. Travel Time= 1.7 min

Avg. Velocity = 0.87 fps, Avg. Travel Time= 6.9 min

Peak Storage= 717 cf @ 12.13 hrs

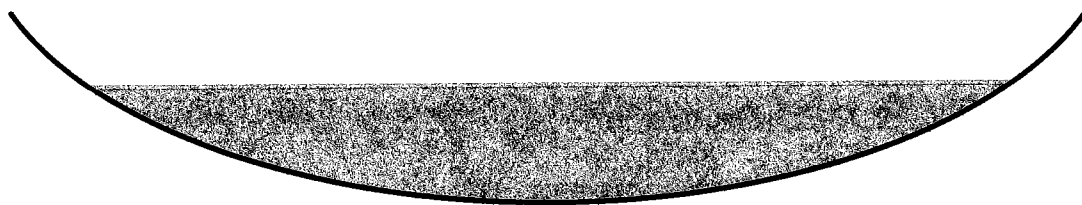
Average Depth at Peak Storage= 0.63'

Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 18.47 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds

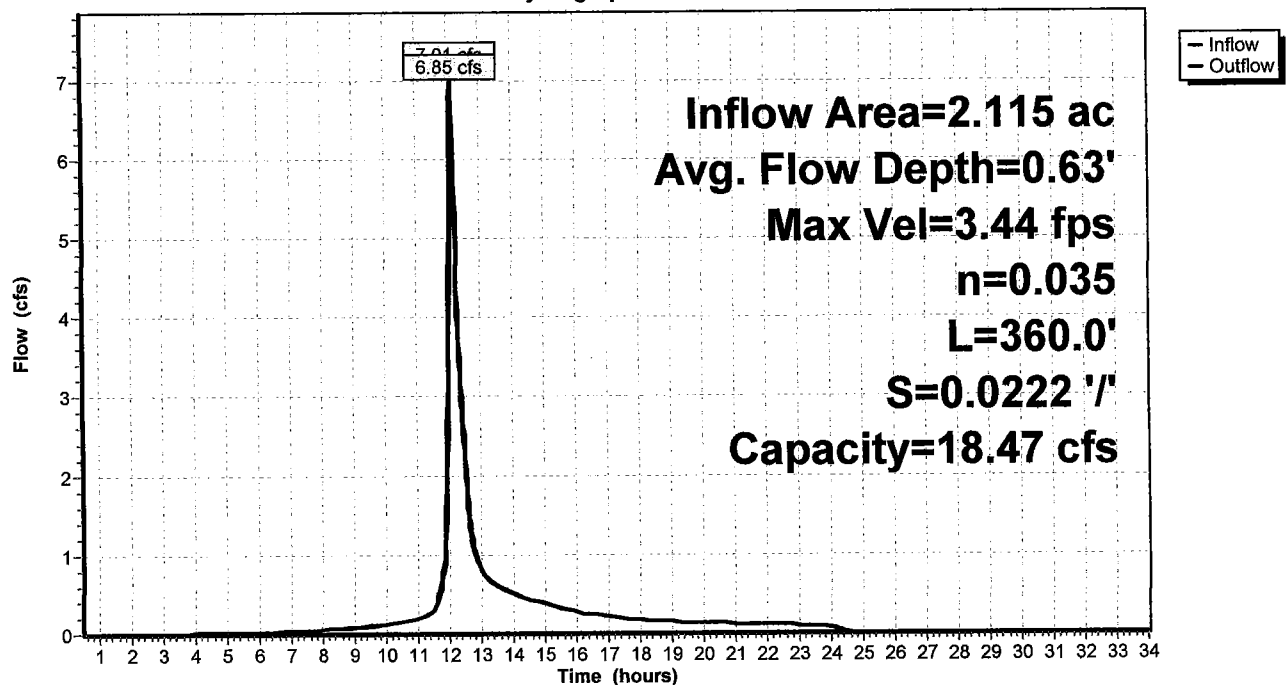
Length= 360.0' Slope= 0.0222 '/'

Inlet Invert= 502.00', Outlet Invert= 494.00'



Reach 1R: INTERMITTENT STREAM

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 112

Summary for Reach 2R: CHANNEL

Inflow Area = 3.083 ac, 31.62% Impervious, Inflow Depth = 3.27" for 25 YR event
Inflow = 10.38 cfs @ 12.10 hrs, Volume= 0.840 af
Outflow = 10.37 cfs @ 12.11 hrs, Volume= 0.840 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Max. Velocity= 3.99 fps, Min. Travel Time= 0.3 min

Avg. Velocity = 1.05 fps, Avg. Travel Time= 1.0 min

Peak Storage= 169 cf @ 12.11 hrs

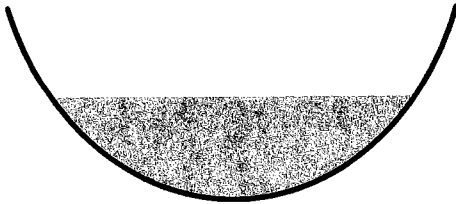
Average Depth at Peak Storage= 1.07'

Bank-Full Depth= 2.00' Flow Area= 6.7 sf, Capacity= 37.62 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040 Earth, cobble bottom, clean sides

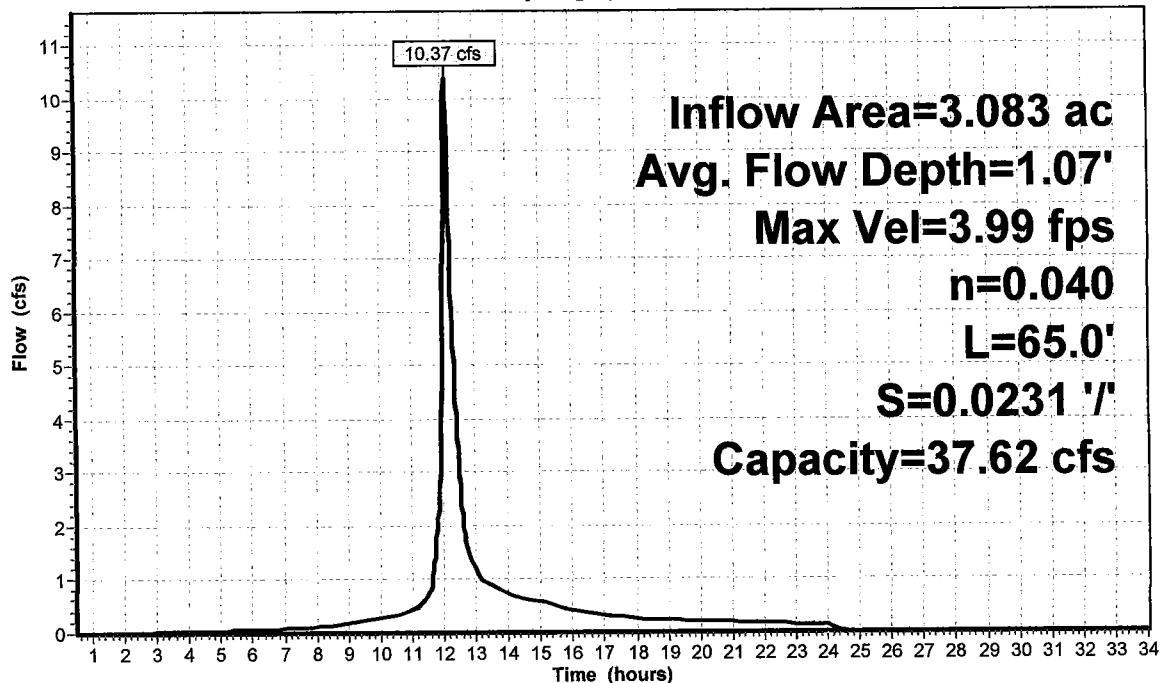
Length= 65.0' Slope= 0.0231 '/'

Inlet Invert= 493.00', Outlet Invert= 491.50'



Reach 2R: CHANNEL

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 113

Summary for Pond 5P: CB#4

Inflow Area = 0.430 ac, 32.21% Impervious, Inflow Depth = 2.37" for 25 YR event
Inflow = 1.11 cfs @ 12.08 hrs, Volume= 0.085 af
Outflow = 1.11 cfs @ 12.08 hrs, Volume= 0.085 af, Atten= 0%, Lag= 0.0 min
Primary = 1.11 cfs @ 12.08 hrs, Volume= 0.085 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 500.92' @ 12.08 hrs

Flood Elev= 500.37'

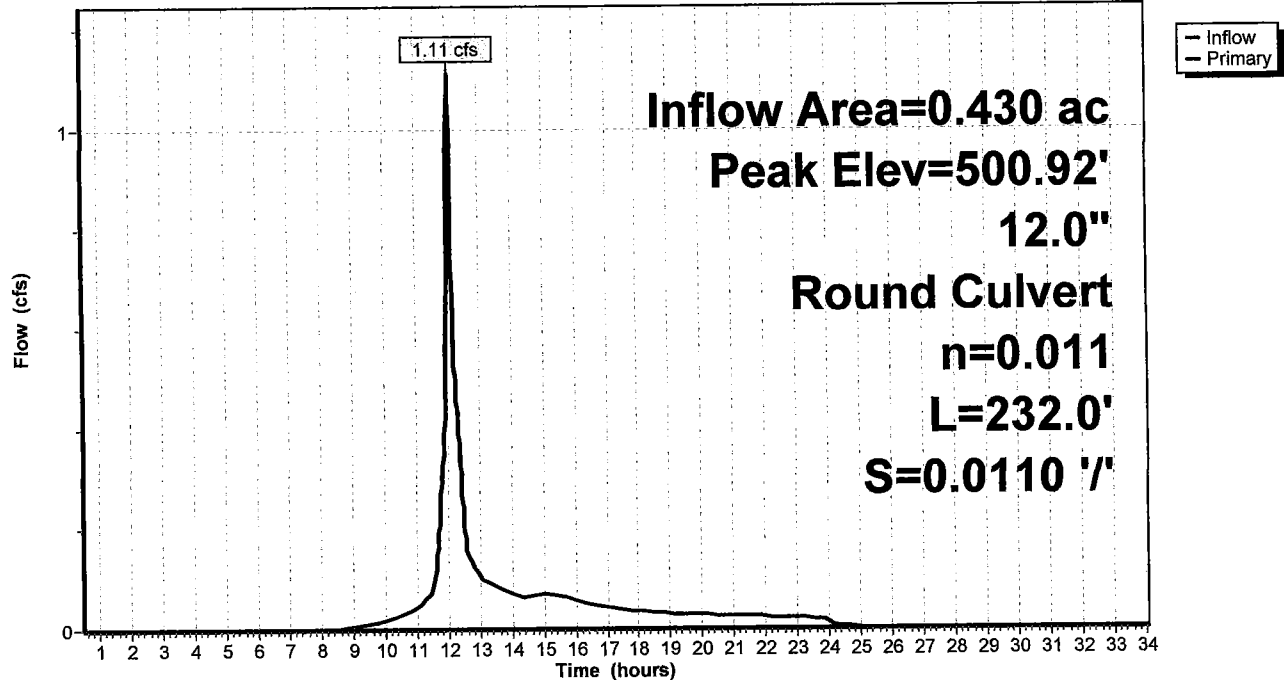
Device	Routing	Invert	Outlet Devices
#1	Primary	500.37'	12.0" Round Culvert L= 232.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 500.37' / 497.82' S= 0.0110 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.11 cfs @ 12.08 hrs HW=500.92' TW=497.90' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 1.11 cfs @ 2.52 fps)

Pond 5P: CB#4

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 114

Summary for Pond 6P: CB#3

Inflow Area = 0.750 ac, 53.40% Impervious, Inflow Depth = 3.41" for 25 YR event
Inflow = 2.81 cfs @ 12.07 hrs, Volume= 0.213 af
Outflow = 2.81 cfs @ 12.07 hrs, Volume= 0.213 af, Atten= 0%, Lag= 0.0 min
Primary = 2.81 cfs @ 12.07 hrs, Volume= 0.213 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 497.93' @ 12.07 hrs

Flood Elev= 499.53'

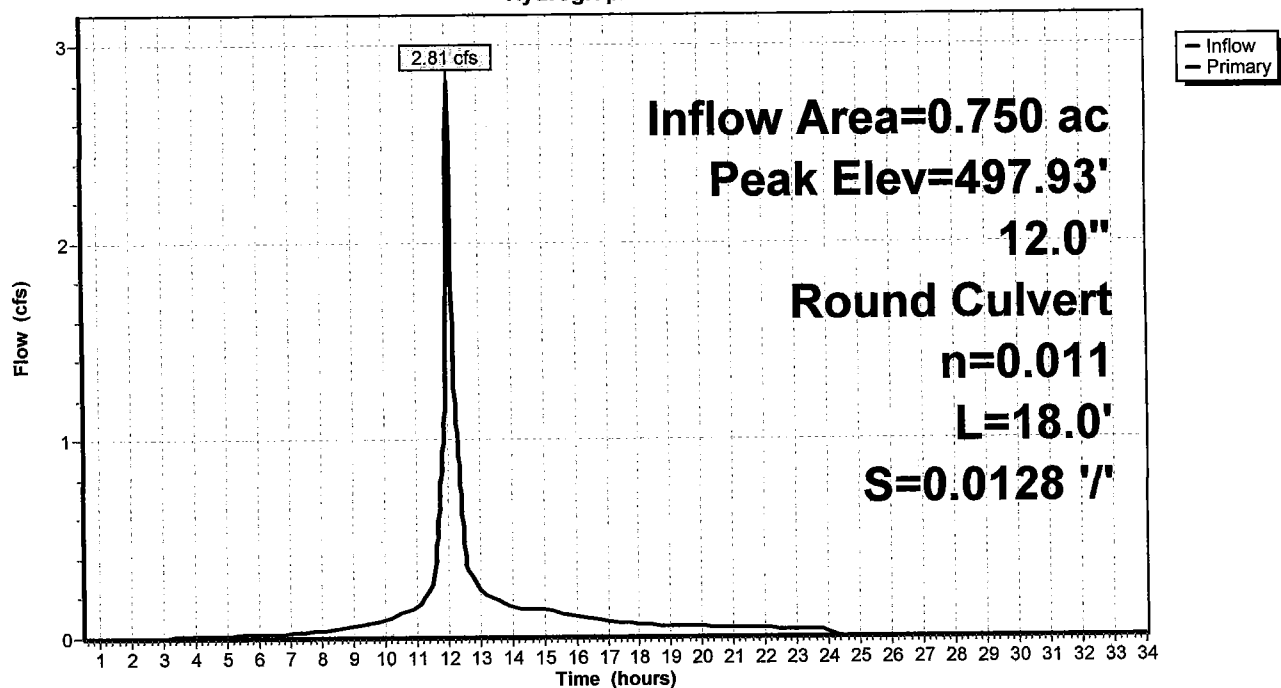
Device	Routing	Invert	Outlet Devices
#1	Primary	495.88'	12.0" Round Culvert L= 18.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.88' / 495.65' S= 0.0128 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=2.79 cfs @ 12.07 hrs HW=497.90' TW=497.35' (Dynamic Tailwater)

↑1=Culvert (Inlet Controls 2.79 cfs @ 3.56 fps)

Pond 6P: CB#3

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 115

Summary for Pond 7P: CB#2

Inflow Area = 0.793 ac, 55.97% Impervious, Inflow Depth = 3.51" for 25 YR event
Inflow = 3.05 cfs @ 12.07 hrs, Volume= 0.232 af
Outflow = 3.05 cfs @ 12.07 hrs, Volume= 0.232 af, Atten= 0%, Lag= 0.0 min
Primary = 3.05 cfs @ 12.07 hrs, Volume= 0.232 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 497.38' @ 12.07 hrs

Flood Elev= 499.70'

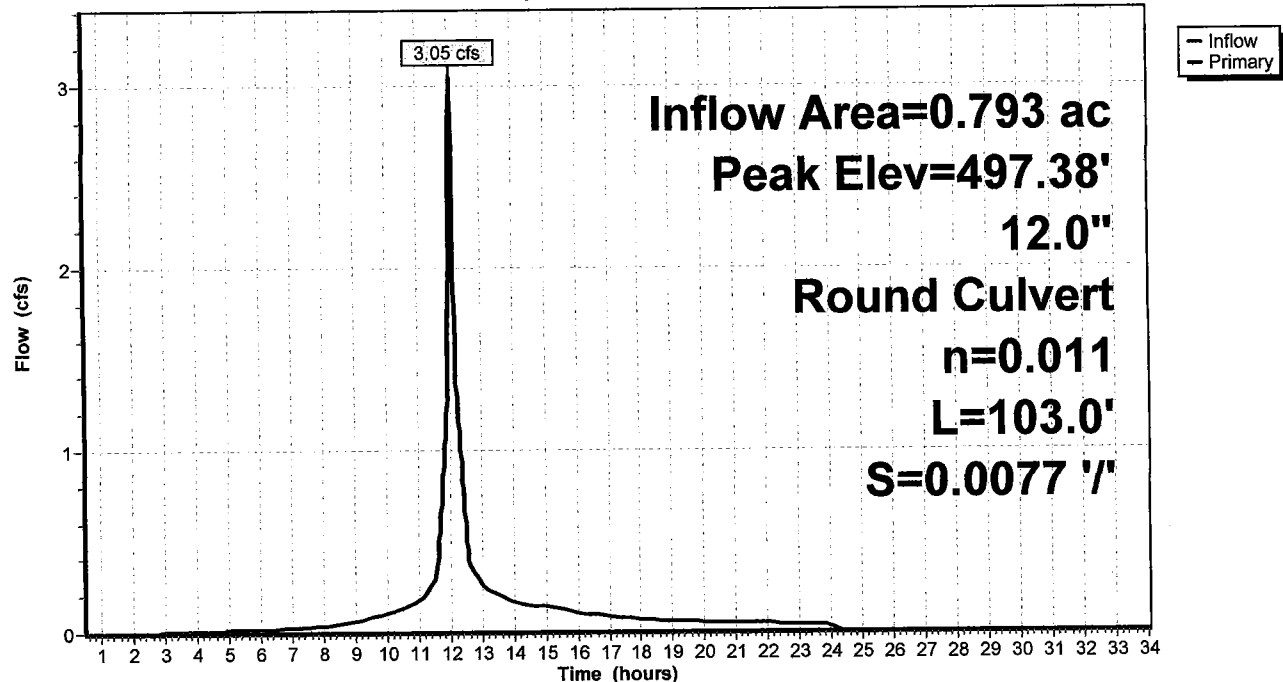
Device	Routing	Invert	Outlet Devices
#1	Primary	495.65'	12.0" Round Culvert L= 103.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.65' / 494.86' S= 0.0077 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.03 cfs @ 12.07 hrs HW=497.35' TW=496.47' (Dynamic Tailwater)

1=Culvert (Outlet Controls 3.03 cfs @ 3.86 fps)

Pond 7P: CB#2

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 116

Summary for Pond 8P: CB#1

Inflow Area = 0.969 ac, 63.95% Impervious, Inflow Depth = 3.81" for 25 YR event
Inflow = 4.01 cfs @ 12.07 hrs, Volume= 0.308 af
Outflow = 4.01 cfs @ 12.07 hrs, Volume= 0.308 af, Atten= 0%, Lag= 0.0 min
Primary = 4.01 cfs @ 12.07 hrs, Volume= 0.308 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 496.48' @ 12.07 hrs

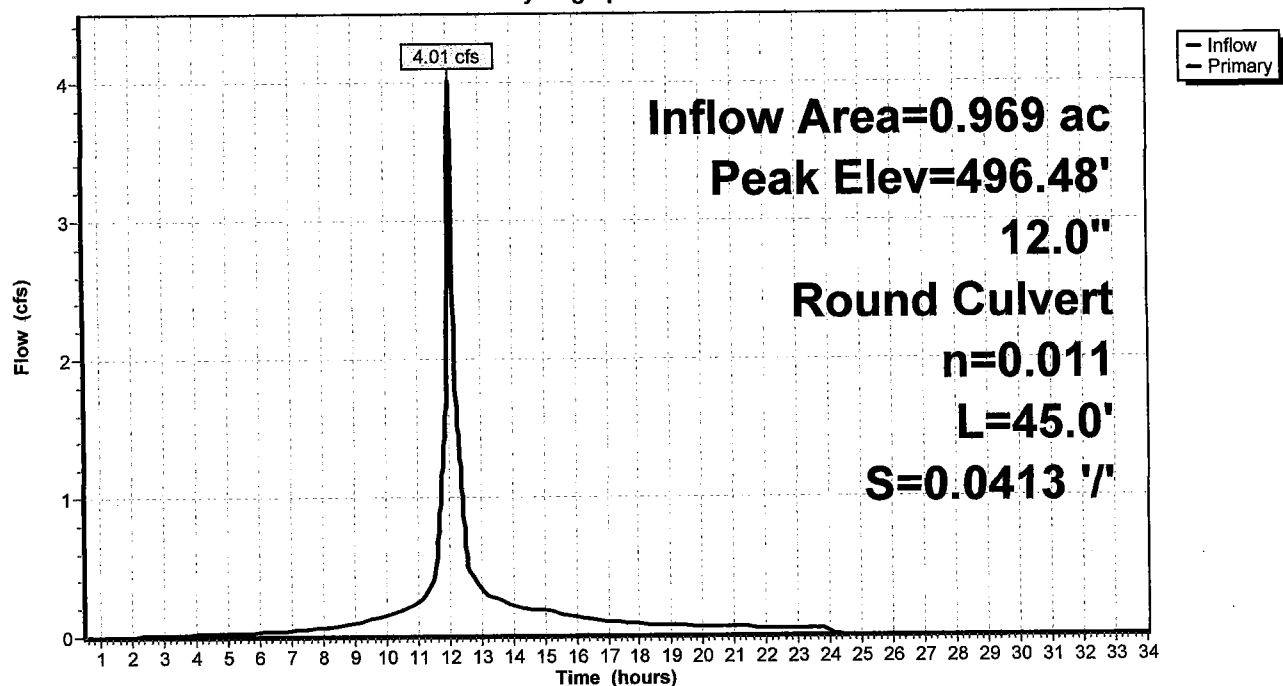
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	494.86'	12.0" Round Culvert L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 494.86' / 493.00' S= 0.0413 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.98 cfs @ 12.07 hrs HW=496.47' TW=494.03' (Dynamic Tailwater)
↑1=Culvert (Inlet Controls 3.98 cfs @ 5.07 fps)

Pond 8P: CB#1

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 117

Summary for Pond 10P: ENLARGED STORMWATER BASIN

Inflow Area = 1.496 ac, 0.00% Impervious, Inflow Depth = 3.05" for 25 YR event
 Inflow = 5.54 cfs @ 12.08 hrs, Volume= 0.381 af
 Outflow = 4.59 cfs @ 12.13 hrs, Volume= 0.321 af, Atten= 17%, Lag= 3.1 min
 Primary = 4.59 cfs @ 12.13 hrs, Volume= 0.321 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 502.74' @ 12.13 hrs Surf.Area= 3,119 sf Storage= 3,933 cf

Plug-Flow detention time= 103.3 min calculated for 0.321 af (84% of inflow)

Center-of-Mass det. time= 36.8 min (859.5 - 822.8)

Volume	Invert	Avail.Storage	Storage Description
#1	500.70'	4,796 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.70	30	0	0
501.00	1,542	236	236
502.00	2,039	1,791	2,026
503.00	3,500	2,770	4,796

Device	Routing	Invert	Outlet Devices
#1	Primary	502.25'	8.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=4.56 cfs @ 12.13 hrs HW=502.74' TW=502.63' (Dynamic Tailwater)

1=Broad-Crested Rectangular Weir (Weir Controls 4.56 cfs @ 1.17 fps)

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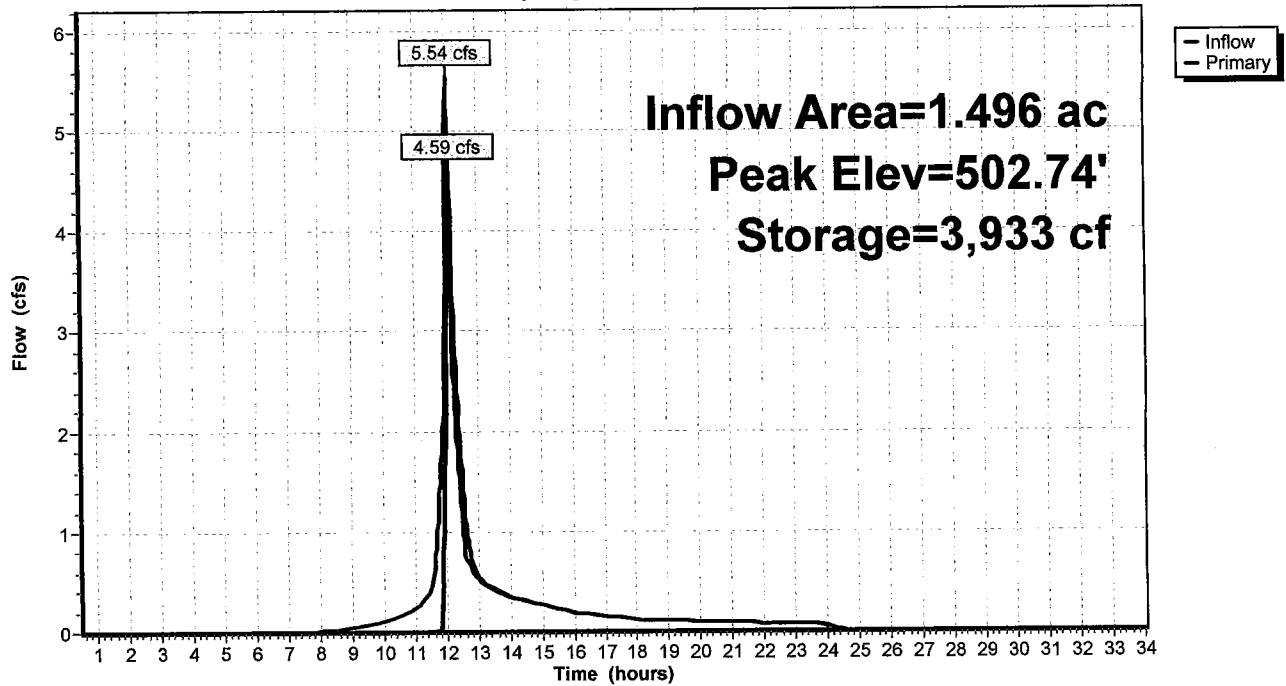
Type III 24-hr 25 YR Rainfall=5.40"

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Page 118

Pond 10P: ENLARGED STORMWATER BASIN

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Type III 24-hr 25 YR Rainfall=5.40"

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Page 119

Summary for Pond 11P: CULTEC 100HD

Inflow Area = 0.093 ac, 100.00% Impervious, Inflow Depth = 5.16" for 25 YR event
 Inflow = 0.51 cfs @ 12.07 hrs, Volume= 0.040 af
 Outflow = 0.21 cfs @ 12.24 hrs, Volume= 0.035 af, Atten= 58%, Lag= 10.4 min
 Secondary = 0.21 cfs @ 12.24 hrs, Volume= 0.035 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3
 Peak Elev= 499.63' @ 12.24 hrs Surf.Area= 1,050 sf Storage= 618 cf

Plug-Flow detention time= 156.6 min calculated for 0.035 af (88% of inflow)
 Center-of-Mass det. time= 98.6 min (844.4 - 745.8)

Volume	Invert	Avail.Storage	Storage Description
#1A	498.63'	655 cf	15.00'W x 70.00'L x 2.04'H Field A 2,144 cf Overall - 506 cf Embedded = 1,637 cf x 40.0% Voids
#2A	499.13'	506 cf	Cultec C-100HD x 36 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 4 rows
		1,161 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Secondary	499.13'	4.0" Round Culvert L= 23.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 499.13' / 498.90' S= 0.0100 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	499.80'	6.0" Round Culvert L= 23.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 499.80' / 499.34' S= 0.0200 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Secondary OutFlow Max=0.21 cfs @ 12.24 hrs HW=499.63' (Free Discharge)

1=Culvert (Inlet Controls 0.21 cfs @ 2.46 fps)
 2=Culvert (Controls 0.00 cfs)

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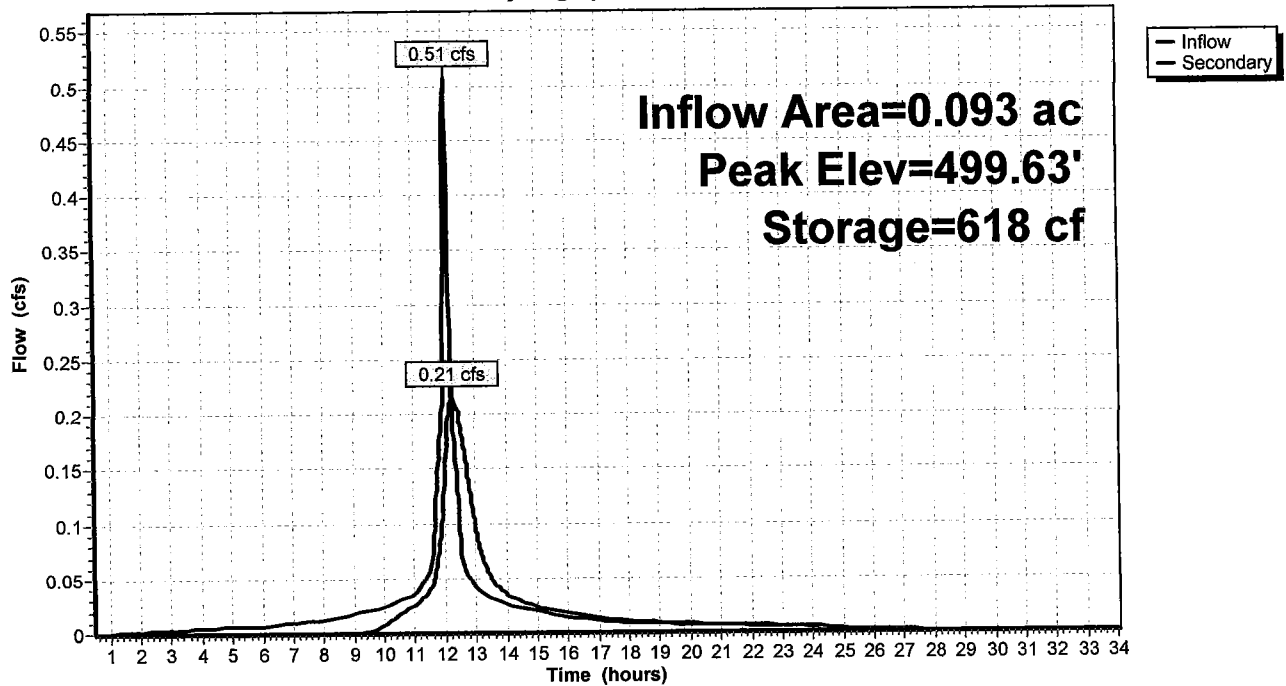
Type III 24-hr 25 YR Rainfall=5.40"

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Page 120

Pond 11P: CULTEC 100HD

Hydrograph



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Type III 24-hr 25 YR Rainfall=5.40"

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Page 121

Summary for Pond 12P: P-BASIN

Inflow Area = 0.110 ac, 0.00% Impervious, Inflow Depth = 4.93" for 25 YR event
 Inflow = 0.59 cfs @ 12.07 hrs, Volume= 0.045 af
 Outflow = 0.02 cfs @ 15.36 hrs, Volume= 0.008 af, Atten= 97%, Lag= 197.6 min
 Primary = 0.02 cfs @ 15.36 hrs, Volume= 0.008 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3
 Peak Elev= 501.51' @ 15.36 hrs Surf.Area= 2,214 sf Storage= 1,635 cf

Plug-Flow detention time= 596.6 min calculated for 0.008 af (19% of inflow)
 Center-of-Mass det. time= 352.4 min (1,112.1 - 759.7)

Volume	Invert	Avail.Storage	Storage Description
#1	500.50'	2,779 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.50	383	0	0
501.00	1,911	574	574
502.00	2,500	2,206	2,779

Device	Routing	Invert	Outlet Devices
#1	Primary	501.50'	5.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.02 cfs @ 15.36 hrs HW=501.51' TW=500.50' (Dynamic Tailwater)
 ↳ **1=Broad-Crested Rectangular Weir** (Weir Controls 0.02 cfs @ 0.28 fps)

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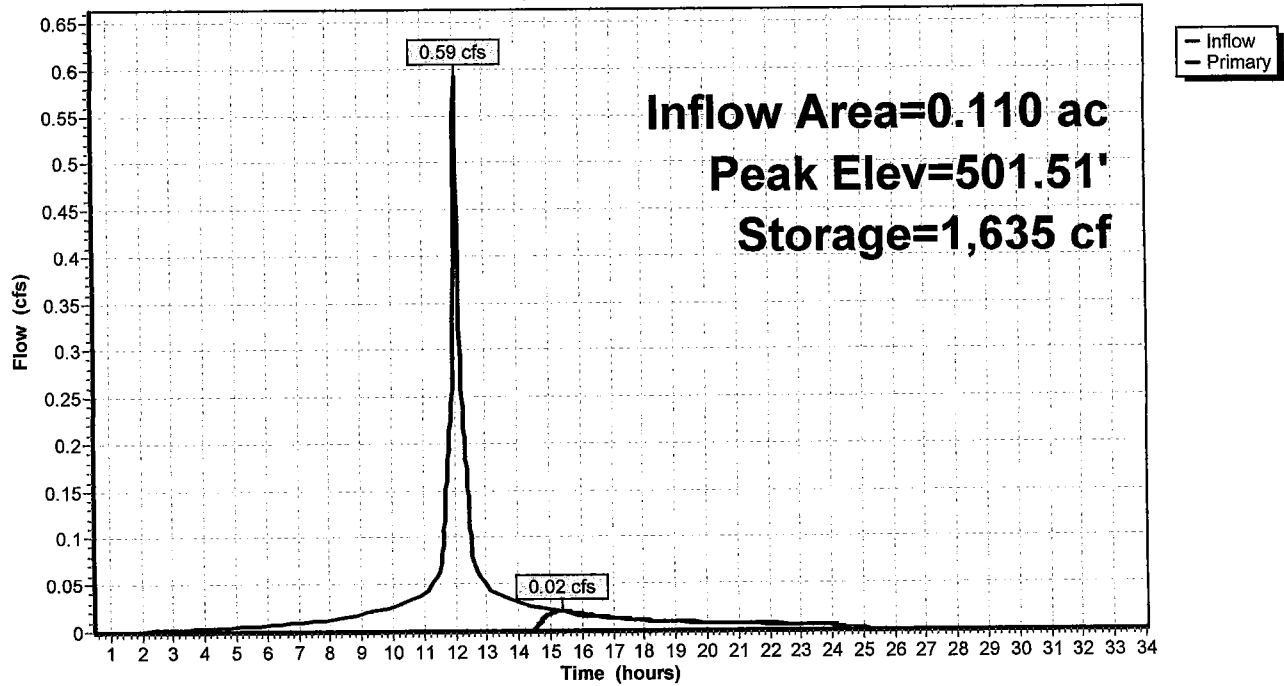
Type III 24-hr 25 YR Rainfall=5.40"

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Page 122

Pond 12P: P-BASIN

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 123

Summary for Subcatchment 1S: PAVE, GRAVEL, BLDG

Runoff = 1.54 cfs @ 12.07 hrs, Volume= 0.106 af, Depth= 3.99"

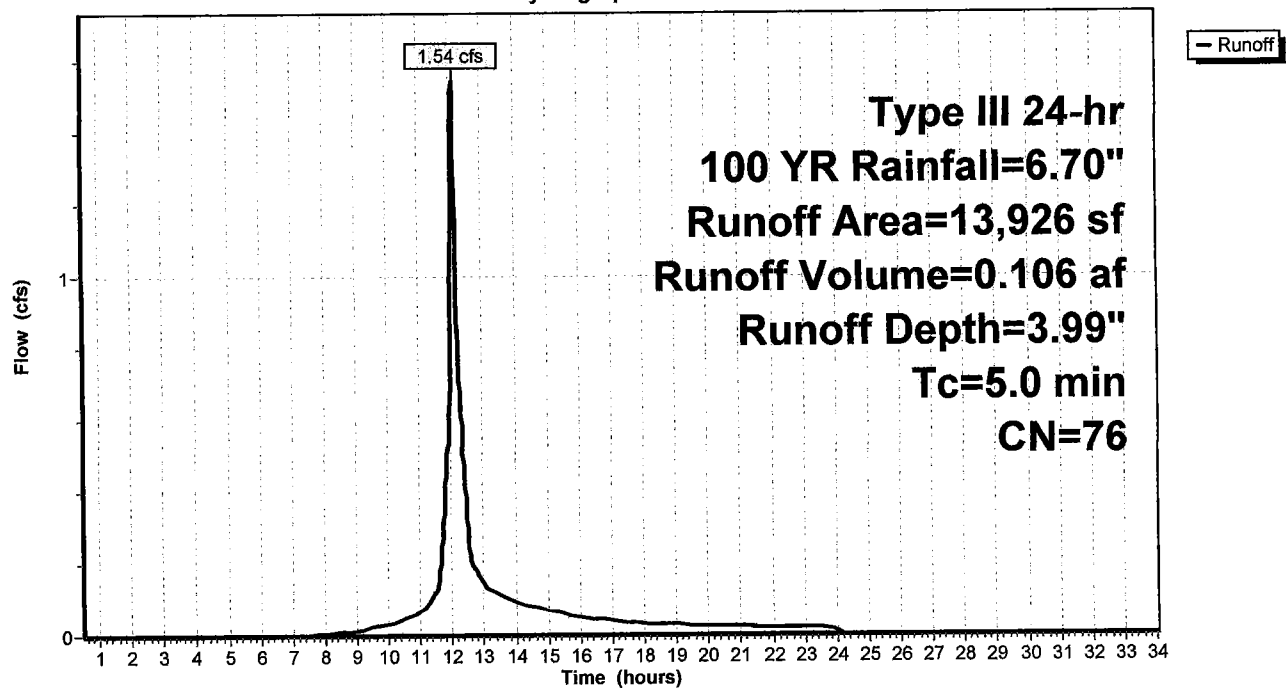
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YR Rainfall=6.70"

Area (sf)	CN	Description
* 6,030	98	Paved parking, & bldg. HSG B
7,350	56	Brush, Fair, HSG B
546	96	Gravel surface, HSG B
13,926	76	Weighted Average
7,896		56.70% Pervious Area
6,030		43.30% Impervious Area

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

Subcatchment 1S: PAVE, GRAVEL, BLDG

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 124

Summary for Subcatchment 2S: PAVE\BLDG

Runoff = 3.51 cfs @ 12.07 hrs, Volume= 0.268 af, Depth= 6.11"

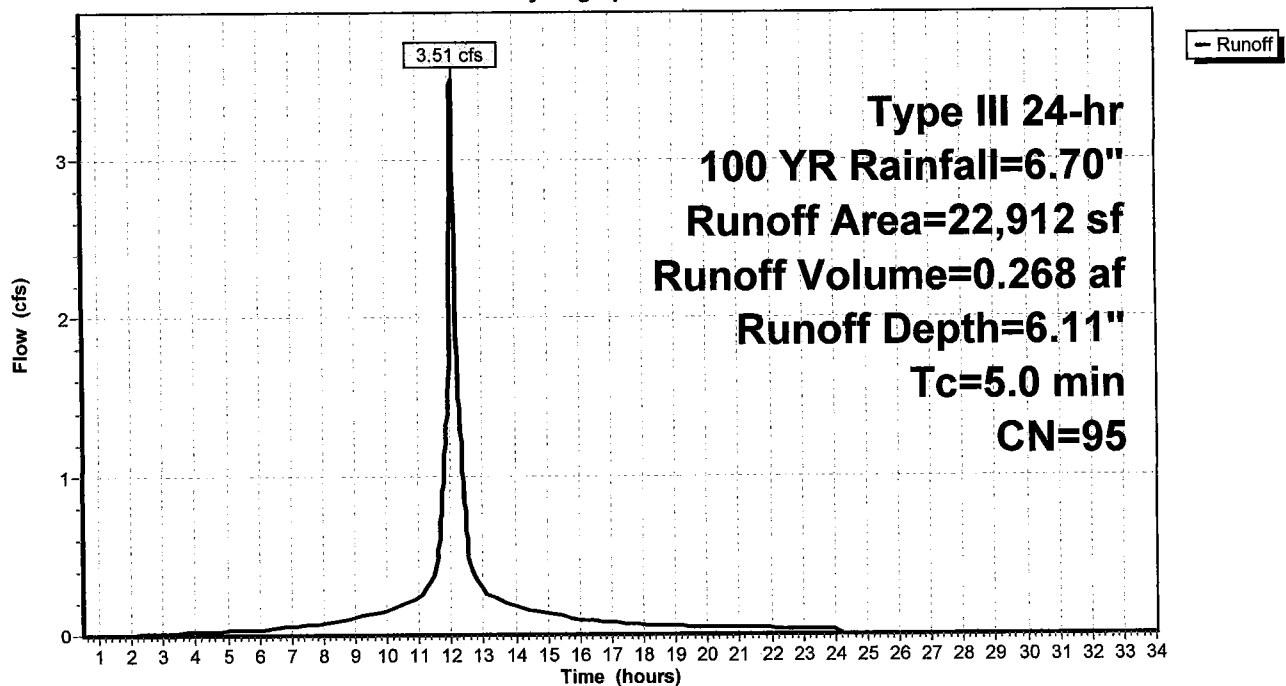
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YR Rainfall=6.70"

Area (sf)	CN	Description
* 11,437	98	Paved parking & bldg. HSG B
8,700	96	Gravel surface, HSG B
2,775	79	<50% Grass cover, Poor, HSG B
22,912	95	Weighted Average
11,475		50.08% Pervious Area
11,437		49.92% Impervious Area

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

Subcatchment 2S: PAVE\BLDG

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 125

Summary for Subcatchment 3S: GRAVEL AREA, WOODS

Runoff = 7.59 cfs @ 12.07 hrs, Volume= 0.524 af, Depth= 4.20"

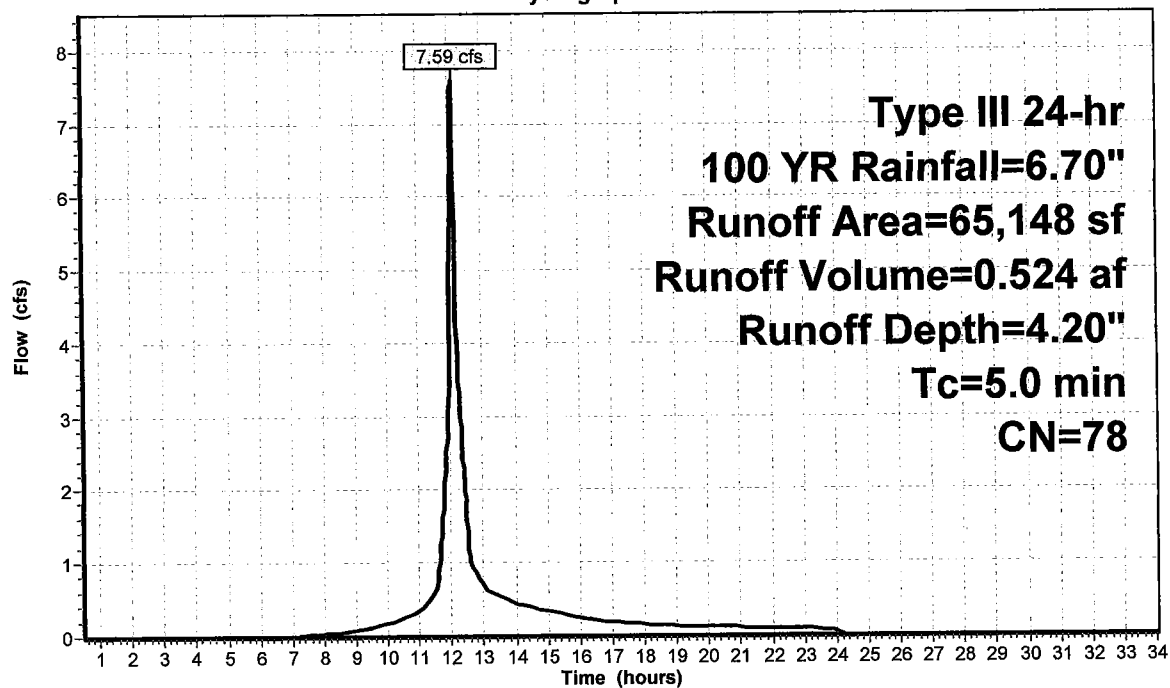
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YR Rainfall=6.70"

Area (sf)	CN	Description
33,118	60	Woods, Fair, HSG B
32,030	96	Gravel surface, HSG B
65,148	78	Weighted Average
65,148		100.00% Pervious Area

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

Subcatchment 3S: GRAVEL AREA, WOODS

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Type III 24-hr 100 YR Rainfall=6.70"

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Page 126

Summary for Subcatchment 4S: PAVE\BLDG

Runoff = 2.13 cfs @ 12.07 hrs, Volume= 0.163 af, Depth= 6.11"

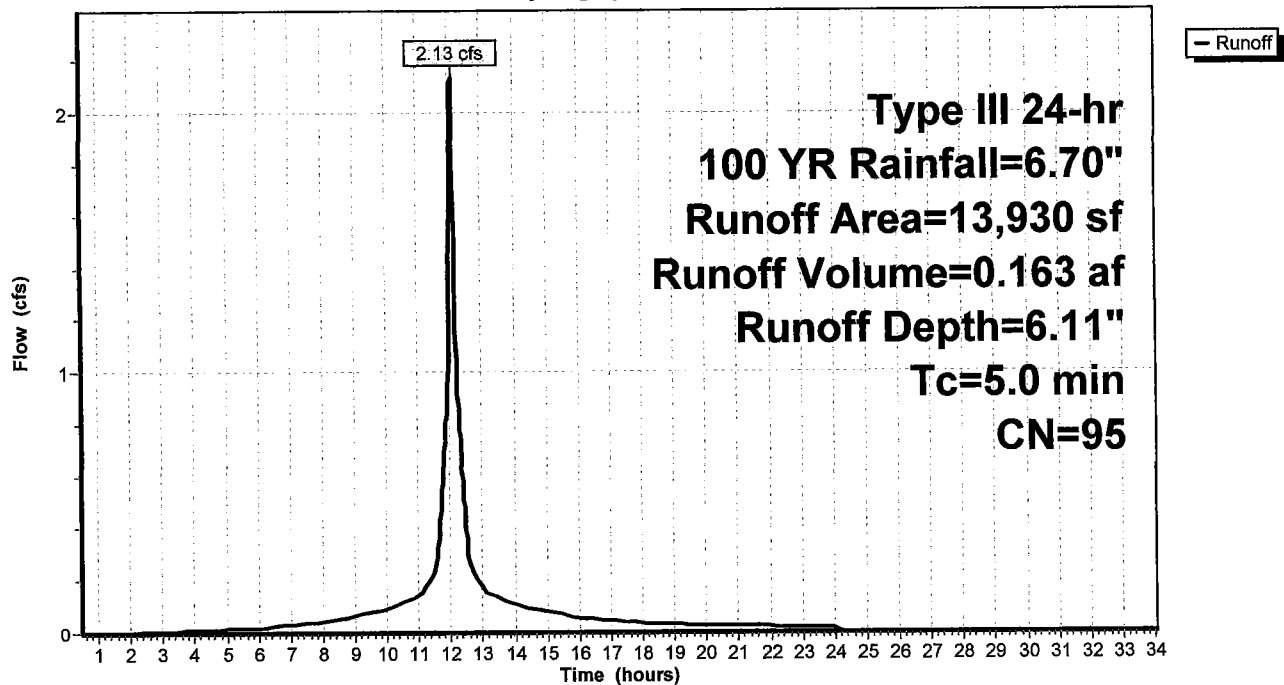
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YR Rainfall=6.70"

Area (sf)	CN	Description
11,405	98	Roofs, HSG B
2,525	79	<50% Grass cover, Poor, HSG B
13,930	95	Weighted Average
2,525		18.13% Pervious Area
11,405		81.87% Impervious Area

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

Subcatchment 4S: PAVE\BLDG

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 127

Summary for Subcatchment 5S: PAVEMENT

Runoff = 0.30 cfs @ 12.07 hrs, Volume= 0.024 af, Depth= 6.46"

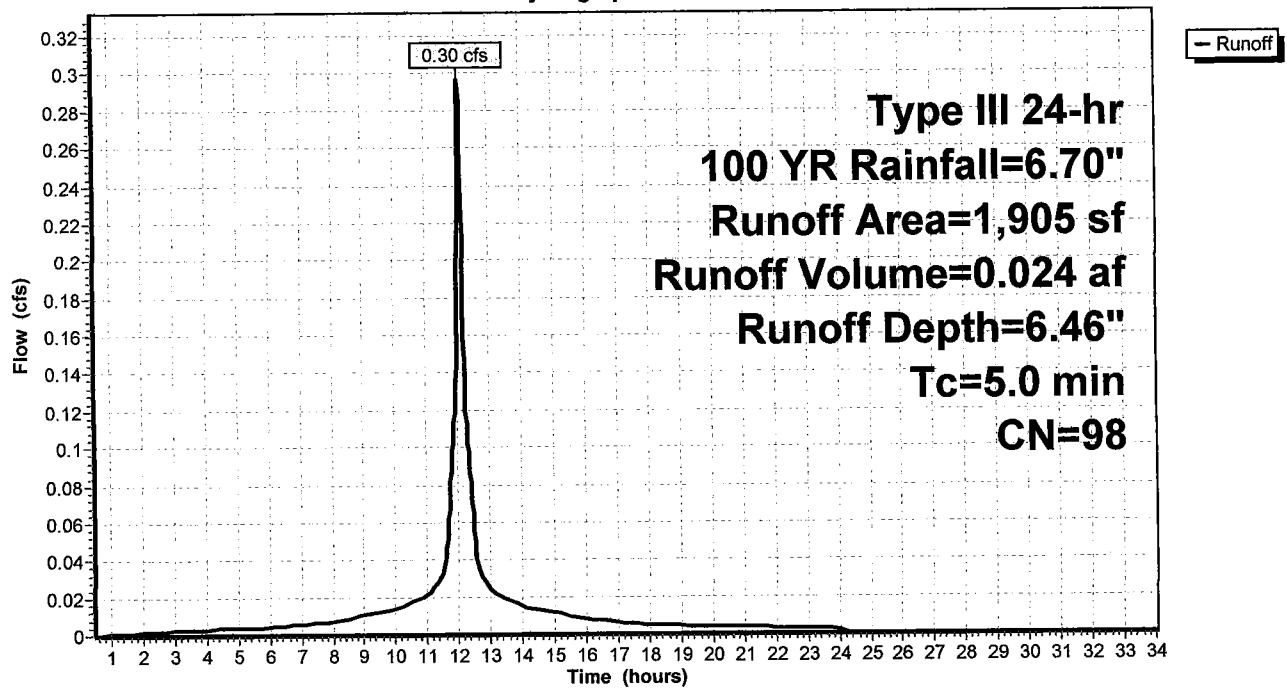
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YR Rainfall=6.70"

Area (sf)	CN	Description
1,905	98	Paved parking, HSG B
1,905		100.00% Impervious Area

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

Subcatchment 5S: PAVEMENT

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Type III 24-hr 100 YR Rainfall=6.70"

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Page 128

Summary for Subcatchment 6S: PAVEMENT

Runoff = 1.19 cfs @ 12.07 hrs, Volume= 0.095 af, Depth= 6.46"

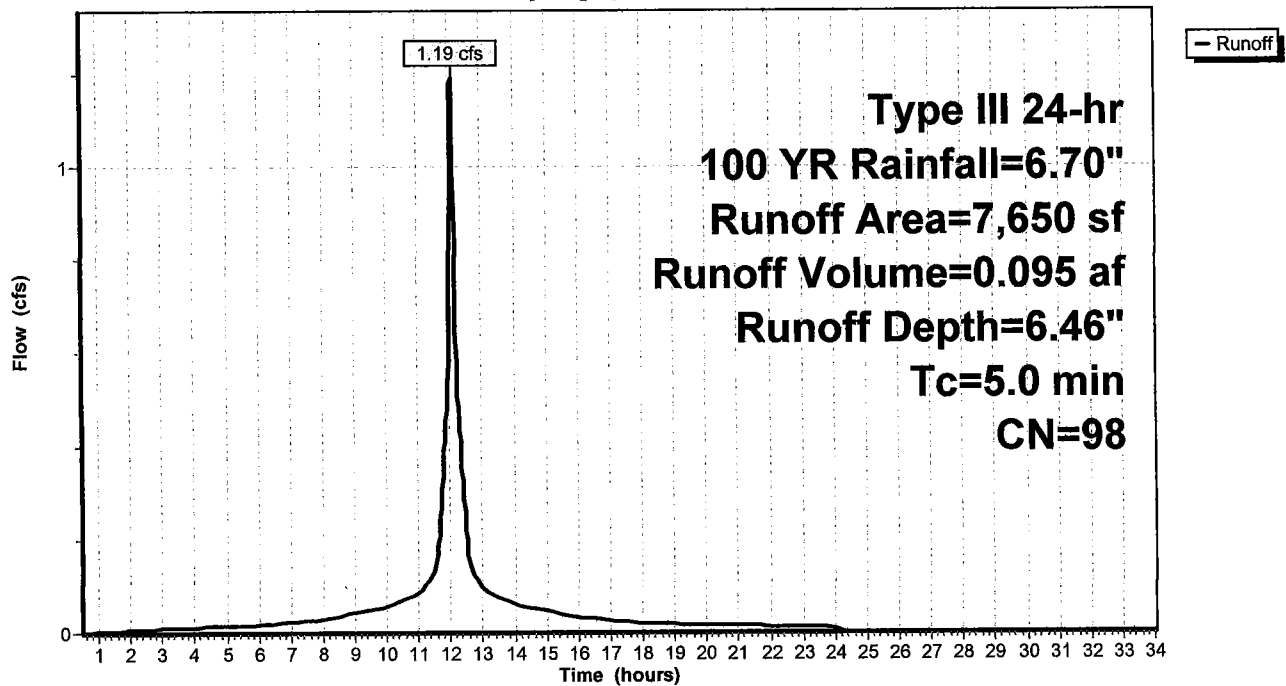
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YR Rainfall=6.70"

Area (sf)	CN	Description
7,650	98	Paved parking, HSG B
7,650		100.00% Impervious Area

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

Subcatchment 6S: PAVEMENT

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 129

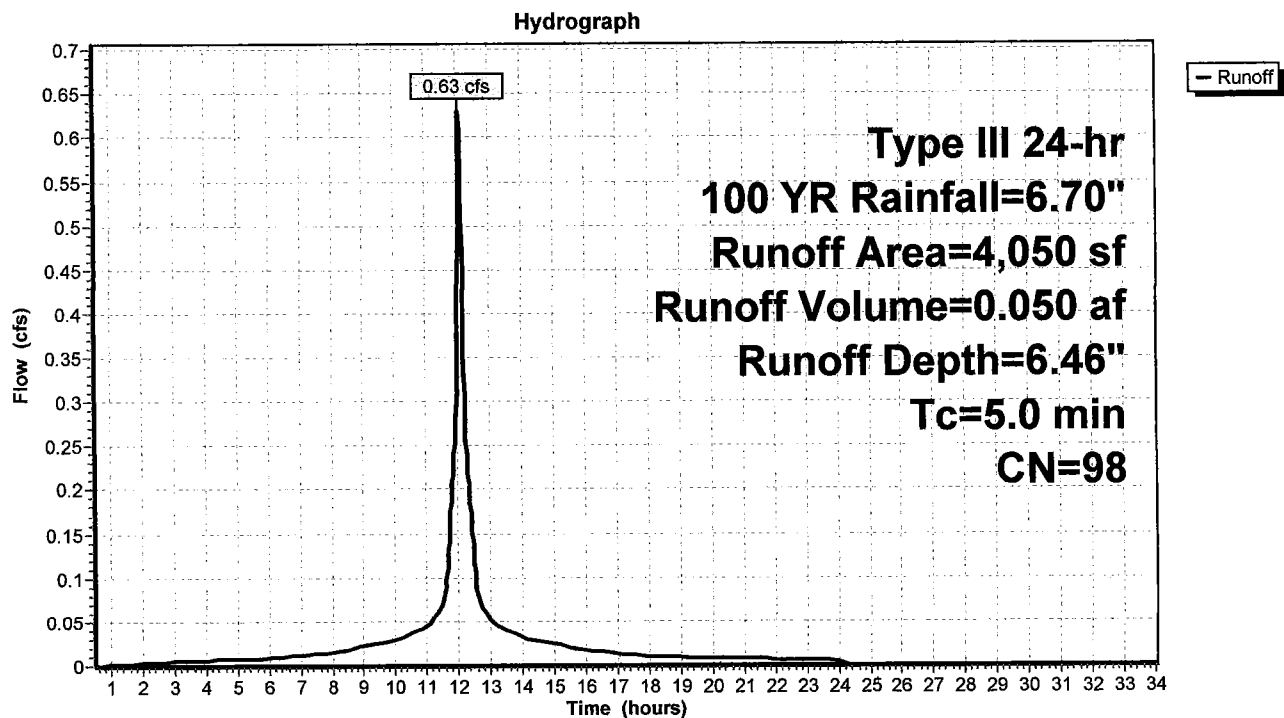
Summary for Subcatchment 12S: ROOF RUNOFF

Runoff = 0.63 cfs @ 12.07 hrs, Volume= 0.050 af, Depth= 6.46"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YR Rainfall=6.70"

Area (sf)	CN	Description
4,050	98	Roofs, HSG B
4,050		100.00% Impervious Area

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

Subcatchment 12S: ROOF RUNOFF

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Type III 24-hr 100 YR Rainfall=6.70"

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Page 130

Summary for Subcatchment 13S: GRAVEL AREA

Runoff = 0.74 cfs @ 12.07 hrs, Volume= 0.057 af, Depth= 6.22"

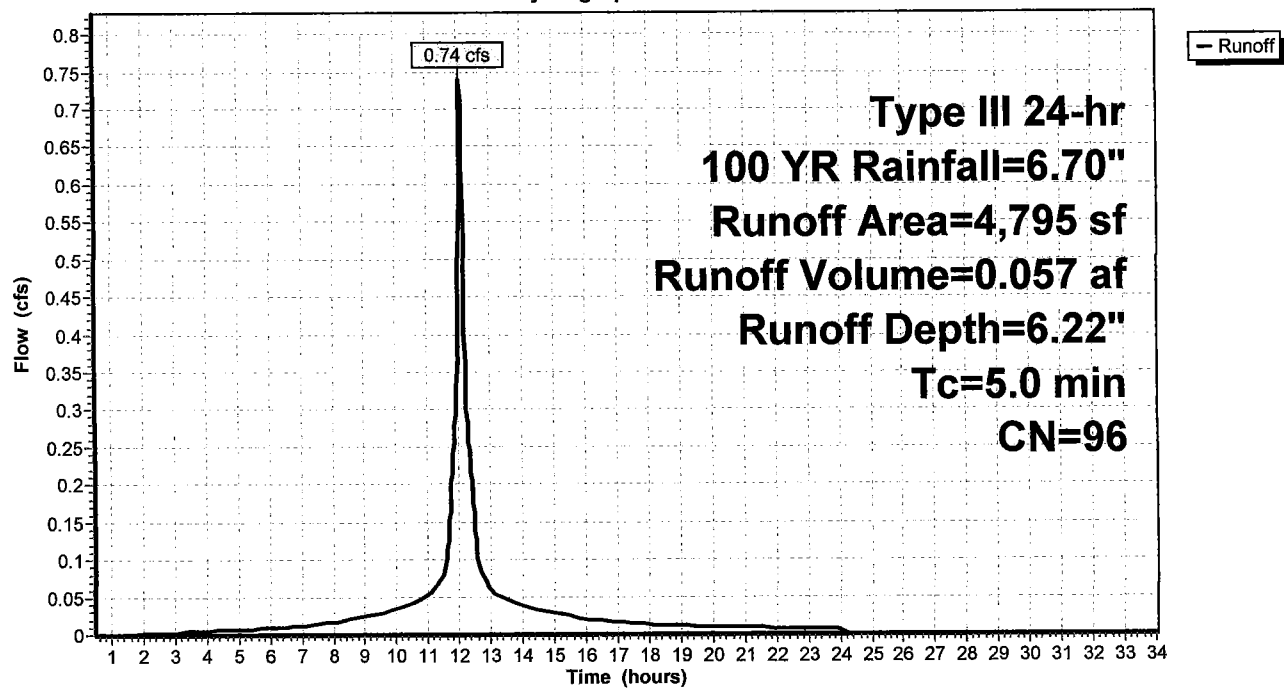
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs
Type III 24-hr 100 YR Rainfall=6.70"

Area (sf)	CN	Description
4,795	96	Gravel surface, HSG B
4,795		100.00% Pervious Area

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

Subcatchment 13S: GRAVEL AREA

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 131

Summary for Reach 1R: INTERMITTENT STREAM

Inflow Area = 2.115 ac, 16.81% Impervious, Inflow Depth = 4.16" for 100 YR event
Inflow = 9.65 cfs @ 12.10 hrs, Volume= 0.732 af
Outflow = 9.46 cfs @ 12.12 hrs, Volume= 0.732 af, Atten= 2%, Lag= 1.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Max. Velocity= 3.79 fps, Min. Travel Time= 1.6 min

Avg. Velocity = 0.94 fps, Avg. Travel Time= 6.4 min

Peak Storage= 899 cf @ 12.12 hrs

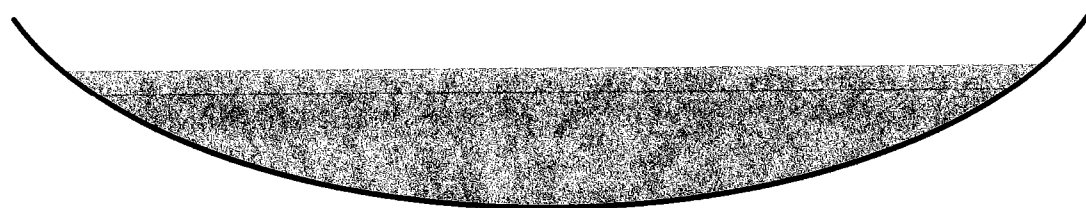
Average Depth at Peak Storage= 0.73'

Bank-Full Depth= 1.00' Flow Area= 4.0 sf, Capacity= 18.47 cfs

6.00' x 1.00' deep Parabolic Channel, n= 0.035 Earth, dense weeds

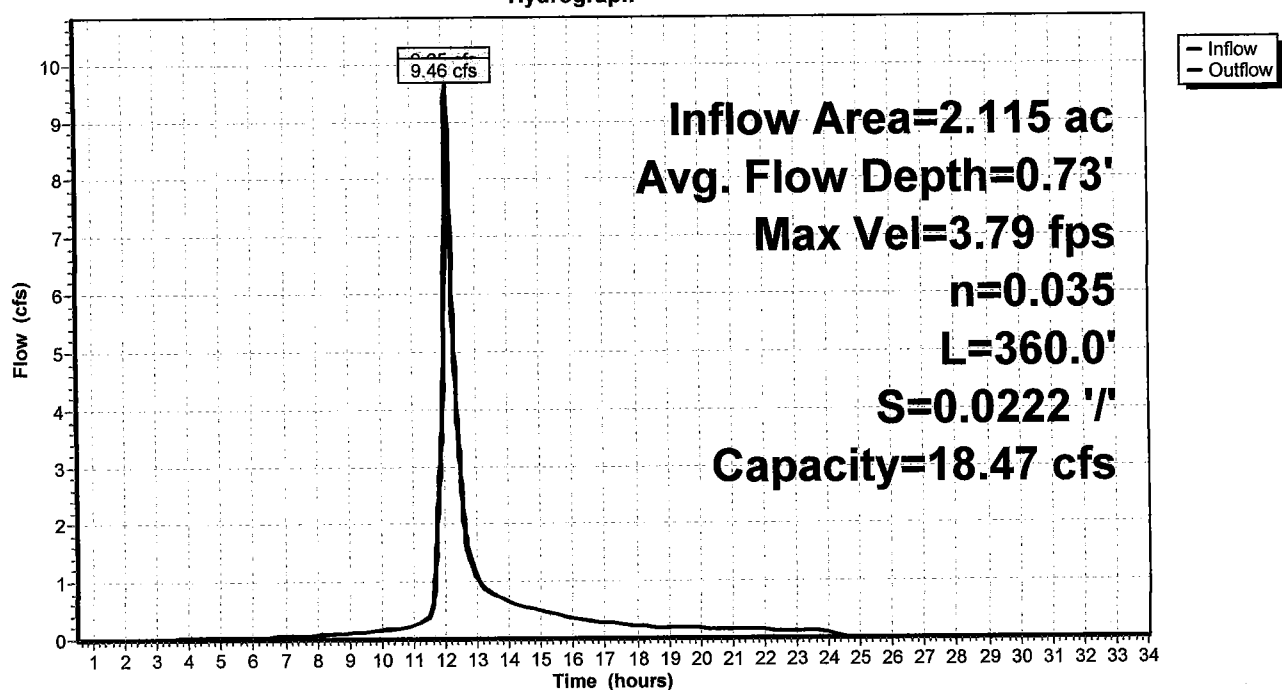
Length= 360.0' Slope= 0.0222 '/'

Inlet Invert= 502.00', Outlet Invert= 494.00'



Reach 1R: INTERMITTENT STREAM

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 132

Summary for Reach 2R: CHANNEL

Inflow Area = 3.083 ac, 31.62% Impervious, Inflow Depth = 4.44" for 100 YR event
Inflow = 14.11 cfs @ 12.10 hrs, Volume= 1.140 af
Outflow = 14.11 cfs @ 12.10 hrs, Volume= 1.140 af, Atten= 0%, Lag= 0.2 min

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Max. Velocity= 4.34 fps, Min. Travel Time= 0.2 min

Avg. Velocity = 1.13 fps, Avg. Travel Time= 1.0 min

Peak Storage= 211 cf @ 12.10 hrs

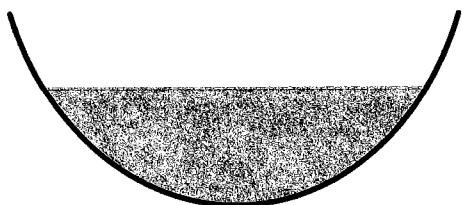
Average Depth at Peak Storage= 1.24'

Bank-Full Depth= 2.00' Flow Area= 6.7 sf, Capacity= 37.62 cfs

5.00' x 2.00' deep Parabolic Channel, n= 0.040 Earth, cobble bottom, clean sides

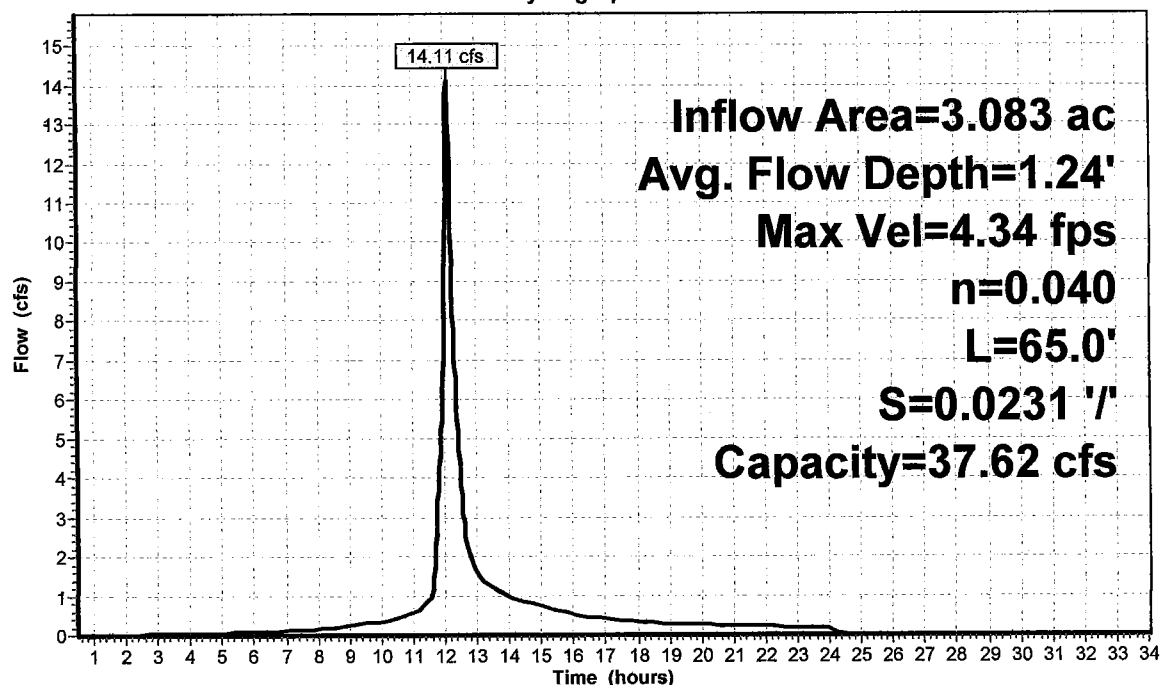
Length= 65.0' Slope= 0.0231 '/'

Inlet Invert= 493.00', Outlet Invert= 491.50'



Reach 2R: CHANNEL

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 133

Summary for Pond 5P: CB#4

Inflow Area = 0.430 ac, 32.21% Impervious, Inflow Depth = 3.54" for 100 YR event
Inflow = 1.54 cfs @ 12.07 hrs, Volume= 0.127 af
Outflow = 1.54 cfs @ 12.07 hrs, Volume= 0.127 af, Atten= 0%, Lag= 0.0 min
Primary = 1.54 cfs @ 12.07 hrs, Volume= 0.127 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 501.06' @ 12.08 hrs

Flood Elev= 500.37'

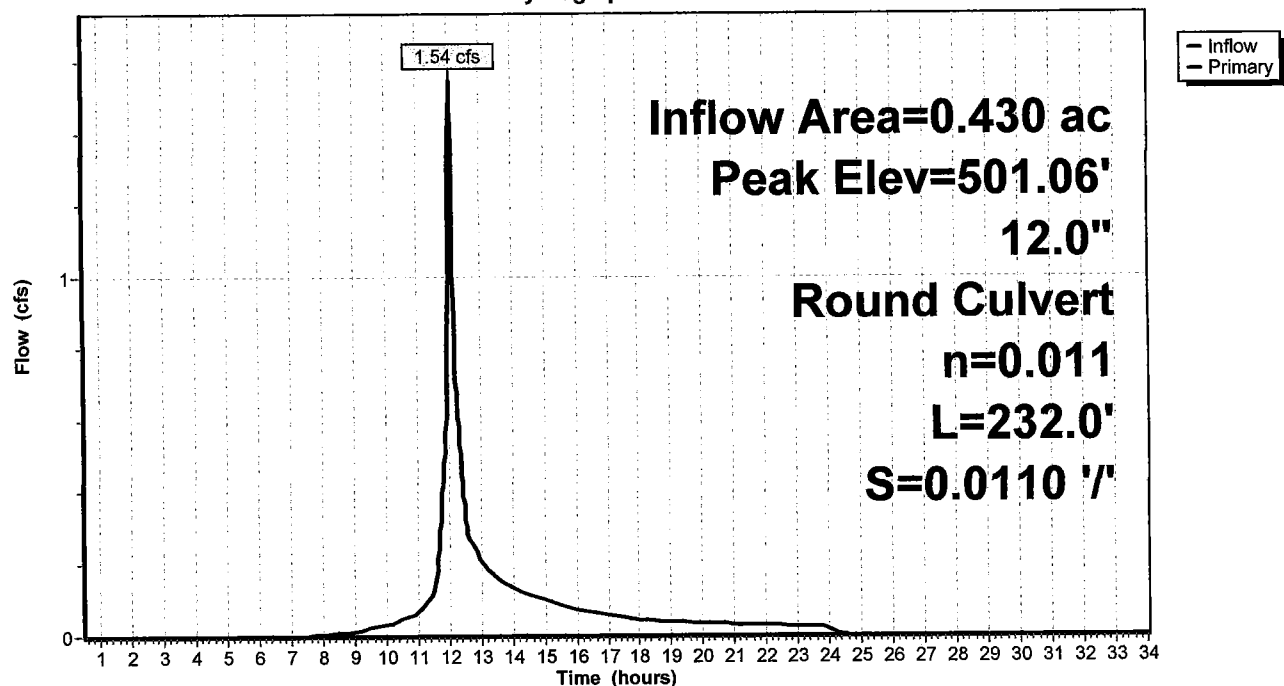
Device	Routing	Invert	Outlet Devices
#1	Primary	500.37'	12.0" Round Culvert L= 232.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 500.37' / 497.82' S= 0.0110 '/ Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=1.51 cfs @ 12.07 hrs HW=501.05' TW=499.63' (Dynamic Tailwater)

↑1=Culvert (Outlet Controls 1.51 cfs @ 3.72 fps)

Pond 5P: CB#4

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 134

Summary for Pond 6P: CB#3

Inflow Area = 0.750 ac, 53.40% Impervious, Inflow Depth = 4.63" for 100 YR event
Inflow = 3.68 cfs @ 12.07 hrs, Volume= 0.289 af
Outflow = 3.68 cfs @ 12.07 hrs, Volume= 0.289 af, Atten= 0%, Lag= 0.0 min
Primary = 3.68 cfs @ 12.07 hrs, Volume= 0.289 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 499.69' @ 12.07 hrs

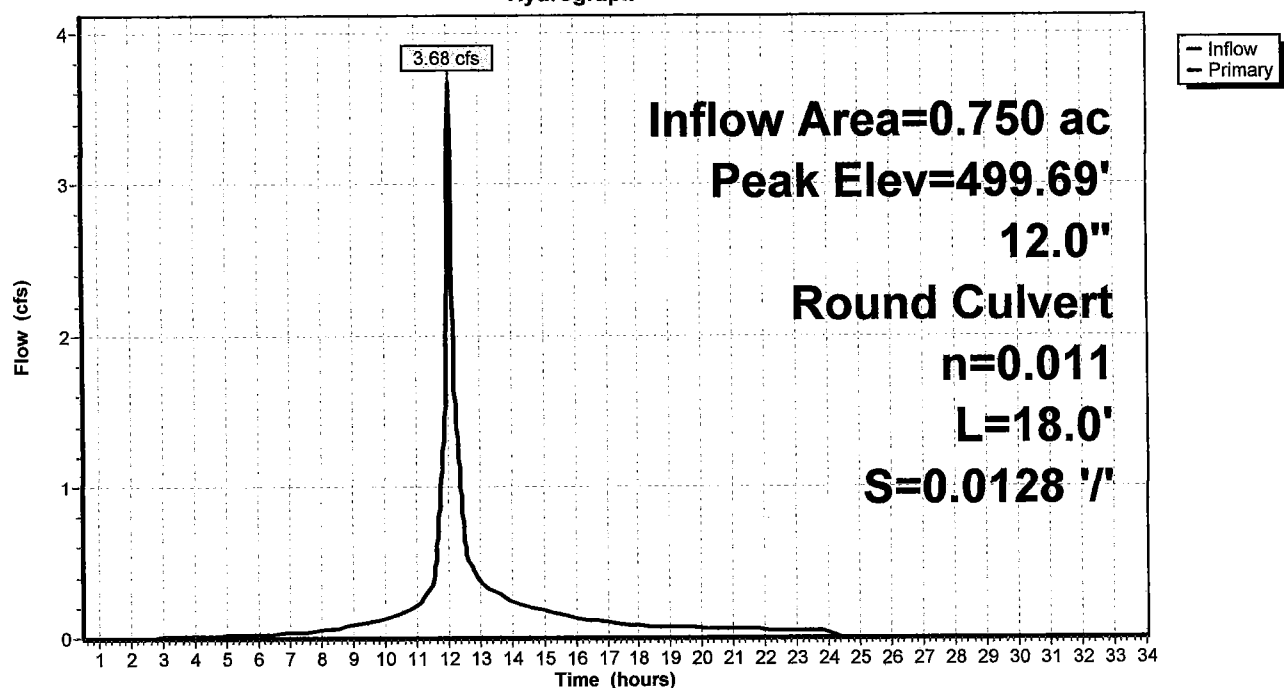
Flood Elev= 499.53'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.88'	12.0" Round Culvert L= 18.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.88' / 495.65' S= 0.0128 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.65 cfs @ 12.07 hrs HW=499.62' TW=498.69' (Dynamic Tailwater)
←1=Culvert (Inlet Controls 3.65 cfs @ 4.65 fps)

Pond 6P: CB#3

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 135

Summary for Pond 7P: CB#2

Inflow Area = 0.793 ac, 55.97% Impervious, Inflow Depth = 4.73" for 100 YR event
Inflow = 3.97 cfs @ 12.07 hrs, Volume= 0.313 af
Outflow = 3.97 cfs @ 12.07 hrs, Volume= 0.313 af, Atten= 0%, Lag= 0.0 min
Primary = 3.97 cfs @ 12.07 hrs, Volume= 0.313 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 498.74' @ 12.07 hrs

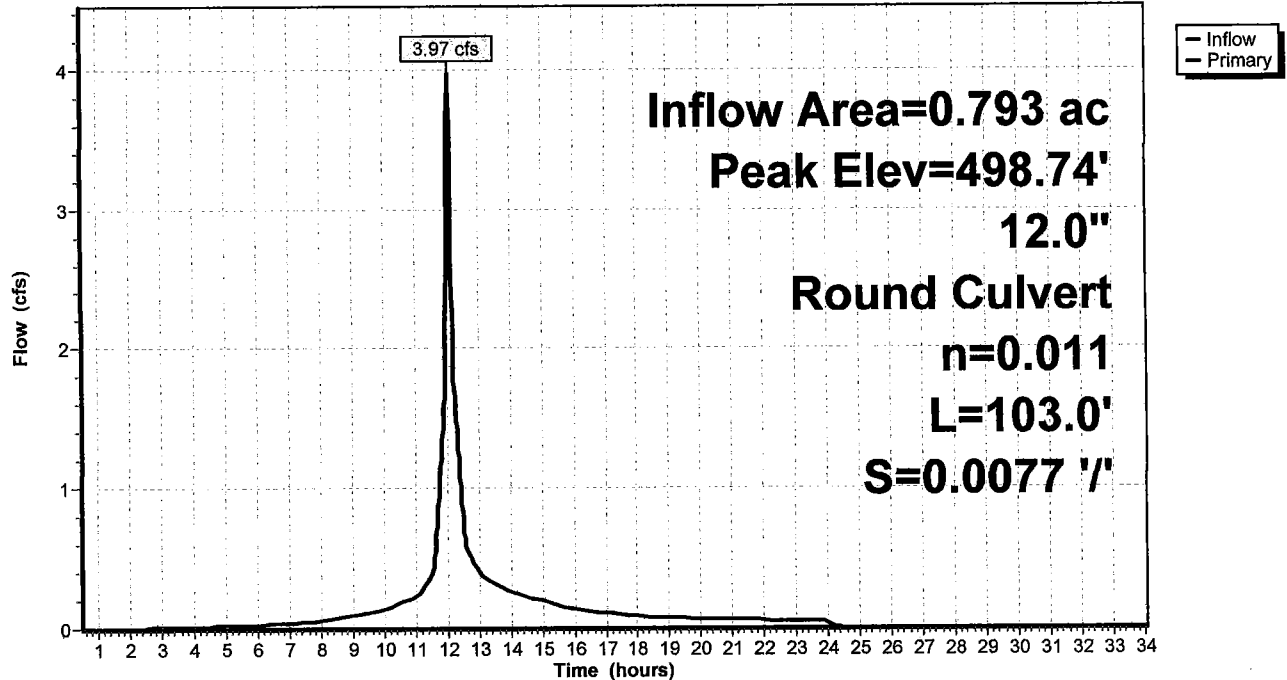
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	495.65'	12.0" Round Culvert L= 103.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 495.65' / 494.86' S= 0.0077 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=3.94 cfs @ 12.07 hrs HW=498.69' TW=497.20' (Dynamic Tailwater)
↑1=Culvert (Outlet Controls 3.94 cfs @ 5.02 fps)

Pond 7P: CB#2

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 136

Summary for Pond 8P: CB#1

Inflow Area = 0.969 ac, 63.95% Impervious, Inflow Depth = 5.05" for 100 YR event
Inflow = 5.16 cfs @ 12.07 hrs, Volume= 0.408 af
Outflow = 5.16 cfs @ 12.07 hrs, Volume= 0.408 af, Atten= 0%, Lag= 0.0 min
Primary = 5.16 cfs @ 12.07 hrs, Volume= 0.408 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 497.22' @ 12.07 hrs

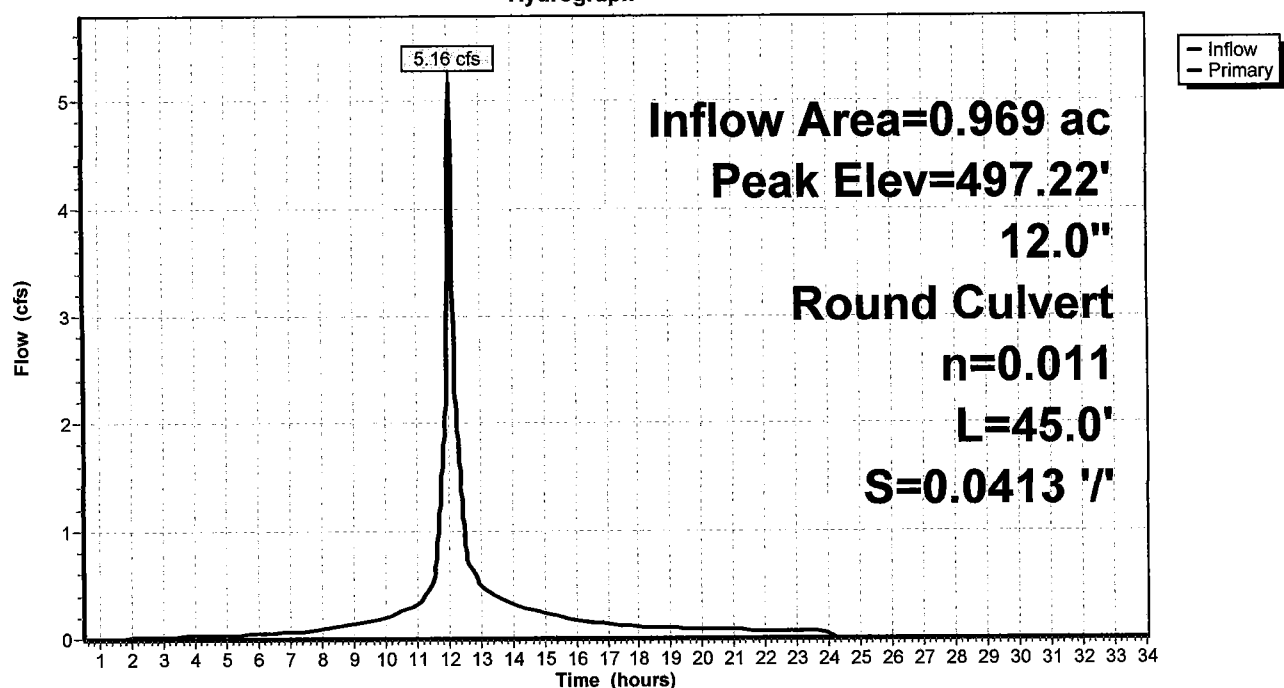
Flood Elev= 499.70'

Device	Routing	Invert	Outlet Devices
#1	Primary	494.86'	12.0" Round Culvert L= 45.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 494.86' / 493.00' S= 0.0413 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 0.79 sf

Primary OutFlow Max=5.13 cfs @ 12.07 hrs HW=497.20' TW=494.20' (Dynamic Tailwater)
↑1=Culvert (Inlet Controls 5.13 cfs @ 6.53 fps)

Pond 8P: CB#1

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 137

Summary for Pond 10P: ENLARGED STORMWATER BASIN

Inflow Area = 1.496 ac, 0.00% Impervious, Inflow Depth = 4.20" for 100 YR event
 Inflow = 7.59 cfs @ 12.07 hrs, Volume= 0.524 af
 Outflow = 6.51 cfs @ 12.12 hrs, Volume= 0.465 af, Atten= 14%, Lag= 2.8 min
 Primary = 6.51 cfs @ 12.12 hrs, Volume= 0.465 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 502.86' @ 12.12 hrs Surf.Area= 3,297 sf Storage= 4,323 cf

Plug-Flow detention time= 83.7 min calculated for 0.464 af (89% of inflow)

Center-of-Mass det. time= 30.8 min (844.5 - 813.6)

Volume	Invert	Avail.Storage	Storage Description
#1	500.70'	4,796 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.70	30	0	0
501.00	1,542	236	236
502.00	2,039	1,791	2,026
503.00	3,500	2,770	4,796

Device	Routing	Invert	Outlet Devices
#1	Primary	502.25'	8.0' long x 6.0' 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) 2.37 2.51 2.70 2.68 2.68 2.67 2.65 2.65 2.65 2.65 2.66 2.66 2.67 2.69 2.72 2.76 2.83

Primary OutFlow Max=6.50 cfs @ 12.12 hrs HW=502.86' TW=502.73' (Dynamic Tailwater)

1=Broad-Crested Rectangular Weir (Weir Controls 6.50 cfs @ 1.33 fps)

POST DEV JOHNSON

Prepared by BC ENGINEERING & SURVEY, INC

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101 HUNTOON PRE-DEVELOPMENT

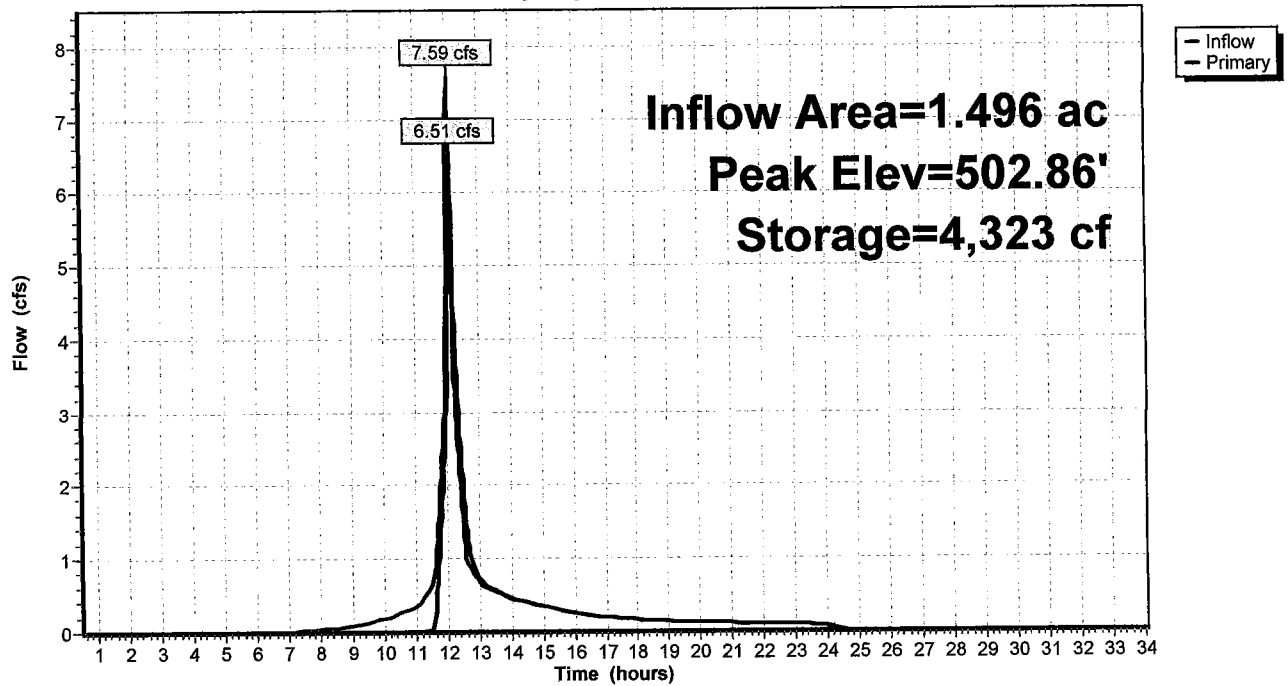
Type III 24-hr 100 YR Rainfall=6.70"

Printed 6/11/2018

Page 138

Pond 10P: ENLARGED STORMWATER BASIN

Hydrograph



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Type III 24-hr 100 YR Rainfall=6.70"

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Page 139

Summary for Pond 11P: CULTEC 100HD

Inflow Area = 0.093 ac, 100.00% Impervious, Inflow Depth = 6.46" for 100 YR event
 Inflow = 0.63 cfs @ 12.07 hrs, Volume= 0.050 af
 Outflow = 0.25 cfs @ 12.26 hrs, Volume= 0.045 af, Atten= 60%, Lag= 11.5 min
 Secondary = 0.25 cfs @ 12.26 hrs, Volume= 0.045 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 499.76' @ 12.26 hrs Surf.Area= 1,050 sf Storage= 715 cf

Plug-Flow detention time= 140.2 min calculated for 0.045 af (90% of inflow)

Center-of-Mass det. time= 90.2 min (832.8 - 742.6)

Volume	Invert	Avail.Storage	Storage Description
#1A	498.63'	655 cf	15.00'W x 70.00'L x 2.04'H Field A 2,144 cf Overall - 506 cf Embedded = 1,637 cf x 40.0% Voids
#2A	499.13'	506 cf	Cultec C-100HD x 36 Inside #1 Effective Size= 32.1"W x 12.0"H => 1.86 sf x 7.50'L = 14.0 cf Overall Size= 36.0"W x 12.5"H x 8.00'L with 0.50' Overlap Row Length Adjustment= +0.50' x 1.86 sf x 4 rows
		1,161 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Secondary	499.13'	4.0" Round Culvert L= 23.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 499.13' / 498.90' S= 0.0100 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.09 sf
#2	Secondary	499.80'	6.0" Round Culvert L= 23.0' CPP, mitered to conform to fill, Ke= 0.700 Inlet / Outlet Invert= 499.80' / 499.34' S= 0.0200 '/ Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.20 sf

Secondary OutFlow Max=0.25 cfs @ 12.26 hrs HW=499.76' (Free Discharge)

1=Culvert (Inlet Controls 0.25 cfs @ 2.90 fps)

2=Culvert (Controls 0.00 cfs)

POST DEV JOHNSON

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101 HUNTOON PRE-DEVELOPMENT

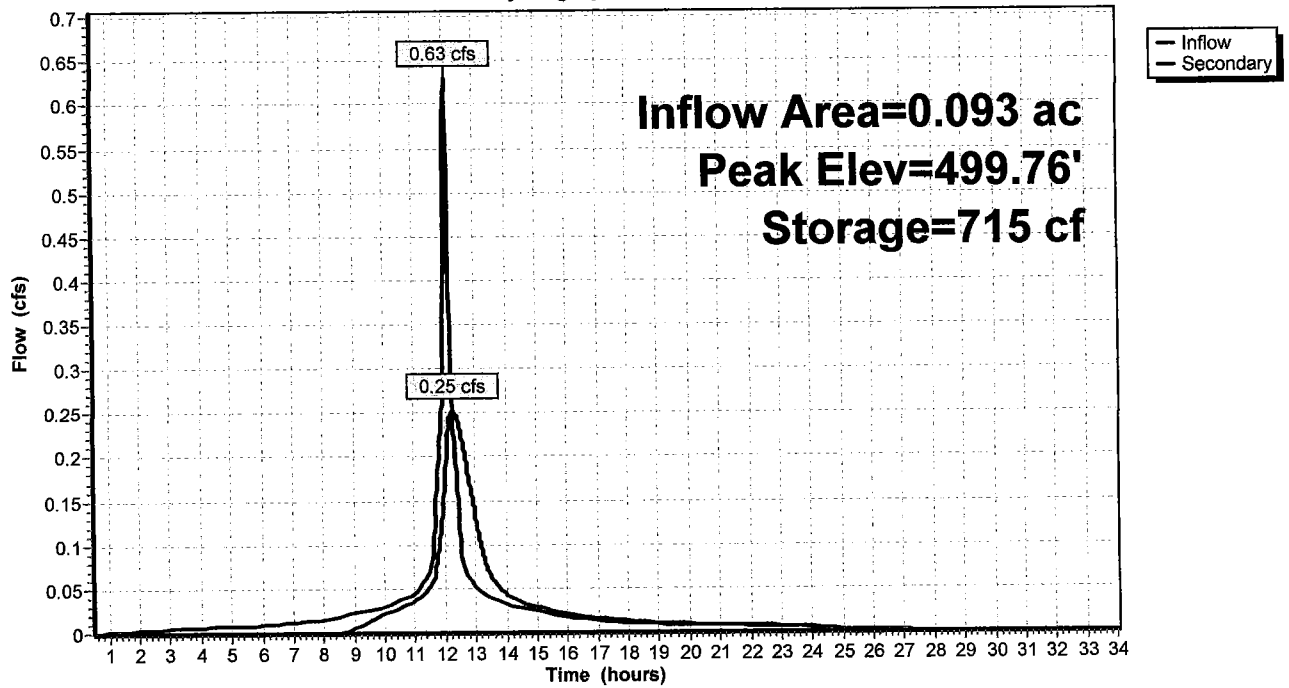
Type III 24-hr 100 YR Rainfall=6.70"

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Page 140

Pond 11P: CULTEC 100HD

Hydrograph



POST DEV JOHNSON

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101 HUNTOON PRE-DEVELOPMENT

Type III 24-hr 100 YR Rainfall=6.70"

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Page 141

Summary for Pond 12P: P-BASIN

Inflow Area = 0.110 ac, 0.00% Impervious, Inflow Depth = 6.22" for 100 YR event
 Inflow = 0.74 cfs @ 12.07 hrs, Volume= 0.057 af
 Outflow = 0.07 cfs @ 12.77 hrs, Volume= 0.020 af, Atten= 90%, Lag= 42.2 min
 Primary = 0.07 cfs @ 12.77 hrs, Volume= 0.020 af

Routing by Dyn-Stor-Ind method, Time Span= 0.50-34.00 hrs, dt= 0.02 hrs / 3

Peak Elev= 501.53' @ 12.77 hrs Surf.Area= 2,226 sf Storage= 1,679 cf

Plug-Flow detention time= 371.6 min calculated for 0.020 af (36% of inflow)

Center-of-Mass det. time= 209.6 min (964.5 - 754.9)

Volume	Invert	Avail.Storage	Storage Description
#1	500.50'	2,779 cf	Custom Stage Data (Prismatic) Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
500.50	383	0	0
501.00	1,911	574	574
502.00	2,500	2,206	2,779

Device	Routing	Invert	Outlet Devices
#1	Primary	501.50'	5.0' long x 5.0' 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) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=0.07 cfs @ 12.77 hrs HW=501.53' TW=500.62' (Dynamic Tailwater)

1=Broad-Crested Rectangular Weir (Weir Controls 0.07 cfs @ 0.43 fps)

POST DEV JOHNSON

Prepared by BC ENGINEERING & SURVEY, INC

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101 HUNTOON PRE-DEVELOPMENT

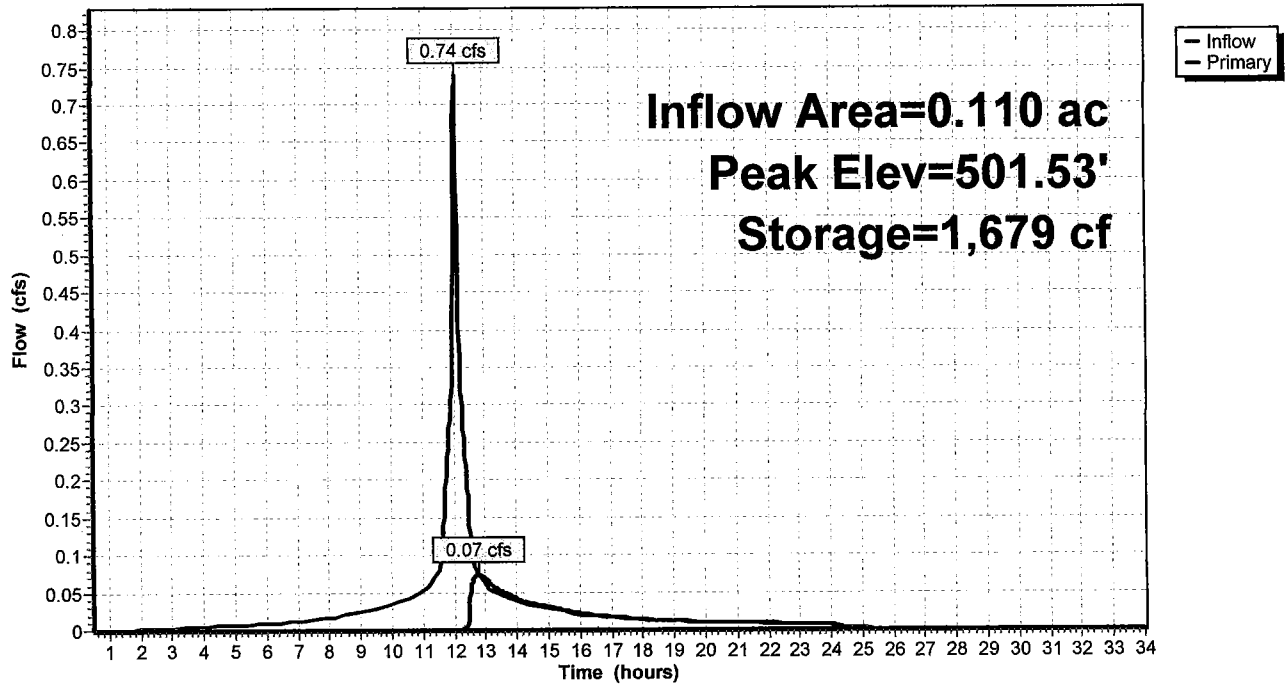
Type III 24-hr 100 YR Rainfall=6.70"

Printed 6/11/2018

Page 142

Pond 12P: P-BASIN

Hydrograph



3.0

Operation and Maintenance



Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.¹ This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8²
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

¹ The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

² For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.



Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

- ☒ New development
- ☐ Redevelopment
- ☐ Mix of New Development and Redevelopment



Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

- ☒ No disturbance to any Wetland Resource Areas
- ☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)
- ☐ Reduced Impervious Area (Redevelopment Only)
- ☒ Minimizing disturbance to existing trees and shrubs
- ☐ LID Site Design Credit Requested:
 - ☐ Credit 1
 - ☐ Credit 2
 - ☐ Credit 3
- ☐ Use of "country drainage" versus curb and gutter conveyance and pipe
- ☐ Bioretention Cells (includes Rain Gardens)
- ☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)
- ☐ Treebox Filter
- ☐ Water Quality Swale
- ☐ Grass Channel
- ☐ Green Roof
- ☐ Other (describe): _____

Standard 1: No New Untreated Discharges

- ☒ No new untreated discharges
- ☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth
- ☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.



Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

- ☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.
- ☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.
- ☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

- ☒ Soil Analysis provided.
- ☐ Required Recharge Volume calculation provided.
- ☐ Required Recharge volume reduced through use of the LID site Design Credits.
- ☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.
 - ☒ Static
 - ☐ Simple Dynamic
 - ☐ Dynamic Field¹
- ☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.
- ☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.
- ☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:
 - ☐ Site is comprised solely of C and D soils and/or bedrock at the land surface
 - ☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000
 - ☐ Solid Waste Landfill pursuant to 310 CMR 19.000
 - ☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.
- ☐ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.
- ☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

¹ 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.



Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

- ☒ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.
- ☒ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
 - Provisions for storing materials and waste products inside or under cover;
 - Vehicle washing controls;
 - Requirements for routine inspections and maintenance of stormwater BMPs;
 - Spill prevention and response plans;
 - Provisions for maintenance of lawns, gardens, and other landscaped areas;
 - Requirements for storage and use of fertilizers, herbicides, and pesticides;
 - Pet waste management provisions;
 - Provisions for operation and management of septic systems;
 - Provisions for solid waste management;
 - Snow disposal and plowing plans relative to Wetland Resource Areas;
 - Winter Road Salt and/or Sand Use and Storage restrictions;
 - Street sweeping schedules;
 - Provisions for prevention of illicit discharges to the stormwater management system;
 - Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
 - Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
 - List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.
- ☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.
 - ☐ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:
 - ☐ is within the Zone II or Interim Wellhead Protection Area
 - ☐ is near or to other critical areas
 - ☐ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
 - ☐ involves runoff from land uses with higher potential pollutant loads.
 - ☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.
 - ☐ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.



Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

- ☐ The BMP is sized (and calculations provided) based on:
 - ☐ The ½" or 1" Water Quality Volume or
 - ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.
- ☐ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.
- ☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

- ☒ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.
- ☐ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted **prior to** the discharge of stormwater to the post-construction stormwater BMPs.
- ☐ The NPDES Multi-Sector General Permit does **not** cover the land use.
- ☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.
- ☐ All exposure has been eliminated.
- ☐ All exposure has **not** been eliminated and all BMPs selected are on MassDEP LUHPPL list.
- ☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

- ☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.
- ☐ Critical areas and BMPs are identified in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

- ☐ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:
 - ☐ Limited Project
 - ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
 - ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
 - ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
 - ☐ Bike Path and/or Foot Path
 - ☐ Redevelopment Project
 - ☐ Redevelopment portion of mix of new and redevelopment.
- ☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.
- ☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
 - Construction Period Operation and Maintenance Plan;
 - Names of Persons or Entity Responsible for Plan Compliance;
 - Construction Period Pollution Prevention Measures;
 - Erosion and Sedimentation Control Plan Drawings;
 - Detail drawings and specifications for erosion control BMPs, including sizing calculations;
 - Vegetation Planning;
 - Site Development Plan;
 - Construction Sequencing Plan;
 - Sequencing of Erosion and Sedimentation Controls;
 - Operation and Maintenance of Erosion and Sedimentation Controls;
 - Inspection Schedule;
 - Maintenance Schedule;
 - Inspection and Maintenance Log Form.
- ☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.



Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

- ☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has **not** been included in the Stormwater Report but will be submitted **before** land disturbance begins.
- ☐ The project is **not** covered by a NPDES Construction General Permit.
- ☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.
- ☐ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

- ☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:
 - ☒ Name of the stormwater management system owners;
 - ☒ Party responsible for operation and maintenance;
 - ☒ Schedule for implementation of routine and non-routine maintenance tasks;
 - ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
 - ☐ Description and delineation of public safety features;
 - ☐ Estimated operation and maintenance budget; and
 - ☒ Operation and Maintenance Log Form.
- ☐ The responsible party is **not** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:
 - ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
 - ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

- ☒ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;
- ☒ An Illicit Discharge Compliance Statement is attached;
- ☐ NO Illicit Discharge Compliance Statement is attached but will be submitted **prior to** the discharge of any stormwater to post-construction BMPs.

STORM WATER MANAGEMENT
LONG-TERM OPERATION AND MAINTENANCE PLAN

SITE: 101 Huntoon Memorial Highway
Leicester, MA 01542

PREPARED FOR: 101 Huntoon, LLC
101 Huntoon Memorial Highway
Leicester, MA 01542

DATE: June 5, 2018

BC Engineering & Survey, Inc.
P. O. Box 466, Oxford, MA 01540

June 5, 2018

Town of Leicester
Leicester Planning Board
3 Washburn Square
Leicester, MA 01524

RE: 101 Huntoon, LLC
101 Huntoon Memorial Highway
Leicester, MA

Operation and Maintenance Plan:

Owner of Facility: 101 Huntoon, LLC
101 Huntoon Memorial Highway
Leicester, MA 01542

Operator of Facility: 101 Huntoon, LLC
101 Huntoon Memorial Highway
Leicester, MA 01542

Operation and Maintenance Procedures:

1. Pavement shall be kept clean of all debris and swept annually of winter sand.
2. Existing catch basins shall be inspected quarterly for siltation buildup and cleaned as necessary
3. Stormwater chambers shall be inspected annually to ensure proper infiltration, check inlets and outlets for clogging and remove any debris as required.
4. All snow is to be stockpiled in the designated snow storage area as noted on the plans, once weather permits the snow storage area shall be cleaned of all litter.
5. See Site Improvement Plans for additional Storm Water Pollution Prevention notes and details.

Respectively submitted
101 Huntoon, LLC

[illegible]

FIGURE 1

ASSESSORS MAP

Unofficial Property Record Card - Leicester, MA

General Property Data

Parcel ID 44 B6.3 0
Prior Parcel ID -
Property Owner CHERRY HILL REAL ESTATE CORP

Account Number

Mailing Address PO BOX 325

Property Location 101 HUNTOON MEMORIAL HW

Property Use IND WHS

Most Recent Sale Date 2/22/2001

Legal Reference 23574-126

City ROCHDALE

Grantor DAIGE,JOHN V

Mailing State MA Zip 01542

Sale Price 100

ParcelZoning

Land Area 1.490 acres

Current Property Assessment

Card 1 Value Building Value 438,200

Xtra Features
Value 20,100

Land Value 92,300

Total Value 550,600

Building Description

Building Style INDUST-LT
of Living Units 1
Year Built 2000
Building Grade AVERAGE
Building Condition Average
Finished Area (SF) 13680
Number Rooms 0
of 3/4 Baths 0

Foundation Type CONCRETE
Frame Type STEEL
Roof Structure FLAT
Roof Cover METAL
Siding CORREG STL
Interior Walls MINIMUM
of Bedrooms 0
of 1/2 Baths 0

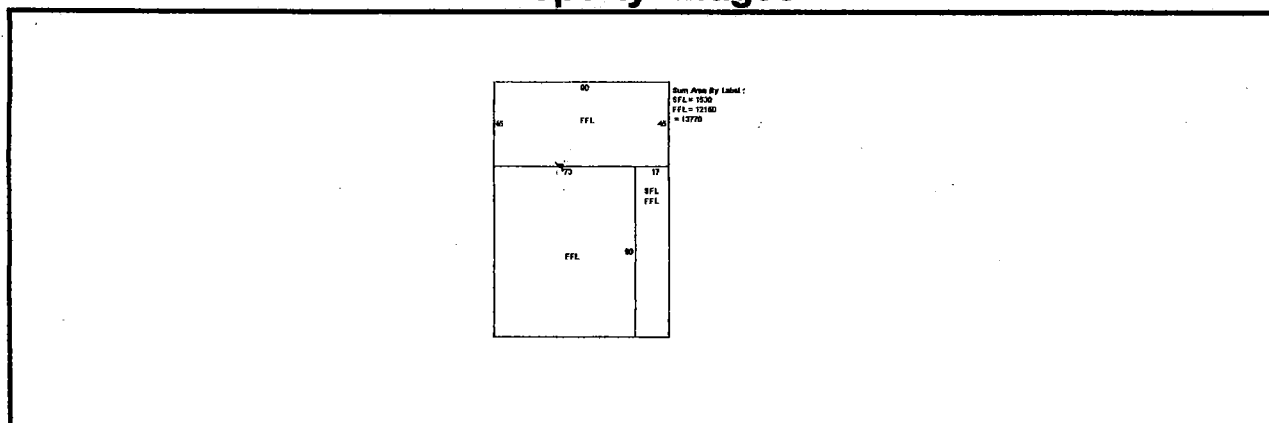
Flooring Type CONCRETE
Basement Floor N/A
Heating Type FORCED H/A
Heating Fuel OIL
Air Conditioning 10%
of Bsmt Garages 0
of Full Baths 2
of Other Fixtures 1

Legal Description

Narrative Description of Property

This property contains 1.490 acres of land mainly classified as IND WHS with a(n) INDUST-LT style building, built about 2000 , having CORREG STL exterior and METAL roof cover, with 1 unit(s), 0 room(s), 0 bedroom(s), 2 bath(s), 0 half bath(s).

Property Images



Disclaimer: This information is believed to be correct but is subject to change and is not warranted.

FIGURE 2

RECORDED DEED AND PLANS



2017 00024135

Bk: 56827 Pg: 364

Page: 1 of 3 03/08/2017 03:50 PM WD

MASSACHUSETTS EXCISE TAX
 Worcester District ROD #20 001
 Date: 03/08/2017 03:50 PM
 Ctrl# 165550 04932 Doc# 00024135
 Fee: \$4,696.80 Cons: \$1,030,000.00

QUITCLAIM DEED

Cherry Hill Real Estate Corp., also known as Cherry Hill Real Estate Corporation, a corporation duly established under the laws of the Commonwealth of Massachusetts having a usual place of business at 5 Sacks Drive, Cherry Valley, MA for consideration paid and in full consideration of

ONE MILLION THIRTY THOUSAND (\$1,030,000.00) DOLLARS

grants to 101 Huntoon, LLC, a Massachusetts limited liability company with a mailing address of 101 Huntoon Memorial Highway, Rochdale, MA 01542

with quitclaim covenants

PARCEL ONE

A certain tract or parcel of land with the buildings thereon, located on the northeasterly side of Route 56 in the Town of Leicester, County of Worcester, Commonwealth of Massachusetts, which is shown as Lot 3 on a "Plan of Land Owned by Karl Klosek" dated December 26, 1983, drawn by George E. Smith, Jr., Surveyor, and recorded with the Worcester District Registry of Deeds, Plan Book 517, Plan 68, which parcel is further bounded and described as follows:

BEGINNING at the most westerly point thereof on the northeasterly line of Route 56 at the most southerly corner of Lot 4 on said plan;

THENCE N. 58° 55' 30" E. a distance of 408 feet, more or less, along Lot 4 to a point in a stone wall at land now or formerly of one Cooper;

THENCE S. 9° 43' 48" E. a distance of 185.5 feet along the stone wall and land now or formerly of one Cooper to a point;

THENCE S. 58° 33' 06" W. a distance of 341.07 feet along land now or formerly of General Machine & Tool, Inc. to a point on the sideline of Route 56;

THENCE N. 31° 04' 30" W. a distance of 175.00 feet along the sideline of Route 56 to the point of beginning.

101 Huntoon Memorial Highway, Leicester, MA

WILSON ABSTRACT CO.
 TITLE 64878 + 48487
 Lot 3 Lot 2

③

CONTAINING, according to said plan, 65,140 square feet.

BEING the same premises conveyed to Cherry Hill Real Estate Corp. by deed dated November 2, 2000 and recorded with the Worcester District Registry of Deeds in Book 23574, Page 126.

PARCEL TWO

A certain parcel of land located to the east of Huntoon Highway, Massachusetts Highway Route 56, in the Town of Leicester, in Worcester County, Massachusetts and being shown as Lot 2 on a plan of land entitled "PLAN OF LAND LOCATED NEAR HENSHAW STREET, LEICESTER, MASSACHUSETTS OWNED BY DAVID A. COOPER, MARJORIE A. COOPER, JAMES H. COOPER, HAZEL M. COOPER, RICHARD A. COOPER, AND JAMES A. COOPER, PREPARED FOR DAVID AND RICHARD COOPER, 515 HENSHAW ST., ROCHDALE, MA 01542" PREPARED BY LAND PLANNING, INC., CIVIL ENGINEERS, LAND SURVEYORS, ENVIRONMENTAL CONSULTANTS, DATED JULY 17, 2006 and recorded in the Worcester District Registry of Deeds ("the "Registry") in Plan Book 847, Plan 58.

No implied easement by necessity is intended to be granted over or with respect to the remaining land of David A. Cooper, James A. Cooper, Marjorie A. Cooper and Richard A. Cooper, co-partners under the general partnership d/b/a Coopers' Hilltop Farm as in deed recorded in Book 42016, Page 204.

BEING the same premises conveyed to Cherry Hill Real Estate Corporation by deed dated October 24, 2007 and recorded with the Worcester District Registry of Deeds in Book 42016, Page 204.

GRANTOR certifies under pains and penalties of perjury that the property hereby conveyed is not a principal residence and further certifies under oath that no person is entitled to claim a homestead in this property.

This conveyance does not constitute the sale or transfer of all or substantially all of the grantor's assets within the Commonwealth of Massachusetts.

Signature page to follow

Witness my hand and seal this 8 day of March, 2017.

Cherry Hill Real Estate Corp.

By John V. Daige Pres + Treasurer
John V. Daige, President and Treasurer 3-8-17

COMMONWEALTH OF MASSACHUSETTS

WORCESTER, SS

March 8, 2017

John V. Daige personally appeared before me and acknowledged having signed the foregoing document voluntarily for its stated purpose, in his capacity as President & Treasurer of Cherry Hill Real Estate Corp. and further swore or affirmed to me that the contents of the document are truthful and accurate to the best of his knowledge, whose identity I determined by.

- ☒ driver's license or other state or federal government document bearing a photographic image
- ☐ oath or affirmation of a credible witness known to me who knows the above signatory,
- ☐ my own personal knowledge of identity of the signatory, to be the person whose name is signed above,

Patricia M. Finnegan

Notary Public:

My commission expires:

 **PATRICIA M. FINNEGAN**
NOTARY PUBLIC
Commonwealth of Massachusetts
My Commission Expires May 28, 2017

ATTEST: WORC. Anthony J. Vigliotti, Register

"SITE"

N. OR F. COOPER

S-2°-43'-48"E
187.9'

185.5'

408.4'

LOT 4

AREA =
77,485 f

477.4'

LOT 3

AREA =
65,140 f

341.07'

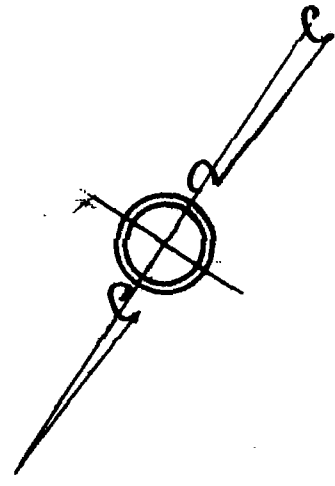
S-58°-23'-06"W

175.00'

N-31°-04'-30"W

KARL KLOSEK

GENERAL MACHINE
& TOOL INC.



George E. Smith for



ROUTE # 56

I CERTIFY THAT THIS PLAN HAS BEEN MADE IN
CONFORMITY WITH THE RULES AND REGULATIONS
OF THE REGISTRY OF DEEDS OF THE COMM. OF MASS.

NOTE: THIS PLAN MADE FROM DEEDS AND OTHER PLANS.

APPROVAL UNDER THE
SUB-DIVISION CONTROL
LAW NOT REQUIRED

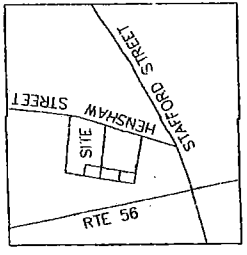


LEICESTER PLANNING BOARD

RECEIVED
DEC 26 1983
LEICESTER PLANNING BOARD
OFFICE OF THE
REGISTER OF DEEDS
COMMONWEALTH OF MASSACHUSETTS
RECEIVED
DEC 26 1983
OFFICE OF THE
REGISTER OF DEEDS
COMMONWEALTH OF MASSACHUSETTS

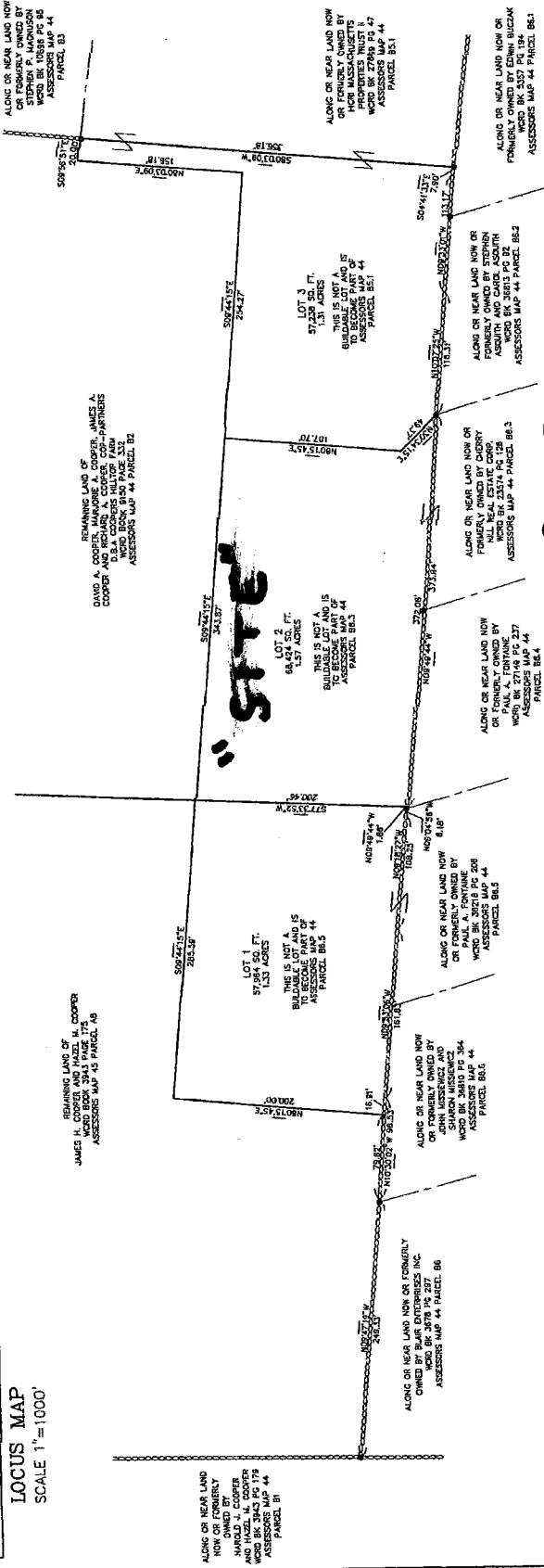
PLAN OF LAND
LEICESTER MASS.
OWNED BY
KARL KLOSEK
DEC. 26 1983





LOCUS MAP
SCALE 1" = 1000'

TO HENSHAW STREET



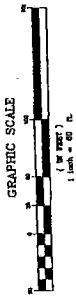
SITE

TO ROUTE 56

- LEGEND
- IRON PIPE FOUND
 - DRILL HOLE FOUND
 - - - ABUTTING PROPERTY LINE
 - CENTER LINE OF STONEWALL
 - PARCELS TO BE COMBINED

ZONING DISTRICT 9-2 (BUS. STRUCTURAL)

AREA	20,000 S.F.
FRONTAGE	150 FT.
FRONT YARD	50 FT.
REAR YARD	50 FT.
REAR YARD	40 FT.



*THE PURPOSE OF THIS PLAN IS TO
CREATE LOTS 1, 2, AND 3

PLAN OF LAND
LOCATED NEAR
HENSHAW STREET
LEICESTER, MASSACHUSETTS
OWNED BY
DAVID A. COOPER, MARJORIE A. COOPER, JAMES H. COOPER
HAZEL M. COOPER, RICHARD A. COOPER & JAMES A. COOPER
PREPARED FOR
DAVID AND RICHARD COOPER
515 HENSHAW ST.
ROCHESTER, MA 01542

WORCESTER DISTRICT REGISTRY
OF DEEDS-WORCESTER, MA
PLAN BOOK 3943 PAGE 179
RECEIVED 10-1-06
Sheet 1 of 1
With Date 10-1-06
MA BOOK 3943 PAGE 179
ATTENT: Catherine J. Rogers
Register

FOR REGISTRY OF DEEDS USE ONLY

APPROVAL UNDER THE
SUBDIVISION CONTROL LAW
NOT REQUIRED
PLANNING BOARD
Date 10/1/06
Signature [Signature]

I CERTIFY THAT THE PREPARATION
OF THIS PLAN CONFORMS TO THE
RULES AND REGULATIONS OF THE
MASSACHUSETTS DEPARTMENT OF
REVENUE



DATE 10/1/06
PLANNING BOARD
Signature [Signature]

NO.	DATE	REVISION	CHECKED
1			
2			
3			
4			
5			

DESIGNED BY: [Signature] 10/1/06
DRAWN BY: [Signature] 10/1/06
CHECKED BY: [Signature] 10/1/06

LAND PLANNING, INC.
Civil Engineers - Land Surveyors
Environmental Consultants

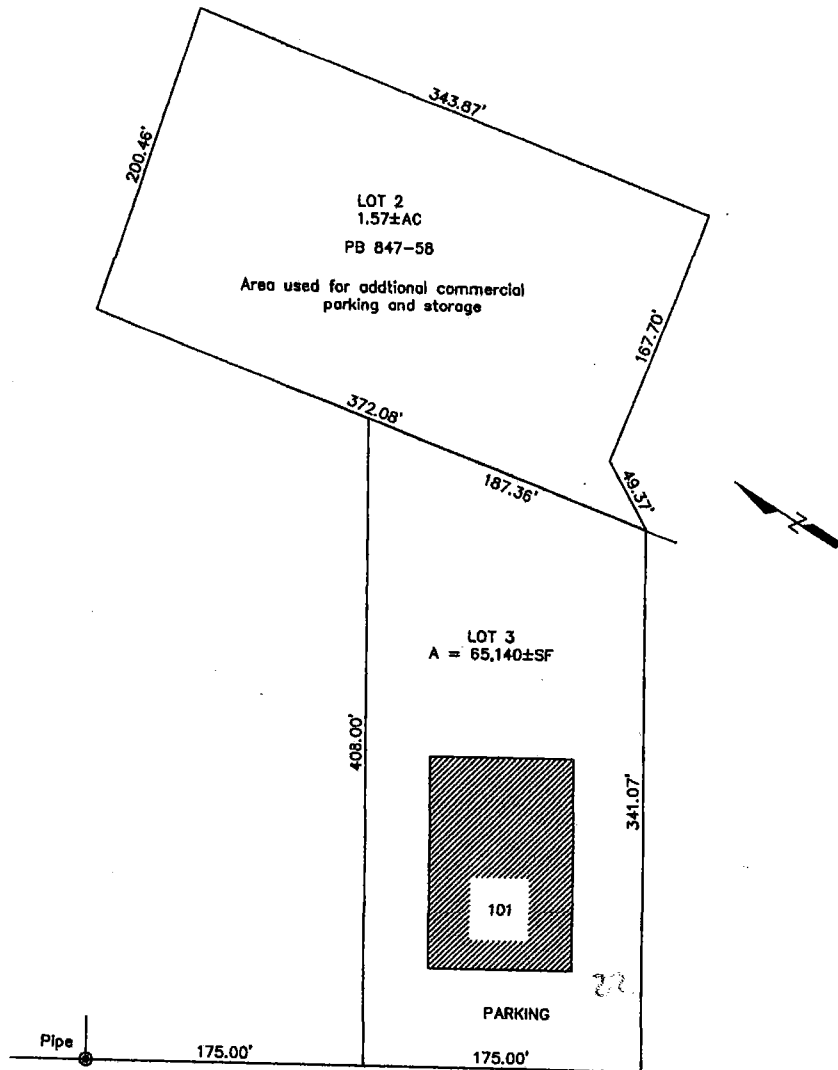
BELLINGHAM
187 HARTFORD AVE. 02018
508-866-4150

GRAFTON 01536
214 WOOD ST.
508-839-9226

HANSON
1115 MAIN STREET 02041
781-284-4144

HOLDEN
P.O. BOX 844 01520
508-829-3000

DATE JUL 17, 2006
JOS. G. 1 OF 1
G 0578



HUNTOON MEMORIAL HIGHWAY

DEED REF: 23574-126

PLAN REF: 517-68

CERTIFICATION MADE TO: LAW OFFICES OF JENEEN M MORAN ESQ

I HEREBY CERTIFY THAT THE BUILDING SHOWN ON THIS PLAN IS LOCATED ON THE GROUND APPROXIMATELY AS SHOWN AND CONFORMED TO THE DIMENSIONAL REQUIREMENTS OF THE ZONING BY-LAWS OF THE TOWN/CITY OF LEICESTER, MASS. WHEN CONSTRUCTED OR IS EXEMPT FROM VIOLATION ENFORCEMENT ACTION UNDER MASS. GENERAL LAWS CHAPTER 40A SEC. 7.

I ALSO CERTIFY THAT THE BUILDING(S) SHOWN HEREON DO NOT LIE WITHIN A FEDERALLY DESIGNATED FLOOD HAZARD AREA AS DEFINED ON THE F.E.M.A. FLOOD HAZARD BOUNDARY MAP FOR THE TOWN/CITY OF LEICESTER, MASS.

THIS PLAN WAS NOT MADE FROM AN INSTRUMENT SURVEY AND IS FOR MORTGAGE PURPOSES ONLY. FURTHERMORE, IT IS NOT TO BE USED FOR THE PHYSICAL ESTABLISHMENT OF PROPERTY LINES AND/OR CERTIFICATION OF FENCES, PLANTINGS, PAVED AREAS, UTILITIES, SHEDS, ETC., OR THE CONSTRUCTION OF ADDITIONAL STRUCTURES ON THE LOT. ANY STRUCTURES/PAVED DRIVEWAYS ON LOCUS OR ABUTTING AND LOCATED NEAR PROPERTY LINES REQUIRE AN INSTRUMENT LOCATION TO DETERMINE ANY POSSIBLE ENCROACHMENTS. CERTIFICATION IS RESTRICTED TO BUILDING AREA OF LOT.

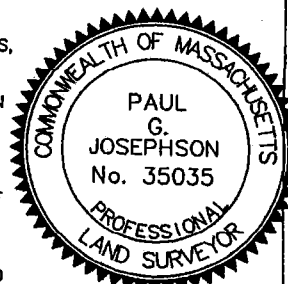
THIS CERTIFICATION IS BASED UPON THE LEGAL DESCRIPTION(S) OF THE PREMISES SHOWN HEREON WHICH WERE PROVIDED BY THE CLIENT, TOWN TAX MAPS, LINES OF OCCUPATION AND DOES NOT PURPORT TO REVEAL ANY INCONSISTENCIES AND/OR ENCROACHMENTS WHICH MAY BE DISCOVERED WITH A FULL AND COMPLETE TITLE SEARCH, EXAMINATION OF ABUTTING DEEDS, OR INSTRUMENT SURVEY. NO CERTIFICATION IS HEREBY MADE WITH RESPECT TO ANY OTHER PROVISIONS OF SAID BY-LAW.

P.N. Associates, Inc.
President

[Signature]

Date

02/28/17



MORTGAGE INSPECTION

PLOT PLAN

IN

LEICESTER, MASS.

Scale 1" = 120'

P.N. ASSOCIATES, INC.

310 Oak Street
Shrewsbury, MA

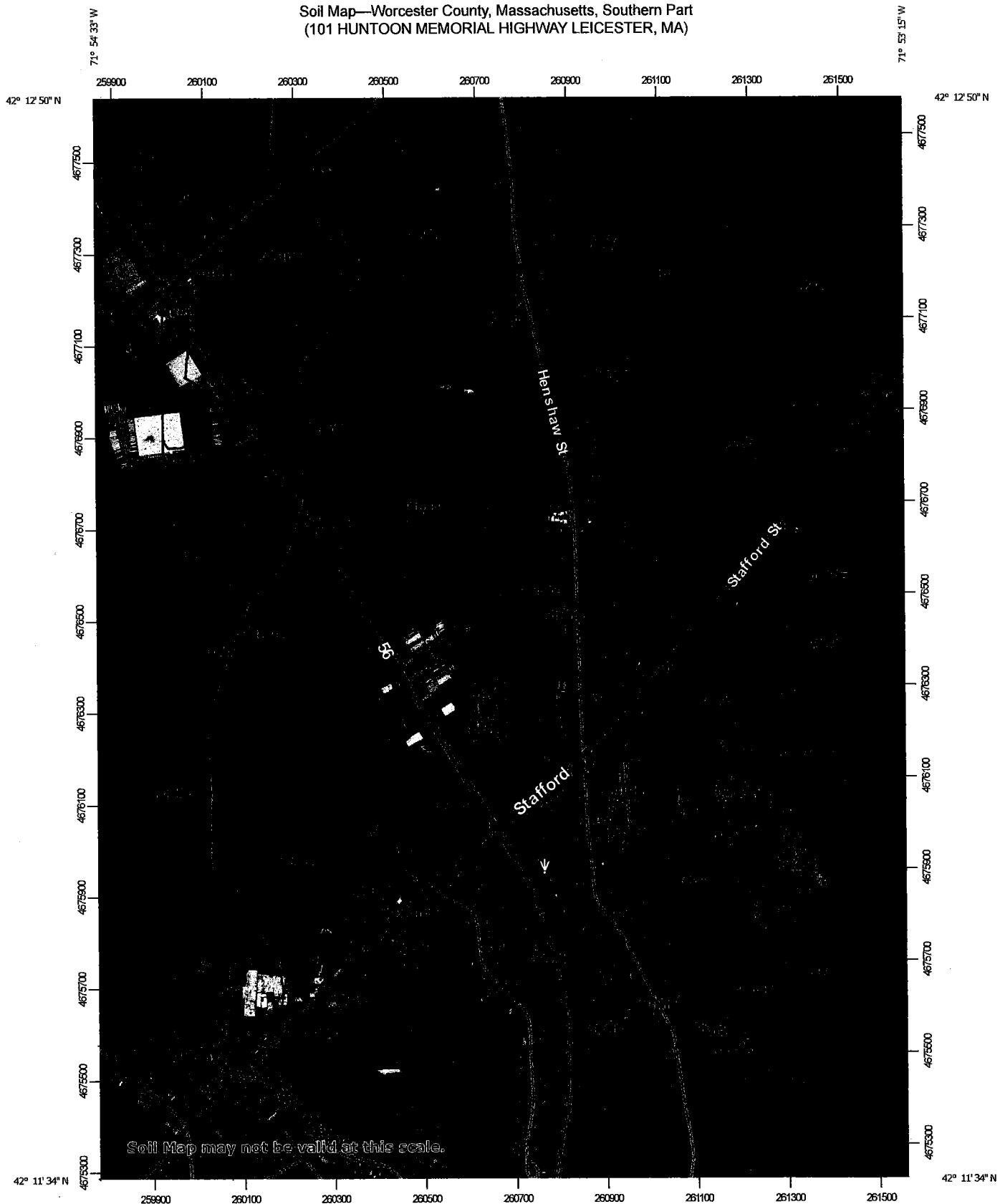
508-958-2914

Fax 508-519-9198

FIGURE 3

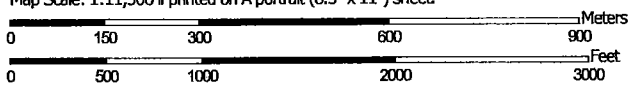
SOILS INFORMATION

Soil Map—Worcester County, Massachusetts, Southern Part
(101 HUNTOON MEMORIAL HIGHWAY LEICESTER, MA)



Soil Map may not be valid at this scale.

Map Scale: 1:11,500 if printed on A portrait (8.5" x 11") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84



Natural Resources
Conservation Service

Web Soil Survey
National Cooperative Soil Survey

5/4/2017
Page 1 of 4

MAP LEGEND

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Date(s) aerial images were photographed: Mar 30, 2011—May 1, 2011

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Area of Interest (AOI)

- Area of Interest (AOI)
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Soils

- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

Map Unit Legend

Worcester County, Massachusetts, Southern Part (MA615)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
1	Water	19.4	2.9%
3A	Scarboro and Walpole soils, 0 to 3 percent slopes	0.0	0.0%
51A	Swansea muck, 0 to 1 percent slopes	9.1	1.4%
52A	Freetown muck, 0 to 1 percent slopes	19.4	2.9%
73A	Whitman fine sandy loam, 0 to 3 percent slopes, extremely stony	21.3	3.2%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	69.8	10.6%
300B	Montauk fine sandy loam, 3 to 8 percent slopes	51.0	7.8%
300C	Montauk fine sandy loam, 8 to 15 percent slopes	13.0	2.0%
302B	Montauk fine sandy loam, 0 to 8 percent slopes, extremely stony	43.8	6.7%
302C	Montauk fine sandy loam, 8 to 15 percent slopes, extremely stony	64.0	9.7%
302E	Montauk fine sandy loam, 15 to 35 percent slopes, extremely stony	13.5	2.1%
305B	Paxton fine sandy loam, 3 to 8 percent slopes	38.5	5.9%
305C	Paxton fine sandy loam, 8 to 15 percent slopes	42.3	6.4%
305D	Paxton fine sandy loam, 15 to 25 percent slopes	22.0	3.3%
307B	Paxton fine sandy loam, 0 to 8 percent slopes, extremely stony	14.2	2.2%
310B	Woodbridge fine sandy loam, 3 to 8 percent slopes	1.4	0.2%
312B	Woodbridge fine sandy loam, 0 to 8 percent slopes, extremely stony	0.7	0.1%
315A	Scituate fine sandy loam, 0 to 3 percent slopes	37.7	5.7%
315B	Scituate fine sandy loam, 3 to 8 percent slopes	35.0	5.3%

Worcester County, Massachusetts, Southern Part (MA615)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
317B	Scituate fine sandy loam, 3 to 8 percent slopes, extremely stony	72.1	11.0%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	16.9	2.6%
422C	Canton fine sandy loam, 8 to 15 percent slopes, extremely stony	36.4	5.5%
422E	Canton fine sandy loam, 15 to 35 percent slopes, extremely stony	0.9	0.1%
651	Udorthents, smoothed	15.0	2.3%
Totals for Area of Interest		657.5	100.0%

FIGURE 4

SITE AERIAL

A18-A40 (BVW)

A1-A18- Intermittent stream coming from upgradient wetland
(technically not a drainage ditch)

A40

SITE

A1

HUNTOON MEMORIAL HIGHWAY



FIGURE 5

**PER-DEVELOPMENT
WATERSHED DELINEATION**

GENERAL NOTES:

EXISTING TOPOGRAPHY WAS OBTAINED FROM A FIELD SURVEY CONDUCTED ON APRIL 29 AND MAY 2, 2017, BY BC ENGINEERING & SURVEY INC. ELEVATIONS REFER TO ASSUMED, SEE BENCHMARK LOCATED AS SHOWN ON PLANS.

PROPERTY LINE INFORMATION OBTAINED FROM A PLAN RECORDED IN THE W.D.R.D. PLAN BOOK 517, PLAN 68 & PLAN BOOK 847, PLAN 58.

THE LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES ARE APPROXIMATE ONLY. THE DESIGNER DOES NOT GUARANTEE THEIR ACCURACY OR THAT ALL UTILITIES AS SUBSURFACE STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION, AND INVERT ELEVATIONS OF THE UTILITIES AND STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION ANY DISCREPANCIES WITH RECORD DATA SHALL BE REPORTED TO THE DESIGNER IMMEDIATELY. THE CONTRACTOR IS CAUTIONED TO CONTACT "DIG SAFE" (1-800-322-4844) 72 HOURS PRIOR TO EXCAVATION.

ALL MATERIALS AND CONSTRUCTION PRACTICES SHALL BE IN CONFORMANCE WITH THE LATEST EDITION OF THE MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS (MHPW) CONSTRUCTION STANDARDS AND THE MHPW "STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES", UNLESS OTHERWISE SPECIFIED BY LOCAL AUTHORITY OR THE DESIGNER.

IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE HIS WORK WITH THE APPROPRIATE HIGHWAY AND UTILITY DEPARTMENTS. CONTRACTOR SHALL MAINTAIN ALL EXISTING AND NEWLY INSTALLED UTILITIES IN GOOD WORKING ORDER AND SHALL PROTECT THEM FROM DAMAGE AT ALL TIMES UNTIL THE WORK IS COMPLETED AND ACCEPTED.

THE CONTRACTOR SHALL UTILIZE ALL MEASURES AND MATERIALS NECESSARY TO ENSURE THE SAFETY OF ALL PERSONS AND PROPERTIES AT THE SITE DURING CONSTRUCTION. ALL EXCAVATIONS SHALL CONFORM TO CURRENT OSHA STANDARDS.

THE CONTRACTOR SHALL PROVIDE APPROPRIATE EROSION AND SEDIMENTATION CONTROL MEASURES AT ALL TIMES. DEWATERING OPERATIONS SHALL BE PROVIDED, IF REQUIRED; ALL DISCHARGES SHALL PASS THROUGH SEDIMENTATION CONTROL DEVICES TO PREVENT IMPACTS UPON WATER BODIES, BORDERING VEGETATED WETLANDS, DRAINAGE SYSTEMS, AND ADJUTING PROPERTIES.

UNLESS OTHERWISE NOTED, ALL DISTURBED AREAS SHALL BE DRESSED WITH A MINIMUM OF FOUR INCHES (4") OF LOAM AND SHALL BE SEED WITH AN APPROVED GRASS MIX. SLOPE EXCEEDING 2:1 SHALL BE LOAMED AND STABILIZED WITH PEGGED SOD OR APPROVED EROSION CONTROL BLANKETS UNLESS OTHERWISE NOTED.

WORK WITHIN THE HIGHWAY LAYOUT SHALL CONFORM TO THE CONDITIONS OF THE PERMIT ISSUED BY THE MASSACHUSETTS HIGHWAY DEPARTMENT AND OR LOCAL AUTHORITY AS APPROPRIATE.

ALL STRUCTURES AND APPURTENANCES SHALL BE CONSTRUCTED FOR H-20 LOADING.

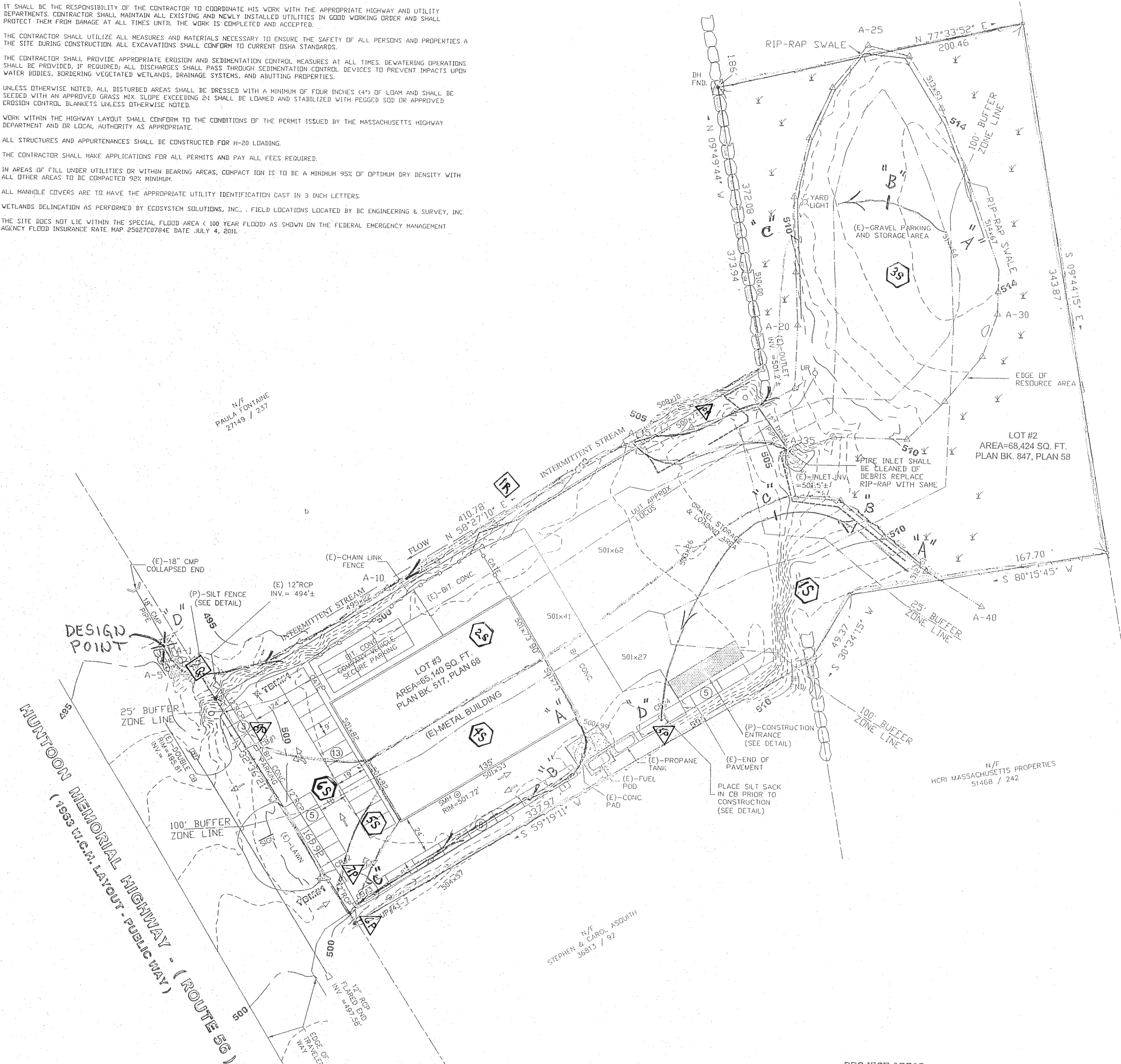
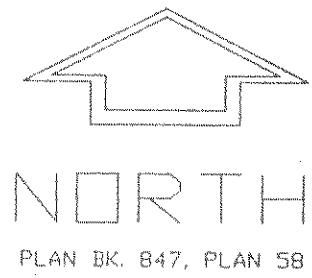
THE CONTRACTOR SHALL MAKE APPLICATIONS FOR ALL PERMITS AND PAY ALL FEES REQUIRED.

IN AREAS OF FILL UNDER UTILITIES OR WITHIN BEARING AREAS, COMPACT ION IS TO BE A MINIMUM 95% OF OPTIMUM DRY DENSITY WITH ALL OTHER AREAS TO BE COMPACTED 90% MINIMUM.

ALL MANHOLE COVERS ARE TO HAVE THE APPROPRIATE UTILITY IDENTIFICATION CAST IN 3 INCH LETTERS.

WETLANDS DELINEATION AS PERFORMED BY ECOSYSTEM SOLUTIONS, INC., FIELD LOCATIONS LOCATED BY BC ENGINEERING & SURVEY, INC.

THE SITE DOES NOT LIE WITHIN THE SPECIAL FLOOD AREA (100 YEAR FLOOD) AS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP 250270784E DATE JULY 4, 2011.



PROJECT AREAS:

EXISTING	
UPLAND AREA	96,595 SQ. FT.±
WETLAND AREA	36,969 SQ. FT.±
TOTAL AREA	133,564 SQ. FT.±
IMPERVIOUS AREA (BUILDING/PAVEMENT)	36,003 SQ. FT.±
GRAVEL STORAGE AREA	60,592 SQ. FT.±
PROPOSED	
IMPERVIOUS AREA (BUILDING/PAVEMENT)	44,103 SQ. FT.±
GRAVEL AREA	52,492 SQ. FT.±
REMOVAL OF IMPERVIOUS PAVEMENT	-2,700 SQ. FT.±

TEMPORARY BENCH MARKS

TBM #1
PK NAIL SET 200
ELEV. = 500.00'
TBM #2
PK NAIL SET 201
ELEV. = 500.39'

LEGEND

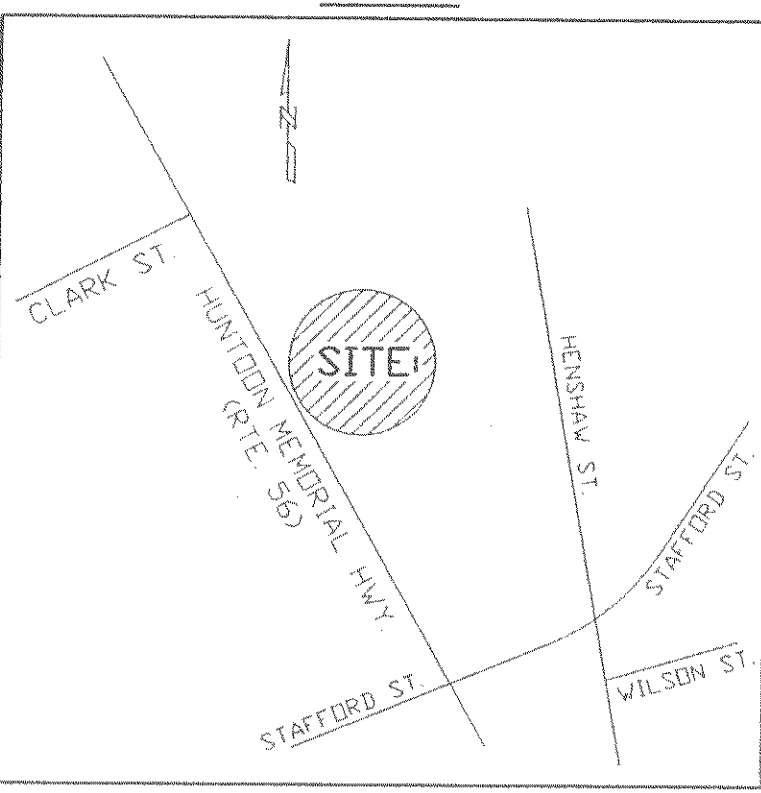
--- 000 ---	EXISTING GRADE
--- 000 ---	PROPOSED GRADE
000x00	EXISTING SPOT ELEVATION
000x00	PROPOSED SPOT ELEVATION
	WETLAND LINE
CB	CATCH BASIN
SMH	SEWER MANHOLE
UP#	UTILITY POLE
TBM	TEMPORARY BENCH MARK
DH FND.	DRILL HOLE FOUND
WETLAND	WETLAND
STONE WALL	STONE WALL
FINISHED FLOOR	FINISHED FLOOR
EXISTING	EXISTING
PROPOSED	PROPOSED

(E)-CB #1	(E)-CB #3
RIM=498.86'	RIM=499.53'
INV. IN=494.86'	INV. IN=495.88'
INV. OUT=494.86'	INV. OUT=495.88'
OUTFALL INV.=493'.0±	
(E)-CB #2	(E)-CB #4
RIM=499.70'	RIM=500.37'
INV. IN=495.65'	INV. IN=497.82'
INV. OUT=495.65'	

EXISTING PARKING SPACES

21 SPACES 9' x 19'
13 SPACES 8' x 20'
6 SPACES 8' x 20' COMPANY VEHICLES
40 TOTAL SPACES

LOCUS MAP



ZONING

ZONING DISTRICT: HB-2 BUSINESS DISTRICT
MIN. LOT AREA : 45,000 SQ. FT.
MIN. LOT FRONTAGE : 200 FT.
MIN. FRONT YARD SETBACK : 50 FT.
MIN. SIDE YARD SETBACK : 50 FT.
MIN. REAR YARD SETBACK : 50 FT.

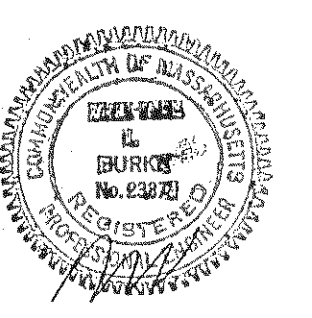
REFERENCE - DEEDS - PLANS

RECORDED AT WORCESTER DISTRICT REGISTRY OF DEEDS
SUBJECT PARCEL : DEED BOOK 56827, PAGE 364
PLAN BOOK 847, PLAN 58
PLAN BOOK 517, PLAN 68

ASSESSORS

WEBSTER ASSESSORS INFORMATION
SUBJECT PARCEL: MAP 44, PARCELS B6.3 & B2.2

CIVIL ENGINEER



MICHAEL J. BURKE R.P.E.
LICENSE # 23374
DATE: 6/19/18

EXISTING CONDITIONS PLAN
101 HUNTOON MEMORIAL HIGHWAY
LEICESTER, MASSACHUSETTS 01524

OWNED BY:

101 HUNTOON, LLC
101 HUNTOON MEMORIAL HIGHWAY
LEICESTER, MA 01524

NO.	DATE	REVISION
1		"PRE-DEVELOPMENT"
2		"DRAINAGE AREAS"
3		
4		
5		



SCALE: 1" = 40' DATE: MAY 1, 2018
JOB#: BC1040-17 LEICESTER

BC ENGINEERING & SURVEY INC.
CIVIL ENGINEERING - LAND SURVEYING

P.O. Box 466 Oxford Ma. 01540 Tel. (508) 949 - 2700

FIGURE 6

**POST-DEVELOPMENT
WATERSHED DELINEATION**

GENERAL NOTES:

EXISTING TOPOGRAPHY WAS OBTAINED FROM A FIELD SURVEY CONDUCTED ON APRIL 29 AND MAY 2, 2017, BY BC ENGINEERING & SURVEY INC. ELEVATIONS REFER TO ASSUMED, SEE BENCHMARK LOCATED AS SHOWN ON PLANS.

PROPERTY LINE INFORMATION OBTAINED FROM A PLAN RECORDED IN THE V.D.B.D. PLAN BOOK 517, PLAN 68 & PLAN BOOK 847, PLAN 58.

THE LOCATION OF UNDERGROUND UTILITIES AND STRUCTURES ARE APPROXIMATE ONLY. THE DESIGNER DOES NOT GUARANTEE THEIR ACCURACY OR THAT ALL UTILITIES AS SUBSURFACE STRUCTURES ARE SHOWN. THE CONTRACTOR SHALL VERIFY SIZE, LOCATION, AND INVERT ELEVATIONS OF THE UTILITIES AND STRUCTURES AS REQUIRED PRIOR TO THE START OF CONSTRUCTION. ANY DISCREPANCIES WITH RECORD DATA SHALL BE REPORTED TO THE DESIGNER IMMEDIATELY. THE CONTRACTOR IS CAUTIONED TO CONTACT "DIG SAFE" (1-800-552-4849) 72 HOURS PRIOR TO EXCAVATION.

ALL MATERIALS AND CONSTRUCTION PRACTICES SHALL BE IN CONFORMANCE WITH THE LATEST EDITION OF THE MASSACHUSETTS DEPARTMENT OF PUBLIC WORKS (MHPW) CONSTRUCTION STANDARDS AND THE MHPW STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, UNLESS OTHERWISE SPECIFIED BY LOCAL AUTHORITY OR THE DESIGNER.

IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE HIS WORK WITH THE APPROPRIATE HIGHWAY AND UTILITY DEPARTMENTS. CONTRACTOR SHALL MAINTAIN ALL EXISTING AND NEWLY INSTALLED UTILITIES IN GOOD WORKING ORDER AND SHALL PROTECT THEM FROM DAMAGE AT ALL TIMES UNTIL THE WORK IS COMPLETED AND ACCEPTED.

THE CONTRACTOR SHALL UTILIZE ALL MEASURES AND MATERIALS NECESSARY TO ENSURE THE SAFETY OF ALL PERSONS AND PROPERTIES AT THE SITE DURING CONSTRUCTION. ALL EXCAVATIONS SHALL CONFORM TO CURRENT OSHA STANDARDS.

THE CONTRACTOR SHALL PROVIDE APPROPRIATE EROSION AND SEDIMENTATION CONTROL MEASURES AT ALL TIMES. Dewatering operations shall be provided, if required, all discharges shall pass through sedimentation control devices to prevent impacts upon water bodies, bordering vegetated wetlands, drainage systems, and abutting properties.

UNLESS OTHERWISE NOTED, ALL DISTURBED AREAS SHALL BE DRESSED WITH A MINIMUM OF FOUR INCHES (4") OF LOAM AND SHALL BE SEEDED WITH AN APPROVED GRASS MIX. SLOPE EXCEEDING 2:1 SHALL BE LOANED AND STABILIZED WITH PEGGED SOD OR APPROVED EROSION CONTROL BLANKETS UNLESS OTHERWISE NOTED.

WORK WITHIN THE HIGHWAY LAYOUT SHALL CONFORM TO THE CONDITIONS OF THE PERMIT ISSUED BY THE MASSACHUSETTS HIGHWAY DEPARTMENT AND OR LOCAL AUTHORITY AS APPROPRIATE.

ALL STRUCTURES AND APPURTENANCES SHALL BE CONSTRUCTED FOR H-20 LOADING.

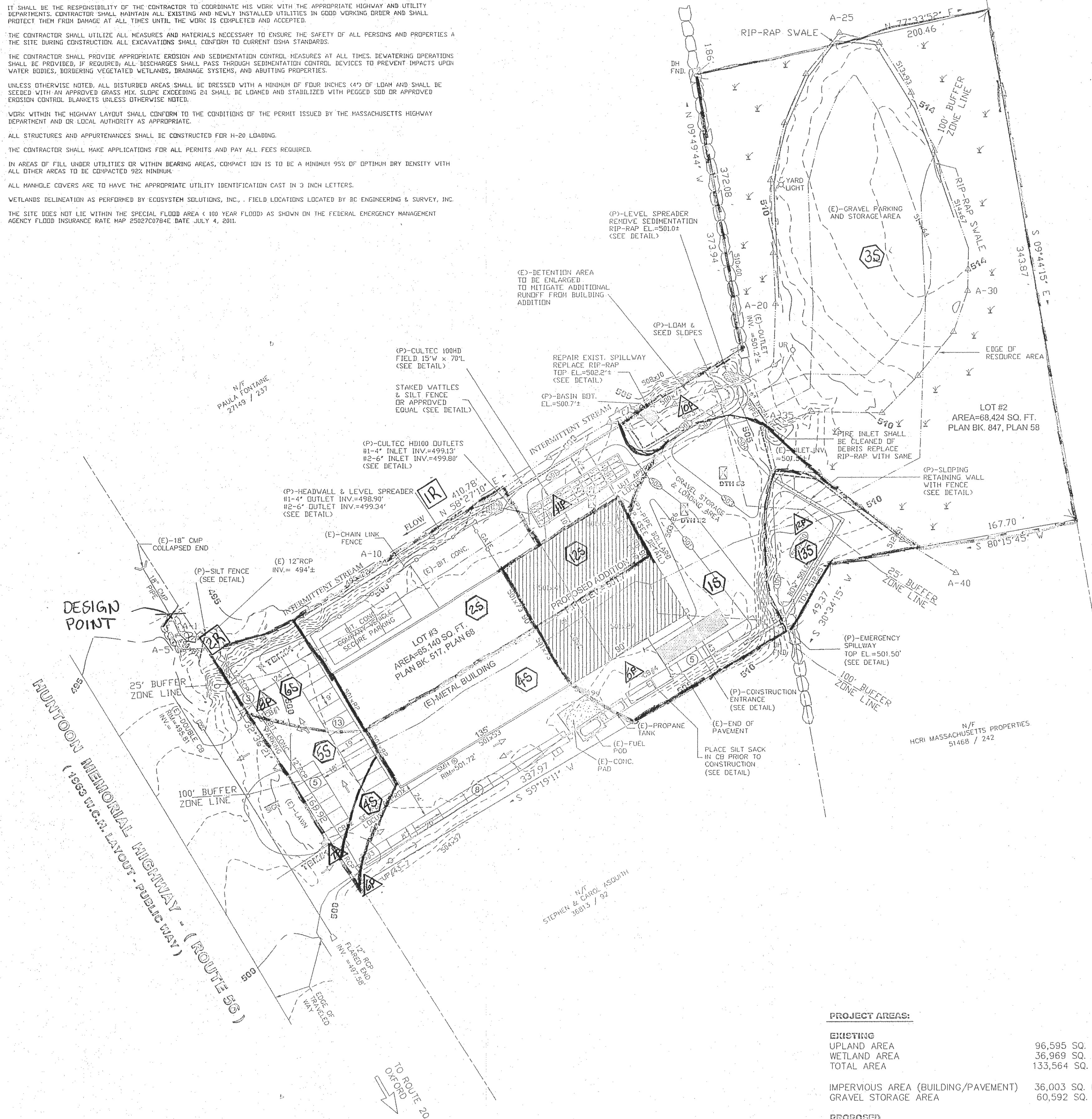
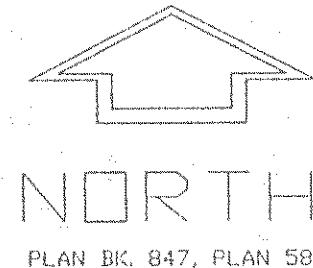
THE CONTRACTOR SHALL MAKE APPLICATIONS FOR ALL PERMITS AND PAY ALL FEES REQUIRED.

IN AREAS OF FILL UNDER UTILITIES OR WITHIN BEARING AREAS, COMPACT ION IS TO BE A MINIMUM 95% OF OPTIMUM DRY DENSITY WITH ALL OTHER AREAS TO BE COMPACTED 92% MINIMUM.

ALL MANHOLE COVERS ARE TO HAVE THE APPROPRIATE UTILITY IDENTIFICATION CAST IN 3 INCH LETTERS.

WETLANDS REDELINEATION AS PERFORMED BY ECOSYSTEM SOLUTIONS, INC., FIELD LOCATIONS LOCATED BY BC ENGINEERING & SURVEY, INC.

THE SITE DOES NOT LIE WITHIN THE SPECIAL FLOOD AREA (100 YEAR FLOOD) AS SHOWN ON THE FEDERAL EMERGENCY MANAGEMENT AGENCY FLOOD INSURANCE RATE MAP 25027C0784E, DATE JULY 4, 2011.



PROJECT AREAS:

EXISTING
UPLAND AREA 96,595 SQ. FT.±
WETLAND AREA 36,989 SQ. FT.±
TOTAL AREA 133,584 SQ. FT.±

IMPERVIOUS AREA (BUILDING/PAVEMENT) 36,003 SQ. FT.±
GRAVEL STORAGE AREA 60,592 SQ. FT.±

PROPOSED
IMPERVIOUS AREA (BUILDING/PAVEMENT) 44,103 SQ. FT.±
GRAVEL AREA 52,492 SQ. FT.±
REMOVAL OF IMPERVIOUS PAVEMENT -2,700 SQ. FT.±

TEMPORARY BENCH MARKS

TBM #1
PK NAIL SET 200
ELEV.= 500.00'

TBM #2
PK NAIL SET 201
ELEV.= 500.39'

LEGEND

--- 000 ---

---(000)---

000x00

000x00

CB □

SMH ⊙

UP# ○

TBM

DH FND.

WETLAND

STONE WALL

FINISHED FLOOR

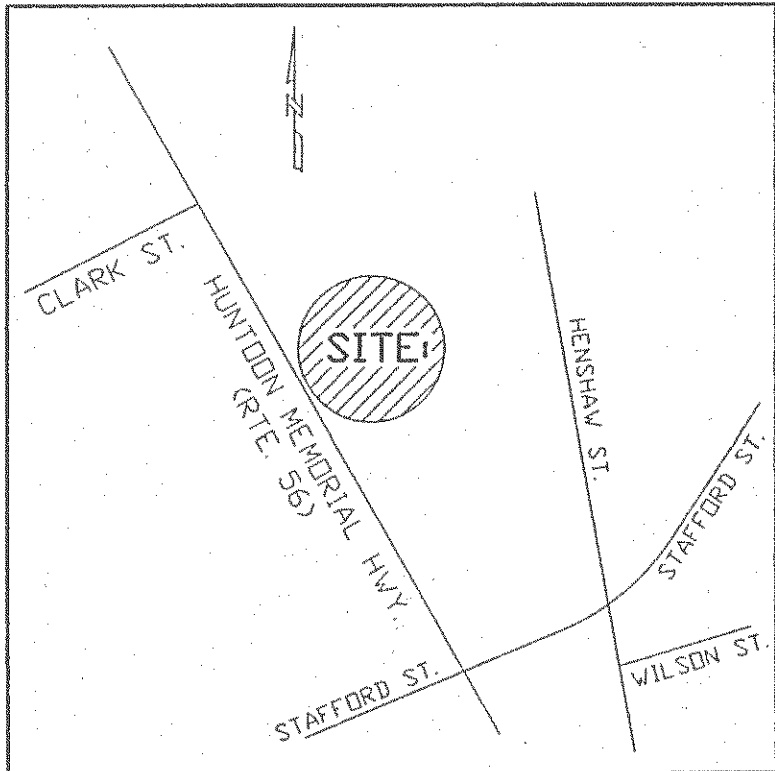
EXISTING

(P)

EXISTING GRADE
PROPOSED GRADE
EXISTING SPOT ELEVATION
PROPOSED SPOT ELEVATION
WETLAND LINE
CATCH BASIN
SEWER MANHOLE
UTILITY POLE
TEMPORARY BENCH MARK
DRILL HOLE FOUND
WETLAND
STONE WALL
FINISHED FLOOR
EXISTING
PROPOSED

LOCUS MAP

NO SCALE



ZONING

ZONING DISTRICT: HB-2 BUSINESS DISTRICT
MIN. LOT AREA : 45,000 SQ. FT.
MIN. LOT FRONTAGE : 200 FT.
MIN. FRONT YARD SETBACK : 50 FT.
MIN. SIDE YARD SETBACK : 50 FT.
MIN. REAR YARD SETBACK : 50 FT.

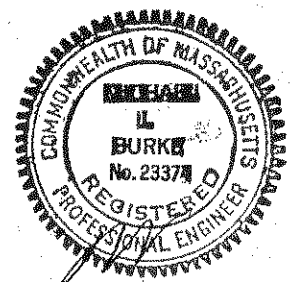
REFERENCE - DEEDS - PLANS

RECORDED AT WORCESTER DISTRICT REGISTRY OF DEEDS
SUBJECT PARCEL : DEED BOOK 56827, PAGE 364
PLAN BOOK 847, PLAN 58
PLAN BOOK 517, PLAN 68

ASSESSORS

WEBSTER ASSESSORS INFORMATION
SUBJECT PARCEL: MAP 44, PARCELS B6.3 & B2.2

CIVIL ENGINEER



MICHAEL J. BURKE R. P. E.
LICENSE # 23374
DATE: 6/12/18

EXISTING CONDITIONS PLAN
101 HUNTOON MEMORIAL HIGHWAY
LEICESTER, MASSACHUSETTS 01524

OWNED BY:

101 HUNTOON, LLC
101 HUNTOON MEMORIAL HIGHWAY
LEICESTER, MA 01524

NO.	DATE	REVISION
1		POST-DEVELOPMENT
2		DRAINAGE AREAS
3		
4		
5		



SCALE: 1" = 40' DATE: MAY 1, 2018
JOB#: BC1040-17 LEICESTER

BC ENGINEERING & SURVEY INC.
CIVIL ENGINEERING - LAND SURVEYING

P.O. Box 466 Oxford Ma, 01540 Tel. (508) 949 - 2700

101 HUNTOON MEMORIAL HIGHWAY

LEICESTER, MA

DRAWING INDEX

TITLE	SHEET NO.
SYSTEM LAYOUT SHEET	1 OF 4
SYSTEM CALCULATION SHEET	2 OF 4
SYSTEM OVERLAY SHEET	3 OF 4
DETAIL SHEET	4 OF 4

COMBINED PROJECT MATERIALS LIST		
CONTACTOR 100RHD STARTER	4	PIECES
CONTACTOR 100EHD END	31	PIECES
HVLV SFCX2 FEED CONNECTORS	6	PIECES
CULTEC NO. 410 NON- WOVEN GEOTEXTILE*	353	SQ. YARDS
CULTEC NO. 66 WOVEN GEOTEXTILE 6' x 100'	80	LINEAL FEET
1-2 INCH WASHED, CRUSHED STONE	90	TONS

*7.5 FT WIDE ROLLS = 300 SQ. YARDS
*12.5 FT WIDE ROLLS = 500 SQ. YARDS

PROJECT INFORMATION	
PROJECT NO:	18-0786.00
CULTEC SALES REP:	KEVIN GOODRICH 475-289-7075 KGOODRICH@CULTEC.COM
CULTEC CAD TECH:	GORDON JOHNSON 475-289-7116 GJOHNSON@CULTEC.COM
COMMENTS:	



CULTEC, Inc.
Subsurface Stormwater Management Systems
P.O. Box 280
878 Federal Road
Brookfield, CT 06804
www.cultec.com
PH: (203) 775-4416
PH: (800) 4-CULTEC
FX: (203) 775-1462
tech@cultec.com

NOTE: THESE SHOP DRAWINGS MAY CONTAIN COMPONENTS INCLUDING BUT NOT LIMITED TO MANHOLES, CATCH BASINS, STORM PIPES AND FITTINGS, MANIFOLDS, CASTINGS AND OTHER NECESSARY APPURTENANCES THAT MAY NOT BE SUPPLIED BY CULTEC, INC. IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND/OR SUPPLIER TO CONFIRM WITH CULTEC THE MATERIALS PROVIDED.

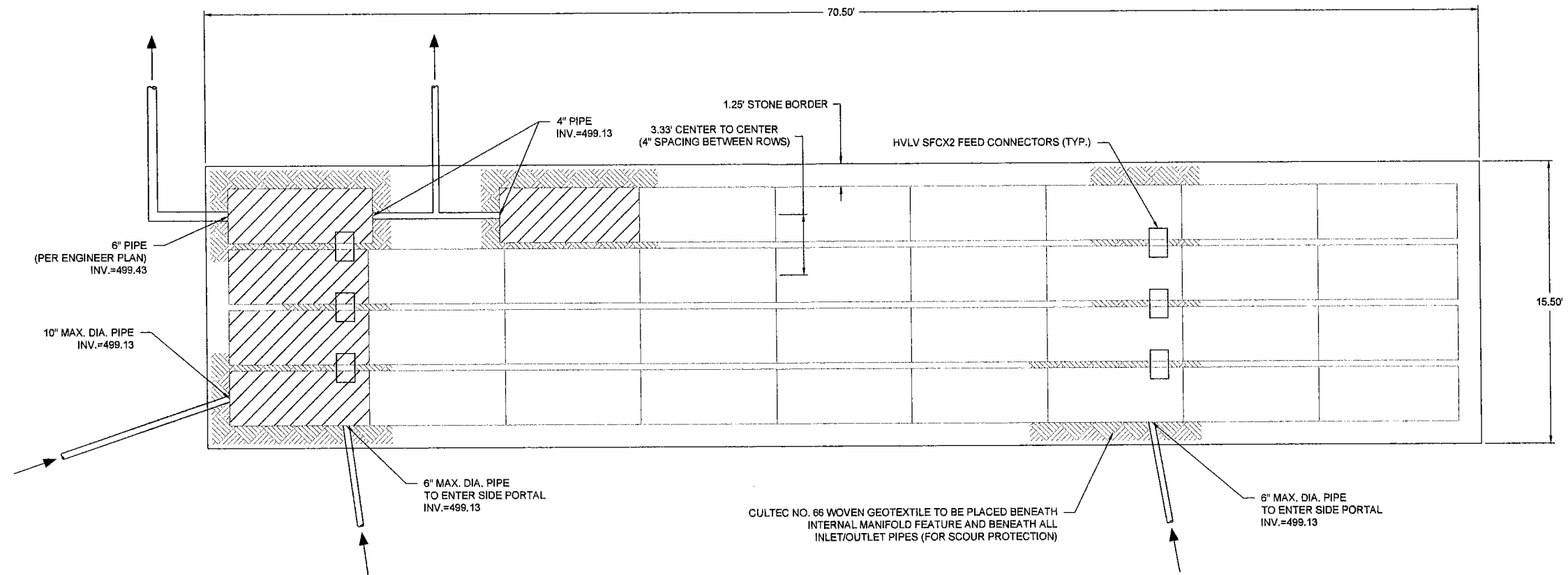
BEFORE YOU BEGIN - REQUIRED MATERIALS AND EQUIPMENT

1. PROPER GEOTECHNICAL SOIL EVALUATION BY A QUALIFIED ENGINEER OR SOIL SCIENTIST TO DETERMINE SUITABILITY OF STRUCTURAL INSTALLATION
2. OSHA COMPLIANCE
3. CULTEC WARNING TAPE, OR EQUIVALENT
4. ASSURANCES FROM LOCAL UTILITIES THAT NO UNDERGROUND GAS, ELECTRICAL OR OTHER POTENTIALLY DANGEROUS PIPELINES OR CONDUITS ARE ALREADY BURIED AT THE SITE
5. ACCEPTABLE 1- 2 INCH (25 - 51 mm) WASHED, CRUSHED STONE AS DETAILED IN CULTEC'S INSTALLATION INSTRUCTIONS. CLEANLINESS OF STONE TO BE VERIFIED BY ENGINEER.
6. ACCEPTABLE FILL MATERIAL AS SHOWN IN CULTEC'S INSTALLATION INSTRUCTIONS.
7. ALL CULTEC CHAMBERS AND ACCESSORIES AS SPECIFIED IN THE ENGINEER'S PLANS INCLUDING CULTEC NO. 410 NON-WOVEN GEOTEXTILE, CULTEC STORMFILTER AND CULTEC NO. 66 WOVEN GEOTEXTILE, WHERE APPLICABLE.
8. RECIPROCATING SAW OR ROUTER
9. STONE BUCKET
10. STONE CONVEYOR AND/OR TRACKED EXCAVATOR
11. TRANSIT OR LASER LEVEL MEASURING DEVICE
12. COMPACTION EQUIPMENT WITH MAXIMUM GROSS VEHICLE WEIGHT OF 12,000 LBS (5,440 KGS). VIBRATORY ROLLERS MAY ONLY BE USED ON THE STONE BASE PRIOR TO THE INSTALLATION OF CHAMBERS.
13. CHECK CULTEC CHAMBERS FOR DAMAGE PRIOR TO INSTALLATION. DO NOT USE DAMAGED CULTEC CHAMBERS, CONTACT YOUR SUPPLIER IMMEDIATELY TO REPORT DAMAGE OR PACKING-LIST DISCREPANCIES.

REQUIREMENTS FOR CULTEC CHAMBER SYSTEM INSTALLATIONS

1. INSTALLING CONTRACTORS ARE EXPECTED TO COMPREHEND AND USE THE MOST CURRENT INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING A SYSTEM INSTALLATION. IF THERE IS ANY QUESTION AS TO WHETHER YOU POSSESS THE MOST CURRENT INSTRUCTIONS, CONTACT CULTEC AT (203) 775-4416 OR VISIT WWW.CULTEC.COM.
2. CONTACT CULTEC AT LEAST THIRTY DAYS PRIOR TO SYSTEM INSTALLATION TO ARRANGE FOR A PRE-CONSTRUCTION MEETING.
3. ALL CULTEC SYSTEM DESIGNS MUST BE CERTIFIED BY A REGISTERED PROFESSIONAL ENGINEER.
4. USE CULTEC INSTALLATION INSTRUCTIONS AS A GUIDELINE ONLY FOR MINIMUM/MAXIMUM REQUIREMENTS. ACTUAL DESIGN MAY VARY. REFER TO APPROVED CONSTRUCTION DRAWINGS FOR JOB-SPECIFIC DETAILS. BE SURE TO FOLLOW THE ENGINEER'S DRAWINGS AS YOUR PRIMARY GUIDE.
5. THE FOUNDATION STONE SHALL BE LEVEL AND COMPACTED PRIOR TO CHAMBER INSTALLATION.
6. OVERLAPPING RIB CONNECTIONS OF CHAMBERS SHALL BE FULLY SHOULDERED PRIOR TO STONE PLACEMENT.
7. CENTER-TO-CENTER SPACING SHALL BE CHECKED AND MAINTAINED THROUGHOUT INSTALLATION PROCESS.
8. ANY DISCREPANCIES WITH THE SYSTEM SUB-GRADE SOIL'S BEARING CAPACITY MUST BE REPORTED TO THE DESIGN ENGINEER.
9. NON-WOVEN GEOTEXTILE MUST BE USED AS SPECIFIED IN THE ENGINEER'S DRAWINGS.
10. CULTEC REQUIRES THE CONTRACTOR TO REFER TO CULTEC'S INSTALLATION INSTRUCTIONS CONCERNING VEHICULAR TRAFFIC. RESPONSIBILITY FOR PREVENTING VEHICLES THAT EXCEED CULTEC'S REQUIREMENTS FROM TRAVELING ACROSS OR PARKING OVER THE CHAMBER SYSTEM LIES SOLELY WITH THE CONTRACTOR THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS. THE PLACEMENT OF WARNING TAPE, TEMPORARY FENCING, AND/OR APPROPRIATELY LOCATED SIGNS IS HIGHLY RECOMMENDED. IMPRINTED WARNING TAPE IS AVAILABLE FROM CULTEC. FOR ACCEPTABLE VEHICLE LOAD INFORMATION, REFER TO CULTEC INSTALLATION INSTRUCTIONS.
11. TRAFFIC OF INSTALLATION EQUIPMENT OR OTHER VEHICULAR TRAFFIC OVER TOP OF THE CULTEC STORMWATER SYSTEM IS STRICTLY RESTRICTED AND PROHIBITED UNTIL SATISFACTORY COVER AND COMPACTION IS ACHIEVED ACCORDING TO CULTEC'S MANUFACTURER INSTALLATION INSTRUCTIONS.
12. EROSION AND SEDIMENT-CONTROL MEASURES MUST MEET LOCAL CODES AND THE DESIGN ENGINEER'S SPECIFICATIONS THROUGHOUT THE ENTIRE SITE CONSTRUCTION PROCESS.
13. CULTEC SYSTEMS MUST BE DESIGNED AND INSTALLED IN ACCORDANCE WITH CULTEC'S MINIMUM REQUIREMENTS. FAILURE TO DO SO WILL VOID THE LIMITED WARRANTY.
14. CONTACT CULTEC, INC. AT 203-775-4416 WITH ANY QUESTIONS OR FURTHER CLARIFICATION OF REQUIREMENTS.
15. PLACEMENT OF EMBEDMENT STONE MUST BE IN ACCORDANCE WITH CULTEC'S INSTALLATION INSTRUCTIONS. STONE COLUMN HEIGHT DEFERENTIAL MUST NEVER EXCEED 12" (305 mm) BETWEEN CHAMBER ROWS, ADJACENT CHAMBERS OR STONE PERIMETER. STONE MUST BE PLACED OVER THE CROWN OF THE CHAMBERS TO ANCHOR THE CHAMBERS IN PLACE AND MAINTAIN ROW SPACING.
16. EMBEDMENT STONE MUST ONLY BE PLACED BY EXCAVATOR OR TELESOPING CONVEYOR BOOM. PLACEMENT OF EMBEDMENT STONE WITH BULLDOZER IS NOT AN ACCEPTABLE METHOD OF INSTALLATION AND MAY CAUSE DAMAGE TO THE CHAMBERS. ANY CHAMBERS DAMAGED USING AN UNACCEPTABLE METHOD OF BACKFILL ARE NOT COVERED UNDER THE CULTEC LIMITED WARRANTY.

THIS DRAWING WAS PREPARED TO SUPPORT THE PROJECT ENGINEER OF RECORD FOR THE PROPOSED SYSTEM. IT IS THE ULTIMATE RESPONSIBILITY OF THE PROJECT ENGINEER OF RECORD TO ENSURE THAT THE CULTEC SYSTEM'S DESIGN IS IN FULL COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS. IT IS THE PROJECT ENGINEER OF RECORD'S RESPONSIBILITY TO ENSURE THAT THE CULTEC PRODUCTS ARE DESIGNED IN ACCORDANCE WITH CULTEC'S MINIMUM REQUIREMENTS. CULTEC DOES NOT APPROVE PLANS, SIZING, OR SYSTEM DESIGNS.



1 SYSTEM LAYOUT DETAIL
NTS

NOTE: ALL EXTERNAL SYSTEM STRUCTURES, INLET/OUTLET PIPES, AND PROPOSED ELEVATIONS MUST BE DESIGNED AND APPROVED BY PROJECT ENGINEER OF RECORD. PROJECT ENGINEER OF RECORD MUST ENSURE CHAMBER BURIAL REQUIREMENTS ARE MET.

CULTEC CONTACTOR® 100HD LEGEND

MATERIALS LIST		
(SYSTEM MATERIALS LIST - SEE COVER SHEET FOR COMBINED PROJECT MATERIALS LIST)		
CONTACTOR 100RHD STARTER	5	PIECES
CONTACTOR 100EHD END	30	PIECES
HVLV SFCx2 FEED CONNECTORS	6	PIECES
CULTEC NO. 410 NON-WOVEN GEOTEXTILE	353	SQ. YARDS
CULTEC NO. 66 WOVEN GEOTEXTILE 6' x 100'	80	LINEAL FEET
1-2 INCH WASHED, CRUSHED STONE	90	TONS

	CONTACTOR 100RHD STARTER
	CONTACTOR 100EHD END
	HVLV SFCx2 FEED CONNECTORS
	CULTEC NO. 66 WOVEN GEOTEXTILE
	CULTEC SEPARATOR ROW
	STONE BORDER

CULTEC STORMWATER MANAGEMENT SYSTEM
TOTAL STORAGE REQUIRED: 1,164.00 c.f.
TOTAL STORAGE PROVIDED: 1,192.00 c.f.
 (SYSTEM AREA: 1,092.75 s.f.)
 *SYSTEM INSTALLED REQUIRING STONE AMOUNTS OF
 6 INCHES BELOW AND ABOVE CHAMBERS AND
 15 INCH BORDER SURROUNDING



CULTEC, Inc.
Subsurface Stormwater Management Systems
 P.O. Box 280
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 FX: (203) 775-1462
 tech@cultec.com

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101 HUNTOON MEMORIAL HIGHWAY
 LEICESTER, MA
 SYSTEM LAYOUT SHEET

CULTEC STORMWATER CHAMBER			
PROJECT NO:	18-0786.00	DATE:	6/14/18
DRAWN BY:	GMJ	CHECKED BY:	GMJ
SCALE:	N.T.S.	SHEET NO:	1 OF 4



CULTEC Contactor 100HD Stormwater System Calculations

CONSULTING ENGINEER:	
ISC Engineering and Survey Inc.	
P.O. Box 466	
Oxford MA	
508-948-2700	

PROJECT INFORMATION:	
18-0786.00	
101 Huntoon Memorial Highway	
Leicester, MA	

CALCULATED BY:	
Gordon Johnson	
Cultec, Inc.	
878 Federal Rd.	
Brookfield, CT 06804	
203.775.4416	
203.775.1462	

DATE:
6/14/18

System Information

Proposed bed layout of	5	No. of Rows	35	Total No. of Chambers
Area	1092.75	Sq. Ft.	Perimeter	172
				Ft.

Given:				
Storage required	1164	CF	32.94	m ³
Stone base	6	Inches	152.4	mm
Stone above	6	Inches	152.4	mm
Chamber Spacing	4	Inches	101.6	mm
No. of HVLV SFCx2 Feed Connectors	6	units		
Stone Porosity	40	%		
Stone Border Width	1.25	feet	0.38	m

Other Parameters:

Assumptions

Model Name	Chamber Height	Design Unit	Chamber Width	Chamber Spacing	Design Unit	Chamber Volume	Design Unit	Installed Chamber Length
	inches	ft	inches	inches	ft	cu. ft	cu. ft	ft
	mm	m	mm	mm	m	cu. m	cu. m	m
Contactor* 100 RHD Starter	English 12.5	2.04	36	4	3.33	1.88	3.85	7.50
	Metric 318	0.62	914	102	1.02	0.17	0.36	2.29
Contactor* 100 EHD End	English 12.5	2.04	36	4	3.33	1.88	3.85	7.50
	Metric 318	0.62	914	102	1.02	0.17	0.36	2.29
HVLV™ SFCx2 Feed Connectors	English 7.6	n/a	12	n/a	n/a	0.29	n/a	0.33
	Metric 193.0	n/a	305	n/a	n/a	0.03	n/a	0.10

Storage Provided Within CULTEC Contactor 100HD Stormwater Chambers and HVLV SFCx2 Feed Connectors - not including stone			
Number of Contactor 100RHD Starters by design	=	5 pcs	
5 pcs x 7.500	=	37.50 feet	11.43 m
Number of Contactor 100EHD Middle/Ends by design	=	30 pcs	
30 pcs x 7.500	=	225.00 feet	68.58 m
Length adjustment per row	=		
5 x 0.500	=	2.50 feet	0.762 m
Number of HVLV SFC-24 Feed Connectors	=	6 pcs	
6 pcs x 0.333	=	2.00 feet	0.6096 m
Total footage of Contactor 100HD chambers	=	265.00 feet	80.77 m
Total footage of HVLV SFCx2 Feed Connectors	=	2.00 feet	0.61 m
Storage provided within Contactor 100HD chambers	=	498.47 CF	14.12 m ³
Storage within HVLV SFCx2 Feed Connectors	=	0.59 CF	0.02 m ³
Total Storage within chambers and feed connectors	=	499.05 CF	14.13 m ³

Storage Provided Within Entire CULTEC Stormwater System - including stone			
Effective Bed depth (not including additional cover)		2.04 feet	0.62 m
Total Area		1092.75 sq. ft.	101.52 m ²
Volume of Effective Excavation (not including additional cover)		2231.03 CF	63.18 m ³
Perimeter of Bed		172.00 feet	52.43 m
Total Storage within CULTEC Contactor 100HD chambers and feed connectors		499 CF	14.13 m ³
Total Stone Required		1732 CF	49.05 m ³
		64 CY	
		90 tons	
Storage provided within stone		692.79 CF	19.62 m ³
Storage provided within Sand Filter (Calculated at 20% Void)		0.00 CF	0.00 m ³
Total Storage within CULTEC Stormwater System	=	1192 CF	33.75 m ³

Req. storage attained.

CULTEC MATERIALS LIST			
Model	Quantity	Unit of Measure	Quantity
			Unit of Measure
Contactor 100RHD Starter Heavy Duty	5	pcs	
Contactor 100EHD Middle/End Heavy Duty	30	pcs	
HVLV SFCx2 Feed Connectors	6	pcs	
CULTEC No. 410 Non-Woven Geotextile	352.31	Sq. Yards	295 m ²
CULTEC No. 66 Woven Geotextile 6' x 100' (1.83 m W x 30.48 m L)	80	feet	24 m
Total Stone	90	tons	49 cubic meters

SYSTEM STORAGE CALCULATION



Project Information:

Date: 6/14/2018

18-0786.00
101 Huntoon Memorial Highway
Leicester, MA
0

Number of Rows -
Total number of chambers -
HVLV SFCx2 Feed Connectors -
Stone Void -
Stone Base -
Stone Above Units -
Area -
Base of Stone Elevation-

5	units	
35	units	
6	units	
40	%	
6	Inches	152 mm
6	Inches	152 mm
1092.75	ft ²	101.52 m ²
498.63		

CULTEC Contactor 100HD Incremental Storage Volumes

Height of System		Chamber Volume		HVLV SFCx2 Feed Connector Volume		Stone Volume		Cumulative Storage Volume		Total Cumulative Storage Volume		Elevation	
in	mm	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft ³	m ³	ft	m
24.5	622	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	1192.10	33.76	500.67	499.25
23.5	597	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	1155.67	32.72	500.59	499.23
22.5	572	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	1119.25	31.69	500.51	499.20
21.5	546	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	1082.82	30.66	500.42	499.18
20.5	521	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	1046.40	29.63	500.34	499.15
19.5	495	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	1009.97	28.60	500.26	499.13
18.5	470	0.03	0.00	0.00	0.00	18.20	0.52	18.23	0.52	973.55	27.57	500.17	499.10
18	457	6.36	0.18	0.00	0.00	33.88	0.96	40.24	1.14	955.32	27.05	500.13	499.09
17	432	17.76	0.50	0.00	0.00	29.32	0.83	47.08	1.33	915.08	25.91	500.05	499.06
16	406	29.15	0.83	0.00	0.00	24.77	0.70	53.92	1.53	868.00	24.58	499.96	499.04
15	381	36.84	1.04	0.00	0.00	21.69	0.61	58.53	1.66	814.08	23.05	499.88	499.01
14	356	42.14	1.19	0.00	0.00	19.57	0.55	61.71	1.75	755.56	21.39	499.80	498.99
13	330	46.11	1.31	0.02	0.00	17.98	0.51	64.11	1.82	693.85	19.65	499.71	498.96
12	305	48.76	1.38	0.06	0.00	16.92	0.48	65.74	1.86	629.74	17.83	499.63	498.93
11	279	50.88	1.44	0.08	0.00	16.07	0.46	67.04	1.90	564.00	15.97	499.55	498.91
10	254	53.80	1.52	0.09	0.00	14.91	0.42	68.79	1.95	496.96	14.07	499.46	498.88
9	229	53.80	1.52	0.10	0.00	14.91	0.42	68.80	1.95	428.17	12.12	499.38	498.86
8	203	53.80	1.52	0.10	0.00	14.91	0.42	68.80	1.95	359.37	10.18	499.30	498.83
7	178	59.10	1.67	0.14	0.00	12.79	0.36	72.02	2.04	290.57	8.23	499.21	498.81
6	152	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	218.55	6.19	499.13	498.78
5	127	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	182.13	5.16	499.05	498.76
4	102	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	145.70	4.13	498.96	498.73
3	76	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	109.28	3.09	498.88	498.71
2	51	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	72.85	2.06	498.80	498.68
1	25	0.00	0.00	0.00	0.00	36.43	1.03	36.43	1.03	36.43	1.03	498.71	498.66
0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	498.63	498.63

Top of Stone Elevation

Top of Chamber Elevation

Bottom of Chamber Elevation

Bottom of Stone Elevation

SYSTEM STAGE-STORAGE TABLE



CULTEC, Inc.

Subsurface Stormwater Management Systems

P.O. Box 280
878 Federal Road
Brookfield, CT 06804
www.cultec.com

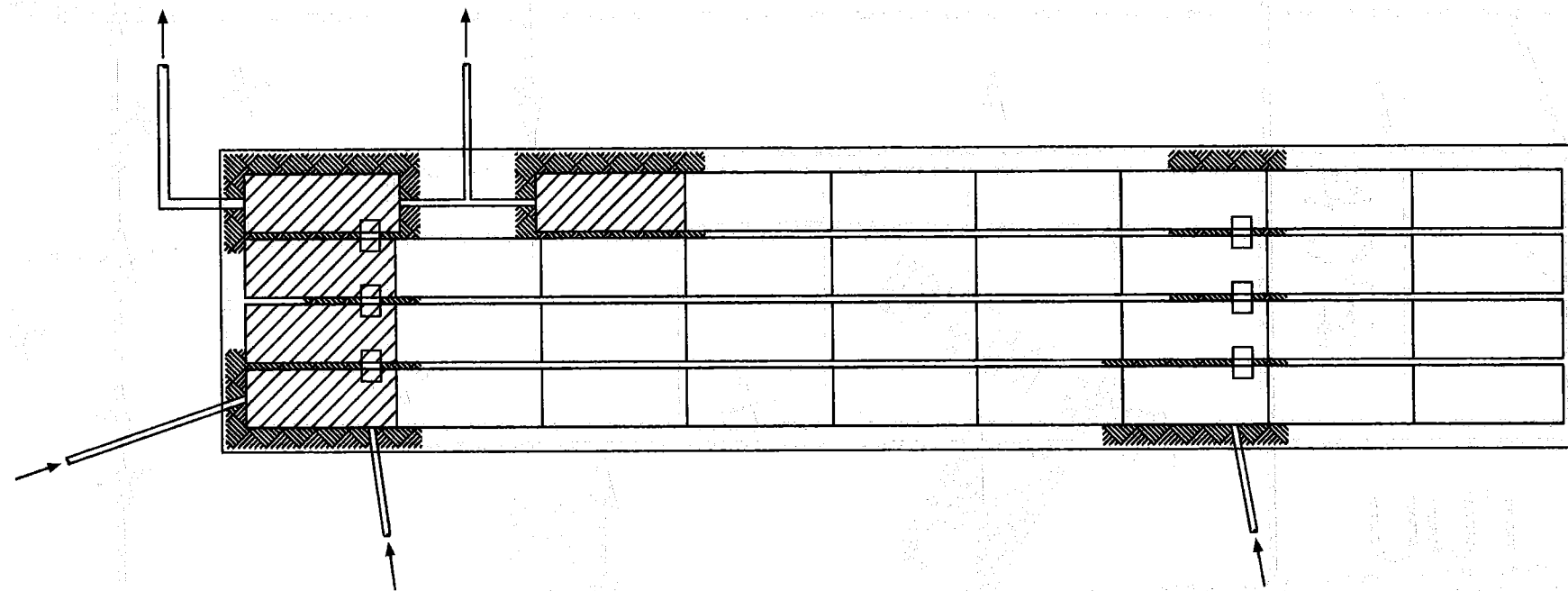
PH: (203) 775-4416
PH: (800) 4-CULTEC
FX: (203) 775-1462
tech@cultec.com

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101 HUNTOON MEMORIAL HIGHWAY
LEICESTER, MA
SYSTEM CALCULATION SHEET

CULTEC STORMWATER CHAMBER

PROJECT NO:	18-0786.00	DATE:	6/14/18
DRAWN BY:	GMJ	CHECKED BY:	GMJ
SCALE:	N.T.S.	SHEET NO:	2 OF 4



CULTEC, Inc.

Subsurface Stormwater Management Systems

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101 HUNTOON MEMORIAL HIGHWAY
LEICESTER, MA
SYSTEM OVERLAY SHEET

CULTEC STORMWATER CHAMBER

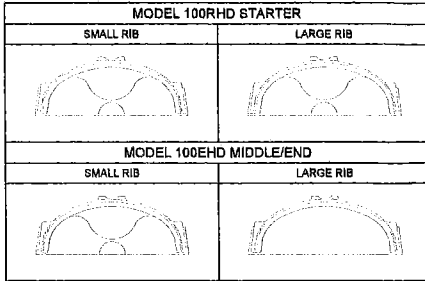
PROJECT NO:	18-0786.00	DATE:	6/14/18
DRAWN BY:	GMJ	CHECKED BY:	GMJ
SCALE:	N.T.S.	SHEET NO:	3 OF 4

CULTEC CONTACTOR 100HD CHAMBER PRODUCT SPECIFICATIONS

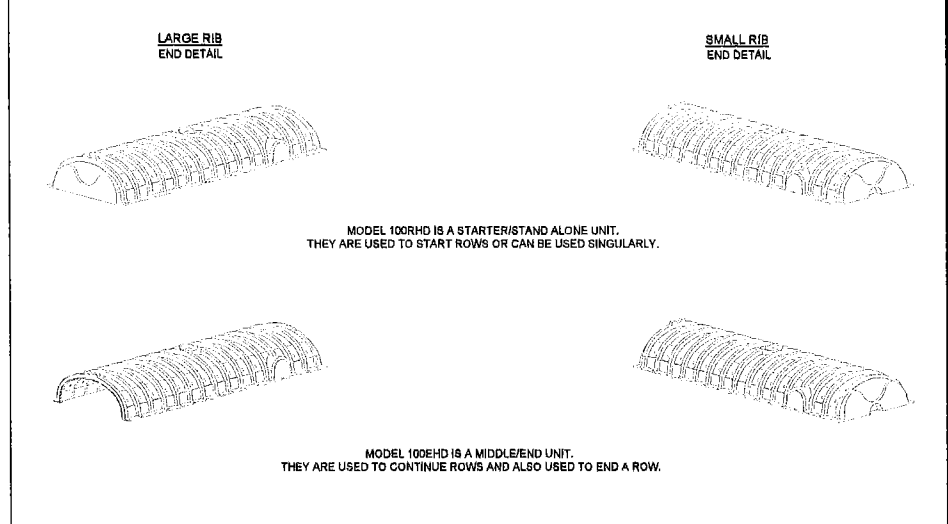
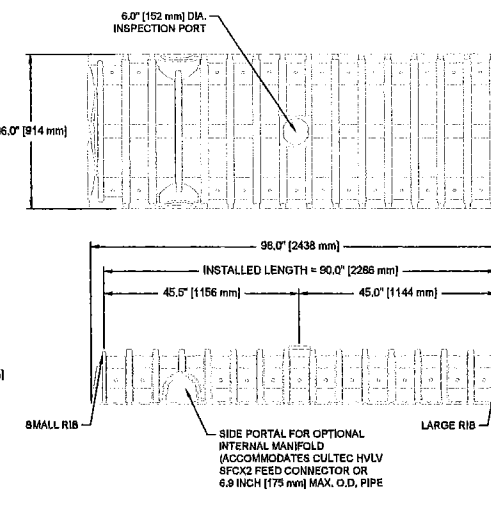
- GENERAL:**
CULTEC CONTACTOR 100HD CHAMBERS ARE DESIGNED FOR UNDERGROUND STORMWATER MANAGEMENT. THE CHAMBERS MAY BE USED FOR RETENTION, RECHARGING, DETENTION OR CONTROLLING THE FLOW OF STORMWATER RUNOFF.
- CHAMBER PARAMETERS:**
1. THE CHAMBERS WILL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-776-4418 OR 1-800-428-5832)
 2. THE CHAMBER WILL BE VACUUM THERMOFORMED OF BLACK HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HDPE).
 3. THE CHAMBER WILL BE RIGID IN SHAPE.
 4. THE CHAMBER WILL BE OPEN-TOPPED.
 5. THE CHAMBER WILL BE JOINED USING AN INTERLOCKING OVERLAPPING JOINT METHOD. CONNECTIONS MUST BE FULLY BRIDGED BY OVERLAPPING RIBS, HAVING NO SEPARATE COUPLERS OR SEPARATE END WALLS.
 6. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC CONTACTOR 100HD SHALL BE 12.5 INCHES (318 mm) TALL, 36 INCHES (914 mm) WIDE AND 8 FEET (2.4 m) LONG. THE INSTALLED LENGTH OF A JOINED CONTACTOR 100HD SHALL BE 7.8 FEET (2.39 m).
 7. MAXIMUM INLET OPENING ON THE CHAMBER ENDWALL IS 18 INCHES (457 mm).
 8. THE CHAMBER WILL HAVE TWO SIDE PORTALS TO ACCEPT CULTEC HVLV SFCx2 FEED CONNECTORS TO CREATE AN INTERNAL MANIFOLD. THE NOMINAL INSIDE DIMENSIONS OF EACH SIDE PORTAL WILL BE 6.9 INCHES (175 mm) HIGH BY 7.6 INCHES (194 mm) WIDE. MAXIMUM ALLOWABLE OUTER DIAMETER (O.D.) PIPE SIDE IN THE SIDE PORTAL IS 8.9 INCHES (226 mm).
 9. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV SFCx2 FEED CONNECTOR SHALL BE 7.6 INCHES (194 mm) TALL, 12 INCHES (305 mm) WIDE AND 18.7 INCHES (476 mm) LONG.
 10. THE NORMAL STORAGE VOLUME OF THE CONTACTOR 100HD CHAMBER WILL BE 1.888 CF/FT (0.173 m³/m) - WITHOUT STONE. THE NORMAL STORAGE VOLUME OF A JOINED CONTACTOR 100HD SHALL BE 13.928 CF/FT UNIT (0.398 m³/UNIT) - WITHOUT STONE.
 11. THE NORMAL STORAGE VOLUME OF THE HVLV SFCx2 FEED CONNECTOR WILL BE 0.234 CF/FT (0.027 m³/m) - WITHOUT STONE.
 12. THE CONTACTOR 100HD CHAMBER WILL HAVE FORTY-FOUR DISCHARGE HOLES BORED INTO THE SIDEWALLS OF THE UNITS CORRE TO PROMOTE LATERAL CONVEYANCE OF WATER.
 13. THE CONTACTOR 100HD CHAMBER SHALL HAVE 16 CORRUGATIONS.
 14. THE ENDWALL OF THE CHAMBER, WHEN PRESENT, WILL BE AN INTEGRAL PART OF THE CONTINUOUSLY FORMED UNIT. SEPARATE END PLATES CANNOT BE USED WITH THIS UNIT.
 15. THE CONTACTOR 100HD STARTER UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO FULLY FORMED INTERNAL ENDWALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS.
 16. THE CONTACTOR 100HD MODULIZED UNIT MUST BE FORMED AS A WHOLE CHAMBER HAVING ONE FULLY FORMED INTEGRAL ENDWALL AND ONE FULLY OPEN END WALL AND HAVING NO SEPARATE END PLATES OR END WALLS.
 17. THE HVLV SFCx2 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT WILL FIT INTO THE SIDE PORTALS OF THE CONTACTOR 100HD AND ACT AS CROSS FEED CONNECTIONS.
 18. CHAMBERS MUST HAVE HORIZONTAL STIFFENING FLEX REDUCTION STEPS BETWEEN THE RIBS.
 19. THE CHAMBER MUST BE DESIGNED TO WITHSTAND TRAFFIC LOADS WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
 20. HEAVY DUTY UNITS ARE DESIGNATED BY A COLORED STRIPE FORMED INTO THE PART ALONG THE LENGTH OF THE CHAMBER.
 21. THE CHAMBER WILL HAVE A RAISED INTEGRAL CAP AT THE TOP OF THE ARCH IN THE CENTER OF EACH UNIT TO BE USED AS AN OPTIONAL INSPECTION PORT OR CLEAN-OUT.
 22. THE UNITS MAY BE TRIMMED TO CUSTOM LENGTHS BY CUTTING BACK TO ANY CORRUGATION.
 23. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2008 CERTIFIED FACILITY.
 24. MAXIMUM ALLOWED COVER ON TOP OF UNIT SHALL BE 12 FEET (3.66 m).

CULTEC HVLV SFCx2 FEED CONNECTOR

- GENERAL:**
CULTEC HVLV SFCx2 FEED CONNECTORS ARE DESIGNED TO CREATE AN INTERNAL MANIFOLD FOR CULTEC CONTACTOR 100HD STORMWATER CHAMBERS.
- CHAMBER PARAMETERS:**
1. THE CHAMBERS WILL BE MANUFACTURED BY CULTEC, INC. OF BROOKFIELD, CT. (203-776-4418 OR 1-800-428-5832)
 2. THE CHAMBER WILL BE VACUUM THERMOFORMED OF BLACK HIGH MOLECULAR WEIGHT HIGH DENSITY POLYETHYLENE (HDPE).
 3. THE CHAMBER WILL BE RIGID IN SHAPE.
 4. THE CHAMBER WILL BE OPEN-TOPPED.
 5. THE CHAMBER WILL BE JOINED USING AN INTERLOCKING OVERLAPPING JOINT METHOD. CONNECTIONS MUST BE FULLY BRIDGED BY OVERLAPPING RIBS, HAVING NO SEPARATE COUPLERS OR SEPARATE END WALLS.
 6. THE NOMINAL CHAMBER DIMENSIONS OF THE CULTEC HVLV SFCx2 FEED CONNECTOR SHALL BE 7.8 INCHES (194 mm) TALL, 12 INCHES (305 mm) WIDE AND 18.7 INCHES (476 mm) LONG.
 7. THE HVLV SFCx2 FEED CONNECTOR CHAMBER SHALL HAVE 3 CORRUGATIONS.
 8. THE HVLV SFCx2 FEED CONNECTOR MUST BE FORMED AS A WHOLE CHAMBER HAVING TWO OPEN END WALLS AND HAVING NO SEPARATE END PLATES OR SEPARATE END WALLS. THE UNIT WILL FIT INTO THE SIDE PORTALS OF THE CONTACTOR 100HD STORMWATER CHAMBERS AND ACT AS CROSS FEED CONNECTIONS CREATING AN INTERNAL MANIFOLD.
 9. THE CHAMBER WILL BE DESIGNED TO WITHSTAND TRAFFIC LOADS (HHD) INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS.
 10. THE CHAMBER SHALL BE MANUFACTURED IN AN ISO 9001:2008 CERTIFIED FACILITY.
- CULTEC NO. 86 WOVEN GEOTEXTILE SPECIFICATIONS:**
- GENERAL:**
CULTEC NO. 86 WOVEN GEOTEXTILE IS UTILIZED AS AN UNDERLAYMENT TO PREVENT SEEDING CAUSING BY WATER MOVEMENT WITHIN THE CULTEC CHAMBERS AND FEED CONNECTORS UTILIZING THE CULTEC MANIFOLD FEATURE.
- GEOTEXTILE PARAMETERS:**
1. THE GEOTEXTILE WILL BE PROVIDED BY CULTEC, INC. OF BROOKFIELD, CT. (203-776-4418 OR 1-800-428-5832)
 2. THE GEOTEXTILE WILL BE BLACK BY APPEARANCE.
 3. THE GEOTEXTILE WILL HAVE A TENSILE STRENGTH OF 318 LBS (1.4 kN) PER ASTM D4332 TESTING METHOD.
 4. THE GEOTEXTILE WILL HAVE A TENSILE ELONGATION RESISTANCE OF 15% PER ASTM D4332 TESTING METHOD.
 5. THE GEOTEXTILE WILL HAVE A MAJOR BURST RESISTANCE OF 800 PSI (4138 kPa) PER ASTM D776 TESTING METHOD.
 6. THE GEOTEXTILE WILL HAVE A TEAR RESISTANCE OF 115 LBS (0.51 kN) PER ASTM D4332 TESTING METHOD.
 7. THE GEOTEXTILE WILL HAVE A PUNCTURE RESISTANCE OF 100 LBS (0.45 kN) PER ASTM D4332 TESTING METHOD.
 8. THE GEOTEXTILE WILL HAVE A COMBINATION RESISTANCE OF 600 LBS (4000 N) PER ASTM D634 TESTING METHOD.
 9. THE GEOTEXTILE WILL HAVE A TAP RESISTANCE OF 700 LBS (3113 N) PER ASTM D4332 TESTING METHOD.
 10. THE GEOTEXTILE WILL HAVE A PERMITTIVITY RATIO OF 800 SEC-1 PER ASTM D4471 TESTING METHOD.
 11. THE GEOTEXTILE WILL HAVE A WATER FLOW RATING OF 4 CMPTS (160 LPM) PER ASTM D4471 TESTING METHOD.
 12. THE GEOTEXTILE WILL HAVE A FIBRIC ORIGIN AREA OF 41% PER ASTM D4471 TESTING METHOD.
 13. THE GEOTEXTILE WILL HAVE AN APPARENT DRIP RATE OF 40 US GPD (0.015 L/S) PER ASTM D4471 TESTING METHOD.
 14. THE GEOTEXTILE WILL CONSIST OF A 100% HIGH-TENSILE, ULT-FIL POLYPROPYLENE FIBER.

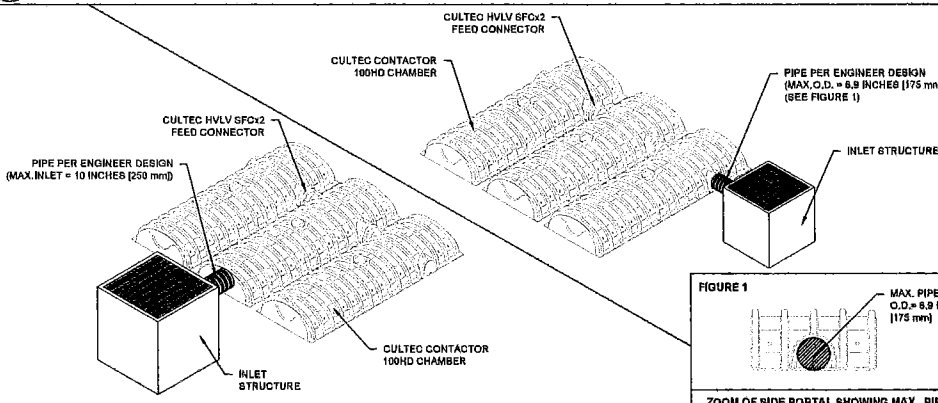


CULTEC CONTACTOR 100HD CHAMBER STORAGE = 1.888 CF/FT [0.173 m³/m]
INSTALLED LENGTH ADJUSTMENT = 0.5' [0.15 m]
ALL CONTACTOR 100HD HEAVY DUTY UNITS ARE MARKED WITH A COLORED STRIPE FORMED INTO THE PART ALONG THE LENGTH OF THE CHAMBER.



100HD 1.0

GENERAL NOTES

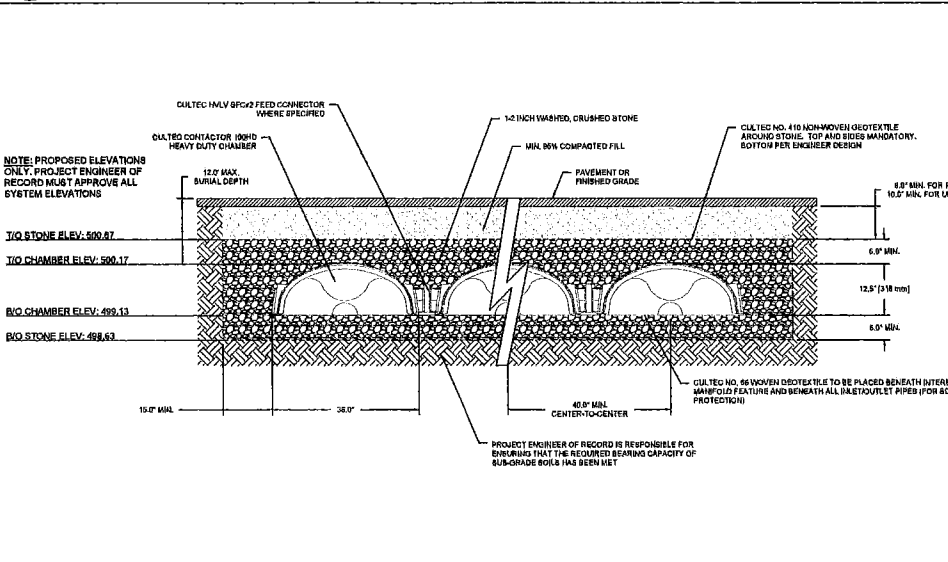


100HD 4.0

CULTEC TYPICAL INLET CONNECTION

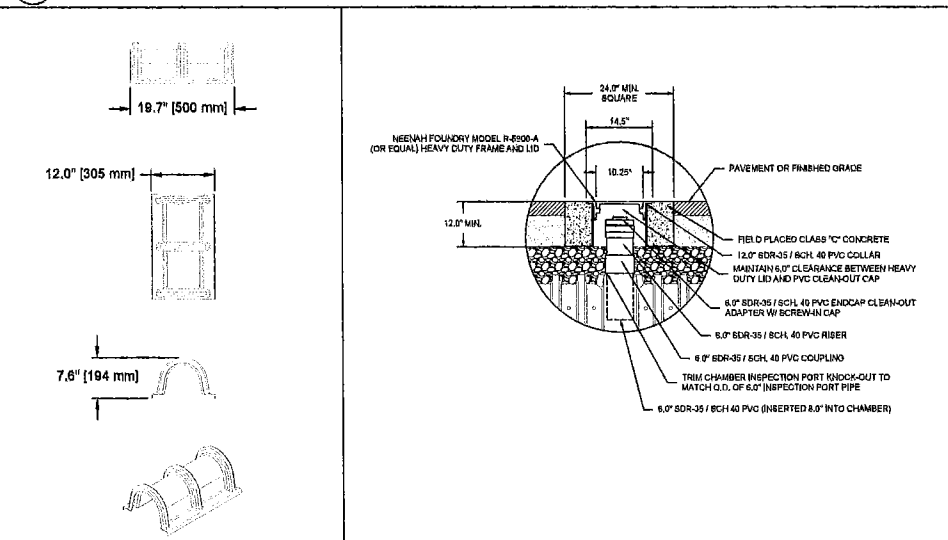
100HD 2.0

CULTEC CONTACTOR 100HD HEAVY DUTY THREE VIEW



100HD 5.0

CULTEC CONTACTOR 100HD HEAVY DUTY SYSTEM CROSS SECTION

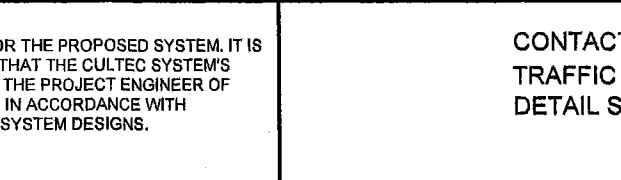


100HD 8.0

CULTEC HVLV SFCx2 FEED CONNECTOR

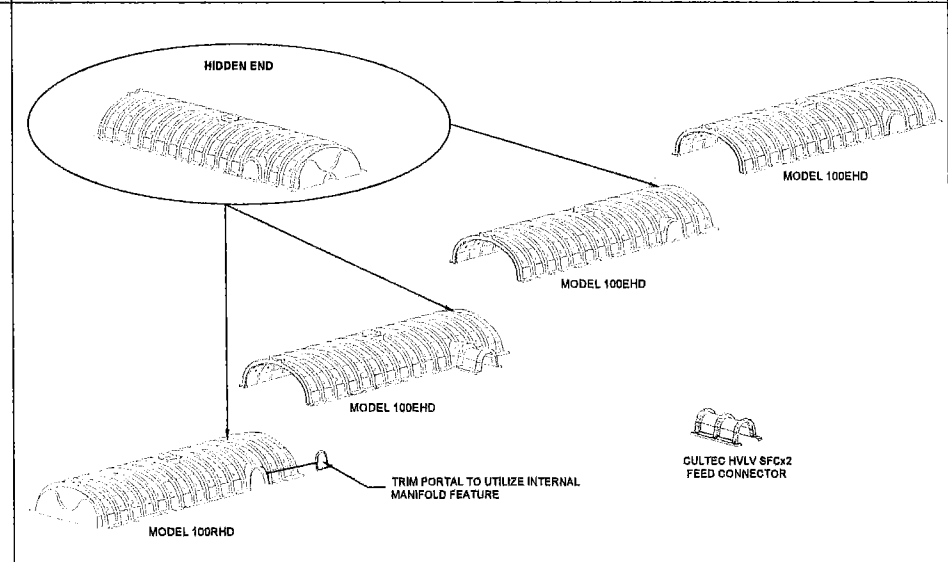
100HD 9.0

OPTIONAL INSPECTION PORT - ZOOM DETAIL



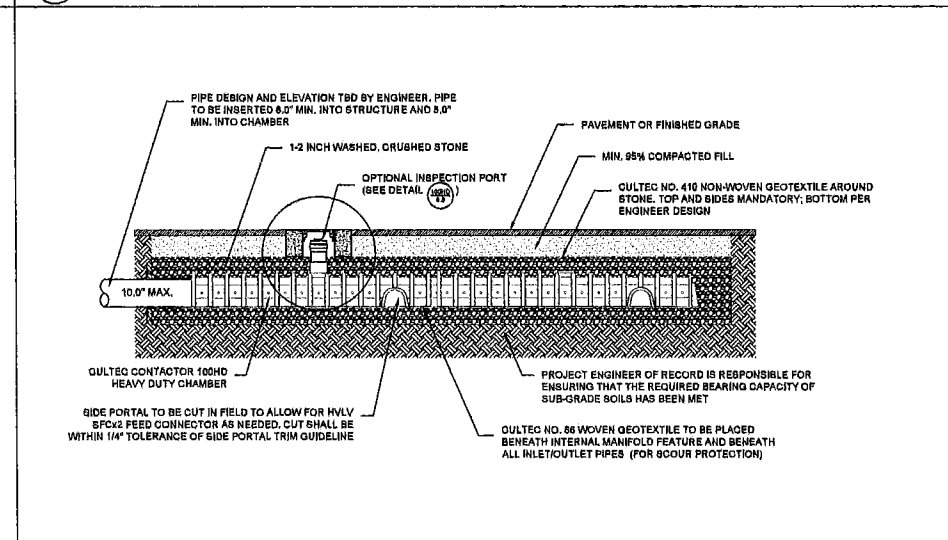
100HD 3.0

CULTEC CONTACTOR 100HD HEAVY DUTY END DETAIL INFORMATION



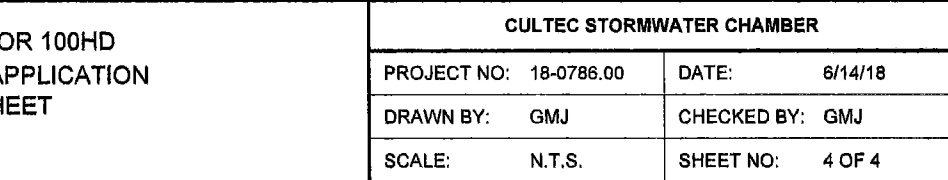
100HD 6.0

CULTEC CONTACTOR 100HD HEAVY DUTY TYPICAL INTERLOCK



100HD 10.0

CULTEC MANIFOLD - OPTIONAL INSPECTION PORT DETAIL



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CONTACTOR 100HD
TRAFFIC APPLICATION
DETAIL SHEET

CULTEC STORMWATER CHAMBER			
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